Wednesday, April 15

15:00 - 17:30

REG DAY 1: Inscription

Room: USJ Hall CSH

17:30 - 19:00

OPN: Cérémonie d'Ouverture

Room: Campus des Sciences Humaines, Amphithéâtre Pierre Y. Aboukhater

19:00 - 19:45

CB1: Vin d'Honneur

Thursday, April 16

08:00 - 09:00

REG DAY2: Inscription

Room: USJ Hall CSH

09:00 - 09:45

SP1: Séance plénière 1

Recherche, expérimentation et éthique sont-ils conciliables ?
Prof. Michel Scheuer s.j, Université Saint-Joseph de Beyrouth (Liban)

Room: USJ Salle Polyvalente E5
Chair: Dolla Karam Sarkis (Université Saint Joseph, Lebanon)

09:45 - 10:00

CB2: Pause-Café

10:00 - 11:30

BIO1_Medicale: Biological, Medical, Pharmaceutical, Health Sciences I

Room: USJ CSM Amphi B

Chairs: Georges Aaraj (American University of Beirut, Lebanon), Patrice Courvalin (Pasteur, France)

Differential Regulation of Iron Export Proteins in Breast Cancer Cell Lines

Rania Darwish (American University of Science and Technology, Lebanon)

Iron from dietary sources is absorbed by the duodenum of the small intestine, where it is then transported to various body compartments to participate in normal body functions such as being stored as ferritin, coupled to myoglobin, and contributing to effective erythropoiesis. Iron exists as heme-iron and non-heme each having a different absorption mechanism. While heme iron is taken up by the heme carrier protein into the duodenum, non-heme iron is reduced by the duodenum specific cytochrome b-like protein (DCYTB) into ferrous iron to be taken up by the divalent metal transporter 1 (DMT1). As part of the absorbed iron stays inside the duodenum and enter the labile iron pool the other part is exported by the only known iron export protein in mammals, ferroportin (FPN). As iron is exiting the cell it is oxidized back in to its ferric form by hephaestin (Heph), a protein that belong to the multicopper ferroxidases family. This step is necessary for iron to be coupled to transferrin, which in turn will transport iron to various body compartments. Three multicopper ferroxidases exist in vertebrates to date, hephaestin (Heph), zyklopen (Zp) and ceruloplasmin (Cp). Besides being an essential element for many cellular functions, iron has lately emerged as a key molecule in carcinogenesis. This is due to the fact that iron can lead to the formation of reactive oxygen species (ROS) due to its loosely bound electrons on its outer shell. ROS are molecules containing oxygen that can lead to DNA damage via oxidative stress when produced in excess. They can be found as radicals such as superoxide anion (O2.-) and hydroxyl radical (OH.), or as non-radicals such as hydrogen peroxide (H2O2) and oxygen (O2). This increased production of ROS, whether from iron reactions and/or several mutations, cell signaling and proliferation of cancer cells are enhanced. Studies have shown a higher level of serum iron in breast cancer (BC) patients compared with the controls, even though their dietary iron intake was lower. This may suggest an increased risk of developing breast cancer as the iron levels increase through the disruption of redox reactions. A study in 2005 showed increased iron staining in colon ductal carcinoma cells using Perl staining. Another study reported overexpression of iron import proteins and down regulation of iron export proteins. A later study reported, using immuno-staining, a decreased expression of FPN in ductal carcinoma of the breast when compared to normal tissues. The study showed further down-regulation of FPN the cancer stage progresses. Previous work in the lab tested the hypothesis of the diminution of the expression of MCF in ductal carcinoma cells. Immunostaining of in situ ductal carcinoma of the breast showed a decreased expression of Cp and Zp. The down regulation was also reported at the mRNA level using qPCR. No Heph expression was reported in breast tissues. The differential regulation of Zp, Cp, and FPN were confirmed on breast cancer cell lines. RNA was extracted using TRizol from MCF10A (transformed but non tumorigenic cell lines extracted from fibrocystic breast tissues), MCF7 and MDA-MB231 (both are tumorigenic breast cell line with MDA-MB231 being more invasive than MCF7). The RNA was then reverse transcribed using iScript Reverse Transcription Supermix for RT-qPCR (Bio-RAD). Gene expression was first evaluated by qPCR using SybrGreen method (Bio-Rad) with gene-specific primers. The results were then confirmed using gene-specific TaqMan probes (Applied Biosystems). The results showed a marked reduced expression of Zp and Cp genes in MCF7 compared to MCF10A, and a more pronounced decrease in MDA-MB231. MCF7 showed a decrease in FPn expression compared to MCF10A, yet MDA-MB231 showed a higher FPN expression profile than that of MCF7 cells. To evaluate whether this differential regulation is cell directed and biologically significant, estrogen was used to monitor the expression of the target genes. MCF10A, MCF7, and MDA-MB231 cells were grown in their standard media until they became approximately 70% confluent. The media was later replaced with DMEM 1X, 5% charcoal stripped FBS, and 1% Pen/Strep. After 72 hours, the cells were split into two groups; the first group was kept in DMEM 1X, 5% stripped FBS and 1% Pen/Strep while the other group was placed in DMEM 1X, 5% stripped FBS, 1% Pen/Strep, and 10-8 ng/ml β-estradiol. The cells were kept at 370C for 24 hours, where then gene expression was evaluated. qPCR using SybrGreen and TaqMan probes showed a decrease in Zp, Cp, and FPN expression in MCF7 cells (ER+) treated with estrogen, while no change in MCF10A (ER-) and MDA-MB231(ER-) was observed. Future perspectives include confirming the down regulation of Zp, Cp and FPN in breast cancer on the protein level using immunoblotting as well as investigating increased iron retention inside breast cancer tissues compared to normal ones using Perl staining.

Evaluation of nutritional and environmental conditions for phenol degradation by a Lebanese strain of Candida tropicalis

Hiba Koubeissi (Beirut Arab University, Lebanon)

Phenol is an acute toxic compound for nervous system, kidneys, liver, muscles and immune system; it is mutagenic and possibly carcinogenic. Candida tropicalis H was locally isolated from petroleum contaminated soil and was found to be highly effective for the removal of phenol, which was used as sole source of carbon and energy. Phenol degradation was approximately 92.72 % of an initial concentration of 2000 mg phenol l-1 in 72 hrs. Residual phenol was examined along with the growth of yeast. After the application of Plackett-Burman design, 99.91 % (of 2000 mg l-1) phenol degradation were achieved in 3 days. Maximum degradation was recorded at 30 °C, pH 7.5, agitation rate 100 rpm. The most effective factors influencing phenol degradation, among studied 11 variables, were K2HPO4 and culture volume. Candida tropicalis H tolerated phenol concentration of 2100 mg l-1 and it could be a good candidate for the bioremediation of phenol contaminants from heavily polluted sites.

The biting midges: origin, taxonomy, distribution and phylogeny

Joanna Choufani (Muséum National d'Histoire Naturelle, France)

The biting midges, a dipteran family called Ceratopogonidae, include 6180 modern species and 274 fossil species. The oldest records of this family are described from the Lower Cretaceous Lebanese amber (circa 145 Ma) with only 24 species. Here in, We add twelve new fossil species, from France (Leptoconops daugeroni Choufani, Azar & Nel, 2011, Leptoconops gravesi Choufani & Nel, 2014, Leptoconops sp. Choufani & Nel, 2014, Culicoides doyeni Choufani & Nel, 2014, Devalquia brisaci Choufani & Nel, 2013 and Metahelea roggeroi Choufani & Nel, 2013), Lebanon (Lebanoculicoides daheri Choufani & Nel, 2014, Protoculicoides krzeminskii Choufani & Nel, 2014, Archiaustroconops annae Choufani & Nel, 2014, Archiaustroconops hammanensis Choufani & Nel, 2014, and Archiaustroconops dominiakae Choufani & Nel, 2014) and Syria (Lebanoculicoides bloudani Choufani & Nel, 2015). The worldwide distribution of amber deposits containing fossils and the feeding habits of the family are reviewed. A phylogenetic study comparing 49 taxa representing the five subfamilies and six tribes is established allowing questioning the definition and position of several genera

Genetic study and characterization of Bacillus thuringiensis strains active against Diptera isolated from Lebanese soils

Mandy Antoun (Saint Joseph University, Lebanon); Laure Chamy (Université Saint Joseph, Lebanon); Joel Chopineau (Institut Charles Gerhardt Montpellier, France); Mike Osta and Zakaria Kambris (American University of Beirut, Lebanon); Mireille Kallassy Awad (Biotechnology Laboratory, UR TVA, Saint Joseph University, Lebanon)

The control of diseases represents a major concern for public health. Indeed, the application of chemical pesticides could not eradicate mosquito-borne epidemic diseases such as malaria, filariasis, yellow fever… and major efforts are employed for the development of environment friendly pesticides based on Bacillus thuringiensis israelensis (Bti), Bt reference strain used against Diptera. In this study, 25 Bt strains were isolated from Lebanese soil samples and they were selected based on their toxicity against three dipteran larvae: Aedes albopictus, Culex pipiens and Anopheles gambiae. These strains were classified in 3 categories: High toxicity (A23, D21, D15, Bti), Low toxicity (H3, D12, DOT, SLK1, R3, D29, M16) and non-toxic (D23, A5, D10, D1, D3, D17, D4, D25, NAR2, D11, NV1, D22, D27). The LC50 of the highly toxic strains (A23, D21 and D15) were conducted and we found that A23 was 1.77 fold more toxic against Culex and 1.5 fold more toxic against Aedes than Bti. Moreover, only the strains, which had a high toxicity and a low toxicity comparing to Bti, were studied genetically in details. In fact, the strains, which presented a unique interesting plasmid profile compared to Bti, were the target of serial PCR reactions in order to identify genes responsible for the toxicity against Diptera such as cry4A, cry4B, cry10A, cry11A, cyt2A, cyt2B, cyt1A, cry40 like gene, cry50 like gene, cry30…. In addition, the protein profiles performed on an SDS PAGE acrylamide gel were compared between highly toxic strains and strains with low toxicity in order to reveal its protein composition diversity. We found that the strains with high toxicity A23, D21 and D15 had similar major proteins compared to Bti: 135KDa, 125 KDa (Cry4A/ 4B proteins), 72KDa (Cry11), 47 KDa (Cry10), and 25 KDa (Cyt). However, the strain with low toxicity presented a unique protein profile and specifically the strain D5 was found also toxic against Lepidoptera and surprisingly more effective than HD1 (Bt reference strain used against Lepidoptera): Toxicity tests on Ephestia kuehniella larvae revealed an LC50 (D5) = 57.99 µg/mL and LC50 (HD1) = 130.65 µg/mL. Finally, to understand the proteolytic activation of the toxins inside the midgut of dipteran larvae, we reproduced this process in vitro using a trypsin suspension of 1mg/mL. The results showed a different pattern of the activation process for each strain explaining the differences observed in the toxicity level comparing to Bti. Therefore, we have identified two strains A23 and D21 with a significant toxicity against dipteran larvae suggesting a probable polymorphism of their genes and the strain D5 active against both lepidopteran and dipteran larvae and more effective than HD1 and further investigations are ongoing. Acknowledgements: This work was supported by the research council of Université Saint-Joseph, Beirut (project FS59) and the "Agence universitaire de la Francophonie" PCSI 2012. M.A. was funded by grant from "the National Council for Scientific Research" and Université Montpellier 2.

A model predictive of human immune responses for vaccine design: Human leucocyte-engrafted NOD-SCID-IL2rynull Mouse

Stephanie Ghosn (Faculty of Public Health, Lebanese University, Lebanon); Soulaima Chamat (Faculty of Medicine, Lebanese University, Lebanon); Eric Prieur (Vac4all, France); Pierre Druilhe (Vac4all, Lebanon); Hasnaa Bouharoun-Tayoun (Faculty of Public Health, Lebanese University, Lebanon)

The general lack of valid preclinical models predictive of clinical results increases the cost and risk of failure in clinical development of vaccines against many important pathogens. We designed a novel humanized mouse model in which human leucocytes are prepared in a way that favor their successful engraftment in NOD-SCID-IL-2rγnull(NSG) mouse, and evaluated its ability to predict human immune responses induced by vaccination. We selected a malaria vaccine candidate, LSA3-Full Length(LSA3-FL), where high discrepancy had been observed between the clinical and the pre-clinical results. In addition, we also compared in the model the immunogenicity of LSA3-FL with that of a shorter form of the molecule, LSA3-short. NSG mice were engrafted with human leucocytes derived from five different donors and they were immunized with LSA3-Full-Length or LSA3-short, adjuvanted with Montanide ISA 720. We found that LSA3-short triggered the production of human antibodies and a protective Th1 immune response while LSA3-Full-Length did not in the same consistent manner. We identified in the full-length molecule epitopes responsible of immune response control which had not been detected in previous preclinical experiments in a variety of animal models. Results were reproducible for all tested leucocyte donors. The findings of LSA3-FL in our new humanized NSG model could have predicted the results of LSA3-FL in the clinic. The results also pointed to the shorter construct, LSA3-short as a more efficient vaccine candidate. Our results differ from those reported by other groups in the same NOD-SCID-IL-2rγnull(NSG) mouse. We propose this new humanized NSG model mouse as a relevant, time and cost-saving model for improved selection of vaccine candidates for clinical development.

A serine protease homolog negatively regulates TEP1 consumption in systemic infections of the malaria vector Anopheles gambiae

Hassan Yassine (Imperial College London, United Kingdom); Layla Kamareddine (AUB, Lebanon); Soulaima Chamat (Lebanese University, Lebanon); George Christophides (Imperial College London, United Kingdom); Mike Osta (American University of Beirut, Lebanon)

Malaria is one of the most common vector-borne diseases pervasive in tropical and subtropical regions of Africa, Asia, and America that is transmitted to humans by few mosquito species of the genus Anopheles (WHO, 2007). Anopheline vectors of malaria, like all other invertebrates depend only on their innate immune system to fight pathogens including Plasmodium parasites. This system is typically activated when pattern recognition receptors (PRRs) recognize conserved pathogen associated molecular patterns (PAMPs) and trigger a downstream signal modulation cascade composed of several serine proteases culminating with the activation of several immune effector responses that act concertedly to eliminate the pathogen. The hallmark of mosquito effector proteins is the C3 complement-like protein TEP1 which was initially shown to be involved in the phagocytosis of bacteria by acting as an opsonin [1]. Later TEP1 was shown to bind to Plasmodium berghei ookinetes egressing from the basal side of the mosquito midgut triggering their killing as well as to hyphae of the entomopathogenic fungus Beauveria bassiana in the hemocoel triggering their melanotic encapsulation. TEP1 exists in the hemolymph in two forms: the full-length unprocessed form (TEP1-F) and a proteolytically cleaved active form called TEP1cut. TEP1cut but not TEP1-F is physically associated with a complex of two leucine-rich repeat proteins, LRIM1 and APL1C, which stabilize TEP1cut in the mosquito hemolymph [2, 3]; silencing either LRIM1 or APL1C triggered the loss of TEP1cut from the hemolymph and its deposition on host tissues in the absence of infection. Recent studies revealed that TEP1 accumulation on microbial surfaces is positively and negatively regulated by two non-catalytic clip domain serine proteases [also known as serine protease homologs (clip-SPHs)] SPCLIP1 [4] and CLIPA2 [5], respectively. CLIPs are the main constituents of enzymatic cascades that relay and amplify the signal transmitted from PRRs to downstream transduction pathways or, in certain cases, directly to terminal effector proteins such as phenoloxidase (PO), the rate limiting enzyme in melanin biosynthesis. We have shown that CLIPA2 is a key negative regulator of TEP1 accumulation on microbial surfaces. CLIPA2 silencing in adult female mosquitoes triggered an exacerbated TEP1-mediated response that significantly enhanced mosquito resistance to infections with a broad class of microorganisms including, P. berghei, Escherichia coli and B. bassiana [5]. Interestingly, midguts dissected from CLIPA2 kd mosquitoes infected with Plasmodium parasites showed an overall significant increase in TEP1-labelled ookinete stage parasites egressing from the midgut epithelium as compared to controls [5]. We recently found that TEP1 and SPCLIP1 co-immunoprecipitate with CLIPA2 from the hemolymph of naive and B. bassiana infected mosquitoes using western blot analysis suggesting that CLIPA2 is part of a larger protein complex circulating in the hemolymph. To gain further insight into the mechanism of action of CLIPA2 and identify all its potential interacting proteins, we conducted a large scale immunoprecipitation of CLIPA2 from the hemolymph of 900 B. bassiana-infected female A. gambiae mosquitoes followed by shotgun-based protein identification using a nanoLC-LTQ Orbitrap mass spectrometry. More than 100 proteins were identified with high confidence using this approach (Osta M, unpublished data). Subsequent functional genetic analysis of the immunity related genes corresponding to the candidate proteins identified in the CLIPA2 interactome is expected to provide novel insight into the mechanism of action of this family of serine protease homologs and identify the molecular links that bridge this molecule to the mosquito complement-like pathway. References 1. Levashina EA, Moita LF, Blandin S,

Vriend G, Lagueux M, Kafatos FC: Conserved role of a complement-like protein in phagocytosis revealed by dsRNA knockout in cultured cells of the mosquito, Anopheles gambiae. Cell 2001, 104(5):709-718. 2. Fraiture M, Baxter RH, Steinert S, Chelliah Y, Frolet C, Quispe-Tintaya W, Hoffmann JA, Blandin SA, Levashina EA: Two mosquito LRR proteins function as complement control factors in the TEP1-mediated killing of Plasmodium. Cell host & microbe 2009, 5(3):273-284. 3. Povelones M, Waterhouse RM, Kafatos FC, Christophides GK: Leucine-rich repeat protein complex activates mosquito complement in defense against Plasmodium parasites. Science 2009, 324(5924):258-261. 4. Povelones M, Bhagavatula L, Yassine H, Tan LA, Upton LM, Osta MA, Christophides GK: The CLIP-Domain Serine Protease Homolog SPCLIP1 Regulates Complement Recruitment to Microbial Surfaces in the Malaria Mosquito Anopheles gambiae. PLoS pathogens 2013, 9(9):e1003623. 5. Yassine H, Kamareddine L, Chamat S, Christophides GK, Osta MA: A serine protease homolog negatively regulates TEP1 consumption in systemic infections of the malaria vector Anopheles gambiae. Journal of innate immunity 2014, 6(6):806-818.

BIO3_Biologie: Biological, Medical, Pharmaceutical, Health Sciences III

Room: USJ CSM C3

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Marc Karam (University Of Balamand, Lebanon)

The Anti-tumor Activities of Parthenolide and ST1926 against Human Herpes Virus8- associated Primary Effusion Lymphoma

Louna Karam, Iman Halloum and Eva Hmeide (Lebanese University, Lebanon); Rana Abdel-Samad (American University of Beirut, Lebanon); Claudio Pisano (Biogem, Research Institute, Lebanon); Robert Slany (University of Erlangen-Nuremberg, Lebanon); Frank Neipel (University of Erlangen, Germany); Nadine Darwiche (American University of Beirut, Lebanon); Raghida Abou Merhi (Lebanese University & Faculty of Sciences, Lebanon)

Introduction: Primary effusion lymphoma(PEL) is a B-cell neoplasm, caused by the Human Herpes Virus 8 (HHV8) infection and manifested as malignant effusions in body cavities. PEL cells do not present conventional genetic cancer mutations, however the oncogenesis is attributed to HHV-8 latent genes, LANA-1/2,v-cyclin and v-FLIP. PEL is life threatening to immunocompromised and elderly patients since they relapse after standard chemotherapy treatments, thus the need for new effective and targeted drugs. Among promising drugs, parthenolide (PTL), a natural sesquiterpene lactone and potent NF-κB inhibitor, was reported to have anti-cancer activities against a variety of hematopoietic malignancies and cancer stem cells. ST1926, a novel orally available synthetic retinoid, exhibited a targeted apoptotic and genotoxic effect in numerous human tumor models The aim of this study was to elucidate the anti-tumor activities and underlying molecular mechanisms, of PTL and ST1926 on PEL in vitro and ex vivo. Methods: Human PEL(BC1, BC3)and non-PEL (RAJI) cell lines and ascites derived from PEL-like mouse model were used. The anti-proliferative activities of ST1926 and PTL were determined using MTT cell proliferation assay. Flow cytometry was used to detect cell cycle distribution and apoptosis using propidium iodide and Annexin V-FITC kit. The protein expression of apoptosis-regulated genes was examined using Western blot analysis. The drugs effect on latent viral transcripts expression was studied via qRT-PCR. Results: Our results show that ST1926 and PTL display potent anti-proliferative effects on PEL cell lines and ascites. Each drug separately resulted in increased preG1population and in cell cycle arrest, increased p53 protein levels and PARP cleavage in PEL cells and ascites. In addition, ST1926 downregulated all tested viral latent transcripts in ex vivo PEL ascites. Conclusion: The promising anti-cancer and anti-viral effects of PTL and ST1926 drugs could provide a novel basis for clinical application in PEL.

Effet des cellules souches mésenchymateuses adipeuses sur le cancer hépatocellulaire

Rim Serhal (Université Saint Joseph, Lebanon); George Hilal and Mayssam Moussa (Saint Joseph University, Lebanon); Oula El Atat (USJ, Lebanon); Charbel Khalil (Universite Saint-joseph, Lebanon); Nada Alaaeddine (Université Saint Joseph, Lebanon)

Introduction: Le cancer hépatocellulaire (CHC) est un cancer primitif de foie qui touche environ 500000 personnes par an représentant ainsi la sixième malignité commune dans le monde et la troisième cause de mortalité reliée au cancer après le cancer de poumon et de l'estomac. En général, CHC se développe conséquemment à la présence d'une maladie hépatique chronique suite à l'infection par le virus de l'hépatite B (HBV) ou C (HCV), une maladie hépatique alcoolique (ALD: alcoholic liver disease), nonalcoholic fatty liver disease (NAFLD) et nonalcoholic steatohepatitis (NASH). La cirrhose est le facteur de risque individuel le plus important et présent chez 80% des patients avec CHC quelle que soit la maladie de départ. Son traitement curatif étant habituellement limité par le développement multifocal et le diagnostic tardif. Les cellules souches mésenchymateuses adipeuses (AD-MSC), facilement isolées à partir du tissu adipeux, ont une capacité d'auto-renouvellement et de différenciation en plusieurs lignées

cellulaires en plus de leur effet paracrine via la sécrétion des facteurs de croissance, des molécules anti-inflammatoires et des médiateurs anti-fibrotiques ou antigéniques. Ces cellules constituent alors un potentiel thérapeutique attractif pour le CHC. Pour cette raison, la relation entre les cellules cancéreuses et les MSC est fréquemment étudiée. Hypothèse: Le but de notre étude est d'investiguer l'effet des AD-MSC sur le CHC surtout leur effet sur la prolifération, la migration et l'invasion de la lignée de cancer hépatique HepG2/C3A. Méthodes: Les HepG2/C3A sont co-cultivées directement ou indirectement dans des plaques de co-culture avec les AD-MSC ou traitées par le milieu conditionné dérivé de ces cellules. La prolifération des cellules est mesurée par le test de numération cellulaire et par le test de sel de tetrazolium (WST-8). Les quantités des marqueurs de cancer AFP (alphafoetoproteine) et DCP (Des-gamma carboxy prothrombine), dans le surnageant des cellules, sont déterminées par ELISA. La migration des cellules est mesurée par le wound healing assay et confirmée en utilisant cell migration and invasion assay. Résultats: Nos résultats de test de numération cellulaire montrent que la coculture directe et indirecte des AD-MSC avec les HepG2/C3A ont inhibé le nombre des cellules HepG2/C3A de 93,6% (P=0.0002) et de 90 % (P= 0.0002) respectivement. En plus, le traitement par le milieu conditionné des AD-MSC induit une inhibition significative de la prolifération de 44.5% avec P= 0.0003. Alors que par le test de prolifération WST-8, on a démontré que les AD-MSC ont inhibé la prolifération des HepG2/C3A de 47.3% avec (P= 0.0001) et le milieu conditionné des AD-MSC diminue la prolifération de HepG2/C3A de 45.1%. La coculture directe ou indirecte des AD-MSC a inhibé la sécrétion de l'AFP de 98.98% avec P=0.0001 et 98.63% avec P= 0.0001 respectivement. De même, pour la DCP qui est diminuée de 96.85% avec P= 0.0001. En outre, le milieu conditionné des AD-MSC a induit l'inhibition des sécrétions de l'AFP et de DCP de 61.55% (P=0.0001) et 52.73% (P=0.0001) respectivement. En utilisant cell migration and invasion assay, on a démontré que les AD-MSC ont inhibé la migration des HepG2/C3A de 86.24% avec P= 0.0001, de même pour l'invasion qui est diminuée de 39.23% avec P= 0.0008. Ces résultats sont confirmés par wound healing assay où le taux de migration des HepG2/C3A est inhibé de 38.68% jusqu'à 4.55 % par coculture avec les AD-MSC et de 38,68 % jusqu'a 8.81% après traitement par le milieu conditionné de ces dernières. Conclusion: Donc les AD-MSC jouent un rôle important dans la diminution de la prolifération des HepG2 et la sécrétion des marqueurs de cancer hépatique ainsi qu'elles induisent une diminution de la migration et l'invasion de ces cellules cancéreuses.

Comparative study of the antifungal activity of Olea europaea L. against some pathogenic strains of Candida albicans isolated in Lebanon

Mohammad Hasan Halawi, Hoda Youssef and Salwa Abdul Rahman (Beirut Arab University, Lebanon)

Candidemia and invasive candidiasis are a major cause of nosocomial infections, linked to a number of risk factors. The infections with Candida albicans in particular, are both common and increasing in frequency. Olea europaea L. (olive tree) is a typical Mediterranean species that is well adapted to the climatic conditions in Lebanon and is cultivated in almost all its regions. Olive leaves and fruits contain several constituents with considerable pharmacological activities, including polyphenols, flavones, and flavonoids. Five strains of Candida albicans from different body locations of various patients were used to evaluate the antifungal activity of Lebanese olive. Olive leaves and pomace (cake) samples from three different locations were gathered and extracted differently to obtain three categories of extracts: ethanolic, cold aqueous and hot aqueous. The antifungal activity of these extracts was tested using well-diffusion method with average inhibition zone diameter that reached 27 mm. Two out of the tested extracts; cold aqueous extract of Akkar's cake and ethanolic extracts from Koura's leaves, showed antifungal activity against the growth of all isolates under investigation, with the lowest recorded MIC and MFC of 2.5 and 15 mg/ml, respectively for both extracts. The time kill assay was studied to assess the time needed to kill the fungal cells by the olive extracts that showed fungicidal effects, cells died within 6 hours after their treatment with ethanolic extracts from Koura's leaves or cold aqueous extract of Akkar's cake. The decimal reduction time (D-value) was between 71-72 mins for both selected extracts. Total phenolic content was found to be 98.03 GAE mg/g dry matter for ethanolic extracts of leaves from Koura and 91.76 GAE mg/g dry matter for cold aqueous extracts of cake from Akkar, which explains their fungicidal actions and superiority among other tested extracts. The ultrastucture of treated Candida albicans with the two selected extracts revealed the presence of deformed cells with disintegrated protoplasm and even ruptured cell wall and cell membrane. Hence, the current study revealed that some extracts of olive collected from different regions in Lebanon possess antifungal activities against Candida albicans.

New cellular functions of the voltage-gated calcium channel β4 subunit

Mohamad Rima (INSERM U836, Grenoble Institute of Neuroscience, Lebanon); Ziad Fajloun (Azm Center for Research in Biotechnology and its Applications & Doctoral School in Sciences and Technology, Lebanese University, Lebanon); Michel De waard (INSERM U836, Grenoble Institute of Neuroscience, France)

Voltage-gated calcium channels (VGCC) play a key role in neuronal communication and excitability. Until recently, we held the simple view that they consisted of an α1 subunit, usually associated with auxiliary subunits (β,α2δ and γ). However, there is now evidence that auxiliary subunits may also perform other roles unrelated to voltage-gated calcium entry. We have recently shown that β4(one of the four β subunit isoforms) interacts with the thyroid hormone receptor TRα1 as well as other transcription factors or regulators (such as p120-catenin, an important actor of the Wnt signaling pathway) in order to regulate gene expression.

Functional and splicing defect analysis of 23 ACVRL1 mutations in a cohort of patients affected by Hereditary Hemorrhagic Telangiectasia

Ferdos Alaa el Din (Université Libanaise, Lebanon); Alain Kitzis (Université de Poitiers, France); Raghida Abou Merhi (Lebanese University & Faculty of Sciences, Lebanon); Sylvie Patri (Université Libanaise, Lebanon); Vincent Thoreau (Université de Poitiers, France); Sabine Bailly (CEA de Grenoble, France); Montserrat Rodriguez-Ballesteros (Université de Poitiers, Lebanon); Eva Hmeide (Lebanese University, Lebanon); Brigitte Gilbert-Dussardier (Université de Poitiers, Lebanon)

Activin Receptor like kinase 1 (ACVRL1) codes for homodimeric membrane glycoprotein receptor ALK1 that interacts with receptors for the TGFβ superfamily and is the gene mutated in the autosomal dominant vascular disorder Hereditary Hemorrhagic Telangiectasia type 2 (HHT2). Mutations in ACVRL1 lead to abnormal blood vessel formation in the skin, mucous membranes, and often in organs such as the lungs, liver, and brain. This work was designed to examine the pathogenicity of 23 nucleotide variations in ACVRL1 detected in more than 400 patients. Among them, 14 missense mutations and one intronic variant were novels, and 8 missense mutations were previously identified with unknown implication in HHT2. The functionality of missense mutations was analyzed in response to BMP9 (specific ligand of ALK1), the maturation of the protein products and their localization were analyzed by western blot and fluorescence microscopy. The splicing impairment of the intronic and of two missense mutations was examined by minigene assay. Functional analysis showed that 18 out of 22 missense mutations were defective. Splicing analysis revealed that one missense mutation (c.733A>G, p.Ile245Val) affects the splicing of the harboring exon 6. Similarly, one intronic mutation outside the consensus splicing sites (c.1048+5G>A in intron 7) was found pathogenic by splicing study. Both mutations induce a frame shift creating a premature stop codon likely resulting in mRNA degradation by NMD surveillance mechanism. These data confirm the haploinsufficiency model proposed for HHT2. The affected allele of ACVRL1 induces mRNA degradation or the synthesis of a protein lacking the receptor activity. Furthermore, our results suggest that functional and splicing analyses together, represent two robust diagnostic tools to be used by geneticists confronted with novel or conflicted ACVRL1 mutations.

Role of Atp6ap2/(pro)renin receptor in neural stem cells self-renewal

Jeanne d'Arc Al Bacha (Centre Azm pour la Recherche en Biotechnologie, Lebanon); Ziad Fajloun (Azm Center for Research in Biotechnology and its Applications & Doctoral School in Sciences and Technology, Lebanese University, Lebanon); Norman Makdissy (Reviva Regeneratrive Medicine Center, Lebanon)

The (pro)renin receptor also known as ATP6AP2 (ATPase, H+-transporting, Lysosomal Accessory Protein 2) is a receptor for renin and for its inactive precursor prorenin [1]. The gene is located on the X chromosome in locus p11.4 and encoded a 350 amino-acid protein. Atp6ap2 is widely if not ubiquitously expressed and its expression is particularly high in the brain, the heart, the kidney, the liver and the pancreas [1]. It was recently reported that Atp6ap2 is crucial for Wnt receptor complex binding and Wnt/beta-catenin signaling, and for central nervous system (CNS) development in Xenopus and zebrafish. The aim of the study was to establish the relation between Atp6ap2 and beta-catenin involved in mammalian neural stem cells self-renewal. For this purpose, we isolated neural stem cells (NSC) from double transgenic Atp6ap2flox-Ctnnb1D3 mice expressing constitutively active, stabilized beta-catenin. Furthermore, we investigated the impact of Atp6ap2 overexpression on brain development by isolation the NSC from mice which conditionally and ubiquitously overexpressed Atp6ap2. In our study, we studied NSC self-renewal properties by studying neurospheres (NSP) formation, and their differentiation into neurons, astrocytes and oligodendrocytes. We observed a dramatic decrease in NSP number and their diameter (fig. A) after depletion of Atp6ap2 in NSC in both condition of wild-type (Atp6ap2-/y - Ctnnb1+/loxExon3) and mutant (Atp6ap2-/y - Ctnnb1+/ΔExon3) Ctnnb1. This result indicate that constitutive expression of beta-catenin is not sufficient to rescue neural stem cell self-renewal in vitro, exhibiting that Atp6ap2 functions in neural stem cells is not dependent only on Wnt/beta-catenin signaling pathway. Moreover, we showed in conditional and ubiquitous overexpression of Atp6ap2, a slight but significant increase in both NSP number and diameter (fig. B). However, we did not observe any brain abnormality in postnatal and adult mice. Furthermore, we demonstrated that Atp6ap2 mRNA and protein were increased in all tissues examined, including the brain, lung, heart and kidney that are major organs controlling blood pressure. These findings are consistent with recent study that reported that the increased Atp6ap2 is not associated with high blood pressure or organ damage [2]. Altogether, these results indicate that a deficit in Atp6ap2 is detrimental but increased expression of Atp6ap2 is not necessarily associated with pathological effects. The reasons for the discrepancy with other studies that reported that increased Atp6ap2 was observed in tissue fibrosis are still unclear. To conclude, our data confirm that Atp6ap2 is involved in mammalian neural stem cell self-renewal and its function is not exclusively related to the Wnt/β-catenin signaling pathway. On the other hand Atp6ap2 overexpression enhances self-renewal capacity of neural stem cells but does not alter brain development at postnatal and adult stage.

ENG2_civil: Engineering II

Room: USJ CSH 206

Chairs: Fadi A. Geara (Université Saint-Joseph & Ecole Supérieure d'Ingénieurs de Beyrouth, Lebanon), Nadim Zakhia (Holy Spirit University of Kaslik, Lebanon)

Mix Optimization of Structural White Concrete

Riad Wardany and Hiba Al Nahas (Rafic Hariri University, Lebanon); Ibrahim Saab (Civil Engineering, Lebanon); Rachelle Al Kaissi (Rafic Hariri University, Lebanon)

This paper presents an experimental study that aims to optimize the mix design of structural white concrete. White cement, Egyptian white sand and Titanium were used to impart the white color on the concrete mix. Several trial mixes were prepared, and samples were taken and tested for compressive strength at 7 and 28 days. The degree of brightness (white color quality) of the concrete was measured using MatLab image processing script. The results show that the use of Titanium with a percentage of 0.12% by weight of cement gives the highest brightness to the white concrete. Satisfactory results were achieved on samples made with Egyptian sand and white cement. The values of the compressive strength measured on all the tested samples clearly show that the developed white concrete belongs to the family of structural high performance concretes.

Effects of Partial Replacement of Cement by Limestone Powder on Concrete

Hasan Al Majzoub and Riad Wardany (Rafic Hariri University, Lebanon); Wiam Bou Karroum (The University of Melbourne, Australia); Houssam Aouje (The University of Texas at San Antonio, USA)

The tremendous consumption of concrete, with cement being its supreme component, has unfortunate environmental consequences. The most critical of these is the production of huge amounts of CO2 in cement manufacturing process, besides the process itself being energy intensive. Thus, limiting cement production became a main international concern. This paper presents an experimental study on the effects of using limestone powder as partial replacement (0, 5, 10, 15, 20%) of cement. The evaluation of limestone powder effect was based on tests for three main properties of fresh and hardened concrete. A control mix was designed for this purpose after testing the available aggregates. Workability of each test mix was determined by the Slump Test. Mix consistency and initial setting time were measured using the Vicat Apparatus. Compressive strength (at 3, 7, and 28 days) was determined from 10×20 cm concrete cylinders. All tests were conducted based on relevant American Society for Testing and Materials (ASTM) standards.

Effect of Basalt and Limestone on SCC Properties

Dima Youness and Ahmad Mechaymech (Rafik Hariri University, Lebanon); Riad Wardany (Rafic Hariri University, Lebanon)

Unlike conventional concrete, Self-Consolidating Concrete (SCC) is a highly fluid concrete characterized by its flowability and stability. It has the capability of filling formworks and flowing through dense reinforcement easily without any mechanical energy. Such performance requires optimized coarse aggregates content and a higher paste content with an adequate viscosity. SCC has a high level of interest in construction industry such as precast concrete, prestressed concrete, bridges, tunnels etc... It would be useful for the Lebanese market industry through productivity improvement and by shortening the construction period. It's locally limited due to its expensive materials such as high fines content and the use of high range water reducers agents (HRWRA). On the other hand, the industry needs the know-how of designing a flowable and non segregating SCC and its placement techniques for its high lateral pressure. This paper introduces the development of SCC in Lebanon, by using local materials such as limestone powder as replacement of cement and basalt fine aggregates as fine aggregates, for the purpose of manufacturing SCC in our Lebanese market as a start in the construction field. Mainly, the experimental study will detect and monitor the behavior of this high performance concrete containing the locally materials by measuring its properties such as workability, stability, passing ability, and rheology. The expected results show the potential for the industry to begin with a durable and economical type of concrete. This will lead to a wider regional constructional demand in the Middle East Region. Index Terms— Self Consolidating Concrete (SCC), limestone powder, basalt fine aggregates I. INTRODUCTION SCC is a highly fluid concrete characterized by its flowability and stability. It's capable of filling formworks and flowing through dense congested reinforcement easily without any mechanical energy. SCC can also serve as a high early strength concrete for precast, mass concrete, dams, underwater projects, bridges, and repairement processes. As a fresh state it shows a high rate of placement, deformability, resistance to bleeding and segregation in both dynamic and static state, thus pumped easily and has a higher bond strength with steel. As a hardened concrete, it improves appearance and finishing as a mirror glass surface with less screeding effort. Unlike conventional concrete, SCC has better structural behavior such as higher tensile and compressive strength with a lower drying shrinkage, thus lower surface absorption and therefore better durability. Such properties depend on its mix composition of higher fines content as high volume of paste and superplasticizers, along with viscosity modifying agents. II. EXPERIMENTATION METHODOLOGY The experimental study tends to produce and develop an economical self-compacting concrete consisting of a partial replacement of cement by predetermined percentages (0-20%) of limestone powder (LSP), as supplementary cementitous materials. Also, the study tends to produce a durable self-consolidating concrete with basalt crushed fine aggregates predicting its behavior and its effect on SCC fresh properties and hardened properties along with LSP. III. EXPECTED RESULTS The author expects that the use of limestone powder helps successfully in producing SCC with optimized properties. Previous studies showed that the increase in the percentage of limestone filler does not

necessarily lead to increasing in the mechanical properties of concrete, as shown in figure 1. The limestone powder as replacement of cement reduces the dosage of super plasticizer needed to obtain similar slump flow as for SCC made with Portland cement only. [2] The author expects for the basalt fines to improve the rheological properties of SCC and workability. All measured properties shall satisfy the expected values listed in table 1. IV. CONCLUSION The Lebanese construction industry is showing high tendency to use SCC in many contemporary projects to benefit from the various advantages offered by this technology. Due to generally higher strengths resulting from the high powder content needed in SCC, the economic benefit has been most obvious where high strengths were already needed for design reasons. The cost/benefit analysis of SCC balances the increased cost of the concrete against substantial labor savings and aesthetic benefits. REFERENCES [1] K.H. Khayat , S Hwang, Evaluation of Robustness of SCC to Variations in Sand Humidity and Superplasticizer Dosage, ACI Spring Convention, March (2012) [2] Ashtar S. Al-Luhybi, Assistant Lecturer, The Effect Of A Variable Percentage Of Limestone Filler On Some Mechanical Properties Of Self-Compacting Concrete, University of Mosul/College of Engineering/ Civil Eng. Dept. (2008)

Optimisation de la modélisation 2D et 3D des bâtiments industriels métalliques

Fadi A. Geara (Université Saint-Joseph & Ecole Supérieure d'Ingénieurs de Beyrouth, Lebanon); Christelle Geara (Ecole Supérieure d'Ingénieurs de Beyrouth - ESIB, Lebanon)

Toujours en quête du meilleur, l'Homme a tendance à améliorer ses exploits, à les optimiser pour se permettre d'aller plus loin dans les produits de sa conception et son imagination. C'est cette compétence qui mettra en valeur les avantages de l'acier en matière de construction, d'architecture et parfois même d'économie de temps et/ou de coût! Une approche basée sur une minimisation du prix de la construction régit le travail du concepteur et souvent le guide durant les phases de l'ingénierie. Cet article présente une nouvelle approche scientifique et une contribution à l'optimisation de la modélisation des bâtiments industriels (hangars) métalliques en passant de la modélisation bidimensionnelle (2D) à la modélisation tridimensionnelle (3D). En effet, les modèles 3D sont de plus en plus exploités de nos jours, vu leur précision, la meilleure visualisation qu'ils permettent de réaliser, surtout dans l'étude des structures métalliques. Cette tendance croissante à transformer les plans de construction 2D en modèles 3D requiert beaucoup d'expertise, de calculs, mais aussi et surtout elle permet une optimisation plus rigoureuse. Nous avons choisi un hangar dont les dimensions sont généralement les plus courantes dans le marché local. De longueur 50 m, il fait une largeur de 20 m et une hauteur au milieu de 11m avec une toiture à 2 versants symétriques. Notre étude se basera sur l'optimisation du poids de la structure, et ayant aussi pour but le minimisation de son coût. Notons que la structure la plus légère n'est pas nécessairement la moins coûteuse d'autant plus que l'acier n'est pas un matériau à usage très répandu au Liban et que la main d'œuvre spécialisée et coûteuse est l'un des facteurs importants dans l'évaluation exacte du prix. Des questions se posent: Faut-il en plus être rapide dans la fabrication et l'exécution et économiser dans le temps d'étude, se faciliter la vie dans des modèles 2D, ou par contre rentrer dans les détails des modèles 3D pour simuler le comportement réel de la structure ? Quelle façon serait la plus avantageuse ? et avec quels moyes numériques ? La réponse à cette question dépend du choix du concepteur et de ses exigences vis-à-vis du projet. Si le temps presse, ou si le choix se fait sur l'économie du prix de la structure, différentes voies sont à prendre. Dans cette étude, nous insisterons sur la minimisation du poids de la structure en variant les modèles d'étude. Cette recherche fait une comparaison entre: - Un modèle bidimensionnel (2D) simplifié d'une ferme et portique d'un hangar - Un modèle tridimensionnel (3D) du même hangar composé de son squelette uniquement - Un deuxième modèle tridimensionnel (3D) plus détaillé, auquel on a rajouté tous les éléments auxiliaires et étudié leur participation dans l'optimisation de la résistance et du poids de la structure. Les résultats de ces 3 simulations nous permettent d'arriver à une conclusion importante qui portera sur plusieurs points: - La légèreté de la structure (coût du matériel) tout en respectant les critères de résistance, de déformations et de sécurité. - Une meilleure connaissance de la répartition des efforts entre les composantes du bâtiment. - Une meilleure connaissance des efforts climatiques, compte tenu des facteurs de forme et des dimensions du bâtiment. - Les déformations de la structure - Une comparaison entre les éléments structuraux des 3 modèles proposés permet d'arriver à un modèle optimisé.

Etude expérimentale sur l'influence des fissures sur le séchage des sols argileux

Diala Tabbal (Dar Al Uloom University, Saudi Arabia); Isam Shahrour (Université Lille1 Sciences et Technologies, France); Fadi Hage Chehade (Lebanese University - Doctoral School of Science and Technology - Modeling Center - PRASE - Beirut & Lebanese University - University Institute of Technology, Lebanon); Marwan Sadek (LML UMR 8107, Université des Sciences et Technologies de Lille, France); Tomoyoshi Nishimura (Ashikaga Institute of Technology, Japan)

Etude expérimentale sur l'influence des fissures sur le séchage des sols argileux Avec le changement climatique, nous connaissons de plus en plus de la sécheresse dans le monde. Les sols argileux riches en particules fines sont susceptibles de changer de volume lié à celui de la teneur en eau. La fissuration des sols argileux dus au phénomène de la sécheresse est un phénomène d'une importance certaine en géotechnique environnementale. En de nombreuses circonstances, les fissures de dessiccation entraînent des dommages très importants dans divers types de structures. La présence des fissures à la surface peut modifier sensiblement l'écoulement de l'eau et par conséquence le profil de succion. En effet, les fissures changent les propriétés hydrauliques d'un sol et altère les propriétés mécaniques du sol. Ce travail de recherche comporte une étude expérimentale et phénoménologique afin d'étudier l'influence des fissures

sur le séchage des sols argileux. L'étude expérimentale a été réalisée au laboratoire au Japon. Des essais de séchage à succion imposée ont été realisés sur des échantillons d'argile Kaolinite intacts et fissurés. Le comportement du sol a été étudié dans une gamme de succion très étendue grâce à la technique de contrôle de succion par phase vapeur, ou bien, technique de dessiccateur à vide, qui permet d'imposer des succions totales allant de quelques mégapascals jusqu'à des centaines de MPa. Dans notre étude, sept solutions salines saturées ont été utilisées allant de 2.83 MPa jusqu'à 296 MPa. Les essais de dessiccation sont menés dans des moules cylindriques de diamètre 35 mm et de hauteur 20mm préparés et soumis aux mêmes conditions au laboratoire. Le retrait latéral ainsi que l'évolution de la fissuration du sol au cours de séchage sont suivis pour l'ensemble des échantillons. Une première observation des résultats montre que pour tous les échantillons, le séchage de la surface n'a pas été uniforme. Avec le temps, on distinguait des zones déjà sèches et des zones encore humides. Dans le cas des échantillons intacts, la progression du séchage surfacique a commencé sur les bords puis s'est propagée vers le centre. Alors que pour les échantillons fissurés, la progression du séchage surfacique a commencé au centre à partir de la zone fissurée puis s'est propagée vers le centre. Ainsi dans tous les cas, il existe des gradients de teneur en eau au sein de l'échantillon. Quant au phénomène de retrait volumique, les échantillons dont la surface est intacte montre un taux de retrait supérieur à celui observé pour les échantillons dont la surface est fissurée. Dans les échantillons intacts, une rétraction volumique a été observée suivie par une formation des fissures sur toute la surface formant ainsi des polyèdres irréguliers. Le comportement des argiles fissurées est différent. Les échantillons du sol fissurés subissent d'abord un retrait faible suivi d'un développement de fissures secondaires à partir de la fissure initiale. La phase de retrait est très courte et le développement des fissures domine le comportement du sol. La présence des fissures affecte la cinétique de séchage: la vitesse de perte d'eau augmente avec la fissuration engendrant un taux ainsi d'évaporation plus important. Dans cette étude, on a suivi également la variation de la teneur en eau pour l'ensemble des échantillons afin de simuler l'effet des fissures sur le changement du profil hydrique dans le sol.

ENG1_CCE: Engineering I

Room: USJ CSH 208

Chairs: Elie Otayek (Holy Spirit University Of Kaslik, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

Modeling and Simulation of DC-DC Power Converters in CCM and DCM Using the Switching Functions Approach

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

In this paper, new mathematical models of DC-DC switch-mode converters, which are valid under both continuous and discontinuous operating modes, are presented. The modeling technique is based on the switching functions concept. The obtained models are represented by time-variant state equations, which offer high simplicity for computer implementation. For illustration purpose, the proposed modeling approach is applied to the conventional buck and Cùk converters. The obtained models are then tested through computer implementation using the Simulink tool of Matlab.

Power Factor Correction in Single-Phase Systems: Principle, Design, Modeling and Control

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Power Factor Correction (PFC) circuits are widely used in single-phase rectifiers in order to emulate a linear resistive behavior. Several PFC topologies were introduced in the last thirty years, depending on the required source-load characteristics and system performance. The Boost PFC is still the most popular configuration due to its simplicity, but it suffers from high voltage stresses across the power electronic devices. To overcome this drawback, Buck-Boost structures such as the Cùk, SEPIC and Sheppard-Taylor topologies were designed and found quickly great interest among power electronics researchers. The complete analysis of these converters along with the Boost PFC was traditionally elaborated independently, each study being only valid to a specific topology. In this paper, an overview of non-isolated PFC topologies and a unified approach to design and analyze such converters in a common framework is presented. The mathematical developments concern a general-case topology that could represent any of the above mentioned converters. In addition, the major features of the considered converters, their benefits and limitations in terms of performance are highlighted. More specifically, the averaged model of each topology is presented, on the basis of which steady-state characteristics, current tracking ability and design criteria are elaborated and analyzed. The paper constitutes a useful guide for professionals and undergraduate students that would give them insight and help them choosing the most adapted PFC converter for the considered application.

Study of the nonlinearity of the varactor used in the tunable impedance adapters in semiconductor technology

Mouhamad Abou Chahine (Arts Sciences and Technology University in Lebanon, Lebanon)

This paper present a study of the nonlinearity of the varactor used in the tunable impedance adaptersand proposes a solution to improve the response of the component in terms of linearity. In a first time we finda non-linear equivalent circuit model of the varactordiode. Then, we calculate the coordinates ofthe IP3 point using aHarmonic Balancesimulationwith the model of the diode

Easy and Fast Control of Patient Environment

Tarek Saade, Rony Jahjah and Roy Abi Zeid Daou (Lebanese German University, Lebanon)

This paper deals with the design of a system that helps patients with some movements difficulties to control their home environment easily with a relatively low cost material. Although the presence of an assistant is evident with these patients, the cost of hiring such trained persons is very high. Thus, this system provides a tool that can help the patient being autonomous while alone. The proposed system includes several functionalities as the control of the TV (channel, volume and power), the light control, the air conditioner/heater control and call parents option (calling or sending messages to parents). It also enables the monitoring of the patient temperature over internet. As for the required equipment, a screen and a Data Acquisition board are necessary to run this system. The found results look very interesting with a low error rate and a capability of easy personalization of the system with the additional of new features.

Green Water Desalination Plant in Lebanon

Hamza Hussein Slim, Kassem Mogharbel, Ali Hassan and Rabih Rammal (LIU, Lebanon); Ali H Assi (Lebanese International University, Lebanon); Mostafa Gad El Rab (Mechanical Department, Lebanese International University, Lebanon)

Despite the great effort made by authorities and researchers, multiple countries with poor economic resources are experiencing serious difficulties derivative of water scarcity. However, about 97% of the earth's water is salt water in the oceans, and a tiny 3% is fresh water. The only nearly inexhaustible sources of water are the oceans, which, however, are of high salinity. It would be feasible to address the water-shortage problem with seawater desalination, however, the separation of salts from seawater requires large amounts of energy which, when produced from fossil fuels, can pollute the environment. To avoid pollution there is a high interest in coupling the desalination units with some renewables that lead to green water desalination plant. This paper aims to design a green desalination plant in Lebanon powered by renewable energy sources, taking into consideration the selection of suitable desalination process and location at the Lebanese coast.

A Comparative Study between a Conventional Two-Level and a Flying Capacitor Four-level VSI for Use in Four-Wire Shunt APF Applications

Antoine Hanna Nohra (CNAM-Lebanon, Lebanon); Maurice Fadel (Laplace University, France); Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Shunt Active Power Filters (SAPF) are proposed for Power Quality (PQ) improvement in perturbed power distribution networks. Conventionally, the 2-level Voltage Source Inverter (VSI) topology is used in three-phase four wire power distribution networks to mitigate current harmonics and to enhance Power Factor (PF). The Multilevel Inverter (MI) such as the Flying-Capacitor (FLC) topology is competitive with the conventionally inverters for the same targets on low voltage domain, in addition to its performance in medium voltage. In this work a comparative study of two SAPF topologies is proposed. We compare the performance for the two structures for the same modulation, same current and voltage regulation method, same control strategy using modified formulation of the p-q strategy. Firstly, it is demonstrated that the neutral current can be reduced in the conventionally 2-level structure by using a Phase Shift PWM (PSPWM) modulation instead of Sinusoidal PWM (SPWM) modulation. Secondly, peaks of source currents are reduced in the transient state by action on the Pass Band of the DC voltage regulator. Thirdly, comparison between the sizes of the inductance of the filters is made, voltage stresses on the electronic components are compared and harmonic generated by the output voltages of VSI are compared. It is demonstrated the superiority of the FLC over the two-level topology.

FEA1_env: Food security, Environment, Agriculture I

Room: USJ CSH 305

Chairs: Claude Daou (Lebanese University, Lebanon), Khalil Helou (Saint Joseph University, Lebanon)

Deterioration of Groundwater in Beirut by Seawater Intrusion

Mark Saadeh (American University of Technology, Lebanon)

All of Lebanon's aquifers, without exception, are afflicted with some form of contamination or another, be it from the discharge of untreated raw sewage or pesticides and fertilizers through agricultural activities, but at the forefront lies the phenomena of seawater intrusion especially in the capital, Beirut. Extensive sampling of Beirut's groundwater by the author in recent years have revealed staggering values of total dissolved solids(TDS) in the thousands of milligrams per liter, in an increasing number

of wells. This irreversible deterioration of the quality of groundwater in Beirut is forcing many citizens to install costly desalination equipment, import objectionable water and abandoning discharge wells altogether. Initial groundwater sampling began extensively in 2004 until 2008 as part of the author's doctoral dissertation entitled "Influence of Overexploitation and Seawater Intrusion on the Quality of Groundwater in Greater Beirut" submitted to RWTH University in Germany. Then again in what was possibly Lebanon's worst drought period in decades, the author embarked on another campaign to sample Beirut's groundwater during the summer of 2014. Acute water shortages coupled with recent drought conditions have further exasperated the quality of Beirut's ground waters. With levels of total dissolved salts(TDS) in some of Beirut's wells nearing that of seawater(~37,500 mg/L), many aquifers may have been irreversibly damaged. Critical to combating the effect of seawater intrusion however is an understanding of the principle that is known as the Ghyben - Herzberg relation. The principle assumes in theory at least, that for every meter of groundwater drop above sea level there is an equivalent rise of 40 meters of the saline-fresh water interface below sea level, illustrating just how sensitive over-pumping is to groundwater quality deterioration. With an understanding of the principle dynamics behind the phenomena of seawater intrusion, various methods may only then be employed to combat the encroachment of seawater into coastal aquifers underlying Beirut and other coastal cities. Efforts towards the promotion of water conservation, and restricting or even preventing withdrawals from coastal aquifers need to be implemented urgently. More extensive efforts to mitigate the effects of seawater intrusion is by ponding surface waters and storm-water runoff, or using river water sources to recharge the groundwater through recharge wells otherwise known as Aquifer Storage and Recovery (ASR).

Ozone Monitoring IN THE AREA OF THE PORT OF TRIPOLI

Walid Kamali, Salam Messaikeh and Yara EL-Moghrabi (AL-Manar University of Tripoli, Lebanon)

Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere [1]. It occurs when various gases, droplets, and particles are found in the atmosphere beyond their normal concentrations and/or introduced to the atmosphere by anthropogenic sources or natural phenomena. The results shown here are the ground Ozone levels measured within the area of the port of Tripoli as a result of the activities taken within MESP project financed by EU(Managing the Environmental Sustainability of Ports for a durable development)

State of environment of Jounieh Bay (North of Beirut) through the analysis of sediment characteristics

Milad Fakhri and Abir Ghanem (National Center for Marine Sciences-CNRSL, Lebanon)

The Bay of Jounieh is located in the central part of the coastal line of Lebanon and known as a dynamic touristic region due to its beach resorts, port of pleasance, old souk and marinas projects including fishing, diving activities, leisure boats, restaurants, night clubs. Once these activities are misused they might render this place to be delivered into the chaws of modernity and pollution. This hot spot is facing great anthropogenic pressures characterized by increase in urbanization with major roads development, uncontrolled and illegal buildings expansion along the seaside altering the landscape and promoting the release of high inputs of sewage water into the Bay that lack wastewater treatment plant. These domestic and industrial wastes increase the loads of heavy metals, organic matter and chemical toxic substances into the Bay. All these discharged wastes induce changes in water column turbidity, contamination of sediment and smothering of seabed, which all in turn affect the habitats characteristics, food chain integrity,fishery resources, fauna and flora biodiversity and threats to human health either through swimming or consuming unhealthy seafood. In the aim to evaluate the state of environment of Jounieh Bay and to reveal the impact of anthropogenic sources of contamination, we decided to target in our study the sediment matrix that is considered an investigator of the environment history and the final destination for natural and anthropogenic contaminants. This research work is based on studying the spatial variation of sediment's characteristics by the analysis and interpretation of the geochemical (grain size composition), physical(temperature, pH, Eh), chemical (organic and inorganic phosphate, total organic matter, calcium carbonate) and biochemical(chlorophyll-a, pheopigments, carbohydrates, proteins and lipids) parameters. The samples of sediment were collected with a stainless steel grab from 3 three horizontal transects(North, Middle & South) at 3 depths 15, 30 and 60 m using the platform of the scientific vessel CANA-CNRS. The grain size composition was dominated by the fine fraction(<63 µm) that reached 100 % at deepest level 60 m. The sediment was rich in organic matter(0.22-2.97 %) and pheopigments(0.13-7.03 µg/g) but poor in the photosynthetic pigment chlorophyll-a(0.77-2.44 µg/g). The percentage of calcium carbonate, the building blocks of marine organisms shells and the main constituent of the Lebanese coast, varied between 12.5 and 47.7 %. Total phosphate resulting from the presence of sewage, domestic, agricultural and industrial pollution were dominated by the inorganic fraction and its concentration fluctuated between 39 and 264 µg/g. Total phosphate might have a positive influence on living organisms by providing a crucial fertilizing agent for their proliferation. For the labile fraction, the sediment was mostly rich in total lipids(0.32-1.04 mg/g) due to the presence of leisure ports, boats andhuman wastes, in addition lipids are indicators for meiofauna abundance and fresh organic matter and to a lesser degree in carbohydrates(0.011-0.06 mg/g) related to the presence of aged material from terrestrial and plant origin and proteins(0.009-0.051 mg/g) that reflect the importance of system's productivity and iabundance of microalgal biomass. The results show that the northern transect of Jounieh Bay is the least contaminated and that the deep points of the three transects(60 m) are the most affected

by the anthropogenic wastes mainly sewage and oil, that rendered the trophic system to be a meso-oligotrophic system.

Effectiveness of Epoxy Resin and Latex bonding agents in Concrete Repair

Rima Kammouni (Rafik Hariri University, Lebanon); Riad Wardany (Rafic Hariri University, Lebanon); Rasha Toghlby, Bilal Jbara and Ahmad Mechaymech (Rafik Hariri University, Lebanon)

The objective of this study is to evaluate the effectiveness of Epoxy resin and Latex bonding agents in concrete repair. Cylindrical specimens were made with and without the bonding agents. Each cylinder included an inner concrete core of 10 cm diameter which represents the existing substrate. The core was then put inside 16 x 32 cm cylindrical mold and a new concrete (overlay) was placed around. Four specimens were prepared by applying the Epoxy resin on the surface of the inner concrete core then placing the new concrete around. Similar set of cylinders was prepared with Latex added to the mix of the new concrete before placing it in the mold. Another four specimens were made with the same procedure but without any bonding agent to serve as reference. The specimens were cured in water for 28 days and then tested for compressive strength and splitting tensile strength (Brazilian test). This latest was used to investigate the nature of the failure mode of the specimen. Peeling of the outer concrete was observed in the specimens where weak bonding conditions existed. The results show that higher bonding conditions between the overlay and the substrate can be achieved using Epoxy resin.

Evaluation de la qualité des eaux d'irrigation de la rivière Aarka dans la plaine d'Akkar au nord du Liban

Claude Daou and Rony Nabbout (Lebanese University, Lebanon); Farah Maasarani and Celine Hajjar (Lebanese Agricultural Research Institute, Lebanon)

Actuellement, la rivière Aarka à Akkar constitue la source principale qui assure l'eau d'irrigation pour la majorité des terrains agricoles dans la plaine d'Akkar. Selon la FAO, l'irrigation de surface et l'irrigation par aspersion, représentent les méthodes classiques d'irrigation dans la région d'Akkar, soit 91% de ces pratiques agricoles. D'ici vient l'objectif de ce travail qui consiste à évaluer la qualité de l'eau d'irrigation de la rivière Aarka, en vue d'une meilleure gestion de cette ressource. Bien qu'il existe des sources ponctuelles de pollution, telles que les zones rurales et urbaines, la forme prépondérante de pollution en milieu agricole est diffuse. Ce type de pollution provient de l'ensemble du territoire et non d'un point unique identifiable. Ils atteignent ce cours d'eau par le ruissellement de surface ou par l'écoulement souterrain. Les matières organiques ont longtemps été les principaux polluants des milieux aquatiques. Elles proviennent des déchets domestiques (ordures ménagères, excréments), agricoles (lisiers) ou industriels (papeterie, tanneries, abattoirs, laiteries, huileries, sucreries...). La teneur en matière organique des eaux naturelles varie en général de 2 à 10 mg/L (mesuré avec un analyseur de carbone organique total), 90% sont sous forme de carbone organique dissous (COD) et le reste sous forme de particules. A ce jour, personne n'a pu établir une liste exhaustive de toutes les molécules constituant la matière organique, notamment au Liban. La difficulté de cette approche résulte de la grande complexité de la matrice organique (mélange de plusieurs centaines de molécules simples et d'hétéropolymères). Elle pourrait être abordée par une analyse plus simpliste de l'indice SUVA (Specific UltraViolet Absorbance). Comme nous avons déjà mentionné, l'évaluation de la qualité d'eau de la rivière Aarka est une étape essentielle pour la croissance et le rendement agricole de la plaine d'Akkar. Cette étude se trace dans la stratégie d'établissement d'une base de données importante sur la qualité des eaux de surface au Liban et leur exploitation par des outils multidimensionnels tels l'Analyse en Composante Principale (ACP). La rivière Arkaa est un cours d'eau libanais prenant sa source à Nabaa El Fouar (Rahbe -Akkar- Liban) dans la montagne surplombant Halba et se jetant dans la mer Méditerranée un peu moins de 20 km au nord de Tripoli. Sa longueur totale est de 25 km. Huit échantillons (ARK-1 à ARK-8) ont été pris de la rivière Arkaa pendant la durée d'étude allant de mars 2014 à juillet 2014) sur le linéaire du cours d'eau. Les échantillons ont été collectés et transportés au laboratoire dans des glacières à 4ºC, dans les meilleurs délais selon la norme NF T90-100. Une série de 21 paramètres physico-chimiques ont été mesurés pour évaluer la qualité de l'eau. Ces paramètres sont les suivants: pH, conductivité, TDS, Calcium, Magnésium, Sodium, Potassium, Fer, Chlore, Nitrates, Nitrites, Ammoniun, Orthophosphates, Sulfates, DCO (Demande Chimique en Oxygène), Indice permanganate, Bore, Absorbance 254 et COT (Carbone Organique Total). Quatre paramètres microbiologiques sont aussi réalisés: germes totaux à 22 et 37ºC, Coliformes totaux à 37ºC et coliformes thermotolérants à 44ºC. La variation spatio-temporelle de la qualité des eaux de la rivière Aarka montre un chargement en matières minérale et organique de l'eau de l'amont vers l'aval. Par exemple, les paramètres azotés Nitrates et Nitrites augmentent de l'amont vers l'aval de la rivière Aarka (de 5,24 mg/L à ARK-3 jusqu'à 8,21 mg/L à ARK-6 pour les Nitrates et de 0,1 mg/L à ARK-3 jusqu'à 0,314 à ARK-6 pour les Nitrites), influencé par le chargement de l'eau par les matières organiques, lessivage des sols et l'utilisation des engrais en grande quantité dans les activités agricoles. La concentration en Bore est inférieure à 1mg/L jusqu'à la station ARK-6. À partir de la station ARK -7 et jusqu'à l'embouchure, une augmentation de la concentration en Bore est notée (0,72 mg/L à ARK-7 et 1,4 mg /L à ARK-8). Ceci ne pose pas de problème pour les plantations tant que cette concentration n'excède pas 2 mg/L. Afin de déterminer l'origine de l'apport organique anthropique, un indice SUVA (Absorbance spécifique) est utilisé. L'indice SUVA traduit l'absorbance UV spécifique correspondant au rapport de l'absorbance UV à 254 nm sur le COT (Carbone Organique Total). Cet indice est caractéristique de l'aromaticité et du caractère hydrophobe des molécules organiques. Dans cette étude, les stations ARK-1, 2, 4 et 6 possèdent des valeurs d'indice SUVA supérieures ou égales à 4 m-1.L/mg. Ceci indique que l'origine du Carbone dans ces eaux est humique de caractéristique hydrophobe et aromatique, par la suite d'origine principalement naturelle. Les autres stations ARK-3, 5, 7 et 8

présentent des valeurs de SUVA inférieures à 3 m-1.L/mg, montrant une pollution d'origine anthropique. Une étude multidimensionnelle réalisée par l'ACP a pu discriminer les individus entre eux. Nous avons pu attribuer à chaque station choisie sur la rivière Aarka un état trophique particulier. Nous avons pu voir que le caractère microbiologique n'est pas la source principale de pollution dans cette région, bien que l'apport anthropique ne soit pas négligeable. Cependant, l'apport organique et minéral prend une ampleur considérable et définit l'état trophique de cette rivière. Ceci est en effet concordant avec les résultats obtenus par l'analyse de l'indice SUVA. A travers leur composition chimique et biologique, les eaux de la rivière Aarka constituent un mélange très complexe. Ainsi, ces eaux peuvent garder une pollution chimique et biologique. Par ailleurs, l'utilisation de ces eaux en irrigation, dans la plupart des cas, montre que la qualité physico-chimique de ces eaux pourrait entraîner à la longue l'accumulation de ces polluants dans les sols irrigués, ce qui poserait un problème sérieux en irrigation et par la suite, en santé publique.

Lightweight CMU from Timber Wastes

Zainab Majzoub, Omar Jbara, Sanaa El Sayed and Rosaline Chemali (Rafik Hariri University, Lebanon); Riad Wardany (Rafic Hariri University, Lebanon); Ahmad Mechaymech (Rafik Hariri University, Lebanon)

This paper presents an experimental study to test the feasibility of making lightweight Concrete Masonry Units (CMU) using timber waste (sawdust). Different concrete mixtures were created with fine and coarse grained timber sawdust. CMU units were manufactured using the same procedure used in the manufacturing of traditional normal weight units. Bulk unit weight and compressive strength tests were conducted on the manufactured lightweight CMU and the results were compared to the unit weight and strength of a traditional normal weight unit.

FEA2_Agr: Food security, Environment, Agriculture II

Room: USJ CSH 306

Chairs: Maya Kharrat (Universite Saint Joseph, Lebanon), Nabil Nemer (Holy Spirit University of Kaslik, Lebanon)

Effect of soil class on grape quality of cv. Cabenet Sauvignon and wine composition in South Bekaa

Yolla Chamoun, Sara Azar and Tamara Gebara (University of Saint-Joseph, Lebanon)

This study describes an investigation on the effects of the soil class on plant water potential, grape quality and wine issued from each plot of land cultivated with cv. Cabernet Sauvignon. An experiment was carried out on a vineyard located at Kefraya in south Bekaa throughout the 2014 growing season on five different soil classes. Soil classification is based on descriptive and measurable soil features like diagnostic horizons and related characteristics such as the chemical and physical composition of the horizons. Results showed significant differences in grape quality components and thus in wine composition and taste among plots of different soil classes.

Ultrasonographic evaluation of Awassi folliculogenesis and dominant oocyte quality assessment

Christabelle Al Fahel (Notre Dame University, Lebanon); Joseph Sahakian (Notre Dame University-Louaize, Lebanon); Khaled Houchaimi (Lebanese Agricultural Research Institute, Lebanon); Elham Hajj Semaan (Lebanese University, Lebanon); Pauline Y. Aad (Notre Dame University-Louaize, Lebanon)

Female reproductive performance of Awassi ewe, the predominant breed of fat-tail sheep of Lebanon is not well studied. Therefore, this study aims to assess folliculogenesis and evaluate oocyte morphology and quality. 20 Awassi ewes were monitored for folliculogenesis, out of which 10 were later slaughtered for ovarian and oocyte collection at the Lebanese Agricultural Research Institute. They were monitored via ultrasonography using a mindray DP-20Vet and a rectal linear probe set to a frequency of 4.5-5MHz and a depth of 2.5cm from May to July through 3 estrous cycles to determine dominant and subordinate follicles. Ovaries were collected following slaughter, follicles counted and oocytes aspirated from the largest (dominant) and medium-sized (subordinate) using an 18 gauge needle attached to a 1mL syringe and evaluated under light microscope based on size, shape, cytoplasmic granulation, presence of zona pellucida and presence of cumulus cells. AMH, ZAR-1 and BMP15 gene expression amplified using qRTPCR with SYBR and normalized to 18S rRNA. Results showed that 35% of follicles were dominant, counting 24.4% of good quality oocytes and 17.8% of bad quality. Furthermore, 20% of follicles were subordinate with 13.3% containing a good quality oocyte and 8% were bad quality. Ovarian size raged from 10.2 to 11.2±0.6mm with an average number of 19 follicles located in both right and left ovaries. Folliculogenesis in Awassi ewes showed an estrous cycle of 17±3 days with 2 waves and a dominant follicle of 4±0.9 mm. The oocyte recovery rate was 68%. In the search for an oocyte quality marker involved during follicle development and function, AMH mRNA was high in small and dominant follicles, but not subordinate; BMP-15 was down-regulated in small oocytes while ZAR-1 did not differ among different quality oocytes.

Results established from the above mentioned genes are promising in considering the their use and efficiency in distinguishing between different quality oocyte. This research was supported by a grant from the LCNRS and NDU

Folliculogenesis and Cyclicity in Baladi Goats

Joseph Sahakian (Notre Dame University-Louaize, Lebanon); Aya Baalbaki (Universite Saint Joseph, Lebanon); Elham Hajj Semaan (Lebanese University, Lebanon); Maya Kharrat (Universite Saint Joseph, Lebanon); Pauline Y. Aad (Notre Dame University-Louaize, Lebanon)

Baladi goats are the predominant goat in the alpine regions of Lebanon, partly due to their resilience and tolerance to fluctuating environmental and pasture conditions. However, little is known about their ovarian activity. Thus, the purpose of our experiment was to establish a concrete record of the folliculogenesis and cyclicity as seen in local Baladi goats. 36 goats were classified as thin or fat based on their body condition score as determined by NEC palpation of the tail vertebra and the body weight. The ovarian activity was followed via rectal ultrasonography using an Mindray ultrasound with rectal probe once per month during March and April, and twice per week subsequently from May to July. Ovarian activity was defined by the size of both ovaries, the dimensions of the dominant follicles when detected, and the presence or absence of corpora lutea. Ovarian size averaged 6.25±0.02 mm, and did not differ between the right or left ovaries, or between animals assigned to the different BCS groups. Results showed a limited ovarian activity during lactation, as indicated by small ovaries, low number of follicles and rare presence of corpora lutea. This suppression was lifted progressively during the month of May, right after approximately 4 months post-weaning, consistent with the start of the sexual season. However, during the months of June and July, both the number of large follicles and CLs increased consistently, especially during July, indicating multiple ovulations during this period. The Estrous cycle length ranged between 13 to 20 days as compared with reported values of 14 to 24 days in range grazed goats, typically with 2-3 follicular waves per cycle. Shorter estrous cycles of 13-14 days were observed in some animals even late in the breeding season contradicting what was previously reported in goats (Camp et al., 1983). Number of small follicles was higher ($P<0.05$) in Thin vs Fat goats, whereas large follicles were higher in Fat vs Thin goats, with 17.8 and 26 % of follicles presenting pre-ovulatory status in Thin vs Fat goats. Surprisingly, the number of CL did not differ between the 2 groups, possibly indicating a missed ovulation event. With a grazed baladi goats and to ensure proper return to estrous, it is very important to ensure proper body condition and nutritional status.

Qualitative risk assessment in relation to the microbial quality of fresh produce from farms to market: Water used for fresh produce washing, among others, is a potentially high risk factor

Dima Faour-Klingbeil (Plymouth University, Lebanon); Ewen Todd (American University of Beirut, Lebanon)

In Lebanon, as in other developing countries, inaccessibility to safe water, lack of agricultural infrastructures and limitations to implementing good agricultural practices (GAP) are persistent challenges. To address the food safety challenges, it is important to understand the hazards spreading and sources of transmission in the food chain. For this purpose, we employed participatory method surveying 10 major farms (n=10) and two washing facilities in Beqaa valley in Lebanon. Interviews with farmers/ owners were conducted to assess the hygienic conditions, applications of risk assessments and GAP. A total of 90 samples of fresh vegetables were collected from farms and wholesale market stalls traced back to surveyed farms, in addition to samples of water (5 litres) from washing ponds or used for irrigation. Our findings revealed a critical lack of proper sanitary conditions, GAP and control over the water quality used on farms and in washing facilities. There were no significant changes in the levels of microbial indicators along the chain. Moreover, water samples collected from harvest's washing ponds, which were filled from wells, had high counts of coliforms and E.coli unlike water samples originating from the same wells. This indicates a likelihood of contamination originating from fresh produce on fields. E.coli > 2 log cfu/g was prevalent in 37% of the samples with a maximum level of 7 log cfu/g, while coliforms levels ranged from 1.7 log CFU/g to 8.2 log cfu/g. Listeria monocytogenes was identified in 9% of fresh vegetables and Salmonella was detected in one sample (Lettuce) obtained from a washing facility. Studies on the bacteriological quality of fresh produce in Lebanon are scant. This is the first attempt as an exploratory study that provides information on the microbiological quality of raw vegetables along the supply chain. Our results emphasized the need for more studies in this area to identify hazards related to fresh produce and suggest that effective control measures should be implemented on farms and washing facilities as well as in subsequent processes to minimize the risk of microbial contamination. Reinforcing the monitoring of water quality used for irrigation and harvest washing, and guidance to implementation of GAP should be regarded in the strategic food safety control plan for the safety of fresh produce.

Première Evaluation de la Diversité des Grenadiers (Punica granatum L.) Cultivés au Liban

Faten Dandachi (Lebanese Agricultural Research Institute, Lebanon); Bariaa Hamadeh (Université Libanaise, Lebanon); Hiyam Youssef (The Lebanese Agricultural Research Institute, Lebanon); Lamis Chalak (The Lebanese University, Lebanon)

Cette étude a consisté à recenser les grenadiers (Punica granatum L.) cultivés au Liban et les caractériser pour leurs traits morphologiques et chimiques. Les prospections menées en 2013 dans les diverses zones de culture de grenadier ont permis de collecter 81 accessions avec une nomenclature essentiellement basée sur le goût du fruit. Pour chaque accession, 38 descripteurs quantitatifs et qualitatifs de la feuille, la fleur, le fruit et le jus ont été examinés et décrits. Une variabilité importante a été notée pour les caractères étudiés. L'analyse en composantes principales a permis de bien séparer les variétés « Helou » des variétés « Hamod ». En revanche, l'analyse de groupe ou dendrogramme, à une distance de 11.11% dissimilitude, a permis de distinguer trois classes: « Helou », « Hamod », et « Lefani ». Chacune de ces trois classes regroupe des accessions présentant des caractéristiques morphologiques plutôt similaires indépendamment de la différence des conditions éco-géographiques et des pratiques culturales appliquées dans les zones de culture. Néanmoins, cette étude devrait être complétée par des études supplémentaires de caractérisation moléculaire afin de bien comprendre la structure génétique des variétés locales du grenadier.

SOC1: Social, Economic and Behavioral Sciences I

Room: USJ CSM Amphi A

Chairs: Christine Babikian (Université Saint Joseph, Lebanon), Amal Habib (CNRS, Lebanon)

Achebe and Ngugi: Literature of Decolonization

Lutfi Hamadi (Lebanese International University, Lebanon)

The purpose of this paper is to shed light on postcolonial literature in European ex-colonies by comparing and contrasting two of the most eminent contemporary African writers, the Nigerian Chinua Achebe and the Kenyan James Ngugi, known later as Ngugi wa Thiong'o. For this purpose, the paper traces the most common and different features in these writers' works, which reveal the unspeakable effects of colonization on the natives, by exploring the lives of their characters in the pre-colonial, colonial and postcolonial periods. The paper emphasizes how both writers depict the conflicts between the powerful colonizers and the defenseless colonized, ending up with the destruction of local cultures and identities, and how they show the persistence of the hegemony of the colonizers in Nigeria and Kenya through postcolonial regimes, uncovering in the process the distorted image of the colonized subjects in the Western literature. The paper also demonstrates how Achebe and Ngugi were highly influenced by the turbulent political events that their countries had been undergoing since the arrival of the white Europeans by the end of the Nineteenth century. Like their characters, both writers were at crossroads of traditional culture and Christian influence, where they faced the dilemma of growing up in two different worlds as Africans and as Westerners. Their incident-packed lives, their suffering from the corruption and violence practiced by postcolonial dictatorships, and their incessant attempts to establish an independent personality and identity found their vent in remarkable creative writings of opposition and decolonization. The characters in their novels reflect to a far extent the predicament African peoples had been passing through for more than a century. Despite a few differences, both writers' works show that the consequences of colonialism are still persisting in the form of chaos, coups, corruption, civil wars, and bloodshed. This reflects Edward Said's and other postcolonial thinkers' belief of how a powerful colonizer imposed a language and a culture, whereas cultures, histories, values, and languages of the natives were ignored and even distorted in the pursuit to dominate these peoples and exploit their wealth in the name of enlightening, civilizing, and even humanizing them. Referring to Achebe's Things Fall Apart, Arrow of God, and Anthills of the Savannah and Ngugi's Weep Not, Child, The River Between, and Petals of Blood, the paper shows how these works explore the histories of Nigeria and Kenya in pre-colonial, colonial, and postcolonial times. Believing in the importance of the role of literature and of the narratives in uncovering the truth, they both present the tribal African societies from within, with their own strengths and weaknesses, agreements and disagreements, and positive and negative values, just like any other human beings, unlike the stereotypical image given to Africans in the Western discourse. Besides, Achebe and Ngugi describe the clash between African traditions and religions and European values and Christianity, in their attempt to raise awareness of the oppression and humiliation that the Africans suffered from on the hands of the white man. In addition, their works portray the corruption of oppressive post-colonial regimes, which reflects the writers' belief that the independence African countries are supposed to have won is totally devoid of any content, and that the white colonialists are still in power through a few black representatives.

Le financement des PME au Liban: un outil de relance économique

Sanaa Hajj (le Cnam Liban, Lebanon); Selim Mekdessi (Lebanese University, Lebanon)

Depuis 1997, l'augmentation rapide du nombre des PME au Liban est stimulée par plusieurs facteurs. Les salaires bas payés dans le secteur public, la faible culture de recrutement des libanais, le manque de chance de progrès et de promotion au niveau des grandes entreprises, l'augmentation des aides offertes par plusieurs ONG aux petites entreprises individuelles et la facilité de création des PE expliquent l'orientation des citoyens libanais vers la création des petites entreprises afin d'améliorer leurs conditions de vie. Par conséquent, « les PME sont au cœur de renouveau du pays». L'économie libanaise est composée surtout des PME et «ce tissu contribue à 80% de la production nationale». Par suite n'importe

quel progrès économique et social du pays exige le développement de leur activité et la création d'un environnement favorable à leur croissance. Actuellement, le Liban est un tissu de PME notamment familiales qui souffrent depuis longtemps de plusieurs problèmes qui perturbent leur bonne démarche et les empêchent de progresser et de s'améliorer. Du coté administratif, la dominance d'une structure familiale caractérisée par le manque de transparence, la faible culture de coopération, et la gestion inefficace, affectent le bon fonctionnement des micros entreprises libanaises. Quant au financement, « Les propriétaires des PME/PMI considèrent leur incapacité d'obtenir des facilités financières à des taux et des conditions raisonnables comme la difficulté majeure entravant l'investissement ». Ces PME, à caractère familial souffrent souvent des problèmes de financement. D'une part, elles sont caractérisées par une absence de logique de levée de fonds, ce qui implique absence de croissance: on reste finalement sur un tissu de PME sans voir émerger de grandes entreprises. D'autant plus, elles sont caractérisées par un manque de politique d'investissement et de culture de « recherche et développement », et par une logique de court terme dans la gestion de l'entreprise ; d'autre part, il existe une carence d'une politique gouvernementale pour le développement des PME, et l'inexistence d'agences de financement de l'innovation. Donc on assiste à une absence de volonté politique pour le développement des PME. En outre, la qualité de beaucoup de produits des PME libanaises ne répond pas aux exigences des marchés internationaux, les dirigeants gèrent leurs affaires selon leurs propres anticipations tout en ignorant les concepts scientifiques de gestion et d'analyse, et « la situation qui se renverse d'une année ou d'un mois à l'autre empêche les investissements à long terme». Ainsi, mal, voire pas du tout, intégrées dans l'économie mondiale, peu intégrées dans les chaînes de valeur faute d'avoir su relever le pari de la sous-traitance et, par voie de conséquence, peu liées aux grandes entreprises nationales et internationales, les PME libanaises restent à l'écart des grands mouvements économiques mondiaux. Le marché local, et même micro-local pour la plupart d'entre-elles, semble être leur unique débouché. (Levratto 2009). Le Liban s'est ainsi engagé récemment dans un processus de réforme de la politique économique, de modernisation industrielle et agricole, d'amélioration du climat d'investissement, d'ouverture du marché intérieur et d'intégration dans l'économie mondiale (Corm, 2004). Donc il a une volonté de promouvoir la dynamique et la croissance nationales grâce à un secteur privé compétitif, des investisseurs dynamiques, des créations d'emplois consécutifs à des efforts significatifs en matière d'innovation, d'internationalisation et d'amélioration de la productivité. Durant les dernières années, le gouvernement a adopté des mesures correctives pour essayer d'atténuer le problème de financement des PME (Kafalat, IDAL, financement européen, etc.). Cependant, ces mesures sont restées insuffisantes. La problématique générale de notre communication consiste à étudier le rôle de financement des PME dans la relance économique souhaitée par l'Etat au Liban, et dans quelle mesure le financement de ces PME est -il une clé de croissance économique? Problématique d'actualité et de préoccupation des politiques gouvernementales, internationales, ce sujet reste plus que jamais une actualité au Liban. L'objectif principal de cette étude est donc d'étudier l'importance des PME dans l'économie libanaise, dans l'emploi et, plus largement, dans l'innovation et la croissance de la productivité globale. Notre rôle est de sensibiliser et convaincre les acteurs économiques et politiques de l'importance et le rôle de financement des PME et son impact sur l'essor économique. D'une part, nous essayons de dresser un prototype de ces entreprises (PME libanaises) du point de vue structure de l'actionnariat, le caractère familiale, le système d'information, la typologie de management ainsi que les outils de management pratiqués ; d'autre part, nous essayons de mettre l'accent sur les déterminants des choix de financement, la typologie des sources de financement (bancaire , subvention ou marché financier), les possibilités de financement existants au Liban, le rôle de l'Etat dans le financement de ces PME (Kafalat), le rôle de la délégation européenne et d'autres organismes, ONG, qui favorisent le financement de ce type d'entreprise. Nous étudions également l'intérêt et le rôle du secteur bancaire dans la politique de financement et surtout les critères de sélection, ainsi que les démarches suivies de la part de deux partenaires Entreprise - Banque, sans oublier l'impact de Bale II sur les politiques des banques. Il s'agit en effet de contribuer à la connaissance et participer à la sensibilisation des pouvoirs à un sujet d'actualité comme le financement des PME et prouver l'apport de ces derniers à l'économie d'un pays et aux perspectives d'un futur meilleur. La méthodologie de cette recherche est une démarche empirico- inductive, nous partons d'une étude sur le terrain afin de confirmer ou infirmer nos hypothèses de départ. Notre étude portera sur un échantillon de 100 PME réparties sur toutes les régions libanaises moyennant un questionnaire élaboré qui prendra en compte notre problématique et nos hypothèses. Cette démarche sera consolidée par des entretiens avec des chefs d'entreprise ou des banques pour comprendre les soucis des PME d'un côté et les démarches de sélections par les préteurs d'un autre côté. Des variables quantitatives comme la VA, le PIB, la création d'emploi seront pris en compte. Ajoutons à cela, des variables qualitatives comme la structure de l'actionnariat ou des critères de sélection, etc. Des tests statistiques adéquats seront mis en place afin de tirer des conclusions scientifiques.

Understanding the impact of the Web on the Arab Near East Society through the interdisciplinary approach of Web Science

Sabrine Saad (Universite saint Joseph & UIR-Web Science- CEMAM, Lebanon)

Bazan, Stéphane B1., Varin, Christophe2 1UIR Web Science - Saint-Joseph University of Beirut, Lebanon; 2UIR Web Science - Saint-Joseph University of Beirut, Lebanon; stefan.bazan@usj.edu.lb This paper presents a conceptual, methodological and contextual approach on how new paradigms offered by Web Science, especially interdisciplinary research and mixed methods, can provide the most relevant perspectives on the realities of the Web in the Arab Near East. In the Manifesto for Web Science, presented by Halford, Pope and Carr at the Web Science 2010 Conference in Raleigh, the authors stated that if Computer science was needed to harness Web Science, "understanding the web requires knowledge and expertise from the social and human sciences". Beirut's Saint-Joseph University launched the first Web Science Interdisciplinary Research Unit in the Middle East in September 2009. Following the research

method proposed by the Web Science Research Initiative in 2008, the UIR Web Science attempts to provide scientific and contextualized answers toward a better understanding of the Web and its usage in the Arab Near East (Lebanon, Jordan, Syria). For example, the current Arab uprisings underlined the impact of the Web as a "social machine" that triggers the emergence of "smart mobs" (Howard Rheingold), which coordinate and undertake efficient protest actions. In this perspective, our research unit focuses on providing a qualitative and quantitative analysis of the usages and roles of social media in the revolts. The paper presents other examples of mixed methodologies to approach the socio-technical impact of the Web on contextualized situations, like E-Learning, Cyber-warfare or E-Commerce.

Which Reforms Do Benefit Lebanon? An Assessment of Paris III

Rock-Antoine Mehanna and Rayan Haykal (Sagesse University, Lebanon)

This article develops a Dynamic Computable General Equilibrium (DCGE) model in order to predict over a short, medium and long term period (40 years), the growth rate of major macroeconomic variables as a result to the sound implementation of the Paris III reforms. 4 simulation scenarios are run to assess the impacts of the different reforms on the Lebanese economy compared to a "status-quo" scenario where no reforms are undertaken. The priority of the Lebanese government should be focused on "Fiscal adjustment-structural reforms" in which the government reduces the level of public debt by 50 percent in order to boost major macroeconomic variables.

Entrepreneurial Teams: Family or Non-Family?

Rima M. Bizri (Rafik Hariri University, Lebanon)

Much has been written about the importance of entrepreneurship in stimulating growth in developing economies. Among the most recent trends in entrepreneurial research is the exploration of family members' tendencies to start entrepreneurial ventures as family teams. Family entrepreneurial teams or FETs (Discua Cruz, 2013) enjoy not only the synergies that come with teams, but more specifically, those that come with "family" teams. "Familiness" was first pinned down by Habbershon and Williams (1999), and later described by Pearson, Carr, and Shaw (2008) as the "positive influence of family involvement in the firm" (p. 950). In recognizing their potential benefits, this paper seeks to investigate the factors that lead to FET formation by using the theory of planned behavior as a theoretical reference. The findings of this study suggest that the elements of TPB, namely positive attitude, subjective norms, and perceived behavioral control, have a significant influence on family members' intentions to start an FET. The results also confirm the influence of the emerging construct "familial stewardship" on this intention, which constitutes a valuable contribution to the literature. This study proposes that a nation can reap the benefits of FETs by integrating family entrepreneurship in the education of the country's youth, thus building a positive attitude and subjective norms toward FETs, meanwhile strengthening the youth's perceived behavioral control.

BIO2_Phamra: Biological, Medical, Pharmaceutical, Health Sciences II

Room: USJ CSM C9

Chairs: Lydia Khabbaz (Université Saint Joseph, Lebanon), Amal Omar (Beirut Arab University, Lebanon)

First multicenter study of carbapenem non susceptible Enterobacteriaceae and Acinetobacter baumannii in Lebanon: analysis of resistance mechanisms and clonality

Dalal Hammoudi Halat (Saint-Joseph University & Lebanese International University, Lebanon); Carole Ayoub Moubareck (Saint Joseph University, Lebanon); Dolla Karam Sarkis (Université Saint Joseph, Lebanon)

Although worldwide dissemination of carbapenem resistance constitutes an important burden to public health, the status of resistance to this antibiotic class has not been yet assessed on a nationwide scale in Lebanon. This study aimed to determine the prevalence of carbapenem resistance among Enterobacteriaceae and A. baumannii in Lebanon, elucidate resistance mechanisms, and identify genetic relatedness of incriminated strains. A one-year follow up was conducted from January through December 2012 in 11 tertiary care centers in different geographic areas across Lebanon to collect carbapenem nonsusceptible Enterobacteriaceae and A. baumannii strains. All selected strains were subject to phenotypic tests including antibiotic susceptibility testing, synergy testing between third/fourth generation cephalosporins and imipenem with clavualnic acid, cloxacillin effect, modified Hodge test, efflux pump inhibitor tests, and EDTA synergy for metallo-β-lactamases. Carbapenemase genes were detected using PCR-sequencing, and insertion sequences IS1999 and ISAba1 were respectively investigated in Enterobacteriaceae and A. baumannii. The position of ISAba1 relative to genes encoding Acinetobacter-derived cephalosporinases (ADCs) and OXA-23 carbapenemase was studied using PCR-mapping. Study of the clonal relatedness of the strains was performed by pulsed field gel electrophoresis for Enterobacteriaceae and by enterobacterial repetitive intergenic consensus sequence-based PCR (ERIC-PCR) for A. baumannii. In 2012, 102 out of 8717 (1.2%) Enterobacteriaceae, and 638 out of 723

(88%) A.baumannii isolated from 11 Lebanese hospitals were nonsusceptible to carbapenems. Forty-four carbapenem nonsusceptible enterobacterial isolates were further analyzed. Of these, Escherichia coli and Klebsiella pneumoniae displayed carbapenem intermediate or resistant phenotypes, concurrent either with sensitivity or resistance to tested cephalosporins and aztreonam. All E. cloacae, Serratia marcescens, Serratia odorifera, and Salmonella enterica subsp. arizona isolates were highly resistant to β-lactams tested, while one M. morganii isolate was resistant to cephalosporins and aztreonam but intermediate to carbapenems. Synergy between clavulanic acid and third/fourth generation cephalosporins was observed for 31 strains including 11 K. pneumoniae, 6 E. coli, 9 E. cloacae, 4 S. marcescens, and 1 M. morganii. These isolates were candidates for extended-spectrum β-lactamase (ESBL) genes detection. None of the isolates displayed synergy between clavulanic acid and imipenem, indicating the absence of ESBLs with carbapenem-hydrolyzing activity. Inhibition zones of third/fourth generation cephalosporins on Mueller-Hinton agar plates with cloxacillin increased for 2 K. pneumoniae and 2 E. coli, indicating the possibility of production of an acquired AmpC cephalosporinase. In 2 out of 9 E. cloacae strains, 3 out of 5 Serratia strains, and in M. morganii, the cloxacillin test was positive. In the remaining strains, the test was negative, possibly due to lack of hyperproducion of a chromosomal AmpC, or to masking by co-production of an ESBL or a carbapenemase. The cloverleaf-like growth pattern in the modified Hodge test was positive for 35 enterobacterial strains including 15 K. pneumoniae, 8 E. coli, 7 E. cloacae, 4 S. marcescens, and 1 M. morganii. Genotypically, 31 (70.4%) strains harbored blaOXA-48 gene including 15 K. pneumoniae, 8 E. coli, 4 S. marcescens, 3 E. cloacaeand 1 M. morganii. Twenty-four (77.4%) OXA-48 positive strains co-harbored an ESBL of the type CTX-M group 1 or SHV, while one (3.2%) co-harbored an acquired AmpC of the ACC type. No tested carbapenemase genes were detected in the remaining 13 Enterobacteriaceae strains, where carbapenem resistance was attributed to the production of acquired AmpC cephalosporinases of MOX or CIT types, outer membrane impermeability and/or efflux pump overactivity. DNA macrorestriction analysis of the OXA-48 producing strains revealed clonal relatedness among 4 K. pneumoniae, 2 E. coli, 2 E. cloacae and 3 S. marcescens. PCR detection of insertion sequence IS1999 known to mobilize blaOXA-48 revealed a positive result for 90% of OXA-48 producers. In parallel, one hundred forty two A. baumannii strains resistant to ceftazidime, cefotaxime, cefepime, aztreonam and imipenem were studied. Synergy between clavulanic acid and imipenem was observed in the majority of the strains suggesting production of an extended-spectrum β-lactamase with carbapenem-hydrolyzing activity. Positive cloxacillin test indicated the activity of ADCs, while EDTA-detection strips were negative excluding synthesis of metallo-β-lactamases. In genotypic analysis, 90% of thestudied isolates co-harbored blaOXA-23 and blaGES-11. The remaining isolates harbored blaOXA-23, blaOXA-24, blaGES-11, or blaOXA-24 with blaGES-11. ISAba1 was located upstream of genes encoding for ADCs and OXA-23 in respectively 96% and 100% of the isolates. This positioning of ISAba1 highlights its role in promoting the expression of bla genes and increasing the level of resistance to β-lactams. ERIC-PCR fingerprinting revealed 18 pulsotypes disseminated among different hospitals. This study is not only the first nationwide investigation of carbapenem resistance, but is also the first report of OXA-23, OXA-24 and GES-11 carbapenemases and enterobacterial acquired AmpC cephalosporinases in Lebanon. It reveals that carbapenem resistance in Lebanon is still low in Enterobacteriaceae, but is markedly higher in A. baumannii. Fingerprint analysis indicates that horizontal transfer is the major mediator of OXA-48 spread in Enterobacteriaceae, while clonal dissemination is mostly responsible for diffusion of OXA-23 and GES-11 producing A. baumannii. With current instability and population displacement in the region, carbapenem nonsusceptible strains are expected to further escalate and spread. Close monitoring and active surveillance of carbapenem resistance in Lebanon is therefore imperative.

Quality of Life and Risk Factors of Dyslipidemic Patients in Lebanon: A Cross-sectional Study

Akram Farhat and Mayssam Bou zeid (Lebanese University, Lebanon); Amal El Hajj, Pascale Salameh and Samar Rachidi (Université Libanaise, Lebanon); Ahmad Yassine (Lebanese University, Lebanon); Wafaa El Bawab (Université Libanaise, Lebanon); Sanaa Awada (Faculty of Pharmacy, Lebanese University, Lebanon)

Introduction: Dyslipidemia is one of the major contributors for cardiovascular comorbidities. Measurement of Quality of life (QOL) is important to assess the health status of dyslipidemic patients. Objective: The primary objective of this study was to evaluate the risk factors of dyslipidemia and the impact of disease on the patient's QOL. The secondary objective was to determine the prevalence of dyslipidemia in Lebanon and to assess the predictive factors affecting the QOL of these patients. Methods: We conducted a cross-sectional observational study, between March and June 2014, in all districts of Lebanon on a sample of the Lebanese population, of both sex and age greater than 18 years. The assessment tool was a standardized questionnaire, where the quality of life was measured by using the SF-36 score. Bivariate and multivariate analyzes were conducted. A subgroup analysis was also performed. Results: Four hundred fifty-two individuals were interviewed during this study, of which 59.5% were women. The average age of the population was 43.3 ± 15.6 years, and 24.8% had dyslipidemia. The bivariate analysis shows that the 8 dimensions of SF-36, the two physical and mental component summary (PCS and MCS respectively), and the overall QOL score (57.9% and 76.5% for cases and controls respectively) were significantly lower among patients with dyslipidemia, than controls ($p < 0.001$). Logistic regression performed on subjects over 30 years, including 110 cases and 221 controls, shows that waterpipe smoking (ORa = 4.113, 95% CI: 1.696-9.971, $p = 0.002$) hypertension (ORa = 3.597, 95% CI: 1.818-7.116, $p < 0.001$), diabetes (ORa = 3.441, 95% CI: 1.587-7.462, $p = 0.002$), were the most risk factors significantly related to dyslipidemia. Having a normal BMI (ORa = 0.056, 95% CI: 0.020-0.161, $p < 0.001$) or being overweight (ORa = 0.281, 95% CI: 0.112-0.704, $p = 0.007$), compared to obese people, as well as monitoring of fat dietary (ORa = 0.319, 95% CI: 0.199-0.513, $p < 0.001$) are considered as protective factors. The QOL score decreased by being unemployed ($p < 0.001$), being overweight or obese ($p = 0.004$) as well

as the smoke exposure (p <0.001) and increased by sport (p<0.01). A higher total QOL score (p = 0.013) was observed in patients treated with statins in comparison to other anti-dyslipidemic medication Conclusion: In addition to the clinical and economic consequences, dyslipidemia may have a significant impact on patient's QOL. Further researches are needed to confirm the impact of treatment on the QOL of dyslipidemic patients.

Studies of the methylsulfonylchalcones effect on the induction of apoptosis in prostatic cancers cells. Analysis of involved signaling pathways

Bassel Ismail and Mona Assaf (Lebanese University, Lebanon)

Prostate cancer is the most common malignant cancer in men and the second leading cause of cancer deaths. Prostate cancer is initially responsive to hormonal therapy; however, in most cases, it becomes androgen-independent, evolving into more aggressive disease. Limited success has been achieved in extending the survival of patients with metastatic and hormone-refractory prostate cancer(HRPC). Furthermore, there is a strong need for novel agents in the treatment and prevention of HRPC. The first aim of this work focuses on the anti proliferative and apoptotic effect of two novel synthetics methylsulfonylchalcones, RG003(2'-hydroxy-4-methylsulfonylchalcone) and RG005(4'-chloro-2'-hydroxy-4-methylsulfonylchalcone). We showed that these compounds induced apoptosis through the intrinsic pathway but not through the extrinsic one, and inhibited the Akt/NF-κB/COX-2 survival pathway in prostate cancer cells, with a dominant effect for RG003. The second aim of this work is to increase the apoptotic effect of the strongest compound, RG003, via combined treatment with TRAIL. Our results show that RG003 enhance the TRAIL effect via the up regulation of DR5 receptor and AP-1activity, and down-regulation of the Bcl-2, PI3K/Akt, NF-kappaB and COX-2 survival pathways. When used in combined treatment, RG003 and TRAIL amplified TRAIL-induced activation of apoptosis, effectors leading to strong apoptotic mechanism in prostate cancer cells.

Inula viscosa and Inula vulgaris Ameliorates Peripheral Neuropathy in Mice

Mohammad Assi (Beirut Arab University, Lebanon); Maha Aboul Ela, Karim Raafat and Abdalla El-Lakany (Faculty of Pharmacy Beirut Arab University, Lebanon)

Peripheral neuropathy has an increasing prevalence because it is a common side effect of several ailments such as infections, diabetes mellitus, autoimmune disorders and malignancies. Diabetic neuropathy (DN) is among the most common of all the long-term complications affecting up to 50% of diabetic patients. Inula species have been used in folk medicine as neuroactive, expectorant, antitussive, diaphoretic, antiemetic, and bactericide effects. The objective of this study is to evaluate the DN amelioration efficacy of two indigenous Lebanese plants, namely, Inula viscosa and Inula vulgaris, in a DN model in mice. After 8 weeks of induction of diabetes by alloxan in mice (six groups, three mice/group), hot plate and tail flick tests were utilized to assess the DN management efficacy. Inula viscosa and Inula vulgaris were found to have in-vivo antioxidant potential and were effective in controlling DN. This amelioration of DN could be related to the potential antioxidant activity of these neuroactive plants. In conclusion, Inula species showed results comparable to tramadol in reversing the long standing diabetes induced complications such as peripheral neuronal dysfunction.

Could a genotyping test along with clinical factors be used for a better management of acute postoperative pain?

Aline Hajj (Universite Saint Joseph, Lebanon); Katell Peoc'h (Université Paris Descartes, Lebanon); Jean-Louis Laplanche (Université Paris Descartes, France); Hicham Jabbour, Nicole Naccache, Hicham Abou Zeid and Patricia Yazbeck (Hôtel-Dieu de France Hospital, Lebanon); Lydia Khabbaz (Université Saint Joseph, Lebanon)

Individualization of acute postoperative pain on an evidence-based decision process is a major issue. The aim of this study is to investigate the influence of genetic and non-genetic factors on the variability to morphine's response in acute postoperative pain. A group of nighty-five patients undergoing major surgery were included prospectively. At 24 hours, a logistic regression model was carried out to determine the factors associated with morphine doses given by a Patient Controlled Analgesia device. The dose of morphine was associated with age (p=0.011), patient weight (p=0.025) and the duration of operation (p=0.030). This dose decreased with patient's age and duration of operation and increased with patient's weight. OPRM1 and ABCB1 polymorphisms were significantly associated with administered dose of morphine (p=0.038 and 0.012 respectively). Patients with at least one G allele for c.118A>G OPRM1 polymorphism (AG/GG) needed 4.1 times the dose of morphine of AA patients. Additionally, patients with ABCB1 CT and CC genotypes for c.3435C>T polymorphism were 5.6 to 7.1 times more prone to receive higher dose of morphine than TT patients. Our preliminary results support the evidence that OPRM1 and ABCB1 genotypes along with age, weight and duration of operation have an impact on morphine consumption for pain relief for acute postoperative pain treatment.

Inhibition of epigenetic regulation as a therapy for pediatric high grade glioma

Tamara Abou-Antoun (Lebanese American University, Lebanon); Stephen Dombrowski (Cleveland Clinica Foundation, USA)

Pediatric high grade glioma (HGG), which ranks among the most lethal of cancers among children, contain two recurrent mutations within the histone H3.3 gene H3F3A (K27M and G34R/V). Recent studies have now shown H3 K27M mutations have specific alterations in methylation of endogenous histone H3 at

Lys27 and global reduction of H3K7me3 on chromatin suggesting these mutations are directly linked to epigenetic regulation. It is not clear whether specific epigenetic regulatory mechanisms may be involved in H3K27M-tumor proliferation and growth, and contributes to their therapeutic resistance and rapid recurrence, or is common among wild-type pediatric HGG. Our investigation focused on distinguishing H3 K27M from wild-type (non-H3.3 mutation) tumors based on cellular hierarchy and pharmacotherapies targeting histone deacetylase (HDAC) and methyltransferase (HMT), p53 and bromodomain mechanisms to disrupt tumor growth and survival. Preliminary results from our lab (90 epigenetic compounds tested) have identified more than twenty effective drugs that killed or altered proliferation and growth in five pediatric HGG in vitro which had no adverse effect on non-neoplastic "normal" cells. Top candidates, which included 3 HMT and 17 HDAC inhibitors, did not preferentially affect tumors with H3 K27M mutation. It was noted that broad HMTi had greater effectiveness than more specific ones suggesting the influence of global methylation on survival. We are validating these findings in additional HGG cell lines and through in vivo studies, and determining whether other co-mutations exist. Additional studies are ongoing to identify specific epigenetic mechanisms that are unique to pediatric HGG with H3 K27M mutation or which may increase sensitization to current radio- and chemotherapy ultimately leading to improve patient outcome.

TR1: Table Ronde 1

Restructuration de la Recherche Scientifique dans un Etablissement d'Enseignement Supérieur
Intervenants: Jean-Pierre Gesson, Fadel Moukalld, Fawaz El Omar, Naim Ouaini, Hervé Sabourin, Dolla Karam Sarkis,

Room: USJ Salle Polyvalente E5

Chairs: Mouin Hamze (National Council for Scientific Research, Lebanon), Ahmad K Jammal (MEHE - Republic of Lebanon & Directorate General of Higher Education, Lebanon)

TECP2_Chimestry: Theoretical and Experimental Chemistry and Physics I

Room: USJ Salle Zaarour

Chairs: Madona Boulos (Universite Libanaise, Lebanon), Nicolas Louka (Saint Joseph University, Lebanon), Mirvat Zakhour (Lebanese University, Lebanon)

Syngas production over Ni-Co/ZSM5 catalysts

Jane Estephane, Samer A Aouad, Jad Zaghloul, Joseph Saba, Billal El Khoury, Henri El Zakhem and John Hanna El-Nakat (University of Balamand, Lebanon); E. Abi Aad (Université Lille Nord de France, France)

ZSM5 supported nickel and/or cobalt monometallic and bimetallic catalysts were prepared with a 7wt.% total metal loading using the wet impregnation method. The CO2 reforming of methane reaction was carried out in the 600°C to 800°C temperature range over the different catalysts (GHSV 60000 mL.g-1.hr-1). The cobalt containing solids favored the reverse water gas shift reaction at high temperature. Carbon deposition was less expressed over solids with high cobalt content. Following 12 hours on stream at 700°C, the bimetallic catalyst with cobalt to nickel ratio of 2, showed high CO2 and CH4 conversions (~60%) accompanied with the lowest carbon deposition (5%). The thermal analysis of aged catalysts showed that among the deposited carbon species, it is the carbon present in the proximity of nickel and/or cobalt catalytic sites that is responsible of deactivation.

Aminocarbene Adducts: Design of a Transfer Agent

Bassem Bassil (University of Balamand, Lebanon)

Mono- and diaminocarbenes have evolved during the past two decades from a chemical curiosity to a very well established class of ligands in organometallic chemistry, alongside applications in technical and pharmaceutical processes.The most common carbene ligands in coordination chemistry are N-heterocyclic carbenes (NHC) of N,N’-substituted imidazol-2-ylidenes, as they can be isolated in their free form as "bottleable carbenes", having coordination properties often compared with the well-established phosphine ligands. In contrast, synthetic pathways for complexes using non-stable carbenes are more constrained. We have been active in the synthesis of main group aminocarbene adducts, as fewer examples are known in the literature compared to the more studied transition metal analogues. This is despite the insight given by the organo-main-group compounds into the kind of chemistry that was only known for d- and f- block elements.

Determination of selected toxic heavy metals levels and their risks, in various types of food stuffs consumed by the Lebanese

Pierre Obeid, Cherine Saliba and John Hanna El-Nakat (University of Balamand, Lebanon)

Knowledge of trace and toxic metal concentrations in food and other matrices is important for assessing the effects and risks of such pollutants on human health. Many studies have been conducted at our laboratory to test the presence of lead (Pb), cadmium (Cd), chromium (Cr), arsenic (As), and mercury (Hg) in different matrices such as vegetables, fish products, meat products ,olive fruits, olives leaves and in soil. Samples were collected from various areas in Lebanon and digested with a specific protocol according to the matrix type of each. Digested samples were analyzed using graphite furnace atomic absorption spectroscopy (GFAAS) for the determination of Pb, Cd, Cr, and As levels, whereas Hg levels were determined using the Flow Vapor Generation (VP100) and reduction of mercury. All samples were analyzed in triplicate and included blanks and certified reference material (CRM) to validate the analysis. Recovery percentages ranged between 80% and 120% and calibration curve fits ranged between 0.995 and 1. The obtained results clearly showed that the levels of specific toxic metals in various types of samples were higher than their corresponding provisional tolerable weekly intake levels. This suggests that individuals consuming such products are at definite health risk from being exposed to such toxic heavy metals and that awareness should be made in order to minimize such exposures.

Synthesis and Applications of Aqueous Soluble Metal and Metal oxide Nanoparticles

Kamil Rahme (Notre Dame University, Lebanon); Justin Holmes (University College Cork, Ireland)

In this paper, we will focus on the synthesis, stabilization and characterization of aqueous soluble noble metal nanoparticles (Gold (Au), and Silver (Ag)) and metal oxide nanoparticles (Fe3O4, Fe2O3). Furthermore, the successful applications of these highly stable nanoparticles dispersion in catalysis, biology, and drug delivery carrier will be demonstrated. Finally, a new application of iron oxide nanoparticle as catalysts in the growing control of Germanium (Ge) nanowire diameters, in the sub-10 nm regime, is achieved through the use of magnetite seeds. The minimum expansion and aggregation of the nanoparticle catalysts, their biologically friendly method of synthesis, and surface chemistry, proved beneficial for precise control over nanowire diameters, cytotoxicity assays and drug delivery efficiency.

Inhibition of the acidic corrosion of mild steel by Thiobarbituric acid

Hanan Rahal, Ashraf Moustafa Abdel Gaber and Ghassan Younes (Beirut Arab University, Lebanon)

The corrosion inhibition of mild steel by 2-thiobarbitruic acid (TBA) in 0.5HCl at 300C was studied using potentiodynamic, electrochemical impedance techniques and quantum chemical calculations. The results indicates that thiobarbituric acid exhibits good performance as inhibitor for mild steel corrosion in HCl. The inhibition efficiency increases with increasing concentration of inhibitor. It reaches its maximum at 2x10-2M give 83.89%. Potentiodynamic polarization studies indicated that TBA is a cathodic type inhibitor. Calculated thermodynamic parameters provided evidence on thee adsorption mode of TBA. It was found that the adsorption of TBA took place through physisorption process that obeyed kinetic-thermodynamic and Temkin models. Quantum chemical parameters were calculated and discussed.

KOH/ZSM5 catalysts for biodiesel production from refined sunflower vegetable oil

Tony Saba, Jane Estephane, Billal El Khoury, Maroulla El Khoury, Henri El Zakhem and Samer A Aouad (University of Balamand, Lebanon)

ZSM5 zeolite was used as support to prepare catalysts with different KOH loadings (15 wt.%, 25 wt.% and 35 wt.%) using the wet impregnation method. The catalytic activity of these catalysts was investigated for the transesterification of edible sunflower oil at 60°C reaction temperature, 12:1 methanol to oil molar ratio, and 6 wt.% of catalyst loading. It was found that 35 wt.% of KOH supported on ZSM5 (35KOH/ ZSM5) exhibited the best catalytic performance. In order to optimize the biodiesel yield, the factors affecting the transesterification reaction such as reaction time, methanol to sunflower oil molar ratio, and catalyst to oil mass ratio were investigated for the 35KOH/ZSM5 catalyst. A 80.3 % of FAME conversion was achieved in 4 h at 60°C with 15:1 methanol to oil molar ratio and 9 wt.% of catalyst loading.

11:30 - 13:00

P1_BIO1_medicale: Poster Session 1- Biological, Medical, Pharmaceutical, Health Sciences I

Room: USJ Hall CSH

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Laure Chamy (Université Saint Joseph, Lebanon), Marc Karam (University Of Balamand, Lebanon)

Etude de l'activité neutralisante anti-Coxsackievirus B de la salive des patients diabétiques de type 1 et des sujets contrôles au Liban

Juliano Haddad (Université Libanaise, Lebanon)

Le Diabète de type 1(DT1) est une maladie auto-immune dirigée contre les cellules pancréatiques et survenant sur un terrain génétiquement prédisposé. Le DT1 se caractérise par une absence de production d'insuline provoquée par une destruction auto-immune à médiation cellulaire des cellules β des îlots de Langerhans du pancréas, les seules cellules de l'organisme connues pour la production d'insuline. Les cellules β fonctionnent comme un détecteur de glucose, elles libèrent de l'insuline afin de maintenir des niveaux physiologiques normaux de glucose dans le sang. Elles constituent donc beaucoup plus que juste une usine à insuline. Une fois que ces cellules sont détruites, le contrôle du glucose sanguin sera perdu, entrainant des conséquences aiguës telles que l'acidocétose et des complications secondaires telles que les maladies cardiaques, la cécité et l'insuffisance rénale. La destruction auto-immune est irréversible et la maladie est incurable. La relation entre les entérovirus(EVs), en particulier les Coxsackievirus de type B(CVB) et le DT1 chez les personnes prédisposées génétiquement a été mise en évidence par le Professeur D. Hober. Pour la première fois en 1969, les chercheurs ont noté que les anticorps anti-CVB ont été trouvés plus fréquemment chez les patients diabétiques de type 1 que chez les sujets témoins. L'ARN des CVB et, en particulier, le sérotype B4 qui est l'espèce d'EVs la plus fréquemment impliquée dans le développement de DT1, a été détecté dans les cellules mononucléées du sang périphérique(PBMC) des patients atteints de DT1. Dans notre étude, nous rapportons pour la première fois la relation entre CVB et DT1 au Liban, pour celà on a procédé à tester in vitro, à l'aide d'un test de neutralisation, l'activité neutralisante anti-CVB dans la salive des sujets diabétiques et témoins au Liban. Nos travaux montrent que l'activité neutralisante anti-CVB de la salive peut être mise en évidence à l'aide d'une méthode biologique faisant appel à des cultures de cellules en lignée continue(Hep-2 et GMK) et les sérotypes 1, 2, 3, 4 et 5 des CVB. Nos résultats(13/82 diabétiques sont positifs pour le CVB2/3/4) confirment cette relation entre l'infection par le CVB et l'apparition du DT1. Notre étude a montré que les CVB 2, 3 et 4 sont détectables au Liban, selon une répartition qui varie avec les différentes régions. A noter que parmi les DT1 le pourcentage de CVB4(13,4%) est plus important que celui de CVB 2 et 3(1,21%). Enfin, notre étude permet de mettre en évidence une relation assez étroite entre l'infection par les CVB et le développement du DT1 au Liban.

CD3bright γδ T cells are early IL-17A-producers during acute pneumococcal infection

Maya Hassane (Lebanese University, Lebanon)

Interleukin-17A is a pro-inflammatory cytokine that plays an important role at mucosal sites in a wide range of immune responses including infection, allergy and auto-immunity. γδ T cells are recognized as IL-17 producers, but based on the level of CD3 expression we have recently defined the remarkable ability of a pulmonary CD3bright Vγ6/Vδ1+ T cell subset with an effector memory phenotype to rapidly produce IL-17A. During pulmonary pneumococcal infection, we show that IL-17A is critical for mice survival given that IL-17AKO mice were more susceptible to the infection in comparison with WT mice. In this context, we demonstrated that CD3bright Vγ6/Vδ1+ γδ T cells are the major source of IL-17A during the early course of infection in a mechanism involving IL-23 and IL-1β. These two cytokines are preferentially produced by conventional CD11b+ dendritic cells and neutrophils. Moreover,their rapid response to infection might be explained by their particular localization in the lung tissue. Unlike other innate-like T cells that preferentially reside in the lung tissue as marginated cells, CD3bright γδ T cells are almost exclusively represented in the interstitial compartment. Interestingly, dendritic cells were also observed to be localised in this latter compartment. Finally, we are currently investigating the role of IL-17-producing CD3bright γδT cells during acute pneumococcal infection. In the future, this might lead to the design of new prophylactic/therapeutic strategies employing tailored γδ T cell-based immunotherapy.

Valeurs spirométriques des enfants Djiboutiens scolarisés âgés de 6 à 16 ans: Résultats préliminaires

Idleh Abar Allaleh (Université de Djibouti, Djibouti); Meriem Denguezli (Faculté de Médecine IBN EL JAZZAR, Tunisia); Mohamed Kileh Wais and Elmi Rayaleh Waiss (Université de Djibouti, Djibouti); Zouhair Tabka (Faculté de Médecine IBN EL JAZZAR, Tunisia)

Les travaux de recherche rapportés dans cette thèse visent à établir les valeurs de référence spirométriques et à analyser l'effet de l'activité physique, des facteurs morphométriques, socio-économiques et environnementaux sur les variables ventilatoires chez les enfants Djiboutiens. Une première étude permettra de proposer des équations prédictives des volumes pulmonaires et des débits maximaux expirés chez un échantillon représentatif d'une population saine d'enfants de Djibouti (67 filles et 92 garçons) âgés de 6 à 16 ans. Ces équations sont réalisées, pour chaque sexe, par régression linéaire (modèle logarithmique) de chaque variable ventilatoire incluant la taille comme variable indépendante. Les valeurs de référence spirométriques Djiboutiens sont proches de celles établies en Afrique noir et dans certains pays d'Asie cependant, elles sont nettement inférieures à celles des enfants Européens et des États Unies. Une autre étape de cette étude tente de montrer que les paramètres morphologiques, le niveau socio-économique et l'activité physique et sportive améliorent significativement les volumes

pulmonaires et les débits maximaux expirés. Le caractère multiethnique de la population de Djibouti est un argument loin d'être captieux et fera sans nul doute de cette étude très utile en pratique médicale pédiatrique, dans la prévention, le diagnostic et le suivi évolutif des maladies cardio-pulmonaires.

Acinetobacter baumanii in Lebanese patients: resistance and pathogenicity

Elias Dahdouh (Complutense University of Madrid, Lebanon); Micheline Hajjar (University of Balamand, Lebanon); Monica Suarez (Complutense University of Madrid, Spain); Ziad Daoud (University of Balamand, Faculty of Medicine & Centre Hospitalier du Nord Hospital, Lebanon)

Objectives: Acinetobacter spp. is an opportunistic pathogen that is showing increasing rates of antimicrobial resistance worldwide. This organism is known to be efficient in acquiring resistance and causing treatment failure. In this study, our aim was to study Acinetobacter spp. isolates from a Lebanese hospital in terms of antimicrobial resistance and virulence. Methods: 95 isolates were obtained from the Saint George Hospital - University Medical Center in Beirut over a time period extending from June 2013 until June 2014. Antimicrobial Susceptibility Testing (AST) was done using the Kirby Bauer technique and the phenotypic detection of resistance was done as previously described (Birgy et al., 2012). In this method, Mueller Hinton plates (MHA) impregnated with 5mM of EDTA, 10mg/mL of Phenyl Boronic Acid (PBA), and 250µg/mL Cloxacillin (embedded) were used respectively for the detection of Metallo β-Lactamases (MBLs), Klebsiella Pneumoniae Carbapenemases (KPCs), and overproduction of AmpC. Additionally, the disks were arranged in a manner where a keyhole effect could be observed for the detection of Extended Spectrum β-Lactamases (ESBLs). The rate of surface motility of the isolates was determined through inoculation on 0.3% Luria Bertani Agar and the measurement of motility at different time points. Hemolysis was determined through inoculation on Blood Agar and observation for 6 days. Biofilm formation was detected by staining of polystyrene tubes with 1% crystal violet after an overnight incubation. Results: Seventy nine isolates (83.2%) were resistant to meropenem. Of these, 2 were resistant and 3 were intermediately resistant to colistin. Eighty four isolates (88%) were resistant to ciprofloxacin and 78 (82%) were resistant to gentamycin. Only 3 strains (3.2%) were resistant to tigecycline. Phenotypically, 27 of the carbapenem resistant strains showed more than 1 mechanism of resistance. MBL was detected in 12 strains, KPC in 31 strains, ESBL in 30 strains, and overproduction of AmpC in 9 strains. Motility rates varied among the isolates from 0.06µm/s to 0.75µm/s. One strain stood out in terms of motility where it showed a motility rate of higher than 2.2µm/s. Hemolysis was detected in 3 strains and only 4 strains were negative for biofilm production. Conclusion: Our data show a high rate of carbapenem resistance. Statistical correlation between the different mechanisms of resistance and the possible cost in terms of virulence, as well as the growth curves for the strains needs to be studied. Finding any correlation between carbapenem resistance and virulence factors could shed new light on how to treat these organisms.

Carbapenem Resistant Enterobacter cloacae in the wastewater of a Lebanese Hospital

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Objective: The Middle East is an area of hyperendemicity of resistant bacteria. ESBL producing organisms pose a severe problem for hospitalized patients and Carbapenem Resistant Enterobacteriaceae are increasingly isolated from different Lebanese patients. In the absence of an efficient community sanitation and sewage disposal, the risks for transmission of hospital organisms into the community are high and pose a public health concern. Our objective was to study the occurrence of Multi-Drug-Resistant Gram Negative Bacilli in a Lebanese hospital sewage treatment plant and to investigate the related mechanisms of resistance. Methods: Wastewater samples were collected between February and August 2011. Water samples were filtered using 0.45 µm membrane and cultivated on VACC as a selective medium. The phenotypic detection of ESBLs, AmpCs, MBLs, and KPCs production was performed using respectively plain Mueller Hinton plates (MHA) and agars impregnated with 5mM of EDTA, 10mg/mL of Phenyl Boronic Acid (PBA), and 250µg/mL Cloxacillin (embedded). In addition, temocillin discs were used for the presumptive detection of OXA enzymes. The disks were arranged in a manner where a keyhole effect could be observed for the detection of Extended Spectrum β-Lactamases (ESBLs). PCR was used for the detection of the genes TEM, SHV, CTXM-15, OXA-48, NDM-1, OMPF and OMPC in the seven Enterobacter isolates and PFGE was performed to determine the relatedness of these isolates. Results: A total of 23 MDR Enterobacteriaceae were isolated during the period of the study including Enterobacter spp, as the most frequently isolated organisms, E.coli, Klebsiella, Citrobacter, and Serratia. 11 strains (47.8%) were ESBL positive, with the highest occurrence in Klebsiella spp, followed by E.coli spp and Enterobacter spp. Chromosomal and plasmidic AmpC were detected respectively in 19 (82.6%) and 13 (56.5%) of the isolates. The most common ESBLs were bla-CTXM and TEM that co-existed in 95.6% of the isolates, SHV was not found. Only 1 Enterobacter cloacae isolate (strain 68) showed full resistance to carbapenems. Among the eight isolates of Enterobacter cloacae that were selected as representatives of the different phenotypic profiles for genotypic studies, 2 were positive for Oxa-48 (strains 23'r and 5.2), however, they showed low MICs (0.5 and 0.25 ng/ml), 2 were positive for NDM-1 (strains 68 and 5.2), only one of them (strain 68) was resistant to carbapenems with an MIC of 16 ng/ml. This latter, gave positive results for both OMPF and OMPC. As per the dendrogram below, Enterobacter 68 and 5.2 share almost 80% of similarity. Conclusion: It should be mentioned that the isolation of this NDM-1 producing Enterobacter

cloacae from hospital waste water occurred almost a year before the first case of carbapenem resistant Enterobacter was detected in the laboratory hospital. Understanding the local epidemiology of resistance in hospitals should include areas of potential resistance such as wastewater and hospital environment.

Telomerase inhibition decreases Alpha-fetoprotein expression in Hepatocellular Carcinoma cells in vitro and in vivo: Possible involvement of Interleukin-6 induced PI3K/Akt/mTor pathway

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Introduction: Hepatocellular Carcinoma (HCC) is an invasive cancer with high metastatic characteristic. Alphafoetoprotein (AFP) is a diagnostic marker for HCC. A direct relationship between poor prognosis and the concentration of serum AFP was noted. Telomerase, an enzyme stabilizing telomere length, is expressed by 90% of HCC. The telomerase is composed of one proteic subunit (hTERT, Human Telomerase Reverse Transcriptase) and an RNA template (hTR, Human Telomerase RNA). The aim of our study was to investigate the effect of telomerase inhibition on AFP secretion and the involvement of PI3K/Akt/mTOR signaling pathway which is activated by the inflammatory cytokine IL-6 in Hepatocellular Carcinoma HepG2/C3A Cell line. Material and method: The HepG2/C3A were cultured in DMEM 1g/L with 10% FBS, 1% P/S and 1% NEAA, and incubated at 37o with 5% CO2. The proliferation and viability test were performed using tetrazolium salt. Cells apoptosis was determined by Annexin V affinity assay. The concentration of AFP and caspase-3 were measured using ELISA kits. The assessment of AFP mRNA expression was done using RT-PCR technique. Cells migration ability was evaluated using boyden chamber in 24-well plate. The effect of costunolide on AFP production in vivo was tested in NSG mice. Results and discussion: Costunolide and BIBR1532 (5 or 10uM), two telomerase inhibitors, decreased significantly the AFP production in cells supernatant and at the mRNA level, not by an apoptotic effect, but by their action on telomerase. This has been demonstrated by a siRNA test and an Annexin V affinity assay. Interestingly, inhibition of PI3K/Akt/mTOR signaling pathway by wortmanin, PI822, GSK1059615 and rapamycin lead to a decreasing in AFP concentration suggesting the involvement of this pathway in AFP regulation. Moreover, an additive/synergistic effect was shown, when costunolide and BIBR were combined with the previous inhibitors. Decreasing in AFP concentration was also shown when cells were treated SPC0213, a PKC inhibitor. Indeed, treated cells with IL-6 (25ng/ml) showed a transitional increasing of AFP production after 8h and a decreasing effect after 10h, suggesting the involvement of IL-6 in AFP production modulation. The migration ability of HepG2/C3A cells decreased significantly after treatment for 24h with costunolide at 10uM ($p=0.0021$), BIBR at 10uM ($p=0.0043$) and rapamycin, an mTOR inhibitor, at 200nM ($p=0.0097$). Costunolide administred at 30mg/kg daily from day 12 of injection of HepG2/C3A cells, was found to decrease significantly the AFP concentration in serum NSG mice compared with the vehicule control ($p=0.0123$). Conclusion: Both inhibition of telomerase and PI3K/Akt/mTOR signaling pathway decreased the AFP production and the migration of HepG2/C3A cells.

Inborn Errors of Metabolism Highlights in Oman: Collaborative model

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Inborn errors of metabolism (IEM) are significant cause of morbidity and death among children. Remarkable emerging technology tandem mass spectrometry (MS/MS) allows the ability to increase drastically the number of IEM diseases that can be detected from a single dried blood spot. Developing countries face challenges in IEM analytical platforms and human resources. The USJ-newborn screening laboratory acquired MS/MS in 2007 and became a regional reference; represent the MENA region at International Society for Neonatal Screening Council (www.isns-neoscreening.org), aim to transfer the know-how to the region for many countries Iraq, Oman, Libya, Tunis and others. We are going to present the outcome of the collaboration with Royal hospital in Oman via Cerba-Paris. Among 516 samples were sent to USJ for IEM investigation in three years, 145 found to be positive cases. The high incidence is due that those were sick babies with symptoms evoking metabolic disorder: perinatal asphyxia, seizures, hypotonia, organ failure, psychomotor delay, mental retardation and others or with family history. Major finding were related to G6PD deficiency (117) and galactosemia (GAL) 8 cases. The etiology of these finding was supported by local physicians. The high incidence of G6PD is due to malaria resistance and there is a cluster of GAL in some tributes. This collaboration should continue meanwhile to assure know-how transfer even after their inquiry of the equipment to reduce false negative and false positive rate as a case of pyruvate carboxylase was diagnosed as citrullinemia by their local resources.

Superior Mesenteric artery syndrome: clinical, endoscopical and radiological correlations according to a single-center experience

Giovanni Tomasello (University of Palermo, Italy)

Background and aim:The superior mesenteric artery SMA) syndrome is a rare entity presenting with upper gastrointestinal tract obstruction and weight loss, due to the compression of the third part of duodenum between the aorta and the SMA. Studies to determine the optimal methods of diagnosis and treatment are essential. This study aims to analyze the clinical presentation, the diagnosis and the management of

this syndrome. Material and methods: Over a 2-year period(2013-2014), 8 cases of SMA syndrome (out of 2074 esophagogastroduodenoscopies, EGDS)) were initially suspected through EGDS. Therefore, these patients performed computed tomography(CT)scan to confirm the diagnosis. Once the diagnosis was confirmed, the patients were referred to a gastroenterologist and to a nutritionist to discuss a personalized approach of therapy; furthermore, for each patient a surgical consultation was proposed. Results:In our series we evaluated retrospectively 8 cases of SMA 6 females), with a prevalence of 0.004%. Median age was 23.5 years (range 14-40), and median weight was 47.5 kilos (range 40-84). The median body mass index was 21 kilos/m2. Symptoms developed between 6 to 24 months(median 12). Premorbid conditions were present in four patients (Anorexia nervosa in two patients, and Spina bifida and Crohn's disease in two patients). Only 2 of 8 patients were hospitalized, due to severe malnutrition. Median aorto-mesenteric angle was 22°, and median aorta-SMA distance was 5 mm. Interestingly, all the patients improved on conservative treatment. Conclusions: To date, SMA syndrome represents a diagnostic and therapeutic challenge. With regard to previous series published, our results show: the importance of the endoscopic suspicion of SMA syndrome, confirmed by CT scan; the preponderance of a longstanding and chronic onset; a female preponderance; the importance of the nutritional counseling in the therapeutic approach; the absence of need for surgical intervention; the better diagnostic accuracy of the narrowing of the aorta-SMA distance, rather than the narrowing of the aortomesenteric angle. Further prospective studies, with a larger number of patients, are needed to clarify the best way to diagnose and manage the SMA syndrome.

Usefulness of CT colonography in patients with occlusive colorectal cancer

Giovanni Tomasello (University of Palermo, Italy)

Background: Up to 15% of patients with colorectal cancer (CRC) present with large bowel obstruction. Currently, computed tomography colonography (CTC) is regarded as a promising technique, for complete evaluation of the proximal colon and simultaneous assessment of extraluminal status. Aim: Aim of this retrospective, observational study is to evaluate the feasibility of using CTC for preoperative examination of the proximal colon before metallic stent placement in patients with acute colon obstruction caused by CRC. Methods: Institutional review board approval was obtained, and patient informed consent was waived. Sixteen patients (13, & 68.4% of whom were males) with a median age of 71 and a range 61-82). They demonstrated acute colon obstruction caused by histologically proven CRC, underwent CTC immediately after incomplete colonoscopy. Fecal/fluid tagging was achieved by using 100 mL of meglumine diatrizoate. The colon was distended by means of pressure-monitored CO 2 insufflation. The sensitivity and specificity of CT colonography in evaluating the colon proximal to the stent and CTC-related complications were assessed. Results: Per-patient sensitivity of CTC for lesions, 5 mm or larger in diameter in the colon, proximal to the stent was 100% (95% CI: 0.4385-1). Per-patient specificity for lesions 5 mm and larger in the proximal colon was 92.3% (95% CI: 0.6669-0.9863). CT colonography did not generate any false diagnosis of synchronous cancer. False positive findings at CTC did not result in a change in the surgical plan for any patients. No CTC-associated stent dislodgment/migration or colonic perforation occurred in any patient Conclusions: Despite the small number of patient of our study, our data show that CTC is a safe and useful method for preoperative examination of the proximal colon before metallic stent placement in patients with acute colon obstruction caused by CRC. Further studies with a larger number of patients and assessing the role of CTC in assessing the extracolonic findings are needed to assess the feasibility of CTC in this category of patients.

Effect of Age and Body mass index on the yield of adipose derived stem cells

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Introduction The use of adipose derived stem cell (ADSC) in plastic surgeries is in the rise due to the characteristics and the differentiation capacity of those cells. It has been reported that most of the adipocytes in fat grafting die and only those located within 300microm of the tissue edge survive. This area of survival is explained by the presence of ADSC having the capacity not only to retain the volume of fat , to promote neoangiogenesis but also to differentiate into adipose tissue making the results satisfying and long lasting. The Use of adipose derived mesenchymal stem cells is not being only restricted to plastic surgeries but due to their plasticity, their capacity of differentiation, their paracrine and trophic effects, they become the potential target for clinical research, and the interest for their use in therapies such as osteoarthritis, Alzheimer, heart defect and many other diseases is growing. Adipose derived stem cells have been proven to retain and have the same characteristics as bone marrow derived stem cells, they have been shown to be multipotent and able to differentiate into adipocytes, cartilage, bone, muscle, stroma, tendon, ligament and other connective tissues , nonetheless the harvesting of fat is minimally invasive with insignificant donor site morbidity and a low complication rate. The number of stem cells in fat is higher; it has been reported to be 100 to 1000 times more, with higher proliferation rate, and less senescence compared to bone marrow. It has been reported that the differention capacity of bone marrow derived stem cells is reduced by age; however the ADSC differentiation capacity is maintained. It has been shown by Caplan et al that when we age the number of stem cells decrease. Objectif The aim of our study is to investigate the relation between age, BMI and stromal vascular fraction SVF yields from adipose tissues. Material and methods A prospective study was conducted in 53 women and 8 men between 20 and 71 years old ,after patient consent, adipose derived stem cells were isolated from lipoaspirates using a well-established protocol. The immunophenotypic properties of freshly isolated human adipose tissue

derived stromal vascular fraction (SVF) were observed by flow cytometry.Descriptive statistical analyses were performed to calculate the mean, standard deviation, minimum, and maximum values for the scale variables of age, BMI and the number of SVF in 30ml of washed fat. Then, we calculate the percentages of categorical variables such as Sex and Sites of liposuction. A nonparametric Kruskal -Wallis test was used to compare mean cell yield ratios between various age and BMI categories. Statistical analyses were conducted using SPSS® release 21.0 (SPSS Inc., Chicago, IL, USA); P values were two-sided and the threshold for statistical significance was set at 0.07(α=7%). Results The mean number of stromal vascular fraction SVF in 30ml of washed fat was 1.66× 108/ml. The ages were separated into 4 groups young (less than 30), middle aged between (30- 40), and between (40- 50), and old group (>50). The cell yield was compared to the 4 stated groups Ten patients were younger than 40 years, they had a mean value of SVF in 30ml equal to 1.16 × 108/ml, and patients who had more than 50 years, had a mean of SVF in 30ml equal to 2.28 × 108/ml. Although the absolute median value of cell yields in the different groups varied, there was no statistically significant difference of this parameter among them (P= 0.319 > 0.07). Furthermore, no statistically significant difference exists between sex and the number of SVF in 30ml (Mann-Whitney test P= 0.121 > 0.07). Fourty seven patients with BMI less than 25 had a mean value of SVF in 30ml equal to 1.33 × 108/ml, and patients who had BMI more than 25 years had a mean value of SVF in 30ml equal to 1.61 × 108/ml with statistically significant difference of this parameter among them (P= 0.060 < 0.07). The number of cells obtained from the abdomen was 1.6× 108 /ml, from the thigh was 1.00× 107 /ml and from the flank was less than 1.00× 107 /ml (P=0.004 <0.07). CONCLUSION Cell yield shows a statistically significant correlation to the BMI and harvest site, but there are no statistically significant correlation between the cell yield, the age and the patients.

Evaluation of Benzene Exposure in Gas Station Workers in Beirut, Lebanon

Bouchra Nakhle (American University of Science & Technology, Lebanon)

Evaluation of Benzene Exposure in Gas Station Workers in Beirut, Lebanon Bouchra Nakhle1, Osama Yamani1, Stephen Rappaport2, Amer Sakr1 and Zouhair Attieh1 1 Department of Laboratory Science & Technology Faculty of Health Sciences, American University of Science & Technology, Lebanon 2 Environmental Health Sciences, University of California, Berkeley, USA nakhlebouchra@gmail.com, o.yamani@gmail.com, srappaport@berkeley.edu, asakr@aust.edu.lb, zattieh@aust.edu.lb Benzene, one of many volatile organic compounds (VOCs), is a product of petroleum refining and a minor component of gasoline. It is emitted into the air through fuel evaporation while refueling vehicle tanks, as well as through vehicle emissions due to incomplete combustion of fuel as well as through tobacco smoke. Though the simplest aromatic compound, it is the base of thousands of chemicals and commercial products. It is used in the manufacturing of many chemicals, mainly ethylbenzene for styrene and polystyrene, cumene/phenol for various resins, cyclohexane for nylon and synthetic fibers, chlorobenzene and aniline. Benzene is part of our daily life's products such as shampoo, hair products, toothpaste, toothbrushes, plastic cups, hair brushes, elastic bands, nail polish, sunscreen, paint, wood stains, nylon carpet, rubber carpet backing, laminates, plastic liners, latex mattresses, housing insulation, pharmaceuticals, laundry detergents, medical devices, food packaging, CD's, CD boxes, toys, sports equipment, computer housings, engine oil surfactants, safety helmets, automotive plastics, tires and others. However, none of these uses are significant sources of exposure to benzene. While the routes of exposure to benzene include ingestion and dermal absorption, the major route is through inhalation. Almost 50% of air benzene is absorbed through the lungs and the ingested percentage is distributed in the body and accumulates mostly in fatty tissues. Exposure to benzene derives from two main sources, industrial such as the petroleum industry as it is used as a solvent in manufacturing chemicals, plastics, adhesives, shoes, tires and rubber manufacturing and in the printing and painting industry. The other main source for benzene exposure is environmental and includes volcano emissions and forest fires. Benzene is also a natural constituent of crude oil, gasoline and cigarette smoke. Cigarette smoke being a major source of exposure to benzene results in different levels of exposure between smokers and non-smokers. Due to benzene's unclear metabolism and the severity of its toxic effects, concern of benzene exposure has increased in the environment and workplace. Gas station attendants are substantially exposed to gasoline vapors including benzene. The amount of benzene vapor inhaled can vary due to various conditions such as temperature, the percentage of benzene in gasoline, the total amount of gasoline filled by the worker during the work-shift, the length of the work-shift and others. Accordingly, due to the continuous exposure of gas station workers to benzene during refuelling of vehicles due to vapours that are displaced from the tanks into the air or in the case of an accidental spill of gasoline, exposure to benzene must be monitored. Monitoring of occupational exposure to benzene has been performed in many countries including North America and Europe, India, Brazil, Thailand, Iran, Italy, Mexico city and Alaska. A number of countries where the studies were conducted enacted laws and regulations that impose bio-monitoring of workers with occupational exposure to benzene. A major factor that contributed to lowering environmental benzene exposure was the reduction of benzene levels in gasoline; however, there is no standard percentage for benzene in gasoline in parts of Africa and the Middle East. Some of the recovery systems included economical support to help purchase new cars equipped with catalytic converters, aspiration system applied to the nozzles and hoses that would capture the vapors from the vehicle's fuel tank and route them to the station's storage tanks during the refueling process, use of masks, washing hands routinely. Unfortunately, no bio-monitoring in Lebanon has been implemented on gas station workers and no regulations or policies exist concerning this serious environmental and public health problem. This study aimed at assessing the level of exposure in gas station workers in Beirut, Lebanon in the breathing zone via the use of personal passive air samplers which were analyzed by GC-MS. An occupational health survey was first conducted on tested workers who inhaled petrol vapors which contained low concentrations of benzene at gas stations. In order to evaluate the level of biological benzene exposure, urinary biomarkers of benzene, t,t-MA (trans,trans-muconic acid) and S-PMA(S-phenylmercapturic acid) were used as exposure biomarkers. 30 mL urine samples in sealed and sterile urine collection vessels

were collected at the end of the work shift once a week for 2 weeks from the exposed workers and the control group. The urinary metabolites were extracted and analyzed by LC-MS/MS. The method and procedure followed were partially validated throughout the study. LOD was calculated to be 4.715317 ng/mL for SPMA and 11.17739 ng/mL for T,T-MA. LOQ was calculated to be 14.28884 ng/mL for SPMA and 33.87089 for T,T-MA. No correlation between SPMA, t,t-MA and air benzene levels and no correlation between SPMA and t,t-MA levels was found. t,t-MA levels appeared to be higher in smokers in comparison with non-smokers. However, there was no correlation between smoking and levels of SPMA. No significant difference was found when comparing the samples collected with hydrochloric acid and the samples without for both SPMA and t,t-MA. But when air benzene is added to the equation, there was an increase in SPMA levels in samples collected with hydrochloric acid. Smoking may be responsible for the lack of correlation. A larger sample size is recommended for future studies.

Diabetic cardiomyopathy and treatment with nanoparticles for drug delivery

Rita Maalouf (Notre Dame University, Louaize, Lebanon)

Diabetic cardiomyopathy (DCM) leads to congestive heart failure and may occur in the absence of hypertension or coronary artery disease. Hyperglycemia is a major risk factor in the development of diabetic cardiomyopathy, comprising functional and structural abnormalities in the heart, including diastolic and/or systolic dysfunction, altered cardiac contractility, cell hypertrophy, apoptosis and interstitial fibrosis. As the disease progresses, there is increased myocyte loss accompanied by myocyte hypertrophy and fibrosis. These changes in cellular phenotype are accompanied by the reinduction of the fetal gene program. Hypertrophy is the compensatory response of the myocardium to increased work, most often resulting from elevated pressures or increases in blood volume. Dilatation with stretching of the myocytes, while initially improving contractility becomes detrimental. The defining features of hypertrophy are enhanced protein synthesis, an increase in cardiomyocyte size and an increase and higher organization of the sarcomere, together with fetal gene activation. In addition to the changes in the myocytes, hypertrophy also includes changes in the extracellular matrix and the microvasculature. Various hypertrophic signaling pathways have been associated with protection of the heart from apoptosis, as well as a predisposition of cardiac myocytes to apoptosis. The existence of both physiologic and pathologic forms of cardiac hypertrophy has been proposed as a potential explanation for this controversy We have shown that NADPH oxidases of the Nox family and particularly Nox4 causes oxidative stress in cardiovascular tissue leading to tissue damage. We show that NADPH oxidase activity and Nox4 expression are upregulated in cardiac myocytes exposed to high glucose and in the myocardium in type 1 diabetic rodent models. This application in Nox4 expression, leads to the alteration in the TGF-Beta/mTOR pathway, thus leading to cardiomyocyte damage. Furthermore, the administration of anti-sense Nox4, inactivates the TGF-Beta/mTOR signaling pathway and decreases the expression of molecular markers of hypertrophy and fibrosis. However the use of antisense Nox4 don't present a therapeutic effect at a specific site of action or organ but block the NAD(P)H oxidase activity in the whole organism. Thus, a better mode of drug delivery is a most. The use of nanotechnology in medicine and more specifically drug delivery is considered to be a breakthrough in the field of disease treatments. Controlled drug delivery systems have several advantages compared to the traditional forms of drugs. Currently many substances are under investigation for drug delivery. Targeted uptake of therapeutic nanoparticles in a cell-, tissue-, or disease-specific manner represents a potentially powerful technology and is under investigation by the pharmaceutical industry. Several technologies have been explored for targeted drug delivery. Magnetic nanoparticles developed using nanocarriers containing iron show promise in targeted drug delivery. These nanoparticles can be directed by a magnetic field to a specific cells or tissue where they can achieve their clinical effect, or the use of aptamer conjugated nanoparticles. The challenge in this field is the design of nanoparticles that are specifically taken up by the targeted cells and release their payload over an extended period to achieve a clinical response. Thus, in this study we established a role of specific Noxes such as Nox4 on cardiac myocyte injury and we designed targeted nanoparticle for drug delivery to inhibit the effect of Nox4 on cardiac hypertrophy, fibrosis and apoptosis. We formulated nanoparticles (NPs) using poly(D,L-lactide-co-glycolide)(PLGA), a biodegradable, biocompatible, and clinically approved polymer. PLGA NPs were synthesized and characterized by dynamic light scattering (DLS) and scanning electron microscopy (SEM). Several key processing parameters were changed including polyvinyl alcohol (PVA) concentration, PLGA concentration, PLGA:PVA ratio, stirring and sonication time. The nanoparticles produced using the optimum formulation conditions had a particle size of 220 nm with a low polydispersity index of 0.067. We are currently optimizing a method for preparing targeted nanoparticle (PLGA NPs) for the intracellular delivery of siRNA against Nox4, thereby reducing cardiac myocytes injury. DCM-associated heart failure contributes to the high morbidity and mortality in diabetes. Our study will identify novel mechanisms of cardiac dysfunction and will help us design nanoparticles for drug delivery thus facilitating the development of novel therapeutic interventions to complement metabolic control of diabetes and to reduce the progression of diabetic complications, thus benefiting diabetic patients in Lebanon and worldwide.

Association between Mutations in Beta Globin Gene and Sickle Cell Disease Complications in Palestinian Refugees in Lebanon

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Association between Mutations in ? Globin Gene and Sickle Cell Disease Complications in Palestinian Refugees in Lebanon Moussa, E.1, Khawaja, G.1, Borjac, J.1,2 1Department of Environmental and Biological Sciences, Faculty of Science, Debbieh, Beirut Arab University, Lebanon. 2 To whom correspondences should be addressed. esra_moussa@hotmail.com ghada.khawaja@bau.edu.lb j.borjac@bau.edu.lb We examine in this study the association between mutations in beta globin gene (HBB) and its related phenotypes with reported sickle cell disease complications in Palestinian refugees

in Lebanon. We also determine whether these mutations affect the structure-function relationship of beta globin chain using bioinformatics. Humans carry 8 functional globin genes arranged in two duplicate gene clusters. These genes code for 6 different types of globin chains: α,β,γ,δ,ε,ζ. Adult hemoglobin (Hb) is a tetrameric protein made of two alpha and two beta chains encoded by α and β globin genes located on chromosomes 16 and 11 respectively. Both the alpha and beta globin gene are constituted of 3 exons and 2 introns. Mutations in α and β globin genes lead a group of diseases known as hemoglobinopathies. Single point mutation in the beta gene is the reason for sickle cell anemia. Blood was collected in EDTA tubes from both male and female SCD Palestinian patients of different ages. The DNA was isolated from the peripheral blood leukocytes using a commercial kit. Primers specific to amplify region encompassing first and second exons were designed. A 740 bp fragment was amplified by polymerase chain reaction and visualized using ethidium bromide staining after separation on a 1.7 % agarose gel. PCR products were sequenced at University Saint Joseph (USJ) sequencing center. The frequency of each polymorphism was determined. Besides the regular Glu to Val at position 6 in the beta globin, our results revealed a C and A deletion at position -92 and -95 respectively in the basal promoter region for many patients. These mutation may affect the expression level of beta globin gene without altering the gene product itself.

Effet du Plasma Riches en Plaquettes (PRP) sur les Cellules Souches Mésenchymateuses

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Introduction: La médecine régénérative a pour objectif de remplacer des cellules déficientes(Thérapie Cellulaire) ou de reconstituer des tissus ou des organes altérés(Ingénierie Tissulaire). Le développement de cette nouvelle médecine est fondé sur la compréhension des processus biologiques impliqués dans le fonctionnement des cellules et des tissus. Pour mener à bien ces objectifs, un type de cellules suscite de grands espoirs « les cellules souches » suite à leur capacité d'autorenouvellement, de différenciation et de leur sécrétion. Parmi ces cellules souches, les cellules souches mésenchymateuses (CSM) font l'objet de nombreuses études depuis plusieurs décennies. Ce sont des cellules d'origine mésodermique mais qui peuvent par la sécrétion des cytokines ou des facteurs de croissances créer un micro-environnement permettant également la régénération de tissus non mésodermiques. Présentes dans de multiples tissus dont la moelle osseuse, le cordon ombilical ou le tissu adipeux, actuellement utilisées, chez l'Homme, dans de nombreux essais cliniques. En parallèle, le PRP, fraction plasmatique issue du sang autologue qui possède une haute concentration en plaquettes et, par conséquent, représente une source concentrée de facteurs de croissance. Son rôle est bien connu dans la coagulation, dans les processus inflammatoires et dans la modulation de l'immunité, mais également des propriétés réparatrices. Objectif: Notre but est d'étudier l'effet du PRP sur la prolifération des cellules souches mésenchymateuses dérivées du tissu adipeux (A-MSC), de la moelle osseuse (B-MSC) et du cordon ombilical (C-MSC) ainsi que son effet sur l'expression des molécules anti-inflammatoires et des facteurs de croissance par ces cellules. Matériels et Méthodes: Les MSCs sont isolées des différents tissus et caractérisées par cryométrie en flux; Le PRP est préparé et activé par la thrombine et le chlorure de calcium CaCl2. Les MSCs sont traitées avec les différentes concentrations de PRP (2%, 5% et 10%). L'effet du PRP sur la prolifération des MSCs est mesuré par le sel de tetrazolium (WST-8) et confirmé par le test de dénombrement cellulaire. En plus, l'expression des cytokines anti- inflammatoires (IL-10, STC1, TSG6), des inhibiteurs de métalloprotéinases (TIMP-1 et 2) et du facteur de l'angiogenèse (VEGF) est détecté par RT-PCR et par ELISA sandwich. Résultats: Pour les differents types de MSC, les marqueurs hématopoïétiques, leucocytaires et endothéliaux tels que CD31, CD34, CD45 et le complexe majeur d'histocompatibilité (CMH) de classe II (HLA-DR) sont negatifs alors que les marqueurs de surfaces CD105, CD73, CD44 et CD90 sont positives. Une augmentation de la prolifération des MSC est détectée suite à un traitement de 48h par les différentes concentrations de PRP. En effet, cette augmentation est plus marquée chez les C-MSC. De même une augmentation de l'expression de VEGF proportionnelle à la concentration du PRP au niveau de l'ARNm et des protéines est observée surtout chez les A-MSC. En outre le PRP induit une augmentation de l'expression des cytokines anti-inflammatoire (IL-10, STC1, TSG6) et des inhibiteurs de métalloprotéinases (TIMP-1 et 2) au niveau de l'ARNm. Conclusion: le PRP induit une meilleure prolifération des MSCs et une forte expression de molécules anti-inflammatoires et de facteurs de croissance par ces cellules; Un mélange contenant les MSC avec le PRP sera considéré une innovation thérapeutique dans la médecine régénérative.

The combinatory effect of Bevacizumab and telomerase inhibitors on vascular endothelial growth factor secretion in gastrointestinal cancers

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Introduction: The expression of vascular endothelial growth factor (VEGF), a molecular mediator, plays a key role in vascular proliferation and tumor survival. Bevacizumab, a humanized monoclonal antibody, targets human VEGF and has been used for the treatment of many types of cancers such as colorectal cancer, non-small cell lung cancer, breast cancer, and gastric cancer. Targeting the vascular endothelial growth factor has demonstrated promising results, with improved quality of life and survival. Telomerase

is almost universally required for cellular immortality, is permissive for tumorigenesis and it is expressed in almost 85% of cancers including the gastrointestinal cancers. Accumulating evidence suggests that telomerase may have roles in cellular processes independent of its role in telomere maintenance. The purpose of this study was to investigate the outcome of a combinatory treatment using Bevacizumab and telomerase inhibitors on VEGF secretion and angiogenesis in multiple gastrointestinal cell lines. Furthermore, we investigated the interrelationship between the PI3K/AKT/mTOR signaling pathway and the telomerase and VEGF modulation. Materials and Methods: Telomerase positive cell lines derived from different tumor entities (AGS (Gastric cancer), Caco-2 (Colorectal cancer), HepG2/C3A (Hepatocellular carcinoma)), and Telomerase negative cell line Saos-2 (bone Osteosarcoma) were cultured in Dulbecco's modified Eagle's Medium (DMEM) supplemented with 10% fetal bovine serum (FBS) and 1% Penicillin/ Streptomycin and incubated at 37ºc with 5% CO2. Cells were treated with Bevacizumab and the following Telomerase inhibitors: BIBR-1532, Costunolide and MST-312. VEGF secretion was quantified using ELISA kits. VEGF, hTERT and HIF-1α mRNA levels were assessed using RT-PCR. Cell viability test was performed using tetrazolium salt. Telomerase negative Saos-2 cells were transfected with hTERT expression plasmid pBABE-neo-hTERT. hTERT gene silencing effect was assessed using hTERT siRNA in Telomerase positive cell lines. Results and Discussion: The 48 hours treatment of AGS, Caco-2 and HepG2/C3A cells with Bevacizumab (5 ng/ml) and Telomerase inhibitors BIBR-1532 (10 µM) and Costunolide (10 µM), but not MST-312 (2 µM), led to a decrease in VEGF secretion with no changes in cell viability as shown by the cell viability assay. Cells treatment with Bevacizumab in combination with BIBR-1532 and Costunolide resulted in a further decrease in VEGF secretion compared to the effect of each of these compounds separately. The effect of the Telomerase inhibitors on VEGF secretion was confirmed using hTERT siRNA that further resulted in a significant decrease in VEGF mRNA levels after a 72 hours treatment. Interestingly, mRNA levels analysis using RT-PCR showed a significant increase in hTERT mRNA levels following a 48 hours treatment with Bevacizumab. Furthermore, the combination of Bevacizumab with hTERT siRNA reestablished hTERT mRNA levels. This increase in hTERT mRNA levels was seen as well when the cells were treated with PI828 (10 µM) and Rapamycin (200 nM), PI3K and mTOR inhibitors, respectively. Conclusion: These results show that Bevacizumab and Telomerase inhibitors, BIBR-1532 and Costunolide, decrease VEGF secretion in AGS, Caco-2 and C3A cell lines. Indeed, VEGF secretion was further decreased when Bevacizumab was combined to these Telomerase inhibitors. In this study, we also observed that VEGF and PI3K/AKT/mTOR pathway inhibition can upregulate hTERT expression at the mRNA levels. This suggests a possible feedback regulation of hTERT by VEGF following cells treatment with Bevacizumab; and this regulation may involve the PI3K/AKT/mTOR pathway. Keywords: Bevacizumab, Telomerase, siRNA, VEGF, hTERT, PI3K/AKT/mTOR.

Molecular analysis in a family with Cockayne syndrome

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Cockayne Syndrome (CS) is a multisystem disorder characterized by growth failure, dwarfism, microcephaly, intellectual disability, senile face, photosensitivity and sensory impairment. It is a rare autosomal recessive genetic disorder that affects 2.7 in 1 million newborns. Most of affected patients present mutations in one of the two genes, ERCC6 (Excision-Repair Cross-Complementing 6) and ERCC8 (Excision-Repair Cross-Complementing 8). The latters encode proteins involved in the transcription-coupled DNA repair pathway. A consanguineous Lebanese family, with 4 deceased siblings affected with typical classical form of CS, was referred to the Medical Genetics Unit of Saint Joseph University (USJ). One of these 4 affected patients was part of a study in 1996. Unscheduled DNA Synthesis and Recovery of RNA Synthesis tests on skin biopsy confirmed the diagnosis of CS. A molecular study of both genes implicated in this disease was undertaken on the DNA of the parents. Fluorescent Sanger sequencing didn't reveal any point mutations. In order to search for big rearrangements, undetectable by Sanger sequencing, array-CGH (Comparative Genomic Hybridization) analysis was performed. However, no Copy Number Variation in correlation with the clinical features of the patients was detected. Sequencing of ERCC4 gene, responsible for XPF-CS (Xeroderma Pigmentosum F-CS), a variant of CS, was then performed and revealed no mutation as well. CS represent one of the disorders where diagnostic tests are very challenging due to genetic heterogeneity. Next-generation sequencing shows promise for diagnosing, and may be proposed to this family.

P1_BIO2_Pharma: Poster Session 1- Biological, Medical, Pharmaceutical, Health Sciences II

Room: USJ Hall CSH

Chairs: Magda Bou Dagher Kharrat (Université Saint Joseph, Lebanon), Aline Hajj (Universite Saint Joseph, Lebanon)

Cartographie fonctionnelle et stéréotaxique du cortex moteur du chat

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Objectif: La stimulation épidurale du cortex moteur (SCM) est une technique neurochirurgicale de plus en plus utilisée pour contrôler les douleurs neuropathiques réfractaires et traiter divers troubles de la musculature. En dépit des études qui ont motivé son application clinique et des études expérimentales qui ont été conduites pour mieux comprendre les mécanismes impliqués dans l'analgésie induite par cette SCM, la médiation de ses effets reste élusive. La connaissance de ces mécanismes d'action nécessite des compléments d'études non réalisables chez l'Homme pour des raisons éthiques. Des modèles animaux sur rongeurs, qui reproduisent cette approche neurochirurgicale sont actuellement développés pour clarifier ses mécanismes. Cependant, les propriétés et caractéristiques du cortex moteur et du thalamus de ces rongeurs diffèrent de celles chez l'Homme, alors que le chat présente plus de similitudes. Pourtant, les atlas stéréotaxiques existants du cerveau du chat ne détaillent pas l'organisation anatomo-fonctionnelle fine du cortex moteur (CM). L'objectif principal de notre étude est d'établir une cartographie fonctionnelle et stéréotaxique précise du CM chez le chat, et de vérifier l'influence de la dure-mère sur la détermination de cette cartographie, dans le but ultime de mettre au point un modèle de SCM épidurale mini-invasive permettant ainsi des expérimentations futures dans des conditions proches de celles utilisées chez l'Homme. Méthodes: Dix chats adultes ont été inclus dans cette étude. Des mesures craniométriques chez l'animal anesthésié et fixé dans l'appareil de stéréotaxie ont été effectuées pour vérifier la reproductibilité des dimensions de la tête au niveau interindividuel. Une craniotomie étendue en unilatéral allant de la suture coronale (en caudal) jusqu'à la limite rostrale du sinus frontal (en rostral) a permis d'accéder au cortex frontal (incluant le CM). Le cortex frontal a été micro-stimulé en mode bipolaire (distance inter-électrode 1mm, cathode toujours positionnée antérieurement à l'anode et parallèlement au plan sagittal, fréquence:60Hz, durée de l'impulsion:200µs), d'abord en situation épidurale puis en sous-durale. Les coordonnées stéréotaxiques ainsi que les seuils moteurs de chaque point permettant l'obtention de la réponse motrice ont été notés en relation avec la musculature sollicitée (membre antérieur, membre postérieur, tronc, face), permettant ainsi d'établir une cartographie du CM, et de calculer la surface de chaque région corticale dévolue à une partie du corps donnée. Les coordonnées stéréotaxiques des sillons crucié et post-crucié ont été aussi déterminées. Résultats et discussion: (1) Le CM du chat est bien défini, séparé du cortex somesthésique, et lui est caudalement adjacent. (2) Il possède une organisation somatotopique très précise, avec des surfaces différentes selon la région anatomique considérée: la région contrôlant la musculature du membre antérieur occupe la plus grande surface du CM (localisation latérale), suivie des régions du membre postérieur (localisation médiale), de la face (localisation la plus rostrale), et finalement du tronc (localisation moyenne dans la moitié antérieure de la région du CM). (3) La cartographie du CM ainsi que son étendue sont les mêmes quelque soit le mode de stimulation (épi- ou sous-durale), l'hémisphère stimulé, ou le chat étudié. (4) La valeur du seuil moteur varie selon le mode de stimulation (plus élevé en présence de la dure-mère qui constitue une résistance électrique intrinsèque additionnelle et qui va ainsi augmenter la dissipation du courant délivré) et selon la région stimulée. (5) Le sillon crucié constitue un repère cortical constant systématiquement situé au sein du CM. Le sillon post-crucié (observé chez seulement 80% de nos chats) présente des coordonnées variables surtout dans le plan antéro-postérieur. Il ne constitue pas systématiquement la limite postérieure du CM qui toutefois ne dépasse jamais caudalement ce sillon post-crucié. Il est fort probable que ce dernier sillon constitue une ébauche du futur sillon central chez les primates. Conclusion: Les coordonnées stéréotaxiques relativement stables du CM obtenues dans cette étude autorisent un guidage fiable dans l'implantation des électrodes de stimulation du CM, qui pourra ainsi se réaliser d'une façon mini-invasive et nous permettra de valider un modèle de SCM épidurale chez le chat dans des conditions similaires à celles utilisées chez l'Homme.

Brain 11C-Diprenorphine PET-scans predict motor cortex stimulation efficacy for the control of refractory neuropathic pain

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Introduction: Motor cortex stimulation (MCS) control of neuropathic pain (NP) relief seems to be mediated by secretion of endogenous opioids, both in humans and animal models. At the same time, NP itself is associated with changes in the brain opioid system. This involvement of opioid receptors changes both in NP itself and its treatment by MCS leads us to investigate whether pre-operative magnitude and distribution of opioid receptors in NP patients could become a biological marker of the ability of MCS to control their pain. Methods: 11C-Diprenorphine PET-scans were performed in 15 patients suffering refractory NP in order to assess their brain opioid receptors. All these patients were subsequently treated by implantation of MCS and were clinically assessed after 7 months of chronic MCS. Control 11C-Diprenorphine PET-scans were performed in eleven healthy subjects of age and sex distribution matched with those of patients. Results: Level of preoperative opioid-binding in insula, thalamus, periaqueductal grey, anterior and middle cingulated and orbito-frontal cortices was significantly correlated with postoperative pain relief at 7 months, induced by MCS. NP patients with mean BP (Binding potential) values lower than the BP range of normal age-matched controls in the thalamus, PAG, and contralateral

insula are those who are less likely to benefit from MCS. Conclusion: 11C-Diprenorphine PET-scans might be used in the future as pre-operative a predictive tool of MCS efficacy and help clinicians to select the best candidates to MCS, in order to avoid unnecessary surgery for patients less likely to benefit from this procedure.

The oncogenic lipid kinase SK1 promotes the migration and polarization of macrophages in melanoma tumors

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Tumor infiltration by tumor-associated macrophages (TAM) is often correlated with poor prognosis in melanoma. However, the mechanisms by which TAM mediate melanoma growth are still poorly understood. Recent studies suggest a role for Sphingosine Kinase 1 (SK1), the enzyme that catalyzes the formation of the oncogenic lipid sphingosine-1-phosphate (S1P), in melanoma progression. The aim of this study was to investigate the role of SK1 in the interaction between melanoma cells and TAM. In vitro migration assays of human or murine monocytes, treated with S1P or melanoma cell-conditioned media, demonstrated that exogenous S1P as well as overexpression of SK1 in melanoma cells are able to amplify monocyte migration. This migration was disrupted in the presence of S1P receptor antagonists. On the other hand, macrophage polarization towards M1 antitumor phenotype was enhanced upon incubation with the medium of SK1-silenced melanoma cells. Intradermal injections of murine melanoma cells (B16F10), either knocked-down or not for SK1, into wild-type or SK1-deficient mice showed that the inhibition of SK1 in the host and/or in the tumor reduces melanoma growth. It also decreased tumor infiltration by macrophages. Furthermore, SK1 inhibition in melanoma cells significantly increased the expression of antitumor cytokines in the tumor microenvironment. Accordingly, preliminary flow cytometry studies indicated that, after SK1 inhibition macrophage polarization was reoriented toward an M1 antitumor profile. These findings suggest a key role of melanoma SK1 in macrophage recruitment and polarization within the tumor microenvironment, thereby enhancing the aggressiveness of this cancer.

Effect of Recombinant Human Arginase [HuArgI(Co)-PEG5000]-Induced Arginine depletion on Colon Cancer Cells

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In this study, we attempt to target Arginine auxotrophy in colorectal cancer cells using a pegylated recombinant human Arginase I cobalt [HuArgI (Co)-PEG5000]. We tested and characterized the activity of HuArgI (Co)-PEG5000 on a panel of seven colorectal cancer cell lines. HuArgI (Co)-PEG5000 was cytotoxic to four out of the seven colorectal cancer cell lines tested. Cell cycle analysis revealed that arginine deprivation is also cytostatic with cell cycle arrest observed in the surviving fraction of all tested cells. Addition of L-citrulline led to the rescue of all the sensitive colorectal cancer cell lines at concentrations of 11.4 mM, 1.14mM but not at 0.114 mM. The ability of L-citrulline to rescue cells was dependent on the expression of argininosuccinate synthetase-1 (ASS1). Single cell intracellular staining and flow cytometry analysis indicated that all colon cancer cell lines tested do express (ASS-1), which, along with the ability of L-citrulline to rescue cells, indicates partial auxotrophy of these cell lines to arginine. Inhibition of autophagy decreased the sensitivity of cells to [HuArgI (Co)-PEG5000]-induced arginine depletion, indicating that following arginine deprivation, autophagy plays a cytotoxic role in colorectal cancer cells. Annexin V and PI staining showed that arginine deprivation induces non-apoptotic cell death in [HuArgI (Co)-PEG5000]-treated colorectal cancer cells. We have, therefore, shown that colorectal cancer cells are auxotrophic for arginine and can be selectively targeted using [HuArgI (Co)-PEG5000]-induced arginine depletion indicating that L-Arginine deprivation may be a potent and selective potential treatment for colorectal cancer.

Oxidant Activity of Sumac Fruit Extracts on Human Muscle Stem Cells and Zebrafish Embryos

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Introduction: Muscle dystrophies are a group of inherited muscle disorders characterized by progressive muscle weakness. Cell therapy performed in skeletal muscle patients with muscular dystrophy is a promising therapy; nevertheless oxidative stress reduces muscle precursor cells (myoblasts) survival. Enhancement of the survival can be achieved by pre-treating cells with anti-oxidant molecules. This study aims to test the anti-oxidant properties of Sumac fruit (Rhus coriaria L.) extracts on human myoblasts in vitro and on zebrafish embryo in vivo. Methods: The cytotoxic effect of ethanolic crude extract (70%) from sumac and its ethyl acetate (EtOAc) fraction were tested using the Trypan blue exclusion assay. The ability of these extracts to protect cells against induced oxidative stress by hydrogen peroxide (H2O2) was studied by cell count, cell cycle, adhesion assays and dihydroethidium (DHE) staining. Real-time PCR

was performed to evaluate the transcriptional expression of MyoD and myogenin in human myoblasts (LHCN-M2). In vivo experiments using zebrafish model were performed to test the sumac extract effect on the viability of 24, 48, 72 and 96 hours post-fertilized embryos. Results: These results demonstrate that pre-treatment of LHCN-M2 with sumac extracts increased the viability of cells after inducing oxidative stress. A concentration of 0.3 µg.mL-1 of EtOAc fraction exhibited the best protective effect against H2O2 induced oxidative stress and restored cellular adhesion. Furthermore, we showed that superoxide dismutase mediates the protective effect of ethyl acetate fraction without any modification of MyoD and myogenin expression. In vivo, zebrafish embryo pre-treatment with low concentrations of EtOAc fraction protected embryos from H2O2 induced death. Conclusion: Low concentrations of ethyl acetate fraction enhance myoblast survival in vitro and increase zebrafish embryo viability in vivo after exposure to H2O2 induced oxidative stress.

Synthesis of a Novel Library of 2H-Indazole Analogues As Potential Binders of β-Amyloid Plaques

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Background: Alzheimer's disease (AD) is the most common form of dementia. It is a progressive, non-reversible brain disorder characterized by the destruction of nerve cells and neural connections in the cerebral cortex. This leads to deterioration of the cognitive abilities of the AD patient, causing gradual loss of memory and the ability to learn and comprehend. 5.4 Million people in the United States of America had Alzheimer's disease in 2012 with an estimated cost of $200 billion in medical care. In Lebanon, statistics show that around 40,000 people are living with the disease. Current diagnostic approaches to assess AD rely on analyzing the cognitive abilities and behavior of the patient, which is complemented with brain images collected on various imaging modalities. The aggregates of amyloid β (Aβ) are considered one of the most prominent pathological hallmarks of AD, and its presence in brain tissues provides a definitive diagnosis of the disease. However, this can only be achieved post-mortem on brain sections, and tools that offer early diagnosis are much needed. Thus, efforts towards the diagnosis of the disease are currently focusing on the development of biomarkers that selectively bind to Aβ aggregates. The most successful biomarker that caught much attention and is undergoing extensive clinical trials is Pittsburgh compound [11C]PiB, a Positron Emission Tomography (PET) imaging agent. Aim of the study: In this work, we report the synthetic optimization and characterization of a library of 2H-indazoles bearing structural similarities to [11C]PiB. These analogues were accessed through the Davis-Beirut reaction where a suitable linker was synthesized and incorporated onto the C3 position of the indazole ring. Results: The 2H-indazoles were synthesized using the Davis-Beirut reaction. As the long term goal of this study is the conjugation of the indazole analogues onto nanoparticles, several linkers were prepared for incorporation into the 3-position of the indazole ring. One of these linkers proved to be suitable for a synthetically efficient Davis-Beirut reaction. Some analogues were purified by crystallization from an appropriate solvent, while others were purified by column chromatography. All molecules were characterized by NMR and mass spectroscopy. Conclusion: The optimization of the reaction conditions and the development of a suitable linker enabled the preparation of several 2H-indazole analogues and expanded the scope of the recently developed Davis-Beirut reaction. These analogues will act as potential biomarkers of Aβ aggregates for the early detection of AD.

Spectrophotometric determination of Clopidogrel Bisulphate and Rosuvastatin Calcium using Discrete Fourier Transform Convoluted Curve and its Ratio Spectra Derivative

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A new,specific, precise and accurate spectrophotometric method using fourier transform convolution (FF method) and its derived ratio (Ratio Spectra Derivative of Fourier Function) (FFR) are developped for the simultaneous determination of two co-administered drugs, Clopidogrel Bisulfate (CLO) and Rosuvastatin Calcium (ROS).Such combination has been recommended for the treatment of coronary heart diseases.Ratio Spectra Derivative of Fourier Function is a newly used method which combines Discrete Fourier Transform Convoluted Spectra (FF method), with ratio spectra derivative (D1R method). Literature review revealed that no chemometric methods were applied for the simultaneous determination of (CLO) and (ROS). The proposed methods were compared to first derivative (D1), second derivative (D2) and Derivative Ratio Method (D1R method), and were found to be beneficial and superior in quantifying both drugs. The methods have been validated according to ICH guidelines. The limit of detection (LOD), limit of quantitation (LOQ), the linearity range, the regression coefficient and standard deviation of the slope gave satisfactory values. The validated methods were successfully applied for the determination of both drugs in their laboratory prepared mixtures and they gave comparable results and were proved to correct the interference from back ground noise with equal accuracy (t-test) and pecision (F-test)

Living the PCSK9 adventure: from the identification of a new gene in familial hypercholesterolemia towards a potential new class of anticholesterol drugs

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Hypercholesterolemia is one of the major causes of coronary heart disease. The genes encoding the low-density lipoprotein receptor (LDLR) and its ligand apolipoprotein B, have been the two genes classically implicated in autosomal dominant hypercholesterolemia. Our discovery in 2003 of the first mutations of PCSK9 (Proprotein convertase subtilisin kexin 9) in French families with autosomal dominant hypercholesterolemia (Abifadel et al. Nature Genetics 2003), has revealed the implication of a new major actor in the regulation of plasma LDL-C (low density lipoprotein-cholesterol) levels. PCSK9 gene encodes an enzyme (PCSK9) that has been thoroughly studied since then and has been shown to degrade the LDL receptor independently of its catalytic activity. Several PCSK9 variants have been identified, some of them are gain-of-function mutations causing hypercholesterolemia by a reduction of LDL receptor levels; while others are loss-of-function variants associated with a reduction of LDL-C levels and a decreased risk of coronary heart disease. PCSK9 has gained high interest among pharmaceutical companies and academia and several strategies to reduce PCSK9 have been investigated. Antisense technology and specific antibodies or competing peptides targeting PCSK9 are being developed and proved their high efficiency in reducing LDL-C in mice and non human primates. Clinical trials have been launched to evaluate the safety, tolerability and efficacy in humans. We are living the different steps of the adventure starting with the discovery of PCSK9 in familial hypercholesterolemia till the clinical trials, especially those evaluating anti-PCSK9 antibodies evolocumab (AMG 145) and alirocumab (SAR236553/REGN727), currently in phase III trials. We focus here on 1) our pioneering work linking PCSK9 to cholesterol metabolism, 2) our identification of new PCSK9 mutations in French, Canadian and Greek probands, 3) our study of PCSK9 as a modifier gene for hypercholesterolemia in Lebanese patients carrying the Lebanese mutation p.C661X of the LDLR and finally 4) our recently published clinical trial studying AMG145 in homozygote patients with hypercholesterolemia, in which a Lebanese patient had been included (Rall et al. Lancet 2015). PCSK9 is a very promising approach to reduce cholesterol levels, to enhance the effectiveness of other lipid-lowering drugs especially statins, and to improve the prevention and treatment of coronary heart disease especially in 1) patients that respond poorly or do not respond to statins, 2) patients with high risk to develop side effects (muscle and hepatic toxicity) under statins especially if high doses are necessary to achieve LDL-C goals, 3) patients with familial hypercholesterolemia which are heterozygous carriers of a mutation of the LDLR, APOB or PCSK9. The promising results in lowering LDL cholesterol levels raise hope that the PCSK9 adventure will lead, after the large and long-term ongoing phase III studies evaluating efficacy and safety, to a new pharmacological class that reduces cholesterol and cardiovascular mortality.

Physico - chemical characterization and In vitro release study of directly compressed metformin tablets using different natural mucilages

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Excipients are currently included in novel dosage forms to fulfill specific functions and in some cases they influence the extent rate of drug release and absorption. Recently, increasing attention has been given to the application of natural mucilages as pharmaceutical excipients. Mucilages are preferred over synthetic and semi synthetic polymers because they are cheap, easily available, non-irritant, biodegradable and biocompatible(1). They are generally polymeric in nature and obtained from woody and non-woody plant parts(2). The functionality of mucilage extracted from Aloe barbadensis miller leaves as a matrix for preparing controlled release tablets of glibenclamide was studied(3). Overall time of release of the drug from the matrix tablets was retarded upon increasing the concentration of mucilage(3) . In other study mucilage extracted from plantago psylium seeds was evaluated as a pharmaceutical binder for paracetamol tablets. In-vitro release study of paracetamol tablets indicated that psylium mucilage can retard the drug release (2). The objective of the study is to formulate metformin tablets as anti-diabetic drug with different mucilages as binding agents extracted from Psyllium seeds (Ps), Aloe barbedensis miller(Ab) or Opuntia ficus indica(Of) leaves. Physicochemical properties of dried powdered mucilages; i.e., flow properties, acute toxicity and microbial load tests were studied. Carr's index values , angle of repose and Hausner ratio showed optimum values indicating good flow properties.. Viscosity values were 315 cp, 1341 cp, 221 cp for(OF),(Ab), (Ps), respectively. The microbial load studies showed total viable aerobic coun(TVAC) 2.06 x 104 CFU/g, 103 x 104 CFU/g and 39 x 104 CFU/g for(Ab) ,(Op) and(Ps) respectively. While total combined molds and yeasts count(TCMYC) was 1x 103 , 9 x102 and 7 x 102 for(Ab)(Of) and(Ps), respectively. Acute toxicity study revealed that all mucilages are non-toxic. Physico- chemical properties and the extent of drug release from compressed tablets prepared by direct compression technique using the extracted mucilages in concentrations ranged from 8-20% were studied. Weight variation(mg), diamete(mm), thickness(mm), friability(%) and hardness(kg/cm2) for the compressed tablets were evaluated. Friability values were ranged from 0.49 - 0.75% indicating an acceptable range. Drug content was about(98.569 ± 0.49%). Generally, increasing mucilage's concentration from 8% to 20% w/w increases the disintegration time(min), for example the disintegration time of(Ab) formulation increased from 16 to 37 minute upon increasing concentration, from 8% to 20%(w/w). In vitro dissolution rate profiles of different formulated matrix tablets revealed that increasing the concentration of mucilages from 8% to 20% w/w increased dissolution rate by 60, 270, 180 minute for Ps, Ab and Of, respectively. In vitro release study of different mucilages showed that(Ab) had retardant effect than(Of) and(Ps) .The order of release was Ab > Of > Ps. It is concluded that the extracted mucilages from plants can be used as binder in formulation and manufacturing of metformin matrix.

Study of Hemomicrocirculatory Bed among Newborns with Congenital Heart Anomalies

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STUDY OF HEMOMICROCIRCULATORY BED AMONG NEWBORNS WITH CONGENITAL HEART ANOMALIES A. Prof Ruzanna Petrosyan PhD, DM, MD, MSc BAU, Faculty of Medicine Department of Basic Medical Sciences Beirut, Lebanon Phone - ext: 009611300110-2641 Email: r.petrosian@bau.edu.lb rupetrossian@yahoo.com Background Changes of the hemomicrocirculatory bed play important role in diagnosis, assessment of severity and character of pathological processes. Few data exist concerning changes of the hemomicrocirculatory system in congenital heart anomalies and the problem remains unsettled. Objectives The aim of this research was to investigate pathomorphological changes of the hemomicrocirculatory bed of the heart in newborns dying within the first 7 days of postnatal life from congenital heart disease. Methods The hemomicrocirculatory bed of the hearts of corpses of 48 newborns who died of congenital heart anomalies has been studied. As a control group, hearts of corpses of 20 newborns that died of other diseases has been studied. The hemomicrocirculatory bed has been examined by means of Ca 2+ ATP method (Chilingaryan A. M.) and modified method of Gomory (Sisakyan C. A.). Results It was revealed that the hemomicrocirculatory system of newborn's heart that was died not of congenital heart anomalies, but because of other diseases, during the first 7 days of postnatal life, sufficiently differentiated, but at the same time, in the terminal part of the hemomcirculatory system non integrated vascular loops, connecting and main capillaries were found. In newborns that died of congenital heart disease in the early postnatal period pathologic alterations in the hemomicrocirculatory bed of the heart were revealed. Activity of growth and making anastomosis of the vascular buds were decreased. Inhibition of integration processes of vascular loops. The growth portion of these loops underwent pathological atrophy and finally disappeared, venous knee of these loops became tortuous. Major part of the connecting and main capillaries contained short and long vascular protrusions with signs of pathological atrophy, and the tip of the dome of these protrusions was expanded. Many of connecting and main capillaries were devoid of buds of growth or there were a few of them. Inhibition of processes of formation of true capillaries in microcirculatory system was revealed. More common changes in congenital heart anomalies characterized by collapses, sclerosis and reduction of microvessels, mostly true capillaries, they became tortuous. Configuration of loops also has changed: they lost their architecture, arterial and venous knees were located far from each other. As a result of the suppression of growth and progressive reduction of the true capillaries capillarotrophic failure of the microcirculation developed, leading to appearance of dystrophic, atrophic and sclerotic lesions. Conclusion Pathology of development of microcirculatory system is determined not only by reducing the activity, and then blocking formation of new portion of terminal part of vascular system, but also by collapse, progressive reduction and sclerosis of already developed microvessels. As a result, microvascular remodeling is revealed. The main manifestation of this is the true capillary deficiency in the hemomicrocirculatory system that results in centralization of tissue circulation and reduction of its metabolic efficiency.

P1_BIO3_Biologique: Poster Session 1- Biological, Medical, Pharmaceutical, Health Sciences III

Room: USJ Hall CSH

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Marc Karam (University Of Balamand, Lebanon), Lydia Khabbaz (Université Saint Joseph, Lebanon)

Determination of the replication timing of the human common fragile site FRA11D

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Cancer is a group of genetic diseases characterized by the transformation of normal cells into malignant cells through uncontrollable division and growth. This abnormal process results from the accumulation of mutations consequent to DNA damage. Genomic instability, which is a hallmark of cancer has been shown to be a key feature of genomic regions called fragile sites. This common property led researchers to investigate the relationship between fragile sites and cancer. Fragile Sites (FS) are specific DNA loci that show propensity to form gaps and breaks on metaphase chromosomes following DNA replication stress. FS are classified according to their mode of induction and frequency of occurrence into two major categories: Rare Fragile Sites (RFS) and Common Fragile Sites (CFS). As the name implies RFS are rare events that take place in less than 5% of the human population, they are in the form of short tandem repeats and are transmitted from parents to offspring by means of mendelian genetics. CFS on the other hand, are present in all normal individuals, they are rich in AT repeats, yet with no specific pattern. CFS can be mainly induced in the presence of low doses of Aphidicolin (AP), a specific DNA polymerases alpha and delta inhibitor. Calyculin A, which triggers premature chromosome condensation at any phase of the cell cycle, also induces CFS. The causes of their fragility are not yet fully deciphered; several causes are so far described such as replication fork stalling and paucity in initiation events. There is substantial amount of evidence that suggests that CFS are either late or slow replicating. This latency might be due to CFS forming secondary structures, which upsets the progression of the replication fork. In our work we propose to investigate the relationship between replication timing and the fragility at the CFS FRA11D

which is located within the chromosomal band 11p14.2. In order to reach our objective, we selected from CHORI BACPAC three Bacterial Artificial Chromosomes (BACs), each containing a specific sequence spanning our region of interest. We have tested with PCR, extracted, labeled and purified the three BACs. These labeled sequences were used as probes to visualize gaps and breaks in lymphocytes in the presence of BrdU, an analog of thymidine used as DNA replication marker, and Calyculin using fluorescent in situ hybridization. The replication timing of these fragile regions has been compared to two controls, the first with early replication pattern and the second with late replicating sequences. Our preliminary data so far reveal that these sequences replicate in mid to late S phase. This finding will provide a better understanding of the origin of genomic instability at the level of FRA11D. A result that will also help in explaining the etiology of genomic rearrangements observed at 11p14 in several genetic diseases.

Searching for the link between periodontitis and diabetes mellitus: A pilot study in rats

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A two-way relationship between Diabetes mellitus (DM) and periodontitis (PD) is now clinically established. Indeed, DM is considered a major risk factor for PD and PD alters glycemic control in diabetic patients. Both PD and DM share common mechanisms of pathogenesis that are related to altered immune-inflammatory responses at local and/or systemic levels. Matrix metalloproteinases (MMPs) are endopeptidases that function in breakdown of several components of the extracellular matrix. Current evidence have shown involvement of MMPs in diverse pathways associated with the development and progression of diabetic complications and periodontal tissue destruction. The aim of this study is to find a possible correlation between the level of MMPs and stages of either periodontitis or diabetes as well as the impact of coexistence of both diseases on the MMP level. In our study, male Sprague Dawley rats (2 months old) were randomized into six groups (n = 10 /group: The study was performed on two steps each involving 3 groups. The first step included rats tht were assigned to one of the following three groups: the control group (G1), induction of DM followed by PD (G2) and the induction of DM alone (G3). In the second step, the assigned groups were: the control group (G4), the induction of PD followed by DM (G5) and periodontal induction alone (G6). For DM induction, animals received a one-time intravenous injection of streptozotocin (STZ) (55 mg/kg). For PD induction, animals were submitted to an incision at the level of the cervical region of the mandibular first molars bilaterally and collimated with an adhesive paste. Body weight and glycemia were determined every week; un-stimulated saliva samples were collected as well as urine and blood on regular basis. Rats were sacrificed at the end of the protocol, gingival tissue removed, fixed in formaldehyde and processed for histopathological study. Significance of the results was assessed using an appropriate statistical test. In our experimental conditions, blood glucose in rats treated with STZ was significantly increased about five fold compared to control group; a moderate increase of 1.5 fold was observed in the periodontal rats. Body weight was consistently decreases following diabetes or PD induction by 38% and 15% respectively. Histopathological studies did not show a significant difference between damages in gum submitted to incision in STZ group and the control. RT-PCR and western blotting studies are in process to assess the level of expression of MMPs 8 and 9 and their tissue inhibitors (TIMPs) in saliva of different groups of rats collected throughout the experimental protocol.

Des traces de détergents dans nos assiettes: une étude pilote

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La bonne hygiène quotidienne est essentielle dans notre vie surtout pour la protection contre la croissance des germes et des maladies. Une partie de l'hygiène concerne le lavage de la vaisselle. Bien que les détergents servent pour nettoyer, cependant ils peuvent être parfois toxiques suite à une mauvaise utilisation. La composition des détergents varie, mais le surfactant anioniques est l'agent principal. Au Liban il y a des pénuries d'eau dans beaucoup de foyer, de surcroit les personnes qui font la vaisselle ont tendance à utiliser une grande quantité de détergents pour avoir de la mousse sans que le rinçage soit complet. Afin de s'assurer que les ustensiles de cuisine ne contiennent pas de traces de détergents suite à la vaisselle, nous avons collecté 100 échantillons à partir des ustensiles de cuisine, dans des foyers de la région Fanar- Sed el Bouchrieh. Ainsi, 200 ml d'eau distillée portée à 40oC a été versée dans différents ustensiles (assiettes verres, marmites..) secoués vigoureusement puis versées dans un bocal stérilisé et stockées au frigidaire. Nous avons par la suite déterminé par une méthode de dosage colorimétrique la présence de traces de surfactants. Un questionnaire se relatant aux conditions de réalisation de la vaisselle a été aussi effectué. Les résultats montrent que 4% des échantillons recueillis contiennent de fortes traces de surfactants anioniques, 36% contiennent de faibles traces, alors que 60% sont dépourvus de traces. L'abondance ou le manque d'eau ne semblent pas une cause directe à ceci, par contre la quantité de produit utilisé et le mélange de 2 détergents pourraient être une cause. Etant donné que notre méthode est semi qualitative, nous avons évalué qu'il faudrait diluer 100 fois le détergent et effectuer 2 rinçages pour ne plus avoir de traces de détergents. Dans ce contexte, une étude toxicologique in vivo chez l'animal est en cours.

THE DIAGNOSIS OF BRUCELLOSIS IN SHEEP AND GOAT SICILIAN FARMS. two years activity

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Institute of Sicily, Italy); Lucia Galuppo (Veterinary Public Healt Institute of Sicily, Italy); Maria Flaminia Persichetti and Claudia Di Pasquale (Veterinary Public Health Institute of Sicily, Italy); Rossella Lelli (Veterinary Public Healt Institute of Sicily, Italy)

Brucellosis is a worldwide zoonotic disease caused by a small, asporigen, not mobile, gram negative bacteria. Although it has been eradicated in some countries, today it represents an high impact disease for some countries of the Mediterranean basin. In Europe, in 2011, the disease was responsible for 330 hospitalizations with a confirmed diagnosis of brucellosis including 21 cases in Italy (EpiCentro, ISS). Likewise, economic losses due to Brucella infection in small ruminants are huge both for breeders and for zootechnicians. Sheep and goats are among the major animal réservoirs, so they do play an important role of Brucella persistence in the territory. Pathology in these species is characterized by reproductive disorders such as abortion, infertility and premature culling (Radostits et al 2000). The persistence of the disease in Sicily is due to the characteristics of island farming that is extensive free and semi-free breeding with animals living and feeding essentially outdoors. In this contribution the authors reported the activity of the laboratories of the Veterinary Public Health Institute of Sicily (IZSSI) in the two year period 2013-2014. According to the EU Eradication program for ovine and caprine Brucellosis in Italy, serological investigations are carried out in all six months old sheep and goats. The protocols are those validated and recommended by the World Organisation for animal health (O.I.E.), among others. For purpose of serological diagnosis, Rose Bengala Test(RBT) is the currently recommended rapid screening test followed by the Complement Fixation Test(CFT) in the case of RBT positivity. Microbiological test for the isolation and typing of Brucella strains are carried out on spleens, lymph nodes, testes, uteri, placentas sampled during slaughtering of serologically positive sheep and goats or on milk, fetal organs and vaginal swabs collected from animals showing clinical signs of infertility. During the two year period, the Veterinary Public Health Institute of Sicily laboratories performed 1,257,250 and 1,116,203 RBT and 338,371 and 308,238 CFT tests respectively in 2013 and 2014. Out of 4,509 and 1,728 specimens cultivated respectively from sheep and goats, two species, Brucella melitensis biovar 3 and Brucella abortus biovar 3, were identified. Brucella abortus is normally associated with disease in cattle, but sometimes may be found in other species due to the promiscuous breeding of bovines and sheep, or sometimes goats. The strains isolated and identified were predominantly B. melitensis biovar 3. However B. melitensis Rev1 from a sheep and a goat, and B. abortus biovar 3 strain, from another goat were also isolated. The strains were typed by the O.I.E. Reference Centre of Teramo(Italy). The isolation of Rev 1 strains is currently investigated. As for the trend, the effects of the eradication plan may be inferred by prevalence and incidence data related to 2013 and 2014. Albeit gradually, the eradication plan seems to be proceeding in the desired direction, inasmuch as the percentage of positivity decreased during the two years of observation. The intervention strategy of examining all animals and the strategy of "test and slaughter" with scheduled interventions in the last two years led to a decrease in both the incidence and prevalence in Sicily thought it is still present. References: Radostits, O.M., Gay, C.C., Blood, D.C., Hinchcliff, K.W., 2000. Veterinary Medicine, 9th ed. ELBS Bailliere Tindall, London, UK, pp. 870-871; OIE Manual of Diagnostic Tests and vaccines for Terrestrial Animals, 2014, Chapter 2.7.2

CRIPTO-1 in Extracellular Vesicles: An Emerging Role in Prostate Cancer Progression

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Prostate cancer (PCa) is the most common malignancy and a prevalent source of cancer-related morbidity and mortality in men worldwide. Identification of tumor biomarkers may help to distinguish clinically significant from indolent PCa and select patients at high risk of relapse for more aggressive treatment. Based on our laboratory recent published data, it was clearly evident that CRIPTO-1 (CR-1), the embryonic gene and the founding member of the EGF-CFC (Cripto,FRL-1, Cryptic) protein superfamily, is overexpressed in a subset of aggressive prostate tumors and accompanied with poor prognosis. CR-1 also appeared to induce epithelial to mesenchymal transition (EMT) in prostate cancer through parallel actions of FGFR1 and AKT mechanistic pathways. Moreover, our current results show that the secretion of vesicles is enhanced in CR-1 transfected cells suggesting the role of this growth factor in regulation of exosome secretion. The tumor microenvironment is rich in many soluble factors and extracellular vesicles acting as intracellular messengers between near and distant cellular compartments and thus furnishing the suitable niche for the tumor to progress and metastasize. In this study, we sought to investigate whether CR-1 could be present in extracellular vesicles and study the mechanisms of action of these secreted vesicles. After optimizing the protocol of extracellular vesicles purification from conditioned media of cells, we demonstrated that vesicles secreted from cells with elevated expression of CR-1 are in turn rich in CR-1. We also found that these secreted vesicles induce epithelial to mesenchymal transition and migration capacity in vitro when being added to cells deficient in CR-1 expression. The work in progress is to explore through which signaling pathway this effect is manifested. In conclusion, our data highlight a new mechanism by which CR1-interacts with target cells via secreted vesicles and actively promotes PCa progression.

Inhibitory Effect of Ferutinin and its Analogues on Breast Cancer Cell Lines and their Progenitor/Stem cell Population

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Introduction: Ferutinin (FRT), the main active component of Ferula hermonis, is a phytochemical with an estrogenic and an anti-proliferative inducing activity on several cell lines including human breast cancer. It has been reported as an agonist to estrogen receptor ERα and agonist/antagonist to ERβ featuring a weak anti-proliferative activity towards breast cancer cells. In a previous work, three ferutinin analogues were synthesized in an attempt to improve the antagonist/anti-proliferative potential of the molecule. The present study aims to investigate the effect of FRT along with its analogues on in vitro growth, cell-cycle progression, apoptosis induction and stem-like properties of breast cancer cell lines. Methods: Cell lines (MCF-7, estrogen dependent and MDA-MB-231, estrogen independent) were treated with FRT and its analogues. Cell proliferation, cell cycle and DNA damage inducing effects of FRT were studied by MTT assay, propidium iodide and DAPI staining, respectively. Sphere formation assays were used to follow the effect of FRT on breast cancer stem cells. Results: FRT enhanced the proliferation of MCF-7 cells at low concentrations and inhibited the proliferation at higher doses. Conversely, only an anti-proliferative effect of FRT was observed on the MDA-MB-231. FRT induced a pre G0/G1 cell cycle arrest in both cell lines. DAPI staining revealed that FRT induces apoptosis in these cells. Cancer stem cell population (CD44 high, CD24 low) was specifically targeted by FRT in MDA-MB-231, whereas it was enriched in MCF-7 cells. Two of FRT analogues remarkably inhibited the growth of the two cell lines by 35-fold on MCF-7 and by 3-fold on MDA-MB-231 when compared to the original molecule. Conclusion: Our results indicate that the natural compound FRT antagonizes tumor cell growth in both breast cancer cell lines. Two of the investigated FRT analogues showed higher efficiency than the natural molecule and could be suggested as potential candidates for breast cancer therapy.

Sicily as a model to study the condition of the Mediterranean marine ecosystem

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Mediterranean basin has been classified as one of the 35 "biodiversity hotspot" in the world because of the high endemic species concentration and simultaneously for the fast natural habitat loss that made biodiversity highly endangered. Sicily, thank to its position in the middle of the Mediterranean Sea, is characterized by a great variability of Flora and Fauna, with a high number of endemic species, about 25%, and represents a strategic source to assay the general conditions of the Mediterranean biodiversity. In few years, many of the Mediterranean ecosystems have been destroyed or damaged by climate changes mainly due to anthropic activities; therefore protection measures have been introduced at international level, like C.I.T.E.S (Convention on International Trade in Endangered Species of Wild Fauna and Flora). This government's agreement imposes rules to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Protected species are included in official lists (Appendix). Among C.I.T.E.S. species, sea turtles represent important subjects useful for studying the condition of the marine ecosystem. Sea turtles living in the Mediterranean, Caretta caretta, Chelonia mydas and Dermochelys coriacea are all included within the protected species. The loggerhead sea turtles (Caretta caretta) are the most frequently found and represents an ancient relict species with a well-recognized biological value. In this study, Sicilian costal habitats where sea turtles live (part of their life) have been investigated to identify the issues related to their population contraction and the damage of their habitat. During the 2014, coastal areas in Sicily were monitored to detect the beaching of sea turtles by the Centro Regionale di Recupero for sea turtles located at the Veterinary Public Health Institute of Sicily (Palermo, Sicily). According to the competent authorities, after each warning call, rescue and transfer procedures were activated in 24 hours, usually in the first 12 hours if the turtle is alive. In the beaching sites, Flora composition and other geographical parameters, indicatives of the globally conditions of the habitat, were studied. Each turtle was recorded, identified by the morphological traits, weighted, sexed and measured. A physical examination was carried for living individuals to evaluate the health condition of the animal and to identify the presence of ectoparasites and/or external lesions. In particular, the presence of extraneous objects was evaluated by direct visual exam in the oral cavity and/or in the cloaca and by radiological investigations. Also a biochemical profile was carried out in different time replicates. In case of death turtle, necroscopy examination and further exams on the organs (bacteriological, virological, parasitological, istopatological, chemical…) were carried out. In one year monitoring, a total of 198 sea turtles were notified in the Sicilian coast, 81 of them were alive and an overall number of 151 were rescued. All were recognized as Caretta caretta. The number of rescue turtles was highest between April and August, probably due to the major presence of the anthropic activities in the dune and coastal areas. Clinical exams revealed that a good prognosis were often associated with the absence of suffering signs such as loss of muscle tone, sunken eye and abundance of ectoparasites

and/or alga. The main cause of beaching was associated with the ingestion of extraneous objects, often related to fishing materials and plastic bags. These conditions were observed, in the same way, for the immature turtles as well as for the adults. This report highlights that Sicily is an important location in the Mediterranean sea turtles routes and points out the actuality and the severity of the issue related to the decrease of the loggerhead sea turtles population. Flora depletion, compared to the geo-botanical evolution levels, was frequently observed in the beaching sites. This also confirms that the anthropic activities are the most important cause related to the beaching and decrease of global biodiversity in the coastal habitats. A concrete way to help protection of sea turtles and more generally the marine ecosystem consists to increase the information level on the biological, ecological and social relevance of these animals and promotes the raising awareness events of the coastal zone users about the issues related to their beaching and the consequences of illegal or incorrect fishing activities.

Rôle des dommages à l'ADN générés par la protéine Tat-VIH dans l'oncogenèse du lymphome de Burkitt

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Le lymphome de Burkitt (LB) est un lymphome malin non hodgkinien (LMNH) des lymphocytes B, la première pathologie humaine dans laquelle le rôle étiologique du virus a été mis en évidence. Il est lié à l'infection par le virus Epstein Barr (EBV) en Afrique et au virus d'immunodéficience humaine 1 (VIH-1) en Europe et aux Etats-Unis. 80% des cas sont caractérisés par une translocation du locus du gène CMYC à la proximité du locus du gène codant pour la chaîne lourde d'immunoglobuline IGH ; t (8;14) (q24;q32), cette translocation marque l'événement initial de la transformation maligne d'une cellule B normale. Il a été montré que la distance physique entre des partenaires potentiels d'une translocation était corrélée avec son incidence. Or, dans des lymphocytes B normaux, une proximité (inférieure à 1 micron) entre les loci IGH et CMYC n'est observée que dans 4% des noyaux. Notre équipe a démontré que le traitement des cellules B isolées à partir de sang périphérique de donneurs sains avec la protéine Tat (Trans-Activateur de la Transcription) du VIH, provoque une délocalisation des allèles CMYC de la périphérie au centre du noyau à proximité des loci IGH. Le pourcentage des cellules ayant cette colocalisation est augmentée 7 fois après le traitement par la protéine Tat (34% vs 4.7% dans les lymphocytes B non traités) (Pval=1,28 10-22). En outre, le mécanisme par lequel Tat induit la translocation CMYC/IGH reste à découvrir. Il a été montré que la protéine Tat excrétée par les cell ules infectées par le VIH-1 peut pénétrer à travers la membrane d'autres types cellulaires, peut induire l'hyperactivation des lymphocytes B et peut aussi interagir avec le génome humain induisant la dérégulation des différents gènes y compris le gène CMYC. Dans le but de comprendre le mécanisme d'action de cette protéine, les lymphocytes B naïfs sont traités avec Tat, avec des inhibiteurs des histones désacétylases et du mécanisme de réparation d'ADN. L'analyse en 3D FISH (Fluorescence par Hybridation In-Situ) montre que le pourcentage de colocalisation est réduit, en présence de l'inhibiteur du complexe MRN (MRE11/Rad50/NBS1). Ce dernier est impliqué dans les mécanismes de réparation de l'ADN, la recombinaison homologue et la jonction des extrémités non-homologues (NHEJ). Il est un détecteur des cassures doubles brins (CDB) et il soutient leur réparation. On pense que Tat induirait la colocalisation, en induisant les dommages et la réparation de l'ADN. L'étude de l'effet de Tat sur les dommages d'ADN par «Comet Assay» dans les lymphocytes B naïfs, montre qu'elle induit des dommages une heure après le traitement. Le niveau d'endommagement de l'ADN est maximal après 6h, il commence à diminuer, parallèlement à la stimulation de la réparation, ce qui est montré par l'analyse de l'expression de gène de MRE11 (RT-qPCR) et de sa protéine (immunofluorescence). Plusieurs perspectives se posent: l'étude du rôle de Tat et du stress oxydatif causé par Tat dans l'induction de la translocation CMYC/IGH et l'étude de l'effet d'extraits de plantes endémiques du Liban à effet antioxydant sur les mécanismes impliqués durant la réponse à l'ajout Tat. La compréhension du mécanisme d'action de Tat en activant le virus par des extraits des plantes Euphorbiacées, contenant du phorbole ester, promoteur de tumeur, connu pour son effet inductif du virus pour entrer dans le cycle lytique.

Antioxidant and anti-inflammatory effects of Solanum melongena extracts

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Extracts from different plants have been used in the traditional medicine to treat a wide variety of disorders including acute and chronic inflammation. In this context, a lot of studies have focused on the association between free radicles, oxidative stress and inflammation which represents an important host response to tissue damage, either through injury or from infection. During an inflammatory response, mediators, such as pro-inflammatory cytokines, including interleukins IL-1, IL-6,IL-12, IL-18, tumour necrosis factor (TNF?), interferon (INF)-?, and the granulocyte-macrophage colony-stimulating factor, are released. This response is antagonized by anti-inflammatory cytokines, such as IL-4, IL-10, IL-13, IFN-? and the transforming growth factor. Likewise, inducible enzyme cyclooxygenases 2 (COX-2) and nitric oxide synthase (iNOS) are significantly up-regulated in response to a broad range of stimuli including cytokines and bacterial lipopolysaccharides (LPS) in inflammatory conditions, both proteins stimulate the production of large amounts of pro-inflammatory mediators such as prostaglandin (PGE2) and nitric oxyde (NO). Many plants in the Solanaceae family, i.e. tomatoes, potatoes and eggplants, possess

natural bioactive molecules that exert an inhibitory activity on different pathways mediating oxidative and inflammatory reactions. The present study aimed to investigate in vitro scavenging capacity, β-carotene bleaching inhibition, ferrous iron chelating activity, also the inhibitory activity of Solanum melongena (eggplant) peduncles methanolic extract and different fractions against COX-2 and iNOS expression and on the secretion of PGE2, NO, IL-6 and TNF? using LPS stimulated RAW264.7 macrophages cells. Peduncles from C. Solanum melongena were extracted with methanol (MeOH). The extract was then successively partitioned with hexane, dichloromethane (CH2Cl2) and ethyl acetate (EtOAc). The EtOAc fraction exhibited excellent 2,2-diphenyl-1-picrylhydrasyl (DPPH) radical scavenging activity, with an EC50 value of 2.8 µg.mL-1 (EC50 of catechin is 1.0 µg.mL-1). Also, this fraction displayed the highest β-carotene bleaching inhibition activity (61.18%) for a concentration of 10 µg.mL-1 at 30 min (64.55% for catechin). When hexane fraction exhibited the highest chelating activity with an EC50 value of 15.3 µg.mL-1 (7.1 µg.mL-1 for EDTA). Furthermore, treatment of LPS-activated RAW cells with hexane fraction reduced the expression of COX-2 and iNOS in a dose-dependent manner. Also, it decreased the production of PGE2 by 4-fold and NO. by 10-fold at a concentration of 10?g.mL-1. Moreover, a significant 3-fold decrease in IL-6 concentration and 2-fold decrease TNF? concentration was detected with the same conditions. At the same time, no cytotoxic effect of the hexane fraction at all tested concentrations was observed against RAW-264.7 using XTT cell viability assay. The results from our study demonstrate an improved anti-inflammatory response in a LPS-stimulated macrophage model upon treatment with eggplant hexane fraction via reduction of IL-6 or TNF-? production or reduction of expression of COX-2 or iNOS and released products.

La drosophile, un modèle d'étude des voies de signalisation contrôlant l'immunité innée et l'inflammation

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Le système immunitaire inné est un système de défense ancestral qui constitue l'unique moyen de défense des invertébrés. Chez les vertébrés, il assure la première ligne de défense contre les infections et joue un rôle essentiel dans l'activation et l'orientation de la réponse adaptative. Les aspects généraux de l'immunité innée sont hautement conservés au cours de l'évolution. Son activation se base notamment sur la détection de motifs microbiens clés par des récepteurs de type Pattern recognition Receptors. Ces récepteurs stimulent alors des cascades de signalisation, dont les voies NF-kB, conduisant à l'expression de plusieurs centaines de gènes dont ceux codant des molécules effectrices, des molécules de co-stimulation ainsi que des cytokines régulant les processus inflammatoires. Deux voies de signalisations de types NF-kB, la voie Toll et la voie IMD régulent la réponse humorale de la drosophile qui culmine en la synthèse de peptides à activité antimicrobienne. Ces voies présentent de fortes homologies avec les voies de types NF-kB activées lors de la réponse immunitaire innée par les cytokines IL-1 et TNFα, respectivement, chez les vertébrés. Par ailleurs, identifiés à partir de leur homologie avec le récepteur Toll de la drosophile, les Toll like Receptors (TLRs) sont responsables de la reconnaissance d'agents infectieux et de l'activation de la réponse immunitaire innée chez les vertébrés. L'objectif de ce projet est d'identifier de nouveaux composants de la voie IMD. La caractérisation de cette voie de signalisation chez la drosophile permettra d'extrapoler les résultats aux études chez les mammifères y compris les humains. Dans ce but, un crible génétique extensif basé sur la technique d'ARN interférence a été effectuée sur un modèle de culture de cellules de drosophiles à l'UPR 9022 du CNRS à Strasbourg. Ce crible a permis l'identification d'un nouveau gène nommé akirine. La caractérisation phénotypique de drosophiles déficientes pour l'expression de l'Akirine a montré que ce gène est essentiel aux mécanismes de défenses de la drosophile contre les infections par des bactéries à Gram-négatif. Deux orthologues de l'akirine ont été identifiés chez les mammifères dont l'un est impliqué dans la modulation de l'activité de NF-κB en aval de L'IL-1R, du TNFR et des TLRs. Outre l'akirine, le crible en cellule a permis la sélection de 8 gènes candidats codant de potentiels régulateurs positifs ou négatifs de la voie IMD. Notre projet consiste à étudier in-vivo, le rôle de ces 8 gènes candidats dans la réponse immunitaire innée chez la drosophile et de caractériser leurs fonctions dans la régulation des voies NF-κB. Les résultats obtenus à ce jour confirment le rôle de 3 nouveaux gènes et donnent une idée claire de la fonction de l'un d'eux au niveau de la voie IMD. D'une façon très intéressante, les trois gènes considérés par cette étude présentent des homologues chez les mammifères. La finalisation de ce travail permettra une meilleure compréhension du fonctionnement de l'inflammation et de la réponse immunitaire innée. Les résultats obtenus faciliteront la mise en place de stratégies efficaces pour contrôler leur activation notamment dans le cas des maladies inflammatoires.

THE COMBINATION OF MONOMERIC AND PENTAMERIC ISOFORMS OF CRP DECREASES THE PRODUCTION OF TNF-? and IL-6 BY U937- DERIVED MACROPHAGES IN THE PRESENCE OF OXLDL

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Atherosclerosis is a multifactorial inflammatory disease. The mechanisms of atherogenesis are not clear yet; however, it is known that C-Reactive Protein (CRP) and oxidized Low Density Lipoprotein (oxLDL) play a major role at both early and advanced stages of the disease. The role of CRP is controversial since it was demonstrated to exhibit both pro- and anti-inflammatory effects at the level of the arteries. These antagonistic effects were justified by the discovery of two isoforms of CRP, monomeric (m) and pentameric (p), where the pro-inflammatory and anti-inflammatory effects were attributed to mCRP and pCRP respectively. On the other hand, oxLDL accumulates in macrophages under the intima of the artery hence transforming them into foam cells that form later the atherogenic plaque. OxLDL and CRP

may form a complex via phosphatidylcholine and thus delay the progression of atherosclerosis. In our project, we aim to investigate the single and combined effects of mCRP, pCRP and oxLDL on U937-derived macrophages. Therefore, U937-derived macrophages were treated with different combinations of CRP's isoforms with or without oxLDL and the levels of major pro-inflammatory cytokines (IL-1β, IL-6, IL-8 and TNF-α) along with the production of reactive oxygen species (ROS) were determined. TNF-? and IL-6 levels were decreased significantly ($p < 0.05$) by the effect of mCRP and pCRP combined with oxLDL, however, no significant decrease was observed neither in the other combinations nor for the other three parameters tested (IL-1?, IL-8 and ROS).

Etudes des interactions hôtes-pathogènes sur le modèle Drosophila melanogaster- Bacillus cereus

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L'interaction hôte-pathogène est un processus complexe impliquant une multitude de facteurs de la part des deux partenaires. Le système immunitaire assure la défense de l'organisme contre les microorganismes infectieux. Les pathogènes, de leur part, développent des stratégies appropriées qui leur permettent de surmonter les réactions immunitaires. Ils acquièrent ainsi le pouvoir d'une infection plus efficace et d'une persistance prolongée dans l'organisme hôte. Afin d'étudier les mécanismes d'interaction hôte-pathogène il est nécessaire de disposer d'un modèle incluant l'hôte et le pathogène. Dans ce contexte, l'approche génétique est particulièrement appropriée puisqu'elle permet l'identification des facteurs de l'hôte et du pathogène à travers l'étude des mutants. Plusieurs méthodologies sont actuellement disponibles pour la génération d'un grand nombre de variantes bactériennes. Idéalement, l'hôte doit également être favorable à l'analyse génétique. Par la puissance de ses outils génétiques, la mouche du vinaigre Drosophila melanogaster constitue un modèle de choix pour l'étude des interactions hôte-pathogène. De plus, les mécanismes de défense de la drosophile ont largement été investigués. De ce fait, il existe à ce jour de nombreux mutants de l'immunité dont la caractérisation phénotypique suite à une infection nous permet de mieux comprendre l'importance relative des différents composantes de l'immunité mises en œuvre par l'insecte contre le pathogène en question. Enfin, la drosophile présente l'avantage de petite taille de ses adultes qui permet la réalisation des tests de virulence sur un effectif significatif mais surtout pour faciliter la réalisation de cribles génétique à grande échelle. Dans le cadre de ce travail, nous nous intéressons aux bactéries appartenant au groupe Bacillus cereus puisqu'elles présentent un double intérêt, d'ordre médical et agronomique. Ces bactéries regroupent des pathogènes humains mais aussi des pathogènes d'insectes appropriés à l'élaboration de bio-pesticide, dont Bacillus thuringiensis. La conservation des facteurs de virulences bactériens ainsi que les mécanismes cellulaires et moléculaires de la réponse immunitaire des insectes évoquent l'existence de stratégies communes déployées lors des processus infectieux ainsi que la conservation des mécanismes de défenses au cours de l'évolution. De ce fait, nous proposons dans le présent travail d'explorer les stratégies élaborées par les bactéries appartenant au groupe Bacillus cereus, pour résister, contourner ou leurrer le système immunitaire de l'hôte au cours de l'infection, en prenant comme modèle la mouche du vinaigre Drosophila melanogaster. Au cours de ce travail, nous cherchons à évaluer l'importance relative des différentes composantes de la réponse immunitaire de l'hôte afin de révéler les mécanismes de résistance développés chez la bactérie pour les surmonter. En parallèle, nous visons l'identification des gènes impliqués dans la virulence bactérienne grâce à un crible génétique extensif exploitant une banque de 5000 mutants de Bacillus thuringiensis. Cette étude nous permettra d'élucider les mécanismes de la virulence bactérienne in vivo ainsi que les stratégies déployées par l'hôte dans la lutte contre l'infection. Nos résultats ont permis la mise en place d'un protocole d'infection permettant la discrimination entre des souches virulentes et atténuées Bacillus thuringiensis. A ce jour, trois mutants de la virulence bactérienne ont été sélectionnés, leurs caractérisations phénotypiques est en cours. Les résultats préliminaires énoncent des hypothèses intéressantes quant à la modalité de résistance de cette bactérie à la réponse immunitaire.

Effects of sub-lethal High Intensity Focused Ultrasound (HIFU) exposure on mechanotransduction and cytotoxic response to anti-neoplastic agents in MCF-10A and MDA-MB-231 cells

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Introduction: High Intensity Focused Ultrasound (HIFU) is a therapeutic device widely used to destroy specific tissues including solid tumors inside the body in an ex-corporal and non-ionizing mode. At the focal point where the acoustic waves are intensified, cell death can result from cavitation and/or thermal ablation effects. However, the effects of sub-lethal HIFU exposure at a distance from the focal point on cell function remain to be elucidated. Given that HIFU exposure results in pressure/tension waves that can cause cellular deformations, we hypothesize that sub-lethal HIFU treatment could result in mechanotransduction alterations that may alter tumorigenesis of mammary epithelial cells and may modulate their response to anti-neoplastic agents. Objective: The aim of this study is to examine the alterations in mechanotransduction due to changes in the physical properties resulting from the exposure of MDA-MB-231 breast cancer cells and MCF-10A immortalized mammary epithelial cells to ultrasonic waves from a custom-designed HIFU setup and to determine consequences on cellular response to anti-

neoplastic agents. Methods: A HIFU setup was custom-designed to permit utilization of a 2.158 MHz transducer for in vitro exposure of MCF-10A and MDA-MB-231 cells. Real-Time PCR was used to quantify mechanosensitive gene expression. We assessed the in vitro effects of sub-lethal HIFU exposure on the expression of seven mechanosensitive genes namely CAV-1 (Caveolin-1 α & β), Hic-5 (Hydrogen Peroxide-Inducible Clone 5), PXN (Paxillin), TTLL4 (Tubulin-Tyrosine Ligase-Like Protein 4), TWIST1 (Twist-Related Protein 1), CTSD (Cathepsin D), and HSPA1A (Heat Shock Protein 70). Cellular viability was assessed using trypan blue exclusion assay. Results: We quantified significant enhanced expression of CAV-1α, PXN, and Hic-5 that was immediate-early in MCF-10A and delayed in MDA-MB-231 cells. Additionally, we noted an immediate-early transient increase in TTLL4 expression in both cell lines and in TWIST1 expression in MDA-MB-231 cells. Notably, sub-lethal HIFU exposure had no significant effect on the expression of CAV-1(total pool), CTSD, and HSPA1A in both cell lines. Moreover, sub-lethal HIFU exposure at 6hr or 30hr prior to the in vitro addition of anti-neoplastic agents sensitized both cell lines to suboptimal cytotoxic doses of Taxol (1.5nM, 7.5nM) and Doxorubicin (0.05uM, 0.5uM) when tested over a period of four days. Furthermore, MDA-MB-231 cells surviving single or dual rounds of HIFU exposure at the focal spot and passaged over 3-to-6 weeks in tissue culture show no significant change in their in vitro sensitivity to Taxol or Doxorubicin. Conclusion & Future Directions: Sub-lethal High Intensity Focused Ultrasound (HIFU) exposure significantly modulates the expression of select mechanosensitive genes in MCF-10A and MDA-MB-231 cells and sensitizes them to suboptimal cytotoxic doses of Taxol and Doxorubicin. Work is underway to determine if sonoporation - among other mechanisms that are related to the above mentioned mechanotransduction alterations - is implicated in the enhanced in vitro sensitivity of both cell lines to suboptimal cytotoxic doses of Taxol and Doxorubicin post sub-lethal HIFU treatment. Subsequently, we plan to assess post-translational changes in phosphorylation of Cav-1 (α & β), Hic-5, Paxillin, TTLL4, and Erk in both cell lines and examine if cells exhibit changes in lumen formation and/or cellular polarity in 3-D matrigel post in vitro exposure to sub-lethal HIFU.

Microbial Transformation of Medrysone and the Biological Activity of its Metabolites

Marie-Anne Boujaoude and Roula M. Abdel-Massih (University of Balamand, Lebanon); Dina Farran and Elias Baydoun (American University of Beirut, Lebanon)

In microbial biotransformation, microorganisms either modify or degrade the basic skeleton of the parent drug using enzymes present in the organism. The metabolites produced are the products of reactions that are more specific, quick and less expensive than those obtained with synthetic organic approaches. Moreover, microbial biotransformation reactions are also more environment-friendly, not requiring extreme conditions or the use of harmful and toxic chemicals like counters. Bacteria and fungi have been widely used in the past decades for the production of analogues of several bioactive compounds that are difficult to synthesize by classical chemical routes. In this study, microbial biotransformation of Medrysone was investigated by screening the biotransformation potential of three fungi: Aspergillus niger, Rhizopus stolonifer and Cephalosporium aphidicola. Medrysone is a steroidal drug used in the treatment of conjunctive inflammations. Biotransformation by Rhizopus stolonifer showed the most promising results and a large scale experiment was performed. Four metabolites were obtained, one of which is a newly formed compound. The biological activity and cytotoxicity against different cell lines of this new metabolite are being studied. This work leads to the discovery of new libraries of drug analogs that have the potential to be drug candidates.

Antitumor and antioxidant effects of Salvia multicaulis, Prangos asperula, Staehelina lobelii and Stachys ehrenbergii on human pulmonary adenocarcinoma cells

Alain Abi-Rizk, Roula Mezher and Marc El Beyrouthy (Holy Spirit University of Kaslik, Lebanon); Georges Nemer (American University of Beirut, Lebanon)

Roula Mezher (1), Marc El Beyrouthy (1), Georges Nemer (2), Alain Abi-Rizk (1) (1) Faculty of Agricultural and Food Sciences, University of the Holy Spirit of Kaslik, Jounieh, Lebanon. (2) Department of Biochemistry, American University of Beirut (AUB), Beirut, Lebanon Lung cancer is the leading cause of cancer-related death in both men and women worldwide. This cancer remains incurable and current drug therapies have many side-effects. For that, replacing chemotherapy with natural cancer remedies could form a whole new level in medicine. In this study we aim to investigate the anticancer and antioxidant effects of the Levant endemic plants Salvia multicaulis, Prangos asperula, Staehelina lobelii and Stachys ehrenbergii on human pulmonary adenocarcinoma. The alcoholic extracts of these plants were analyzed by GC/MS in order to identify their bioactive components. Their Antioxidant effect was also measured by ABTS assay comparatively to vitamin C. Then the effect of different concentrations of these extracts on the viability of A549 lung cancer cells was examined using MTT and NR assays. In order to better understand the mechanism of inhibition, the alkylation effect of these extracts on the A549 cells was studied using NBP assay. Our findings show an interesting cytotoxic effect of these plants extracts on A549 cells. Additionally, S. ehrenbergii and S. lobelii present a specific high alkylation potential. Data from this in vitro study demonstrate an interesting antitumor potential of the Levant endemic S. multicaulis, P. asperula, S. lobelii and S. ehrenbergii, which can be attributed to their antiproliferative and alkylation actions towards human pulmonary adenocarcinoma. Prospective cancer-suppressive effects of the tested extracts should be further evaluated in in vivo experiments.

Is There an Inter-individual Genetic Variability in the Expression Frequency of Common Fragile Sites among Healthy Persons and Leukemia Patients?

Baraah Al Ahmad Nachar (University of Balamand, Lebanon); Eliane El Achkar (University Of Balamand, Lebanon)

Cancer is a genetic disease distinguished by certain pathological processes that involve reprogramming of genetic information, structural components, signals and metabolism of cells leading to uncontrolled cellular proliferation. Oncogenic stress found in cancers was shown to be associated with genomic instability triggering DNA breakages. Such breakpoints in cancer colocalize with preferential sites called fragile sites. Fragile sites are site-specific breaks, gaps or decondensations expressed on metaphase chromosomes when cells are cultured under replication stress conditions. They are classified according to their frequency among population into rare and common fragile sites (CFS). CFS are present in all individuals and thus are considered as part of normal chromosomal structure. They are mainly induced by aphidicolin, a partial inhibitor of DNA polymerases ?, ? and ?. They are conserved throughout evolution, are hotspots for sister chromatid exchange, plasmid and viral DNA integration. Previous cytogenetic studies suggested that there is a variation in the expression frequency of CFS among individuals. However, no molecular studies have been done to detect if there is an expression variability of these sites at hotspots of breakage between normal individuals and leukemia patients. In this study, we propose to determine the expression frequency of FRAXB, a CFS located at Xp22.31 and one of the most CFS expressed in the human genome, in healthy persons and cancer patients of different ages. Blood samples from different donors were collected and cultured for four days. The lymphocytes were then treated with 0.2 µg/ml of aphidicolin for 24 hours. RP11-483M24, a Bacterial Artificial Chromosome (BAC) probe specific for a hotspot of breakage within FRAXB was used in Fluorescent In Situ Hybridization in order to detect breaks on this site. Fluorescent Microscopy was used to capture the fluorescent signal with or without breakage. One hundred fluorescent signals were analyzed per donor. The preliminary results suggest that the expression of FRAXB is significantly variable among healthy individuals of the same age. This could be due to difference in the genetic background of these subjects. Such inter-individual variation in the CFS expression under stress conditions can explain why there is variability in cancer incidence among individuals with the same age subjected to the same environmental conditions and same mutagens.

Ecogeographic study and preliminary molecular characterization of the genus Matricaria L. in Lebanon to guide in-situ and ex-situ conservation efforts

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Ecogeographic survey, the process of collating diversity and ecological and geographic data and synthesizing it, is needed to obtain baseline information regarding the species taxonomy, distribution and ecology and ultimately develop any conservation plan. When complemented with molecular data, habitat and environmental characterization of species distribution areas, would aid in the assessment of the current conservation status of the target species and the most important threats to develop an appropriate management plan, the identification of areas for in situ conservation of the target species and the identification of populations of the target species that contain unique genetic diversity that is not already conserved ex situ, and worth conserving and hence guide collection missions to obtain representatives of the genetic diversity. An ecogeographic survey was conducted for Matricaria chamomilla (L.), the wild chamomile and Matricaria aurea (L.) Sch. Bip., the Golden chamomile between March 2014 and June 2014. Twenty seven sites located in different geographical Lebanese regions were assigned for the study and the peculiarities of each site were recorded. Eight Populations of M. chamomilla and two from M. aurea were included in the molecular screening using the Start Codon Targeted (SCoT) DNA markers. The results confirmed the fact that Matricaria may survive in various environments but it is exposed to many threats influencing its existence mainly urbanization for M. chamomilla and drought and grazing for M. aurea. Preliminary results on molecular screening showed that DNA isolation from young plants of matricaria was difficult due to the presence of carbohydrates and using the common protocols for DNA isolation from medicinal plants were not able to generate DNA able for amplification. Amplificable DNA with ScoT markers was obtained only by using commercial kit for further molecular screening.

IRS-1, PI3K, AKT and GLUT2 Expression in Diabetic Rats Treated with Insulin, Exendin-4 or Selenium

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Diabetes mellitus is a major health burden and its prevalence worldwide is in an alarming increase. The trace element selenium and the stable GLP-1 analogue; exendin-4, have been shown to exert antidiabetic properties and to affect glucose metabolism, yet, the exact molecular mechanisms for these actions await further clarification. In this study, we investigated the effect of short treatment with selenium, exendin-4, a combination of insulin and selenium as well as a combination of selenium and exendin-4 on blood glucose levels and expression of insulin signaling key transducers IRS-1, PI3K, AKT as well as expression of glucose transporter GLUT2 in the livers of STZ-induced diabetic rats. Induction of diabetes in rats resulted in significant hyperglycemia, significant decrease in hepatic steady-state mRNA levels of IRS-1, PI3K, AKT and GLUT2, significant increase in IRS-1 and GLUT2 protein levels, significant decrease in AKT protein levels with no change in PI3K protein levels in diabetic rats relative to control levels. After six days

of treatment, the combination of selenium and exendin-4 decreased hyperglycemia in the diabetic rats to near control value. Treatment with this combination also normalized the protein level of IRS-1. Only treatment with selenium among the five treatment modalities significantly affected the protein level of PI3K that increased in the livers of these treated rats as compared to untreated diabetic rats. All treatment modalities significantly increased and nearly normalized protein levels of AKT in livers of treated diabetic rats relative to levels in untreated diabetic rats. Selenium, insulin and selenium as well as selenium and exendin-4 treatments caused a significant increase in GLUT2 protein levels relative to levels in control rats. Our findings reveal that exendin-4 or the combination of exendin-4 and selenium may exert their antidiabetic effects through acting on IRS-1, AKT and glucose transporter GLUT2 in the liver.

Radiotherapy Induces Injury and Retards Proliferation in Normal Mammary Epithelial Cells within and on the Edge of the Treatment Field

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Introduction: Radiotherapy is a well-established cancer treatment strategy that has been used for more than 100 years. However, radiotherapy causes acute or late side effects such as radiogenic second cancers. These effects may result from primary radiation within the treatment field or from secondary radiation outside the treatment field emitted either from the treatment unit or from within the patient. The dose-effect relationship for side effects in radiotherapy settings is poorly understood, especially outside of the treatment field. The purpose of this study was to assess effects of a radiotherapy setting on proliferation of normal epithelial cells and to measure levels of IL-6, nitric oxide (NO) and matrix metalloproteinases (MMPs), inflammatory mediators indicative of cell injury, in four locations: at center of treatment field (i.e. prescription location), at edge of field, outside of field and far outside field. Methods: An in-vitro model of inflammation was previously established in our laboratory, whereby SCp2 cells, normal mouse mammary epithelial cells, upregulate levels of IL-6, NO and MMPs in response to endotoxin stimulation. In this study, SCp2 cells were exposed to radiation doses and energy spectra characteristic of those received by a cancer patient in a radiotherapy setting, both inside and outside treatment fields. Results: Our results demonstrate, within 24hrs post-radiation, reduced proliferation in cells located at center or at edge of treatment field, and a concomitant increase in levels of IL-6 and NO, but not MMPs. No significant effect for radiation was noted in cells located outside or far outside of treatment field. Conclusion: Collectively, results suggest that primary radiation may cause late injury in normal tissues within treatment field. Further studies are warranted to decipher mechanisms associated with normal tissue injury induced by primary radiation and to observe injury outside the treatment field that relates to late effects such as second cancers. This might provide means for targeting specific signaling pathways and counteracting side effects of radiotherapy in order to ensure effectiveness of treatment, while sparing normal tissues.

Effects of atrial natriuretic peptide on rat ventricular fibroblasts during differentiation into myofibroblasts

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Background and aim: Cardiac fibroblasts are the most abundant cell type in the adult mammalian heart (Camelliti et al., 2005). They play a critical role in normal myocardial structure and function (Manabe et al., 2002 and Benamer et al., 2009). Under pathological conditions, cardiac fibroblasts gain the ability to differentiate into myofibroblats. While the principal role of myofibroblasts is to repair tissue injury, their persistent activation results in a maladaptive response, leading to cardiac fibrosis and consequently cardiac dysfunction (Kong et al., 2014). Myofibroblasts are characterized by increased expression of many extracellular matrix (ECM) markers such as alpha smooth muscle actin (α-SMA), and collagen (Banerjee et al., 2006, Souders et al., 2009). They also express high levels of pro-inflammatory molecules and matrix metalloproteinases (Santiago et al., 2010). Since collagen is a major determinant of myocardial structural integrity, its disproportionate increase in the heart leads to cardiac fibrosis (van Nieuwenhoven & Turner, 2013). Recent studies have suggested that the ECM regulation participates in local antifibrotic effects of natriuretic peptides (Parthasarathy et al., 2013). However, the regulation of cardiac fibroblasts differentiation in pathological conditions involving the natriuretic peptides remains unknown. Atrial natriuretic peptide is a cardiac hormone primarily stored within atrial granules and secreted in response to cardiac volume overload (Rubattu et al., 2008, Arjamaa, 2014). At the cellular levels, the effects of ANP are primarily mediated through the guanylyl cyclase - cGMP activity of natriuretic peptide receptors NPRs (Potter et al., 2006, 2011). Phosphodiesterase (PDE) subtypes regulate distinct cellular functions by selectively degrading different cAMP and cGMP pools (Levy, 2013, Lu et al., 2013) and therefore adjusting cyclic nucleotide signaling (Qvigstad et al., 2010). The aim of our study was to investigate the ANP/NPR/cGMP system during differentiation of serum-stimulated cultured adult rat cardiac fibroblasts into myofibroblasts, for better understanding of cardiac fibrogenesis signaling process. Methods: Ventricular fibroblasts were isolated from adult male rat (weighing 200-300 g) and maintained in primary culture. Fibroblasts were cultured in 96-well plates (for MTT proliferation test) or 6-well plates (for collagen measurements, intracellular cGMP ELISA test and natriuretic peptides receptors western blot screening), and grown for 12 days in medium alone or in medium supplemented with

different chemicals: ANP (1 µM), 8-Br cGMP (100 µM) and IBMX (a potent non-specific phosphodiesterases inhibitor, 100 µM) + ANP (1 µM). For Immunofluorescence (IF), cells were cultured on coverslips, grown in DMEM and fixed with Paraformaldehyde (PFA). MTT technique is based on the transformation of 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide to an insoluble formazan salt by active mitochondria. Therefore formazan formation is associated with the proliferation activity of the cells. Collagen measurements were realized with the SIRCOL collagen assay in order to evaluate total collagen quantity in cell culture medium supernatants. Results: ANP significantly decreased proliferation rate and collagen secretion relative to control from 10 days of culture. These effects were mimicked by the cGMP analog. Indeed spontaneous cell proliferation and collagen secretion increase was reduced by the 8-Bromo-cGMP as fibroblast differentiate into myofibroblast. Meanwhile we observed that combining ANP with 8-Br-cGMP did not lead to additional effects, suggesting that the intracellular pathway involved in the effects of both ligands is the same. The elevated intracellular cGMP levels in the cells incubated with ANP confirmed that ANP intracellular pathway is mediated by cGMP. On the other hand, immunoblotting and immunofluorescence were used to confirm the presence of guanylyl cyclase specific receptors NPR-A and NPR-B. In fact the receptors expression levels, compared to the β-actin, were significantly increased in the presence of ANP after 12 days of culture. Moreover scanning specific cGMP dependent PDEs via RT-qPCR, revealed the expression of mainly 5 isoenzymes PDE2a, PDE3a, PDE3b, PDE5a and PDE10a in the cultured myofibroblasts. Finally inhibiting all PDEs by IBMX, in the presence of ANP, led to an important decrease in proliferation rate. Interestingly intracellular cGMP, in the presence of IBMX, was further increased suggesting that cGMP level is indeed balanced between guanylyl cyclase activity and PDE-induced degradation. Conclusion: This study showed the important role of ANP/NPRA signaling in fibroblast to myofibroblast differentiation. cGMP and specific PDEs modulating cell proliferation and differentiation provide new insights into better understanding cardiac fibrosis in pathogenic situations.

Evidence of a Role for Fibroblast Transient Receptor Potential Canonical 3 Ca2+ Channel in Renal Fibrosis

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Background: It is estimated that more than 14% of the adult population has some degree of chronic kidney disease (CKD), and the prevalence of patients with end-stage renal disease (ESRD) is increasing worldwide (1, 2). Most progressive renal dysfunctions eventually lead to renal fibrosis regardless of the underlying disease, more specifically interstitial fibrosis which is characterized by aberrant growth and proliferation of renal fibroblasts (3-6). Furthermore, calcium (Ca2+) is an important signaling molecule implicated in diverse cellular functions such as differentiation, gene expression, cell proliferation, growth and death and plays a significant role in regulating fibroblast functions (7-9). Transient receptor potential canonical (TRPC) channels are voltage-independent, non-selective calcium channels in the plasma membrane that can be activated by angiotensin II and endothelin I (10); among this channel family, TRPC3 has been increasingly implicated in many forms of cardiac remodeling in hypertrophy and fibrosis but not yet in the kidney diseases (11-16). Objectives: In this study, we examined the role of TRPC3 in renal fibroblasts, and evaluated the therapeutic efficiency of TRPC3-inhibition in obstructive nephropathy in a rat and TRPC3 knockout (TRPC3-/-) mouse unilateral ureteral obstruction (UUO) models. Methods: TRPC3 role was studied in cultured renal fibroblasts and in the development of renal fibrosis in vivo in the adult male rats and TRPC3-/- mice. First, rat renal fibroblasts were isolated by enzymatic digestion of the kidneys, then put in culture. Then, TRPC3 functional role was studied in these cells by fura-2 live intracellular Ca2+ imaging using the Ionoptix Myocyte Ca2+ and Contractility System. TRPC3 channels were activated by the diacylglycerol analogue 1-oleoyl-2-acetyl-sn-glycerol and by angiotensin II, then inhibited by a specific pharmacologic blocker ethyl -1 -(4-(2,3,3-trichloroacrylamide)phenyl)-5-(trifluoromethyl) -1H- pyrazole -4-c arboxylate (pyr3) or by small interfering RNA (siRNA). The physiological effects of TRPC3 blockade on fibroblasts were assessed by MTT proliferation assay, scratch migration assay and trypan blue viability assay. A screening was also performed by quantitative PCR, western blots and Elisa to assess the anti-fibrotic and anti-inflammatory effects of TRPC3 blockade. Afterward, the renal fibroblast intracellular pathway activated by TRPC3 was studied by western blot using several intracellular specific pathway inhibitors. Next, UUO was performed on adult male rats that were treated with pyr3 using osmotic mini-pumps implanted subcutaneously, as well as TRPC3-/- mice. The activation of TRPC3 as well as the fibrotic profile of renal fibroblasts were assessed by intracellular Ca2+ imaging, quantitative PCR, western blots and Elisa. The effect of TRPC3 pharmacologic and genetic inhibition on the development of renal fibrosis was assessed by histopathology. Results: Specific blockade of TRPC3 with the pharmacologic inhibitor pyr3 was sufficient to inhibit both angiotensin II- and 1-oleoyl-2-acetyl-sn-glycerol-induced Ca2+ entry in the cultured renal fibroblasts. TRPC3 blockade or Ca2+ removal inhibited in vitro fibroblast proliferation with up-regulation of negative cell cycle regulators p53 and p21 and down-regulation of positive regulators Ki67 and proliferating cell nuclear antigen. Fibroblast to myofibroblast trans-differentiation was also inhibited as showed by the net decrease of alpha smooth muscle actin that characterizes this type of cells. Extracellular matrix components such as collagen 1, 3 and 4 and fibronectin 1 expression as well as regulators like matrix metalloproteinase 2 and 9 and tissue inhibitor of metalloproteinases 1 diminished with TRPC3 blockade along with the fibrogenic activator connective tissue growth factor. Pyr3 and siTRPC3 treated fibroblasts also showed decreased expressions of the monocyte recruiting chemokine 1 with suppression

of the prostanoid and leukotriene pathways shown by diminished cyclooxygenase 2 and arachidonate 5-lipoxygenase expressions. Secretions of inflammatory and fibrotic cytokines such as interleukin 1 and 6 and transforming growth factor β 1 were significantly reduced with TRPC3 blockade. Furthermore, TRPC3 Ca2+ signaling was important and essential in triggering the mitogen-activated protein kinase ERK pathway, which was subsequently important in driving the fibrotic and inflammatory profile of the renal fibroblasts. Thus, TRPC3 blockade inhibited ERK pathway. The observed effects of TRPC3 inhibition were mediated in a non-cytotoxic way, since this inhibition did not affect the cells viability. Thereafter, in adult male rats or wild-type mice subjected to UUO, TRPC3 expression increased in the fibroblasts of obstructed kidneys and was associated with increased Ca2+ entry, ERK1/2 phosphorylation, and fibroblast proliferation. Both TRPC3 blockade in rats and TRPC3 knockout in mice inhibited ERK1/2 phosphorylation and fibroblast activation as well as myofibroblast differentiation in obstructed kidneys. Finally, TRPC3 inhibition preserved renal tissue by reducing extracellular matrix remodeling, tubulo-interstitial damage, tubular atrophy, widened interstitial space and number of interstitial cells and infiltrating leukocytes. Conclusion: This is the first study which demonstrates that TRPC3 non-specific Ca2+ channels are present in renal fibroblasts and control fibroblast proliferation, differentiation, and activation through Ca2+-mediated ERK signaling, thus mediating renal fibrosis. TRPC3 channels might constitute novel important therapeutic targets for improving renal remodeling in CKD.

P1_eng1_CCE_INf: Poster Session 1- Engineering I

Room: USJ Hall CSH

Chairs: Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon), Nadim Zakhia (Holy Spirit University of Kaslik, Lebanon)

The Efficacy of Sterile Lead-Free Drapes in Attenuating Interventional Radiologist's Radiation Exposure Dose

Sahera Saleh (Rafik Hariri University, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon)

The Efficacy of Sterile Lead-Free Drapes in Attenuating Interventional Radiologist's Radiation Exposure Dose Mohammad O. Diab, Sahera A. Saleh, Mustapha M. Dichari, Nijez Aloulou Bio-instrumentation department, College of Engineering, Rafik Hariri University, Mechref, Lebanon Faculty of Science, Lebanese University, First Branch, Beirut, Lebanon. diabmo@rhu.edu.lb salehsa382@students.rhu.edu.lb I. Introduction During interventional radiology procedures, fluoroscopy is used to image the patient in real-time in order to guide the procedure, performed for ether diagnostic or therapeutic purposes. The radiation emitted by the x-ray imaging system reaches the patient's body specifically at the area of interest. Nevertheless, when radiation enters a patient, not all of the photon beams are fully absorbed or pass straight through the molecules of biologic tissues. A significant amount of the photons are reflected off the cells and exit the body in different directions, creating scatter radiation. Therefore, even though the medical personnel are not in the path of the direct radiation beam, they are susceptible to be exposed to scatter radiation that mainly originates from the patient. Scatter, or secondary, radiation is the main source of occupational radiation exposure. Exposure of medical personnel to x-rays puts them at a great potential risk of developing one of the many biological effects of radiation. Sterile protection equipment have been reported to reduce operator radiation exposure during interventional cardiology procedures. This study sought to evaluate efficiency of sterile radiation protection shields (drapes) in attenuating the operator's exposure dose during interventional cardiology procedures performed via femoral access. II. Study Methodology In an observational study involving a single center and a single interventional radiologist, operator exposure dose was measured during interventional cardiology procedures. The study population included 28 patients who underwent diagnostic coronary angiography or coronary angioplasty procedures from April to September 2014. Procedures were performed by a single cardiologist at Clemenceau Medical Center (CMC) affiliated with John Hopkins, in Beirut, Lebanon, in one catheterization lab on a single-plane image-guided system (GE Innova 3100 Plus). In general, the procedures ranged from simple diagnostic procedures to angioplasty procedures including multiple stent implantations. All cases were realized via femoral access. The cases were randomly selected to Group A of 14 cases performed without using the sterile shields and Group B of 14 cases performed using commercially available lead-free, sterile radiation protection shields (Radionex AS1001 High Attenuation; MMD, Globally distributed by MAVIG, Munich, Germany). The shield used was a 41 x 33 cm rectangular drape with a specially-designed fenestration for procedures performed through femoral access. Radiation protective material consists of a lead-free mixture of Antimony, Bismuth, Tungsten and binding elements. The shields were pulled down over the patient's right leg, above the surgical drape, with the special fenestration in the shield placed over the incision location to prevent blocking the operator's access. A digital Gieger-Muller X-ray and Gamma radiation dosimeter (Polimaster PM 1610 Minsk, Belarus) was used to obtain dosimetric readings. The dosimeter was placed on the outside pocket of the lead apron worn by the operator, to measure the dose received by the unprotected organs. III. Results Dosimetry Readings were compared between the 2 groups with and without radiation protection shield. Fluoroscopy time, patient dose and operator dose and dose rate for Groups A and B are shown in Table I. The reduction in operator dose rate upon using the shield is statistically significant with an average of 72.5% reduction. The percentage of reduction of the dose received by the physician was calculated through comparing

the non-shielded with the shielded procedures. TABLE I FLUOROSCOPY AND RADIATION DATA Group A Without Radionex (n=14) Group B With Radionex (n=14) Exposure time (min) 3.2 ± 2.3 9.3 ± 19.2 Operator Radiation Accumulated Dose (μSv) 53.8 ± 38 41.2 ± 81.6 Operator Radiation Dose Rate (μSv/min) 18.4 ± 12.1 5.1 ± 3.5 Values are Mean ± SD IV. Conclusion Sterile radiation shielding offers effective radiation protection to the operator working via femoral access during angiography and angioplasty procedures. The accumulated dose received by the operator during these procedures decreases upon using the shield, despite the fact that it is already low in the case of optimal personal protection.

Modeling and Characterization of Ionic Polymer Metal Composite (IPMC) Artificial Muscle

Reem Brome (Rafik Hariri University, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon); Nizar Awar (RHU, Lebanon); Mirna Atieh (Lebanese University, Lebanon)

We know from early human tools that physical rehabilitation and extension technologies have been used during much of recorded history. Although the goal of constructing such technologies is not new, great scientific and technological obstacles still exist. Even today, with the great advancement of technology, permanent assistive devices or prosthetics are considered by the amputees as an independent, lifeless mechanism from the patients' bodies. They also do not mimic extensions of their human bodies whether structurally, neurologically, or dynamically. The bionic limbs with electromechanical designs that currently exist in the market are true to be stronger and faster, however are noisy, heavy, and energy consuming. Investigations are turning towards a solution starting from the smallest unit responsible for the actuation of the limb which is the muscle fiber. Researchers are attempting to find ways of replacing individual muscles rather than whole limbs to provide bionic treatments for people who have suffered serious sporting injuries or lost muscles in accidents. They are using synthetic polymer gels that expand and contract in response to small electrical currents to create synthetic muscles for replacing heart valves, sphincter muscles and, eventually, larger muscles. Artificial muscles are one of the most important applications of the technology for flexible structure, designed to imitate human or animal muscles and to monitor its activities and conditions. The emphasis of this research is to understand the behavior of the Ionic Polymer Metal Composite (IPMC) that is a part of the ionic Electro-Active Polymer (EAP) Artificial Muscles category. These polymers usually contain an electrolyte and involve transport of ions/molecules in response to an external electric field. An electromechanical model that relates the electric input and mechanical output is required for the material characterization and application. This research addresses the electromechanical actuation of IPMC and a method used to characterize it by obtaining its most important parameters. The model proposed is to simulate the bending actuation of the IPMC component when a potential is applied to the muscle. The model was successfully able to predict the load that the muscle can hold at the corresponding applied voltage. Furthermore, a method to measure the change in shape or bending of the IPMC was adopted using edge detection image processing technique. It was concluded from the obtained equations that the bending movement of the IPMC depends on its dominant material which allows us to characterize the IPMC and identify its parameters such as its unit per load, resistance, and capacitance. Furthermore, this research explored the main properties of the IPMC through theoretical and live experimental practices, which are important in designing its electromechanical model according to the dominant material it constitutes. Young's modulus is characteristic in the type of the material used with the IPMC. Using edge detection technique, the curve that represents the shape of the IPMC upon a potential applied is obtained to obtain the rest of the missing parameters needed in the electromechanical model demonstrated in this research. The model computes the deflection of the muscle along its length for various input voltage. These results are very valuable to use IPMC in future work to simulate human muscle such as finger grip. Effective feedback sensors and control algorithms are needed to address the unique and challenging aspects of the IPMC actuators. If IPMC-driven artificial muscles can be used to receive its power from EMG signals, a tremendously positive impact will affect many human lives.

Evaluating Fetal Heart Rate Variability by Using FECG Recording - A Direct Technique

Ali Mohydeen (Lebanese University, Lebanon); Bassam Moslem (Rafik Hariri University & RHU, Lebanon); Oussama Bazzi (Lebanese University, Lebanon)

Analysis of the fetal heart rate variability (HRV) has become a widely accepted means of monitoring fetal status. Indeed, it was proven that HRV is a strong and independent predictor of mortality [1, 2]. HRV measurement is done nowadays using the Doppler ultrasound technique that enables the obstetrician to identify the fetal heart contraction. The disadvantages of Doppler ultrasound systems, such as the necessity of intermittent repositioning of the transducer and the need for use with highly trained midwifes led to the search for alternative monitoring technique. Numerous studies have analyzed the fetal electrical cardiac activity, known as fetal electrocardiogram and denoted as Fetal ECG or FECG associated with pregnancy and labor. It was reported that it is of interest to offer a good insight into the physiological state of the fetus [1, 3]. Therefore, it is potentially the best predictor of the status of the fetus. Fetal ECG can be recorded either invasively, by using electrodes attached to the fetal scalp, or non-invasively, by using surface electrodes placed on the abdominal wall of the pregnant woman. Unfortunately, abdominal recordings of fetal ECG have lower signal-to-noise ratio (SNR) as compared to the invasive procedure. This is mainly due to the fact that abdominal recordings include also the maternal ECG signal (MECG) as well as noise. Some of the important noise sources are muscular noise, base line noise, electrode noise and recording system noise [4]. FECG extraction is an interesting as well as a difficult problem in signal processing, and is still being considered as an active area of research. During the past years,

many signal processing techniques have been applied to the analysis of FECG recordings (subtraction method, correlation technique, adaptive filtering, and blind source separation methods). However, all these techniques require the need of recording one or more direct reference maternal ECG signals, which is practically cumbersome. Therefore, an FECG extraction method that requires no reference signals would be of great interest. In this paper, we show that HRV can be estimated directly from the abdominal composite recordings. Our proposed approach is based on a combination of two techniques: Periodic Component Analysis (PiCA) and recursive least square (RLS) adaptive filtering. First, PiCA technique is applied on the matrix of composite abdominal signals. Then, only two components (PCs) are considered: the first one is the PC that contains both the MECG and the FECG components and the second one consists only of the maternal contribution. These two signals are then applied to an adaptive filter in order to eliminate the maternal interference from the first PC. A post processing step that consists of filtering and base wander removal is applied. A time domain-based HRV estimation technique is then applied and the fetal HRV is estimated from both the extracted FECG signal and a reference FECG signal simultaneously recorded from the fetal scalp and used herein to evaluate our technique. The instantaneous heart rate is also determined. The proposed technique is evaluated by comparing the fetal HRV of the estimated FECG signal to a reference value extracted from an FECG signal recorded by using a spiral electrode attached directly to the fetal scalp. The experimental results show that the fetal HRV can be successfully evaluated directly, with a remarkably high accuracy, from the abdominal composite recordings without the need of using any external reference signal.

EEGNET: A Novel Tool for Processing and Mapping EEG Functional Networks

Mohamad Shamas (Universite de Rennes 1, France); Mahmoud Hassan (University of Rennes1, France); Wassim El Falou (Lebanese University, Lebanon); Fabrice Wendling (INSERM, France); Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon)

Due to its excellent temporal resolution, the Electroencephalogram (EEG) has become a key neuroimaging technique to analyze functional brain networks at scalp level (electrodes) and at reconstructed sources (inverse problem). However, a tool that can analyze EEG recordings, from raw signals 2D/3D to brain networks is still missing. Here, we propose a MATLAB-based pipeline, called EEGNET, to process EEG signals and represent corresponding functional brain networks. It includes: 1) Preprocessing of the EEG signals, 2) Solving the inverse problem / reconstructing the cortical sources, 3) Computing the functional connectivity at source level, 4) Calculating the network measures and 5) Visualizing 2D and 3D brain networks. The software is carefully designed to enclose these different phases. The first version of EEGNET is easy to use, flexible and user friendly. Moreover EEGNET is an open source tool and can be freely downloaded from the internet soon.

Pill Dispenser

Elie Samaha (Holy Spirit University, Lebanon); Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

Medication error is costly and may lead to complex anomalies and death. Elderly persons rely on their medications to keep them healthy, but complex medication schedules can lead to mistakes. In fact, the missing doses, the inadequate amounts taken, the disorganized schedule of medicine and so forth could lead to side effects, inefficiency of the treatment, illness and may lead to death. Here comes the idea of developing an automatic pill dispenser that could be a life saver for each family.

Système de modélisation de la répartition de la pression des pieds au fond des chaussures des coureurs de haut niveau

Elie Khoury, Kabalan Chaccour and Rony Darazi (Antonine University, Lebanon)

L'agilité et la vitesse jouent un rôle important chez les coureurs sportifs de haut-niveau. Il est donc essentiel de maintenir leur aptitude durant leurs activités sportives. La durabilité de cette aptitude repose sur plusieurs facteurs à la fois biologiques et physiques. Cependant, Il existe aussi des facteurs externes qui agissent sur la performance durant l'activité, parmi lesquels nous distinguons les habillements choisis. En effet, pour un coureur de haut-niveau, la performance dépend de la flexibilité et la souplesse de la semelle de ses chaussures. Afin d'optimiser la performance durant la course, il est donc nécessaire d'étudier l'interaction du pied avec la semelle. Ceci nous amène au sujet de notre recherche qui consiste à modéliser et visualiser la répartition de la pression du pied au fond des chaussures. Le but est d'analyser la flexibilité de la semelle pour optimiser les performances durant la course. Les solutions existantes utilisent différents types de capteurs pour répondre à différents objectifs. Lin Shui et al mesurent la pression par un capteur formé d'un tissu de plusieurs couches adhérant à un fil conducteur. L'acquisition et la conversion du signal se font par un microcontrôleur et la transmission par un module Bluetooth. S.M.M De Rossi et al ont développé un système d'analyse de la démarche qui mesure le centre de pression en temps réel. Les capteurs utilisés se basent sur la technologie de transduction optoélectronique. L'acquisition et la transmission des données se font également par un microcontrôleur et un module Bluetooth. Les chercheurs du laboratoire RSscan ont développé une plateforme pour détecter les déviations et l'équilibre des personnes en analysant la pression sur des points spécifiques du fond du pied. Désormais, ces systèmes présentent l'inconvénient d'utiliser la communication Bluetooth pour la transmission des données qui s'avère lente et de courte portée. De plus, ces solutions intègrent une complexité au niveau du matériel vu le type de capteur déployé et par conséquence ne peuvent pas être adaptées à notre application. Notre système présente en revanche plusieurs avantages: Les types de capteurs sont résistifs et présentent une longue durabilité, la transmission des données est réalisée

par un module sans fil de longue portée (supérieur à 100 mètre) et le traitement et la visualisation de l'information sur interface développée sur MATLAB. Nous avons remarqué que la pression appliquée et la flexibilité de la semelle sont proportionnelles et dépendent de la constante du matériel de la semelle. La réalisation de ce système va permettre aux fabricants de chaussures d'adapter le matériel de la semelle au profil du coureur afin d'obtenir une distribution quasi uniforme de la pression sur le fond du pied et par conséquence optimiser ses performances.

Connectivity Graph: A New Method for the Classification of Labor-Pregnancy EHG

Noujoud Nader (Lebanese University & Azm Center, Lebanon); Mahmoud Hassan (University of Rennes1, France); Wassim El Falou (Lebanese University, Lebanon); Catherine Marque (Université de Technologie de Compiegne, France); Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon)

The objective of this paper is to present an innovative approach to characterize the electrohysterographic (EHG) signals recorded during pregnancy and labor. The approach is based on the analysis of the synchronisation of the uterine electrical activity. The processing includes i) the estimation of the dependences between the recorded signals, ii) the characterization of the obtained connectivity matrices by using graph measures and iii) the use of these measures for clinical application: the classification of signals recorded during pregnancy and labor. In this abstract we present a circular graph analysis for pregnancy and for labor activities.

The Effect of Feet Position on the Human Stability during Static Postures

Khaled Safi (Center AZM, EDST Lebanese University & LISSI Laboratory Paris-Est University, Lebanon); Inke Marie Albertsen and Emilie Hutin (CHU Henri Mondor, France); Eric Delechelle (University Paris Est Créteil, France); Samer Mohammed (University of Paris-Est Creteil Val de Marne, France); Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon); Yacine Amirat (LISSI Laboratory, France); Jean-Michel Gracies (CHU Henri Mondor, France)

The goal of this paper is to analyze the human stability during static postures using stabilometric signals. The effect of feet position on human balance in Medio-Lateral (ML) plane and Antero-Posterior (AP) plane is also analyzed. Empirical Mode Decomposition method (EMD) is used to decompose each stabilometric signal into a finite number of so-called Intrinsic Mode Functions (IMFs). The standard deviation is calculated for each mode (IMF). The results show significant differences between Feet Apart (FA) and Feet Together (FT) conditions and that the feet positions affect more the stability in the ML direction than in the AP direction.

Boost Pre-Regulators for Power Factor Correction in Single-Phase Rectifiers

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

In this work, a single-switch basic boost, a two-switch asymmetric half-bridge boost and an interleaved dual-boost topology are studied respectively. The averaged model for the first two topologies has been developed, and the same methodology can be systematically applied for the third one. On the basis of the obtained models, control algorithms were then designed and implemented. The reported simulation or experimental results show the effectiveness of these converters connected to their respective control systems, and validate the theoretical study.

Current Accuracy Study of Mixed Mode Signal Interface Circuit for Resistive Gas Sensors

Zeinab Hijazi (University of Genova Italy & Lebanese University, Italy); Maurizio Valle (University of Genova, Italy); Daniele Caviglia (University of Genoa, Italy); Hussein Chible (Lebanese University, Lebanon)

Recent studies aimed to reduce the air pollution and avoid human exposure to dangerous gasses. The need of novel resistive gas sensors and their related electronic interfaces, showing reduced dimensions and low voltage low power characteristics, is in a continuous growth. Gas sensors require an electronic interface circuit sufficiently fast to be able to process all the information coming from the sensor array, for indoor gas monitoring applications and most outdoor chemical targets, in order to detect every kind of gas of interest (eg. CO, NO2, CH4 and methanol)with enough accuracy [1]. Only the analog part of the interface circuit for both gas sensors will be designed, but taking into account that a digital quantity is required as final output.

A High Accuracy FPGA Implementation of Fixed Point Square Root for Singular Value Decomposition Computation

Ali Ibrahim (University of Genova, Lebanon); Maurizio Valle (University of Genova, Italy); Hussein Chible (Lebanese University, Lebanon)

A high accuracy FPGA implementation of fixed point square root for singular value decomposition is presented in this paper. The presented implementation has been developed by using the hardware description language (VHDL), and has been synthesized placed and routed in a SPARTEN 6 XC6slx16 FPGA device. The experimental results figure out an efficient percent error with respect to the theoretical

square root operation. Moreover, the implementation shows good results in terms of area and maximum operation frequency.

Wireless Power Transfer Using Resonant Coupling: A simulation study

Reem Melki (Rafik Hariri University, Lebanon); Bassam Moslem (Rafik Hariri University & RHU, Lebanon)

Nowadays, with the current increase demand for electrical energy due to the rapid population growth and industrialization, wireless power transfer is receiving more and more attention. A simulation study on resonant wireless power transfer is presented; we focus in this paper on the results obtained from experiments conducted on a simulated wireless power transfer system after varying several design parameters. The model is simulated using Ansys/Maxwell 3-D software package. Our study shows that the size of the coils and the distance between them remarkably affect the efficiency of the WPT system. I. INTRODUCTION Until very recently, Wireless power transfer (WPT) consisted of using magnetic inductive coupling, wherein two conductive coils have inductive action upon each other. While purely inductive coupling has several applications, it is only suitable for very short range since it requires high coupling coefficient between the coils which becomes difficult with long distance power transmission. Resonant WPT was therefore proposed [1-2]. Electromagnetic resonant coupling can work over large air gaps with high efficiency. However, in some situations, there are limitations to using only a transmitting and a receiving antenna. Therefore repeater antennas have been recommended to extend the length of the air gap. Long distance power transfer is achieved by simply installing a repeater between the transmitting and receiving stations [3-4]. In this study, two important factors (size of the coils and the distance) are varied in order to evaluate the effect of each parameter on the power-transfer efficiency of the system in the absence of repeaters on one hand, and in the presence of repeaters on the other. Therefore, several sets of simulations were performed, measuring each time the power-transfer efficiency of the system. The model is simulated using Ansys/Maxwell® 3-D software package. II. METHODOLOGY The WPT system consists of 2 main parts: 1) an LC oscillator driving a loop representing the transmitter and 2) a second loop representing the receiver, both tuned at the circuit's resonance frequency f0 ($W0=1/\sqrt{LC}$). The transmitter and the receiver are placed at a distance apart from each other. Table 1 summarizes the design parameters that were used in this study. III. RESULTS Several simulations were conducted in this study. Results have shown that the 100cm radius copper-coils provided the highest power-transfer efficiency with an efficiency of 6.44% at a distance of 95cm separating the transmitting and receiving coils, in the presence of repeaters, and an efficiency of 5% in the absence of repeaters. While the coils that have 50cm radii provided an efficiency of 1% at 95cm, and an efficiency of 0.3% in the absence of repeaters. It is well known that if the distance between transmitter and the receiver coils increases, the transferred power will decrease. However, in order to compensate to this decrease, repeater coils can be installed between the transmitting and receiving coils thus enhancing remarkably the efficiency as shown in figure 3. IV. CONCLUSION This study indicates that the efficiency of the wireless power transfer using resonant coupling can be increased by increasing the size of the coils and/or by decreasing the distance. However the main goal of this technology is to enhance mobility of appliances and devices that is to increase the distance between the power source and loads as much as possible. This can be simply achieved by installing repeater coils which will help in increasing the air gap between the transmitter and receiver coils. References [1] Yiming Zhang, Zhengming Zhao and Kainan Chen, "Frequency Decrease Analysis of Resonant Wireless Power Transfer", Department of Electrical Engineering, Tsinghua University, Beijing China, IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 29, NO. 3, MARCH 2014 [2] Benjamin L. Cannon, James F. Hoburg, Daniel D. Stancil and Seth Copen Goldstein, "Magnetic Resonant Coupling As a Potential Means for Wireless Power Transfer to Multiple Small Receivers", IEEE TRANSACTIONS ON POWER ELECTRONICS, VOL. 24, NO. 7, JULY 2009 [3] AA. Rangelov and N.V Vitanov, "Mid-range adiabatic wireless energy transfer via a mediator coil", Department of Physics, Sofia University, April 2012 [4] Takehiro Imura, "Equivalent Circuit for Repeater Antenna for Wireless Power Transfer via Magnetic Resonant Coupling Considering Signed Coupling", The University of Tokyo, Graduate Scholl of Frontier Sciences, Japan, 2011 IEEE

Study of the electric network stability using the network decomposition into sub-networks

Nivine Abou Daher (Lebanese University & Saint Joseph University, Lebanon); Imad Mougharbel (Lebanese University, Lebanon); Maarouf Saad (École de technologie supérieure, Canada); Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Because of increased electricity demand, most electrical power networks operate at close to maximum capacity, making them more sensitive to external disturbances causing blackouts. Over the years, several blackouts have occurred, affecting the economy of entire countries; these include the one in France in 1987, in Quebec in 1998, in the entire North American in 2003, in the European Network in 2006, and in India in 2012. An overload followed by cascading overloads with uncoordinated control is a situation that produces frequency and voltage instability, leading to blackouts. Secondary coordinated voltage control based on the partitioning of the power network has proven its efficiency, and researchers are currently focusing their efforts in this area. Partitioning consists of dividing the electrical network into sub-networks, and in each partition, control is performed at the level of selected pilot buses. The challenge is to find the most suitable algorithm for carrying out the partition and for selecting the pilot buses according to an efficient control law.

Circuit Design & Simulation Results For Redundancy CRZ A/D Converter

Ali Elrachini and Hussein Chible (Lebanese University, Lebanon)

Accuracy in Analog to Digital Converters (ADCs) is a critical parameter of the converter performance. Will the resolution of ADC, that represent the total numbers of bits generate at the end of digital conversion still the same, the accuracy plays the role to minimize the error result from the mismatching and the gain limit of the amplifiers in analog components design. Different methodologies are used to the accuracy of ADC, we proposed in [1, 2] the using of additional restoring with Z additional levels to improve the accuracy of Multi-stage analog to Digital converter, while in this paper, we propose the circuit design and simulation results by using Cadence.

Remote Sensor Control using Android Application

Roger Achkar, Gaby H Abou Haidar, Ramzy Abou Dayya, Kahtan Daoud and Asslan Salloum (American University of Science and Technology, Lebanon)

The traditional technique of monitoring an electric generator has been through regular daily checks on the generator's variables: oil, temperature, voltage, and current, thus, warranting the smooth operation of a normal cycle of performance. This procedure requires hard work and is often imprecise. This project is the solution for such issues. The idea is to initialize an application that monitors electric generators wirelessly, using the new world's revolutionary operating system, the Android. This process aims at stability and precision. The implemented sensors deliver analog signals that provide real time data of the generator's state. This data is converted and programmed though the Arduino Microcontroller, which outputs it in its digital state and then transforms it into a serial signal, which is in turn transmitted to the android phone, through a router. Thus, a live feedback of the state of the generator is assured. In addition, this project provides a control button that can actually turn this generator on and off as need arises. Results show that the assumption that this project can make the monitoring process easy and accurate is true. This project is the first step towards the revolutionary combination of systems and control, because the ideology of monitoring, and the displaying of real time data can be implemented in various fields in the industry, depending on the needs of each. Such fields include electricity, mechanics, and communication. The main limitation faced is the kind of resources used, or the lack of advanced electronics and technology. However, this project has added to the learning process, in addition to having presented a chance to test theoretical concepts related to communication, control, and programming.

Current-Injection Three-Phase Rectifiers with High Power Quality

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Current-injection rectifiers have found great interest in the Power Electronics community. This is mainly due to their high efficiency related to the reduced number of hard-switching devices, and their reliability with respect to other commonly known rectifiers. This paper presents, in its first part, an overview of three-phase current-injection rectifiers where the benefits and drawbacks of each topology are highlighted and, in its second part, a list of averaged-model-based feedback PWM control strategies applied to a pre-selected rectifier with a fully active current injection system. A comparative performance study of all considered control schemes, in terms of input current Total Harmonic Distortion (THD), DC voltage regulation and dynamic characteristics, is elaborated.

P1_eng2_Mec_Civil: Poster Session 1- Engineering II

Room: USJ Hall CSH

Chairs: Fadi Hage Chehade (Lebanese University - Doctoral School of Science and Technology - Modeling Center - PRASE - Beirut & Lebanese University - University Institute of Technology, Lebanon), Hadi Y. Kanaan (Saint-Joseph University, Lebanon), Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon), Nadim Zakhia (Holy Spirit University of Kaslik, Lebanon)

Polypropylene Fiber Reinforced Concrete

Mirvat Atef Abdallah, Zahra Dabet and Raeda Husein (Rafik Hariri University, Lebanon); Rafik Fawaz (Rafik Hariri Universityk, Lebanon)

The main purpose of our paper is to shed the light on the properties of different types of fiber reinforced concrete. Our experiments have mainly focused on the most important fibers that are glass and polypropylene fibers. In our experimental study, we will explain the importance of the polypropylene fiber due to its important results compared to other types of fibers and to normal concrete mix as well. Polypropylene fibers give excellent properties to the fresh and hardened concrete. So far, we have tested five batches including 6mm and 12mm glass fibers, 6mm and 12mm polypropylene fibers and the normal concrete mix.

Lightweight Mortar Boards and Their Mechanical Properties

Dima Youness (Rafik Hariri University, Lebanon); Riad Wardany (Rafic Hariri University, Lebanon)

This study presents the development of lightweight fiber reinforced mortar boards that use sand and EPS-aggregate (Expanded PolyStyrene) in their mixtures for the purpose of walls finishing and partitions. An experimental program that aims to test the developed boards, their cost effectiveness and their mechanical properties was conducted. The experiments include a control mortar board, fiber-reinforced boards and EPS-aggregate boards with different mixes. The boards were manufactured in the lab and cured in water for 28 days. The hydration of the different specimens was monitored by continuously measuring the temperature of the cement paste. Compressive and flexural strength tests were conducted on the specimens at different ages. The obtained results indicate a great potential to develop lightweight mortar boards using EPS as a partial replacement of aggregate. The ductility of the board and its capacity to resist flexural strength can be increased by adding synthetic fibers to the mix. Comparing to the traditional CMU partition system, significant economy and better finishing surface can be achieved by using lightweight fiber reinforced mortar boards. Index Terms— fiber-reinforced mortar boards, cement boards, partitions I. INTRODUCTION Along with the wide use of gypsum boards come lightweight cement boards. Fiber cement boards have an advantage over gypsum boards in that they are more resistant to impact. Cement boards are thin boards used under tiling systems and in various internal and external finishing applications. The mixture of such boards includes cement, water and foaming agent without any sand. In Lebanon, the use of lightweight cement boards is still limited and the construction industry needs to develop know-how knowledge before adopting this material. This paper presents the development of light weight cement boards that include sand and light weight aggregate in their mixtures (called herein mortar boards). No foaming agent was used in the manufacturing of the lightweight boards. However, small beads (< 5mm diameter) of EPS (Expanded Polystyrene) was used along with sand to lighten the weight of the boards. In addition to reducing the weight of mortar boards, EPS aggregate has the advantage of giving their sound proofing and thermal insulation properties to the boards. In parallel, the current study presents the improvement of the flexural resistance of the developed boards using synthetic fibers. II. EXPERIMENTAL PROGRAM Five mortar boards with 20cm×20cm size and 16 mm thickness were manufactured. Constant water to cement ratio of 0.5 was used in all the mixtures but different proportions of EPS/Fibers were adopted as listed in Table 1. The boards were manufactured in the lab and moist cured for 28 days. Flexural strength tests were then conducted on the different specimens at different ages. III. RESULTS & ANALYSIS The results of the flexural strengths obtained on the different tested boards are presented in Figure 2. Typical failure modes for the specimen made with fibers and those made with EPS aggregate are presented in Figure 3. IV. CONCLUSION Mortar boards can be made with EPS aggregate and synthetic fibers. They have great potential to be adopted by the local construction industry because of their good finishing surface and insulation properties in both internal and external applications. Synthetic fibers significantly improve the flexural strength of lightweight mortar boards. In addition, synthetic fibers increase the ductility and thus the resistance to impact of mortar boards. REFERENCES [1] Cement and concrete basics, Portland Cement Association, 2013

Using parabolic trough for water heating

Mohamad Ramadan (Lebanes International University, Lebanon); Mahmoud Khaled (Lebanese International University, Lebanon)

The amount of solar energy [1] that is available daily on earth is huge. This energy may be sufficient to cover the needs of energy in many domains. Several way of converting or using solar energy exists such as generating electricity, heating water air conditioning and other applications. This work presents an investigation on a new approach to enhance water heating by solar energy. The proposed approach consists in combining two techniques that are solar tracking and utilization of parabolic trough. Solar tracking aims to maximize the absorption of solar energy by rotating the system in such a way to keep the solar collector in optimized position with respect to the sun. On the other hand the utilization of parabolic trough allows to maximize the amount of captured sunrays for a fixed position. A prototype is built to test the proposed approach An experimental study is carried-out, allowing to study the effect of the weather conditions on the system. Moreover the effect of each technique is evaluated separately by performing experiments with solar tracking and without the parabolic mirrors and vice-versa. It is shown that the effect of the mirrors is more significant than the effect of the tracking. On the other hand the combination of both techniques highly increases the water temperature

On the recovery of HVAC systems waste heat

Mohamad Ramadan (Lebanes International University, Lebanon); Mahmoud Khaled (Lebanese International University, Lebanon)

Nowadays one of the main targets of researchers and scientists is reducing fuel consumption due to pollution, prices and finite quantity. According to the researches, their effort can be divided into two main sections: renewable energy and energy management(recovery). Renewable energy is generally defined as energy that comes from unlimited sources such as sunlight, wind, rain, waves, rivers and geothermal heat. Heat recovery is the use of the wasted heat produced from any process and its transformation into useful energy in any mechanical processes of heating or generating mechanical or electrical work. In most processes, some of the energy used will be lost as heat. Sometimes, the loss of this heat is intentional, such as in air conditioning, exhaust and industrial process Heat recovery technologies frequently reduce the operating costs for facilities by increasing their energy productivity. The actual level of heat recovery will depend on the type of heat recovery device selected and the temperature difference between the

supply and extracted streams. A source of 'waste' heat is that found in buildings, for example from the heating or ventilation systems in an office or the industrial drying process or compressed air system in a factory. The most cost-effective use of waste heat is to improve the energy efficiency of the heat generating process itself. Common uses of recovered heat include: Preheating of combustion air for boilers, preheating fresh air used to ventilate the building, heating water…. It is hoped that with the latest findings on heat recovery to increase the efficiency of mechanical processes and decrease world energy demand on the fossil fuel reserves and hence the impact of global warming. Building energy consumption has increased as a result of economic growth, expansion of building sectors and spread of heating, ventilation and air conditioning(HVAC). Buildings are responsible for about 40% of national energy demand in Europe and 60 % in US [1-2]. It can be said that HVAC systems are sources of energy loss. It is thus very beneficial to recover [1-2] this energy by adopting waste energy for building like applications. Several attempts have been made to utilize waste heat from condenser of refrigerator. This heat can be used for number of domestic and industrial purposes. It is valuable alternative approach to improve overall efficiency and reuse the waste heat. The reviewed papers have shown that such a system is feasible. By experimentation with waste heat recovery system(WHRS) in refrigeration unit, Kaushik and Singh [4] have found that 40% of the condenser heat can be recovered through heat exchanger for typical set of operating conditions. The refrigerating unit rejects considerable amount of heat to the atmosphere through its condensing coil unit. So, by using WHRS, waste heat will be recovered. This heat is used to keep snacks and food warm and to heat the water which can be further used, thereby saving significant amount of energy [3]. The most common types of refrigeration systems use the vapor-compression refrigeration cycle. According to the reviewed papers, there are: high grade or low grade heat recovery from condenser. Recirculation of building extract air is the cheapest and most efficient form of Air-to-Air Heat Recovery. However in certain cases, it may not be suitable to re-use this air. In these cases air-to-air heat recovery devices should be considered in both new and refurbishment projects. Finally we can deduce that heating water(directly or indirectly) for domestic usage from the HVAC systems is an important domain to be developed specially in hospitals and laboratories where air is totally rejected due to contamination and the need of hot water in many purposes.

Simulation of a Tri-generation System based on a Solid Oxide Fuel Cell for Residential Applications

Houssein Al Moussawi and Farouk Fardoun (Lebanese University, Lebanon); Hasna Louahlia-Gualous (Caen Basse Normandie University, France)

Power, heat, and cold are the three major types of energy needed for production at domestic levels. However, several worldwide problems (economical, environmental…) are rising as time lapses due to the increasing standards of life. Cost and pollution are two main concerns for every energy generation application. Thus, efficient production ways or systems are being pursued in order to reduce such undesirable effects. Consequently, different tri-generation systems have been studied for their ability to produce electricity, heating, and cooling simultaneously using convenient heat recovery equipment and a single prime mover. Accordingly, different types of prime movers yield different tri-generation technologies, which can be listed as: steam turbines, gas turbines, internal combustion engines, stirling engines, and fuel cells. The latter are considered as an emerging technologies which have attracted attention due to their great advantages with respect to energy-efficiency and pollution measures. Generally, fuel cells represent an entirely different approach to the production of electricity when compared to traditional prime mover technologies. Systems based on fuel cell technology resemble batteries by producing DC voltage through an electrochemical process without directly combusting fuel. Inverters are then used in the purpose of converting the DC to AC power. In fact, high energy conversion efficiency, design modularity, size flexibility, low environmental impact, quick response to load changes, and heat rejection are all advantages for multi-generation applications. Nevertheless, many types of fuel cells can be distinguished in the present time namely are phosphoric acid, proton exchange membrane, molten carbonate, alkaline, and solid oxide fuel cells. More specifically, solid oxide fuel cell based tri-generation system is considered to be one of the best choices for energy production among other fuel cell technologies. This is due to its elevated efficiency, high power density, lack of moving parts, low vibration and noise pollution, and high working temperature. The latter has given the SOFC its most attractive aspects which are the flexibility with respect to the fuel usage by accepting a variety of fuels in operation, and the great suitability for tri-generation applications. The fuel can be solely hydrogen, carbon monoxide, methane, or many other hydrocarbons, where reforming and gas-shift reactions take place. In order to simulate a combined cooling, heating and power (CCHP) system using SOFC, a computer program of the fuel cell is first developed using Matlab software. The overall program consists of three main parts: 1) the mathematical model of the chemical reactions including the gas-shifting and reforming cases; 2) the electrochemical model which aims to evaluate the electrical power output by calculating the cell potential and eliminating different voltage losses; and 3) the thermal model which basically targets the determination of the waste heat output of which a certain portion could be recovered later. As a detailed procedure of the program, the cell geometry and dimensions are pre-defined, as well as the chemical constants. Then, the program asks for a desired output power of which later calculations will be based on. The standard, activation, ohmic, and concentration potentials are evaluated and thus is the cell output voltage, after which the required number of cells to meet the needed power is determined. Next, different rejected heats from the cell such as formation heat of the reactions and dissipated heat of potential losses are calculated. Finally, for a certain fuel and air utilization ratios, the fuel and air consumption rates in addition to the stack efficiency and other desired parameters are estimated. The influence of several effective parameters, such as cell temperature, pressure, current density, fuel utilization coefficient, are also investigated. Results indicate that the optimum working temperature of the cell is 1000℃, and the optimum current density is 3000A/m^2 corresponding to 62% cell's electrical efficiency. At the present

time, coupling between Matlab and TRNSYS software is being under study in order to simulate the recovery process of the heat rejected by the solid-oxide fuel cell and the usage of the recuperated heat for domestic applications such as hot water and space heating or space cooling. Heat exchangers with hot storage tanks shall be used for heating processes, while indirect gas-fired absorption chillers with cold storage tanks for cooling processes. The use of storage devices is essential since the demand for heat and electricity is not synchronized. Moreover, thermal and electricity demand profiles of certain buildings, houses, or institutions will be investigated and covering portion percentages will be evaluated.

Experimental Study of Heat Exchanger Thermal Performance - Effect of Non-Uniformity

Mahmoud Khaled, Ali Ali, Hussein Shams Eldine and Khaled A. Chahine (Lebanese International University, Lebanon); Mohamad Ramadan (Lebanes International University, Lebanon)

The present work suggests an experimental study of the effect of non-uniformity in the velocity and temperature distributions upstream of a heat exchanger on its thermal performance. The main objectives are to validate experimentally the behaviors found in the numerical calculations as well as the codes of calculations.

Flowmeter for gas flow rate measurement at high temperatures

Mahmoud Khaled, Zahra Wehbi, Mostafa Mortada and Khaled A. Chahine (Lebanese International University, Lebanon); Mohamad Ramadan (Lebanes International University, Lebanon)

This project suggests a new energy balance based flowmeter that permits to measure overall flow rates at high temperatures

Mobile Application for a Chess Playing Robot

Michel J Owayjan, Elie Abdo, Jad Ballout, Rabih Hassoun and Mark Bou Malhab (American University of Science & Technology, Lebanon)

Chess is a game that develops mental abilities such as concentration, abstract reasoning, critical thinking, problem solving, strategic planning, and creativity. There exist many automated chess playing robots that have an ability to challenge a human opponent and throughout a complete chess game. However, there is still a need to wirelessly control a chess robot from far distances, especially for those who are internationally into this game. This project presents a chess playing robot that can be controlled by an android mobile, aiming to establish new routes in connecting Smartphone users to whatever electronic device they desire to control. This project is based on an android application, A mobile supporting android OS, EVS (Embedded Vision System), IP cam, PIC microcontroller and LabVIEW software. Connections are to be ensured between the mobile that order the robot to move specified pawns as the chess game is going on, and the EVS that forwards this order to the PIC microcontroller in order for the robot to perform the desired request. LabVIEW software programming codes allows the EVS to interact with the robot and the mobile after being injected into it. These stated procedures play the main roll in constructing a chess playing robot that can be controlled from a distance by using a Smartphone. Facilitating chess playing to users and making them able to interact with a physical robot by using a simple chess application is considered of high importance and significance. This strategic and mental developing game can become the most preferred game of the new chess enthusiasts as it can be played from a far distance. Moreover, building this project has provided worthy personal and academic experience that are beneficial in the researchers' future careers.

Towards Net Zero Energy Homes in the Lebanese context

Fatima Harkouss, Abed Hawila and Farouk Fardoun (Lebanese University, Lebanon); Pascal-Henry Biwole (University of Nice-Sophia Antipolis, France)

Lebanon is a developing country that depends majorly on oil products to cover its energy needs. However, the non-secure future of oil sources, the price increase of fossil fuels, and the growing need of energy, as a result of the acceleration in the economic and population growth rates, make very necessary to search for new alternative energy sources alongside with minimizing residential energy consumption and reduction of CO2 emissions. Recently, the concept of Net-Zero Energy Home/Building has gained wide international attention, and is now seen as the future target for the design of buildings. A net zero-energy building (NZEB) is a residential, commercial or official building with greatly reduced energy needs through efficiency gains such that the balance of energy needs can be supplied with renewable technologies. The net-zero energy concepts is that buildings could generate enough on-site energy to balance-out or exceed their annual energy consumption. The "net" portion means the building may use energy from the utility grid during some times of the day but supplies renewable energy back to the grid during other times, in a balance that equals out over the course of a year. Our project aims to study the feasibility of achieving Net Zero Energy Building (NZEB) for a single family residence in Lebanon. TRaNsient SYstem Simulation program (TRNSYS 17) is used to study the energy performance of the building during a typical year. We considered a Base Case House (BCH) in Beirut, conventional construction, composed of two floors with a total conditioned area of about 133 m2. Heating and cooling systems are assumed to be active all the time for the two floors; the thermostat is set for heating at 20°C and 18°C during occupied and unoccupied hours respectively, for cooling it is set at 24°C and 26°C. Domestic hot water (DHW) demands

are covered by an electric water heater of 200 L capacity. The total annual energy demands of the BCH are estimated to be 11585

Heating/Cooling fresh air from hot/cold exhaust air of HVAC systems

Mahmoud Khaled, Ali Khraibani, Ali Najdi, Amjad Makke and Mostafa Gad El Rab (Lebanese International University, Lebanon); Mohamad Ramadan (Lebanes International University, Lebanon)

The present project suggests a parametric analysis of a heat recovery systems applied to HVAC domain, particularly an all-air system.

P1_FEA2_agr: Poster Session 1- Food security, Environment, Agriculture

Room: USJ Hall CSH

Chairs: Maher Abboud (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon), Charbel Afif (Saint Joseph University, Lebanon), Claude Daou (Lebanese University, Lebanon), Wehbeh Farah (Faculty of Sciences- USJ, Lebanon), Khalil Helou (Saint Joseph University, Lebanon)

The Effect of Greenhouse Gases on Earth's Temperature

Nour Chehayeb (Modern University for Business and Science, Lebanon)

Many companies engaged in the business field neglect operation standards that enhance the quality of environment and protect it. Quality principles ensure that companies will provide customers with healthier and cleaner products. Add to that, the high population and the absence of control in the construction companies lead to global warming and environmental problems. For that reason, the importance of spreading awareness and consciousness about global environmental problems such as global warming, ozone depletion and pollution is crucial for such companies. The world is witnessing changes in its weather due to many troubles in the environment. The unplanned use of the environmental resources has lead to a ruined life cycle since humans are cutting high number of forests in order to construct cities. Global warming is one of the biggest problems facing our Earth nowadays due to the misuse of energy and resources; and therefore leading to serious modulation in its heat. The change in the warm of the earth is changing the life cycle of all creatures(Riebeek, 2010). The fast growth of population is increasing the expansion of urban randomly without any plan which is harming the environment and nature. Planning process, while constructing cities, is very important due to its role in using the spaces efficiently taking into consideration the protection of green lands. People are using the resources in a way that lacks awareness about risks of wasting the natural resources and energy, and about the negative impact of wasting the raw material on the future term. People's daily activities require the usage of a lot of petroleum and electrical consumption that increases air pollution which threatens human lives and environment causing expensive health and medication bills. Many scientists and economists are trying to find a solution for pollution and greenhouse gasses through replacing the existing products with green and renewable products.

Developing a Duplex p35S and T-nos Conventional PCR Method for Testing Genetically Modified Organisms

Montaha Nasrallah (American University of Science & Technology, Lebanon); Narmeen Mallah and Gretta Abou-Sleymane (American University of Science and Technology, Lebanon)

Developing a Duplex p35S and T-nos Conventional PCR Method for Testing Genetically Modified Organisms Montaha Nasrallah; Narmeen Mallah; Gretta Abou Sleymanne Faculty of Health Sciences, Department of Laboratory Science and Technology American University of Science and Technology mkn10011@students.aust.edu.lb; nmallah@aust.edu.lb; gabousleymane@aust.edu.lb Genetically Modified Organisms (GMOs) are plants, animals, or microbes produced by altering their naturally existing genetic material and/or inserting new genetic construct(s) into their genome. An exogenous genetic construct consists of major sections; a gene of interest encoding a desired specific trait, and promoter (start signal) and terminator (stop signal) regions whose main functions are gene regulation. In addition, the construct might include other elements such as selectable markers' genes. The most commonly used regulatory sequences are p35S promoter from Cauliflower Mosaic Virus and T-nos Nopaline Synthase terminator from Agrobacterium tumefaciens. The integration of this genetic construct into a plant genome results in the production of a genetically modified (GM) event. Such genetic alterations are introduced to allow GM plants to acquire beneficial traits such as herbicide tolerance, insect resistance, better quality and enhanced yield. Despite GMOs advantages, an international debate about their adverse health effects and environmental hazards has been raised, which provoked many worldwide countries to establish regulations regarding GMOs production and distribution. Henceforth, complying with these regulations required the availability of specific methods for detecting the presence of GMOs, identifying the type of potential GM events, and determining the GMOs content in a sample. Moreover, the legalization of GMOs

has led to the massive increase in the global hectares of biotechnological crops, the development of new types of crops, and the associated events. Accordingly, with the increase in diversification of GM events accompanied by the challenges in testing, and the rise of a new era in biotechnological research, several laboratories worldwide started conducting new strategies to detect GM crops such as the GMOs matrix approach. In this line, the GMOs laboratory at AUST has established the first comprehensive GMOs matrix which includes 35 GM plant species, 378 GM events, and 96 GM elements associated with these events. Furthermore, the laboratory designed a stepwise testing strategy for the detection of the maximum number of GM events in the minimum number of experiments. This strategy is based on the selection of the most frequent and informative sequences: p35S, T-nos, cp4 epsps, pat, bar, and nptII. The selected elements are detected in two consecutive stages using simplex conventional PCR methods. In the first stage, p35S and T-nos are detected and the results are grouped according to the obtained results. Then, in the second stage the remaining four elements are detected in a well-defined order. This allows drawing conclusions about the possible presence of GM events in a sample, thereby significantly reducing the number of event-specific tests. Currently, we aim to increase the effectiveness of our matrix approach by applying duplex/multiplex conventional PCR methods. Since our laboratory is ISO 17025 accredited, all methods that we use should be validated. Therefore, through this project, we intend to provide a validated duplex conventional PCR method for the simultaneous detection of p35S and T-nos. First, we reviewed all published conventional PCR methods for the detection of p35S and T-nos. None of them were found to be validated. We then searched for primers used in different validated uniplex PCR studies. We checked their specificity using primer Blast, checked their homology using Multi Alignment software, and we selected the ISO Validated primer pairs 35s-1/2 and HA-nos118f/r for p35S and T-nos respectively. P35S primer pair 35S-1/2 has been designed to target a CAMV 35S promoter sequence described in GenBank ® database accession No.V00141; additionally T-nos primer pair HA-nos118f/r has been designed to target the Agrobacterium tumefaciens nopaline synthase terminator sequence described in GenBank® database accession No. V00087. We are currently setting up the conditions for a duplex conventional PCR method. This includes determining the optimal concentration of each PCR reagent (dNTPs, MgCl2, primer pairs, buffer, and DNA polymerase), as well as the thermal cycling conditions (Time- Temperature program). The PCR development is carried out according to ISO17025 standards where certified reference materials (CRMs) are used to check the specificity and sensitivity of the PCR and all the reactions are conducted in duplicates. Furthermore, all conventional PCR methods that have been adopted, optimized, or developed earlier at our laboratory have a sensitivity below 0.9% which is the minimum GMOs labelling threshold worldwide. This therefore passes the need for a Real-Time PCR method. Accordingly, we aim to optimize the current duplex PCR method to attain a similar sensitivity level. This duplex conventional PCR will represent a specific, sensitive, time-saving, cost effective method, and will deliver inexpensive, fast, and a broad-based screening test. Most importantly, duplex conventional PCR will allow the detection of maximum number of GM events using the least experimental steps, which will stimulate boosting the development of regulations and authorization standards concerning GMOs in Lebanon.

GMOs Screening of Babies' Foods in the Lebanese Market

Farah El Sayegh, Narmeen Mallah and Gretta Abou-Sleymane (American University of Science and Technology, Lebanon)

GMOs Screening of Babies' Foods in the Lebanese Market Farah El Sayegh, Narmeen Mallah, Gretta Abou Sleymane Department of Laboratory Science & Technology, American University of Science & Technology (AUST), Lebanon farah.el.sayegh@hotmail.com, nmallah@aust.edu.lb, gabousleymane@aust.edu.lb Genetically Modified Organisms (GMOs) are plants, microbes or animals with altered genetic material. The term GMOs is mainly used to refer to genetically modified (GM) plants. This genetic modification is due to the insertion of new gene construct(s) into the plant genome conferring new trait(s) such as herbicide tolerance, insect resistance or enhanced nutritional values. The integration of the gene construct in the plant genome produces a genetically modified (GM) event. Several detection methods have been developed to screen for the presence of GMOs in plants. These methods target the most common regulatory GM sequences p-35S (Cauliflower Mosaic Virus promoter) and t-nos (Nopaline Synthase terminator). The global hectarage of GMOs has steadily increased and several countries have placed labelling regulations to control their usage. In Lebanon, most agricultural materials are imported from GMOs producing countries, increasing therefore the possibility of introducing GMOs into the market. In this regard, Lebanon took general safety measures for controlling GMOs by issuing a law that bans the import of GM seeds and ratifying the Cartagena Protocol on Biosafety, an international agreement that controls the dealing with GMOs, in 2013. This protocol is currently waiting implementation. To date, no rules and regulations are imposed by the Lebanese Government to control the usage of GM food and feed. However, some social organizations such as GMO free Lebanon have been created in the country in order to increase awareness about GMOs and hopefully activate the development of national GMOs regulations. To further activate the development and the implementation of GMOs' legislations in Lebanon, our laboratory has conducted a series of studies that aims mainly at assessing the presence of GMOs in the country and establishing cost effective testing methods. We have already showed the presence of high GMOs quantities in soybean feed imports. Aiming to provide a more comprehensive assessment of GMOs' status in the country, we are currently conducting another project to monitor GM foods in the Lebanese market. A major part of this project focuses on babies' foods since babies are more sensitive to chemicals and toxic products and they rely on specific types of foods for months. Thus, we are focusing in this current MS project to screen babies' foods available in the Lebanese market. In fact, several previous studies have analyzed babies' foods but they were only targeting the microbiological status and didn't encompass all types of foods. Globally, no established studies were conducted to screen for the presence of GMOs in babies' foods. However, in Japan and in South Africa, Green Peace Organization and African Center for Biosafety (ACB) raised the issue about the presence of GMOs in imported infant formulas.

On the other hand, in Lebanon, according to the most recent World Bank data and to the Lebanese breastfeeding organizations, la Leche League and Lactica, only 15% of Lebanese babies are breastfed between birth and 6 months indicating high consumption of infant foods. In this study, we first conducted a survey in the Lebanese market and showed that most commercialized brands originate from GMOs producing countries such as China, India and United States and only few of these products are labelled as "GMOs Free". Around 100 samples were collected in a representative manner, taking into consideration the consumption level and the frequency of occurrence of each brand. Initially, DNA extraction was done using the CTAB Extraction method which is validated by the European Union Reference Laboratories for GM Food and Feed. Then, the purity and the yield, the fragmentation status, and the amplificability of the extracted DNA were assessed by spectrophotometric measurement, gel electrophoresis analysis and reference gene amplification, respectively. In fact, the DNA assessment step is very critical to avoid having false results. Currently we are screening for the presence of GMOs by targeting p-35S and t-nos sequences using PCR. All testing procedures are carried out according to ISO 17025 Standards. Some of the tested samples showed positive results for one or both of p-35S and t-nos sequences. Interestingly, some of these positive samples are labelled as "GMOs Free", "Organic" or "Natural". Therefore, these results strengthen the need for mandatory GMOs testing in order to control the appropriate labelling. In addition, enforcing the laws is essential to control the imported products, protect consumers' rights, and provide the freedom of choice.

A comparative study of the bioconversion kinetic profiles of p-coumaric acid into 4-ethylphenol by strains of Brettanomyces bruxellensis isolated from Lebanon and France

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Volatile phenols are aromatic compounds and one of the key molecules responsible for olfactory defects in wine. The yeast genus Brettanomyces is the only major microorganism that has the ability to covert hydroxycinnamic acids into important levels of these compounds, especially 4-ethylphenol and 4-ethylguaiacol, in red wine. When 4-ethylphenols reach concentrations greater than the sensory threshold, all wine's organoleptic characteristics might be influenced or damaged. The aim of this study is to compare the bioconversion kinetics of different strains of Brettanomyces isolated from Lebanon and France in order to identify the reaction mechanism related to the p-coumaric acid conversion into 4-ethylphenol. In a previous study, we showed that Brettanomyces strains were detected for the first time in Lebanon. These strains were genetically identified and compared to French ones. Monitoring cells growth in a fermentation medium showed that the same three groups differentiated by the DNA study were also found when comparing the physiological behavior with a high concentration of population for the French strains. In terms of bioconversion kinetics profiles, the disappearance of the acid from the fermentation media followed by the production of both 4-vinylphenol and 4-ethylphenol were diverse. The mass balance, which is the sum of the concentrations of three components in the medium, has never been verified. Its decrease may be due to the adsorption of p-coumaric acid on the Brettanomyces cell walls. This phenomenon appears to be strain-dependent, with values ranging from 0 to 29% of acid adsorbed. Furthermore, p-coumaric acid, which is not fully adsorbed, is converted to 4-vinylphenols in three of the tested strains, the two others reaching low residual values. Concerning enzymatic activities, hydroxycinnamate decarboxylase does not seem to be limiting in the fermentation conditions even if the specific consumption rates are also variable between strains while vinylphenol reductase appears to be limiting for the production of 4-ethylphenols. The specific rates of consumption and production are different and especially the transformation yields of the available acid (unadsorbed) varied from 55 to 92%.

Contribution à l'analyse des produits alimentaires; Recherche et évaluation de l'effet hémolytique des pesticides utilisés au Liban; Introduction des biopesticides comme alternative

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L'utilisation massive de pesticides chimiques est la cause incontestée de dégâts sur la santé et l'environnement induits par ces substances, d'où la nécessité d'analyser leurs traces résiduelles accumulées dans les fruits et les légumes consommés, et aussi de trouver une alternative à leur utilisation en se basant sur la lutte biologique non nocive. Les résultats obtenus au cours de ce travail ont montré la persistance des pesticides Metalaxyl, Trifluraline, Chlorothalonil, et PSD-X (pesticide interdit) respectivement dans les oranges, les fraises, les pêches et les tomates recueillies au Liban. Nous avons montré également que le PSD-X est vendu sur le marché sous un autre nom afin d'échapper aux réglementations. De plus, l'étude de l'effet hémolytique de ces pesticides sur les globules rouges humains a montré un pourcentage hémolytique important de la Trifluraline et du Malathion (également interdit mais présent sur le marché). Enfin et à l'aide d'un biopesticide à base d'épinards, nous avons démontré

une conservation des oranges en post récolte pour une durée de 60 jours. Cet extrait naturel présente une alternative prometteuse pour le développement de nouveaux agents de protection non nocif pour l'homme et l'environnement.

Préservation-Texturation des graines germées: Etude de la germination et de la cinétique de séchage à différents stades de germination

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De contenu nutritionnel très riche et équilibré, les graines germées sont une source idéale de minéraux et de vitamines, mais restent peu consommées de par leur faible durée de conservation. En effet, l'ensemble des études consacrées à ces produits montre des augmentations de teneurs en vitamines considérables comparées aux graines non germées. Selon les graines et les vitamines, cette teneur peut être augmentée de plusieurs centaines de fois. A titre d'exemple, à la suite de la germination, la teneur en vitamine A des graines de luzerne (alfalfa) est multipliée par un facteur de 1200. Cependant, de par leur teneur en eau élevée, ces graines germées présentent un développement microbien actif et très poussé qui limite leur durée de vie à moins de 7 jours dans un milieu réfrigéré. Ils existent, de nos jours, plusieurs procédés de préservation basés sur la réduction de l'activité de l'eau au sein du produit tels que le séchage par air chaud, la lyophilisation ou le séchage par microondes. Néanmoins des problèmes reliés à la déformation des produits, à leur dégradation thermique ou encore aux coûts de traitement très élevés s'imposent. Des recherches ont visé à améliorer la qualité du produit séché par air chaud en introduisant une étape de retexturation de ce produit par expansion. L'application de ce type de traitement aux aliments s'est généralisée avec l'apparition du procédé de puffing puis de la « Détente Instantanée Contrôlée » (DIC). Il s'agissait alors de faire subir au produit un traitement sous hautes températures et pressions suivi d'une détente vers la pression atmosphérique pour le puffing ou vers le vide pour la DIC. Cette détente induisait une alvéolation du produit facilitant les opérations de transfert de chaleur et de matière au sein du produit limitant ainsi la dégradation thermique du produit. Cependant, ces solutions ne sont pas complètement appropriées aux produits hautement thermosensibles comme les graines germées. D'où la naissance du procédé baptisé «IVDV» (Intensification de Vaporisation par Détente vers le Vide) avec une variante de traitement en créneau que nous proposons (montée en pression de 0 à 12 bars en moins d'une seconde). La faisabilité du traitement IVDV a été testée sur différents types de produits tels que la viande, le poisson, les graines oléagineuses ou les fruits. Ces différentes études ont montré un procédé polyvalent dont la maîtrise des conditions opératoires permet de traiter des produits thermosensibles sans altérer leur qualité. D'où l'intérêt d'appliquer ce procédé sur un produit dont les principales caractéristiques sont la thermo-sensibilité, la forte valeur nutritionnelle et la fragilité microbiologique. Traitées ainsi les graines germées devraient, tout en conservant leurs hautes teneurs en vitamines et minéraux, acquérir une texture alvéolaire et croustillante. Nous ouvrirons ainsi la porte à de nouvelles applications de ces graines que ça soit en industrie alimentaire (produits snacks, céréales de petit déjeuner riches en vitamines) ou en cosmétique et pharmaceutique (crème, masque, suppléments vitaminés). L'obtention d'un tel produit, séché, texturé et riche en vitamines, nécessite la maîtrise des différentes étapes du procédé en commençant par le trempage des graines, puis la germination suivie du séchage partiel et enfin l'étape de séchage-texturation. Dans ce cadre, nous allons nous intéresser au cours de ces travaux à la préparation de la matière première avant la germination ainsi qu'à l'effet de ce prétraitement sur la cinétique de germination et l'évolution des jeunes pousses en fonction du temps. En effet, il nous est important d'optimiser le temps de trempage afin d'avoir le meilleur taux de germination avec le minimum de temps de trempage, tout en évitant le développement bactérien. Ainsi l'évolution de la teneur en eau du produit en fonction du temps de trempage, ainsi que le taux de germination en fonction de cette teneur en eau seront évalués afin de déterminer la meilleure teneur en eau et par la suite la meilleure durée de trempage, ainsi que le temps de germination idéal pour chacune des graines. Par ailleurs, l'étude de la cinétique de séchage de ces produits à différents stades de la germination nous permettra dans la suite de maîtriser les conditions du séchage partiel aboutissant à la teneur en eau résiduelle souhaitée. Parallèlement à cela, nous allons étudier l'évolution du contenu nutritif à différents stades de la germination afin de définir la durée de germination optimale correspondant aux valeurs nutritionnelles les plus intéressantes.

Relationship between body condition, milk production and kids growth in Baladi Goats fed on pastoral system

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Baladi goats are dual purpose, locally grown and adapted animals. They are highly desirable due to their low maintenance and their high productivity. Therefore, our purpose was to evaluate milk production and quality across one lactation for these goats, depending on their body condition score. 36 baladi goats aged 1.5 years were followed from February till August, coinciding with delivery to 150 d. Animals were classified according to their body condition score followed throughout the lactation period, along with body weight, milk weight, and milk protein and fat content. Milk protein was analyzed using semi-automated Kjeldahl, and milk fat was extracted using petroleum ether in a soxhlet extractor. After weaning, BCS

showed a significant (P<0.05) difference of 0.9 BCS between Thin and Fat goat, whereas weights did not show any difference (P>0.05) at delivery, but Thin goats showed a faster regaining of body reserves than Fat goats. No significant difference was observed on growth of kids for the 2 groups from d 0 to 60 post-delivery. Milk production did not differ (P>0.05) between the 2 groups, averaging 0.86 ± 0.2Kg/goat/d. Milk production peaked between d 40 to 50, and decreased afterwards till d 165. Milk protein levels increased with decreasing milk production, whereas fat percent decreased throughout lactation with no difference (P>0.05) between Thin or Fat goats. To conclude, baladi goats have a high adaptation ability to lower body reserves, which does not compromise milk production, fat or protein content, and allows them quick recovery from decreasing BCS as soon as negative energy balance is lifted. This research was supported by a grant from the LCNRS and USJ

Rapid molecular typing of Chlamydia species

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Introduction: Recently all known species of the family Chlamydiaceae were reunited in a single order Chlamydiales and in a single genus Chlamydia (Greub, 2010), including several species of obligate intracellular pathogens causing serious damages for animal health. Two species of Chlamydia genus of particular veterinary interest are C. abortus and C. pecorum. The first one causes enzootic abortion and stillbirth in sheep, goats and less frequently cows. C. pecorum can cause in ruminants enteritis, pneumonia, conjunctivitis, encephalomyelitis, arthritis, hypofertility and, more sporadically, abortion (Lenzko et al., 2011). Isolation represents the gold standard for detecting the infection, but there is an increased interest in developing rapid and accurate molecular methods for genotyping Chlamydia species in animal samples (Demkin and Zimin, 2005). Several studies have demonstrated that genome sequencing comparison reveals many polymorphisms that can be used to develop new fast, reliable and cost-effective technologies useful for species identification (Pantchev et al., 2009). Outer Membrane Proteins genes are suitable loci to which molecular detection and identification methods may be targeted for efficient identification of Chlamydia bacteria (Wheelhouse et al., 2012). These proteins exhibit single nucleotide polymorphisms (SNPs) and assays based on these target genes had the potential to provide a simple and reliable way for the detection and identification of Chlamydia species from clinical samples (Geens et al, 2005). The aim of the present research was to set up a method for rapid and inexpensive SNPs analysis to discriminate between two Chlamydia species, C. abortus and C. pecorum, based on omp2 gene polymorphisms by Mismatch Amplification Mutation Assay coupled with melt analysis (Melt-MAMA) (Birdsell et al., 2012). Materials and methods: Cell Culture. Reference strains of C. abortus or C. pecorum (kindly provided by Italian National Reference Laboratory for Animal Chlamydioses) were maintained at 37°C and 5% CO2 in chlamydial growth medium (DMEM plus 1 µg/mL cycloheximide). The growth of these pathogens in cell cultures was confirmed by Direct Fluorescence Antibody. Melt-MAMA PCR analysis. DNA was extracted from pooled samples by QIAamp cador Pathogen Mini Kit (QIAGEN) and used to perform Melt-MAMA analysis. The alignment of omp2 sequence by ClustalW revealed SNPs for unambiguous discrimination among Chlamydia species. An oligonucleotides set was designed to bind to conserved regions of omp2 gene, but also to contain nucleotide variations among C. pecorum, C. abortus, C. felis, C. suis and C. psittaci. These primers sequences were also designed to contain SNPs between C. abortus and C. pecorum in the last but three and in ultimate base; the forward primer of C. abortus carried a GC-clamp at the 5-end too. Each Melt-MAMA reaction mixture (20µl) contained: 1X EVA Green PCR master mix (Biorad), two forward primers (5'-ggggcggggcggggcggggcgggcGTTCTGCAGAAGATACTTTC-3' and 5'- GTTCTGCAGAAGATACGAAT-3'), a common reverse primer (5'- GAATCTGTAGAGTTTTCTGTAAC-3'), and 20µg/µl of DNA. Melt-MAMA were performed using the following cycling parameters: an initial cycle at 95°C for 5 min, 45 cycles at 95°C for 15s, at 58°C for 20s and 72°C for 20s. Endpoint PCR products were subjected to melt analysis using a dissociation protocol with an incremental temperature ramping (0.2°C/0.5s) from 60°C to 95°C. Results and Discussion: We developed a two-locus duplex Melt-MAMA targeting two different SNPs, which define C. abortus and C. pecorum. Each species showed a clear, unambiguous melt-dissociation profile that matched the expected genotype for each respective strain (Fig.1). So far, this study was only based on the use of genus-specific bacteria collected from cell cultures infected with C. abortus and C. pecorum. Figure 1: (a) Melt-dissociation profiles of C. abortus (blue lane) and C. pecorum (green lane); (b) Normalized Melt-curve. (a) (b) PCR assays could be very useful in supporting diagnosis of chlamydiosis, especially Real-Time PCR, as instruments for this kind of analysis are frequently used in clinical and research laboratories due to their efficiency, automation, experimental simplicity, and amenability to high capacity throughput. While conventional Real-Time PCR uses the fluorescent signal generated by exonuclease digestion of a specifically annealed dual-labelled fluorogenic probe, Melt-MAMA PCR assay only requires unlabelled primers; furthermore, this assay, like conventional Real-time PCR, does not require post-PCR sample handling. Conclusions: The results here reported demonstrate that Melt-MAMA is a well-discriminatory technique for differentiating C. abortus from C. pecorum strains isolated in cell cultures, and that could be very useful in supporting diagnosis of chlamydiosis and providing specific information on acuteness of the infection, as it could also detect the pathogen during the early stage of the infection. References • Birdsell, D.N., et al. 2012. Melt analysis of mismatch amplification mutation assays (Melt-MAMA): a functional study of a cost-effective SNP genotyping assay in bacterial models. PLoS ONE 7(3):e32866. doi:10.1371/journal.pone.0032866. • Demkin V.V. and Zimin A.L. 2005. 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Contribution à l'étude des maladies virales de cinq vignobles de raisins de cuve au Liban

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La viticulture Libanaise est d'une majeure importance économique et elle regroupe les raisins de table et les raisins de cuve. Leur superficie est de 10.600 hectares soit environ 8% de la superficie totale des cultures permanentes. La part des raisins de cuve table est de 30%. Cependant, la vigne est sujette aux attaques d'un grand nombre de parasites et pathogènes, parmi lesquels les agents infectieux intracellulaires tels que les virus causant ainsi de grandes pertes et une sévère détérioration des espèces de Vitis cultivées, ce qui menace sérieusement la survie d'un vignoble entier. Suite à l'apparition des symptômes reliés probablement à des maladies virales et suite aux exigences des viticulteurs d'inspecter leurs vignobles, une prospection a été réalisée dans cinq vignobles destinés à la production du vin au Liban afin d'évaluer la présence et l'incidence des dix principaux virus de la vigne. Quatre différentes procédures d'ELISA (DAS - ELISA), Protein-A (DAS-ELISA), Triple antibody sandwich (TAS-ELISA) et Direct binding-ELISA ont été utilisées pour la détection des virus suivants: Grapevine leafroll-associated virus 1 (GLRaV-1), Grapevine leafroll-associated virus 2 (GLRaV-2), Grapevine leafroll-associated virus 3 (GLRaV-3), Grapevine leafroll-associated virus 5 (GLRaV-5), Grapevine leafroll-associated virus 7 (GLRaV-7), Grapevine fanleaf virus (GFLV), Arabis mosaic virus (ArMV), Grapevine virus A (GVA), Grapevine fleck virus (GFkV) et Grapevine virus B (GVB). Un total de 400 échantillons a été collecté où 85 (21,2%) échantillons étaient infectés par un ou plusieurs virus dont (7 %) représentaient une infection mixte. Le GLRaV-3 domine avec un pourcentage de (35,3 %) des ceps infectés, suivi par le GLRaV-2 (21,1 %), par le GVA (16,4 %), par le GLRaV-1 (13 %), le GFkV (9,4 %) et le GFLV (8,28 %). ArMV, GLRaV-5 et GLRaV-7 n'ont pas été détectés, cependant le GVB (5,8 %) était le moindre diffus. L'infection élevée du Grapevine leafroll-associated virus 3 (GLRaV-3) réside dans le fait de la transmission naturelle de ce virus par les cochenilles présents au Liban. Différents cadres symptomatologiques ont été révélés sur les ceps infectés par ces virus au cours de cette étude. Le symptôme principal est l'apparition d'un enroulement du limbe avec un rougissement presque total du tissu foliaire relié aux virus associés à l'enroulement foliaire, et un symptôme de panachure à jaunissement total du limbe avec un nanisme du cep infecté causé par le virus du court noué. En outre, des symptômes remarquables de panachures étaient reliés aux facteurs abiotiques, et un symptôme particulier "rougissement des feuilles" associé au Syrah reste à identifier. La variété Caladoc du vignoble du Nord était la plus infectée (35 % d'infection) suivie par Cinsault celle de la Bekaa central (26,6%), Merlot (18,6%) et Cabernet Sauvignon (16,8 %) les deux variétés de la Bekka Ouest. Cependant la Syrah de la Bekaa Nord était la moindre infectée (14,7 %). Par conséquent, l'établissement d'un programme de la certification de la vigne au Liban afin de produire et de distribuer du matériel végétal de propagation certifié reste la solution la plus opérante pour lutter contre la diffusion des maladies virales.

Essai de différents programmes de traitement contre l'oïdium de la vigne sur la variété Tfeifihi

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Au Liban, la viticulture reste parmi les sources principales des revenus de l'agriculture présentant une place de marque dans le secteur agricole Libanais et occupant une superficie considérable parmi les autres cultures arboricoles autour de 10600 Ha avec une production de 119 103 T. Cependant, cette culture se heurte constamment de la survenue de plusieurs maladies dont l'oïdium de la vigne (Uncinula necator Schwein.), maladie très redoutée dans le vignoble Libanais, voit son aire de répartition dans les différentes régions de production et son impact négatif sur le rendement et la qualité des raisins. Par conséquent, l'oïdium dans la région de la Békaa est une maladie qui a été historiquement un obstacle majeur dans la production viticole. Un vignoble de 918 m2 de surface cultivé par la variété "Tfeifihi" hautement infectée par l'oïdium a été pris en expérimentation afin de tester l'efficacité de différents programmes de lutte contre cette maladie. La division parcellaire était faite en quatre plots: deux plots destinés à être traités avec des fongicides à base de matières actives chimiques spécialisées pour lutter contre l'oïdium, un plot traité avec une matière biologique "Silicate de Potassium" et un plot témoin traité avec de l'eau. Des lectures des taux de grappes infectées étaient prises après une semaine de chaque traitement. Pour chaque plot, cinq traitements ont été faits concomitants avec l'évolution des stades phénologiques de la croissance de la vigne et par conséquent cinq lectures. Des analyses statistiques sur le logiciel SPSS nous ont amené à bien déterminer les différences significatives entre les différents traitements ainsi que l'évolution de cette maladie à chaque lecture. Le programme de traitement le plus efficace était celui basé sur les 2 traitements consécutifs avec la matière active "Trifloxystrobine", suivi par 2 traitements avec la matière active "Tétraconazole" et un traitement avec le "Triadiménol". Il est remarquable que le traitement biologique avec le silicate de potassium a aboutit aussi à un taux

d'infection significativement bas avec l'absence de signes de résistance acquis même après 5 traitements par ce produit. Des études complémentaires concernant d'autres substances actives récemment posées sur le marché semblent nécessaires pour préciser l'efficacité des traitements chimiques et pour gérer le phénomène de résistance car leur mode d'action peut laisser présager l'apparition de souches résistantes. En outre, pour un pays comme le Liban où les fongicides anti-oïdium sont fréquemment utilisés et d'une manière anarchique, l'application raisonnée d'un produit biologique anti-oïdium comme le silicate de potassium ou autre et son évaluation est une nécessité.

Première Evaluation de la Diversité Génétique de Variétés Traditionnelles de Raisin de Table

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Cette étude a consisté en une analyse de la variabilité au sein des variétés locales de raisin de table cultivées au Liban. Au total 71 accessions collectées dans les principales zones de production ont été étudiées. Pour chaque variété, 8 à 26 ceps ont étés étudiés, et une fiche descriptive a été établie pour 17 descripteurs qualitatifs et quantitatifs de la feuille, de la grappe et de la baie. Une variabilité importante a été observée entre les ceps d'une même variété aussi bien pour la forme de la feuille, de la baie et de la grappe, que pour les dimensions de la baie et de la grappe. Dans une deuxième étape, une analyse génétique a été menée à l'aide de marqueurs microsatellites via trois paires d'amorces préalablement développées chez la vigne. L'analyse de groupes basée sur les données moléculaires indique une diversité intra-variétale non négligeable. Les marqueurs utilisés ont permis de différencier trois groupes au sein des deux variétés dénommées « Merwah » et « Baytamouni » et quatre groupes chez « Tfeifihi ». En revanche, la variété « Oubeidi » s'est révélée plus conservée avec seulement deux groupes. Bien que préliminaires, ces résultats indiquent l'existence de plusieurs morphotypes à la base des principales variétés de raisin de table cultivées au pays. Ces variétés devront faire ultérieurement l'objet d'une analyse morphologique et génétique plus approfondie impliquant un large echantillonnage afin de comprendre la sructure genetique des varietes traditionnelles du raisin de table du Liban et d'élucider les facteurs qui seraient à l'origine de cette diversité.

Primary Evaluation of Agronomic Performance of Malting Barley in Bekaa Province

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Beer consumption in Lebanon has increased in the last decades with the increasing demand for both alcoholic and non alcoholic beer. Nevertheless the use of barley in Lebanon is still limited to feed, despite the increased demand by local industries of imported malt. In the present work we assessed the performance of 11 foreign malting genotypes delivered by ICARDA in addition to two commercial varieties, Assi, Rihane and Atahulpa. The field trial was conducted under rainfed conditions in two locations in the Bekaa province: 1) Kfardane LARI station in Northern Bekaa at 1000 m a.s.l. and 171.6 mm precipitations; 2) Qaa in North Bekaa at 648 m a.s.l. and 119.4 mm precipitations. The treatments were arranged in Randomized Complete Block Design with three replications. Fifteen consecutive plants from each treatment were randomly collected at appropriate phenological stage while days to heading, days to maturity and nine quantitative traits were examined. Results showed that out of the 11 malting genotypes, namely Malt 11 and Malt 9 were the earliest to reach heading and maturity in both sites, similarly to checks. The studied genotypes displayed an important variability for quantitative traits. The genotype Malt 9 had the best average yield in Qaa (274.4 g/m2) while Malt 11 had the higher one in Kfardane (245 g/ m2) compared to the checks Rihane (172.2 g/m2 in Qaa, 200 g/m2 in Kfardane), Assi (200 g/m2) and Atta (178 g/m2 in Qaa, 244 g/m2 in Kfardane). The earliness in heading is of great importance since it allows the genotypes to escape the harsh conditions of drought and heat. Although promising, these preliminary results should be submitted to further trials with the perspective of confirming their suitability in the harsh conditions of Northern Bekaa.

First Assessment of Lebanese Barley Landraces in Bekaa Province

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In Lebanon, among cereal crops barley ranks second after wheat. It is grown under rain fed conditions and is recognized to be one of the most drought tolerant crops. Nevertheless germplasm assessment and breeding activities in Lebanon have attributed limited interest on barley and local landraces have not been exploited before despite their potential in adaptation to environmental changes. In this study, 50 Lebanese barley landraces collected from different agroclimatic areas in Lebanon were grown rain fed in Northern Bekaa in comparison with three checks, Assi, Rihane-3 and Atahulpa. Two field trials were conducted, the first one at Kfardane LARI station at 1000 m a.s.l. and 171.6 mm precipitations, and the second one in Qaa farmer field at 648 m a.s.l. and 119.4 mm precipitations. The trials were carried out in Randomised Complete Block Design with three replications. Fifteen consecutive plants from each accession were randomly collected at appropriate phenological stage and 11 traits were examined including days to heading, days to maturity and quantitative traits. Out of the 50 landraces, only two were early in heading and maturity in both sites. As to yield components, landraces showed a large variability in terms of spike length, spike number per plant, grain weight per spike and thousand grains weight. Many landraces presented some similarity to checks for the yield components, but only two landraces, namely LR11 and LR14, had thousand grains weight equal to Assi while none of the landraces reached Rihane-3 performance. The hierarchical classification constructed with Euclidean distance allowed to distribute the 50 landraces studied in three mains clusters based mainly on the heading and maturity periods. Remarkably, eight of the landraces initially collected from different agroclimatic areas in the country were clustered next to the checks sharing similar features of plant height, spike length and yield per plot. At the level of individual plants and based on the thousand grains weight, a set of heads were found to be similar or even greater to the check varieties. These plants should be further evaluated for their agronomic performance, either separately or in bulk, within further relevant breeding program.

Physicochemical, microbiological and sensory properties of concentrated yogurt (Labneh) made of goats' milk, cows' milk and their mixture-Impact on Lebanese consumers' acceptance

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Physicochemical, microbiological and sensory properties of concentrated yogurt (Labneh) made of goats' milk, cows' milk and their mixture Mireille Serhan1 and Jessy Mattar2,3 1University of Balamand, Faculty of Health Sciences, Nutritional Sciences Program, Deir El Balamand, P.O. Box 100, Tripoli, Lebanon. 2Université de Technologie de Compiègne, Centre de Recherche de Royallieu, BP 20529, 60205 Compiègne cedex, France. 3University of Balamand, Faculty of Engineering, Chemical Engineering Department, Deir El Balamand, P.O. Box 100, Tripoli, Lebanon. mireille.serhan@balamand.edu.lb jessy.matar@gmail.com Labneh from goats' milk, cows' milk and their mixture were produced by straining yogurt in cloth bags, and selected physicochemical, microbiological, and sensory parameters were monitored after production. Seven different formulations were prepared by mixing both types of milk in different proportions. Mass fraction (%) of goats' milk in the mixtures of concentrated yogurt formulations was 100, 50, 40, 30, 20, 10 and 0. Labneh of goats' milk was characterized by higher moisture, ash and fat content but lower pH, total solids, protein and lactose content than Labneh of cows' milk. Changes in the profiles of fatty acids were followed using gas chromatographic techniques. It was found that Labneh of goats' milk had higher short and medium chain fatty acids and lower long chain fatty acids than Labneh of cows' milk. As for microbiological analysis, total bacterial counts and lactic acid bacteria were higher in Labneh of goats' milk. Psychrotrophic bacteria were observed only in Labneh made of 100% cows' milk. Molds were noticed in many samples. Fortunately, there was absence of yeasts, Listeria monocytogenes, Salmonella and Staphylococcus aureus in all samples. Labneh samples were assessed organoleptically by a panel of five laboratory staff members, using the Quantitative Descriptive Analysis (QDA) technique. The acceptance test was carried out with 35 consumers (aged 21-35 years). Consumer evaluation was performed according to a hedonic scale ranging from 1 (dislike very much) and 9 (like very much) for aspect, odor, texture, taste and overall appreciation. Sensory analysis revealed a higher overall acceptance and better taste for Labneh made of 40% goats' milk and 60% cows' milk whereas the taste of Labneh made of 100% goats' milk was not well tolerated. Labneh made of 100% cows' milk gained the higher score for texture and samples made of 10% goats' milk and 90% cows' milk had the best appearance. Results showed encouragement for mixing both milk types to produce Labneh. Keywords Concentrated Yogurt (Labneh); Goat milk; Cow milk; Physicochemical Parameters; Microbiological Parameters; Sensory Analysis.

Efficacy of local strains of entomophagous Beauveria bassiana, and Steinernema feltiae on the pronymphs and eonymphs of Cephalcia tannourinensis Chevin under laboratory conditions

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The sawfly cedar of Lebanon, Cephalcia tannourinensis Chevin is the main defoliator of cedars in Lebanon. The study is to determine the effectiveness, competition and the host finding ability of two indigenous entompathogens Beauveria bassiana and Steinernema feltiae. The study included also the use of a commercial entomopathogenic nematode of the Heterorhabditis genus in order to compare the results. The study targeted the two diapausing stages of the cedar sawfly, the pronymphs and the eonymphs. One dose of the entomopathogenic nematodes and two doses of the entomopathogenic fungi were applied

as well as mixtures of the two. Native Beauveria bassiana caused mortalities of 60 and 53% on the pronymphes when applied at 50 and 500 spores/larva, respectively. Native and commercial nematodes caused mortalities of 86.6 and 100% respectively. Mixtures of two entomopathogenic caused mortalities of 100% on the pronymphs and 86.6 to 100% on the eonymphs. A synergistic effect has been proven in the pronymphs when the treatment consisted of two mixtures of the two entomopathogens. The host finding ability was higher for the entomopathogenic nematode than for the entomopathogenic fungus.

Insecticidal Efficacy of Juniperus excelsa M. Bieb. and Juniperus oxycedrus L. Oils and Leaf extracts Against the White Fly Bemisia tabaci Genn. (Hemiptera: Aleyrodidae)

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Bemisia tabaci Genn. is a cosmopolitan and polyphagous insect. Nowadays, there are few effective insecticides available, due to the development of resistance and their high cost. The use of essential oils, as a biological control, holds a great potential. The aerial parts of Juniperus excelsa M. Bieb. and Juniperus oxycedrus L., were harvested in September-November 2013 in the Tannourine Nature Reserve in Lebanon, from specimens formally identified and located. These samples were used afterwards in the extraction of essential oils by hydrodistillation using a Clevenger type apparatus and other aqueous extracts obtained by maceration in alcohol. Oils and extracts obtained will be analyzed by GC/MS. Essential oils from two species of Juniperus contained mostly terpene. Extracts of the two Juniperus contained in common, methyl palmitate and octadecanoic acid. The four arms olfactometer was used for the repellency bioessays on adults of B. tabaci. The exposure of insects to odors of essential oils extracted from leaves and berries of J. excelsa, showed that they have an interesting repellent activity, similar to the effect of Cymbopogon nardus essential oils. Spraying insects at different development stages, showed that the extracts of J. excelsa are more effective than those of J. oxycedrus. Spraying insect larvae, with pyrethrin did not show any efficiency.

Presence of entomopathogenic nematodes along the coastal area in Lebanon

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Entomopathogenic nematodes (EPNs) are parasites of soil-dwelling insects that occur in natural and agricultural soils around the world. Thanks to their entomotoxicity, EPNs are good tools for biological control in agriculture almost everywhere in the world. Following the sampling surveys conducted in Lebanon on the different vegetation strata, where three species were found, Steinernema feltiae, Heterorhabditis bacteriophora and Heterorhabditidoides spp., the current study focused on the coastal zone where soil samples are taken in different sites chosen randomly along the coast like beaches, agricultural and herbaceous fields. In total, 350 soil samples were collected; most of them are located in the South part of the country. These samples are then put in contact with Galleria mellonella larvae to identify the presence of EPNs. Our study has added to the catalog of EPNs species four new strains present in Lebanon belonging to two species ANFA5 isolated in Anfeh (North), EDH1 isolated in Edde (North) and one specie, Heterorhabditis indica isolated for the first time in the south of the country in an agricultural ecosystem planted with banana trees AYA6 isolated in Aytamoun (South), Burj Rahal BR20 (North): and S. feltiae isolated in different locations. In addition as per the molecular results, a new entomopathogenic nematode specie was isolated in an agricultural field in Burj Rahal belonging to Heterorhabditidoides sp.; however the nematodes couldn't be reproduced and morphological measurements couldn't be finalized. On the other hand, soil studies were subsequently realized to establish a relation between the soil parameters and their effects on EPNs. As results, sandy texture as well moisture seems to be favorable factors for the presence and survival of EPNs in the soil. Heterorhabditis indica sample was found in an alkaline soil with a basic pH, contrary to the common pH of other EPNs.

Levée de dormance du Gardenia thunbergia par l'effet de stratification et l'effet de deux types de chélate de Fer sur le taux de chlorophylle a et b dans les nouvelles pousses de Gardenia jasminoides

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Cette étude vise à mettre en valeur l'effet de deux traitements sur la levée de dormance des graines de Gardenia thunbergia. De plus, l'étude du taux de chlorophylle dans les nouvelles pousses avant et après l'application de deux types de chélate de fer le Fe-EDDHA et le Fe-HBED a été réalisée. Le présent travail a consisté à mettre au point une méthode pour deux types de traitement (stratification à froid et imbibition à l'eau) afin d'étudier leur effet sur l'accélération de la levée des dormances des graines de G. thunbergia. D'autre part, des apports de chélate de Fer ont été pratiqués sur les plantes de Gardenia jasminoides pour étudier l'effet des concentrations et type de chélate de fer sur le taux de chlorophylle a et b dans les nouvelles feuilles de G. jasminoides. Les résultats ont montré que l'imbibition des graines pendant 24 h

dans l'eau indépendamment de leur âge donne les meilleurs résultats en ce qui concerne l'accélération de la levée de dormance et le pourcentage de germination. La stratification à froid à 40C pendant quatre et huit semaines a donné de taux de germination élevé mais la durée de levée de dormance était plus longue que celle des graines imbibées à l'eau. Les graines de contrôle ont donné un bon résultat de germination en cas où elles proviennent de semis fraichement récolté mais le déclenchement de la germination était le plus long parmi tous les traitements. Dans le même contexte, le Gardenia jasminioides est une de plante qui assimile le fer, nous avons voulu comparer deux types de chélate de fer, le Fe-HBED et le Fe-EDDHA. Les tests ont montré une relation forte entre les deux types de chlorophylle, nous avons en effet remarqué que le travail des Chl a n'est accompli que par la présence de Chl b et inversement. De plus nous avons trouvé que le rapport Chl a/Chl b est équivalent à 2,8. En ce qui concerne le type de traitement et les différentes concentrations de fer utilisées, les résultats ont montré que les plantes qui n'avaient pas reçu un traitement ont présenté une diminution dans les taux de chlorophylle a et b. Par contre, les résultats révèlent qu'une quantité de 0,5 g par plante de Fe-HBED donne le même effet si d' 1g de Fe-EDDHA, ce même résultat est appliqué pour les plantes traitées à 1,5g de Fe-HBED et 3g Fe-EDDHA. De plus les résultats révèlent que plus la concentration de chélate de fer, est grande plus le taux de chlorophylle va augmenter.

Hydroponics applied to cucumber culture in Lebanon

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Hydroponics has revolutionized modern farming. It has allowed controlling conditions more effectively and therefore having better results. Several reasons have limited the usage of this technique in Lebanon, including high costs, specific materials and certain know how. The purpose of this study is to simplify hydroponics, specifically for cucumber cultivation, to make it more accessible to Lebanese farmers. To accomplish this purpose, two types of media were used, the coco peat and compost chicken manure at two different volumes. The substrates were placed in bags and two repetitions of each combination of media/volume were made. A greenhouse 54 meters long and 8 meters wide has been used to conduct the experiment. At the back of this greenhouse, we planted cucumbers using the traditional method to compare their performance with that of hydroponics. A portion of the soil was sterilized as farmers do and another non-sterilized to serve as a control part. Two attempts have been conducted in a period of eight months. During the first trial, the seedlings were planted and then irrigated two times a day. The following fertilizers were diluted in the mixer and given with the irrigation water: Calcium Nitrate 86.25g; 6-6-42 Fertilizer 103.5g; 12-61-0 Fertilizer 54.75g; 21-0-0 Fertilizer 5.75g; Magnesium Sulfate 34.5g; Iron Chelate 1.38g; Micro-elements 0.69g; Bore Solution 0.69mL, Zinc/Manganese Solution 0.69mL. This trial ended in failure with the seedlings in coco peat not growing properly. So the plants were removed, the nutrients leached out of the media and the coco peat bags treated with Calcium Nitrate to adjust pH. Then another attempt was made using the same method. The plants grew normally and almost equally for a period of two and a half months, after which they suddenly stopped growing and turned yellow. To resolve this problem, the irrigation system was changed; instead of diluting the fertilizers in the mixer and send it with irrigation water, the fertilizers were diluted in a 1000L tank to constitute an irrigation solution given directly to the plants. The following fertilizers were used in the new mix: 0-0-50 Fertilizer 300g; 13-0-46 Fertilizer 300g; Calcium Nitrate 900g; Magnesium Sulfate 250g; Iron Chelate 10g; Micro-elements 10g; Bore Solution 5mL; Phosphoric Acid 175mL. The number of fruits collected per harvest was noted and analyzed using SPSS. There was no significant difference in taking each repetition alone and comparing it to control soil and sterilized soil, but a significant increase in performance was observed between the cucumbers hydroponically grown in general and the soil in general. The results are promising, but not conclusive, since the progress of the crop was not normal and stable throughout the experiment.

Mapping Evapotranspiration to Administer Water Use in Bekaa Valley - Lebanon

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Land surface evapotranspiration (ET) transfers large volumes of water from soil (evaporation) and vegetation (transpiration) to the atmosphere. Quantifying the consumption of water over large agriculture areas and within irrigated projects is important for water rights management, water resources planning, hydrologic water balances, and water regulation. The differences between the actual and potential ET at high spatial resolutions are of interest to agriculture, water resources, and even national security, as an indicator of crop water deficits. Spatial estimates of ET are essential components of general circulation and hydrologic models. Satellite data are ideally suited for deriving spatially continuous fields of ET using energy balance techniques. In this research a surface energy balance model is used to derive the actual ET and many other related products such as surface temperature and soil moisture for a large area in Bekaa valley - Lebanon using Landsat 7 and 8 for different period of time. The objective is to study different water related issues such as crop water deficits and water budget.

Use of geospatial information for sustainable local governance in Lebanon

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The Center for Remote Sensing of the National Council for Scientific Research is implementing an EU, ENP project: "LOCAL-SATS" aiming at the sustainable use of geospatial information for improved local governance (2012-1013). The Union of Municipalities of Hermel is the second Lebanese project partner (end user). This project celebrated its first year with the production of national report assessing the national capacities and infrastructure for the production, treatment, storage and sharing of geospatial information. The main findings of the analysis can be resumed as follows: 1. The Directorate of Geographic Affairs (DGA) is responsible for handling the national geospatial data, whilst the Central Administration of Statistics (CAS) is in charge of the collection, processing, producing and disseminating social and economic statistics at the national level based. 2. The Center for Remote Sensing (CRS) was established by the Lebanese National Council for Scientific Research (CNRS) in 1995 and became fully operational in 1997. Soon, it proved itself a prominent producer of thematic geospatial information using recent advances in remote sensing and GIS technology. 3. The Geo-spatial data and information in Lebanon have been recently adopted in several governmental institutions at various levels. Some of these data are still on-processing to be converted from hard copies into digital form. Nevertheless, each of these institutions has its own geospatial database and information, which are mainly produced by expertise from other specialized entities. There is no unified policy on the national level for geospatial data implementations. Each institution has its own policy for data accessibility but data sharing is almost limited. Each institution is working independently and yet there is still a lack for data convey and exchange between these institutions unless joint works are carried out. 3. The Prime Ministry created on 2002 the National GIS Committee (decree 78/2002) including DAG, CRS-CNRS, Ministry of Agriculture, Ministry of Environment, Ministry of Public Work, Ministry of Post and Telecommunications, Ministry of Energy and Water, Ministry of Finance and Ministry of Health. The National GIS committee was assigned to develop the national spatial data information system and to create the national geoportal (www.gislebanon.gov.lb). Until this moment, the geoportal contains metadata and it is still a long way to go until fully pledged, central geospatial information is built and fully functional and shared. The LOCAL-SATS report analysed the contribution of international bodies (UN, FAO, UNDP, UNEP, USAID, IC) and national institutions in developing and using geospatial information for the displaced, refugees, protected areas, coastal biodiversity and mapping of living conditions and local management respectively. The analysis of the gaps showed that only 60% of the municipalities in Lebanon have cadastral maps. It is one of the major problems of the implementation of geospatial data within the municipalities in Lebanon. After 2000, the geospatial information became part of NGO's activities. The LOCAL-SATS project defined the relevant governmental institutes-contact points, type of data and data availability and sharing policy, beneficiaries of on-going national and international projects, national spatial data infrastructure, spatial data collection and processing capacities, data cost and source of funding as well as the dedicated undergraduate and graduate programs, curricula and personnel-Relevant education and training centers available in Lebanon. While defining strengths and weakness, the project is elaborating environmental observatory and capacity building for local municipalities for the use of geospatial data in local governance. A set of indicators for the current state and historical change of built up, green space and open space areas at the national level and within main Lebanese cities were assessed. The distance to critical services like fire brigades, medical centers and police stations, reflecting the social vulnerability of city settlers were also produced. Results can be used as lessons learned and monitoring tool for sustainable governance.

Migration of tin from tinplate into canned food

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Tinplate food cans hold 60% of metal cans market. They are mainly made of steel sheets, covered on both sides with tin (Sn). These cans may have plain internal tin bodies (uncoated tinplate cans), or internal bodies covered with an organic protection (coated tinplate cans). According to food types, cans are chosen to be coated (used for vegetables), or not (used for fruits, white fleshed foods etc.). The presence of a bare tin surface may lead to a protection of the food as a consequence of antioxidant properties of tin, particularly for the preservation of white fleshed foods. For coated cans, organic coating is used to avoid tin releasing (migration) into canned food, caused by a potential interaction between the can's internal surface and foodstuff. In both cases, exposure to tin must not exceed tolerated levels. Otherwise, it may cause gastrointestinal irritation, among other undesirable effects. In this context, the main objective of our study is to perform a follow-up of tin levels in foodstuffs (vegetables and fruits) canned in coated and uncoated tinplate, in order to assess the factors that affect its migration. All cans were collected from local supermarkets, mainly from a same Lebanese brand. Comparative studies were carried out between cans having different production dates. The analytical procedure consisted in grinding and mixing the content of 3 cans in order to minimize the effect of any variability. 4 digestion replicates were carried out for each sample (2g) using a mixture of nitric acid (HNO_3) and hydrogen peroxide (H_2O_2), in a microwave digestion system. The digest was then diluted in ultrapure water. Tin was determined by flame atomic absorption spectrometry (FAAS) using a nitrous oxide (N_2O)-acetylene flame. KCl was added for each sample in order to prevent tin ionization which can be caused by high temperatures of the N_2O flame. All fruit foodstuffs, canned in uncoated tinplate, contained higher amounts of tin, while tin levels were under the limit of detection (LOD = 10.8 µg/g) in all vegetable foodstuffs canned in coated tinplate cans. This result confirms the protective function of organic coatings in tinplate cans, avoiding tin release into canned foodstuffs. Moreover, tin release seems to be affected less by the pH of the canned foodstuffs when it comes to coated tinplate. This fact has been mainly shown for vegetables, canned in coated tinplate. In this case, pH, varying from 3.94 to 5.95, had no effect on tin migration, which remained under the LOD. In uncoated cans, tin levels increased with the storage duration regardless of the studied foodstuffs.

For instance, amounts of tin reached 27.07 µg/g in canned pineapples, after 6 months of storage and 142.92 µg/g in canned peaches, after 33 months. In most cases, levels were under the recommended permissible limit (200 mg/L) given by the European Commission legislation (EC) N°1881/2006, except for fruit cocktails where they reached 216.76 µg/g, even after 7 months of storage. This study showed that the presence of an organic coating protects foodstuffs by avoiding tin migration. According to our study conditions, the pH was not a determining factor. Tin release was rather influenced by the presence or not of the protective organic coating. Future studies could be carried out on uncoated tinplate cans in order to assess the effects of several factors which could impact tin migration, like storage temperature, duration, chemical composition of the foodstuff, and can quality.

Determination of Phtalates in Lebanese Bread and its Plastic Packaging by HPLC-UV method

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Phtalates standards, reagents and solvents were supplied from Sigma-Aldrich. To offer an easier tool to detect the presence of phthalates in plastic bags and in bread samples, an ultrasonic extraction technique using a suitable extraction solvent, followed by a preconcentration step and HPLC-UV analysis, has been optimized. The two methods were validated according to the strategy proposed by the Commission of the French Society of Pharmaceutical Sciences and Techniques (SFSTP). To implement the validation plan, we considered three series of three repetitions at each concentration level. This was done through spiking of phthalate-free samples with the different phtalates at four concentration levels. The samples were analyzed over three days. It should be noted that during each day of validation, calibration has been verified. In order to validate the method of phthalate determination in plastic matrix, limits of detection (LOD) and quantification (LOQ) were determined, from 10 blank tests. The obtained values were in the range 0.03-2.55 mg/l for LOD and 0.05-3.81 mg/l for LOQ. The relationship between the signal and concentration was linear as the R2 values ranged from 0.9975 to 0.9999. LOD and LOQ of analysis method of phthalates in bread matrix ranged from 0.06 to 0.52 mg/l and from 0.12 to 0.93 respectively. R2 for the calibration curves was in the range 0.9986-09993. The concentrations of the validation samples (both plastic bags and bread) were back-calculated and were used to determine the relative bias, the repeatability, the intermediate precision, and the β-expectation tolerance intervals at the 90% probability level. The results showed that both methods applied on plastic and bread samples were fit for purpose, since the relative bias (%) at each concentration level was less than 20% and the relative standard deviations (RSD%) for repeatability and intermediate precision did not exceed 10%. The relative upper and lower β-expectation tolerance limits (%) did not exceed the acceptance limits of total error for each concentration level, confirming that the proposed method was accurate. Furthermore the risk of having future assay results exceeding ±20% limits of the targeted amounts is strictly controlled. Ten plastic and ten bread samples from the Lebanese market were analyzed; each sample was analyzed in triplicate. It was observed that most samples contained phthalates at concentration less than 20 ppm. The migration test revealed that all the detected values were less than the permissible limits except for one sample where DBP was present in a very close amount to the maximum permissible limit of 18ppm. It was shown that higher levels of phthalates were detected in bread samples that are directly in contact with the plastic bag by comparison to those in the middle of the bag. After the development of an HPLC method for the determination of phthalates in plastic bags, validation of this method was performed using the accuracy profile as decision tool. This tool allowed the validation of the proposed method regarding the seven studied phthalates: DMP, DEP, DPP, BBP, DBP, DCHP, and DOP. Similarly, a development and validation of an analysis method of these compounds in the Lebanese bread was made. The validated method allowed the analysis of ten samples of plastic bags and ten bread samples from the Lebanese market. Plastic bags presented low phthalate levels, below permissible limits, except for one sample. For bread samples, very low or unquantifiable values were found.

Evaluation of food safety knowledge and practices among usek staff

Agathe Balis (Université Saint Esprit de Kaslik, Lebanon); Lara Hanna Wakim (Holy Spirit University of Kaslik, Lebanon); Chantal Mikhael (USEK, Lebanon)

The recent succession of the food crisis has endangered the relationship of trust between the consumers and all food production parties. In order to enhance consumer perception towards Lebanese food safety, we began a survey on a sample of a population (n = 200) chosen among the Holy Spirit University of Kaslik's staff in order to determine their food safety knowledge and practices. the main objectives of this study is to underline the deficiency of food safety knowledge during purchase and handling of food among USEK's staff and help them increase their awareness concerning the food safety since the baseline knowledge and behaviors in a target group is essential for the development of effective health educational programs in Lebanon. The study found significant difference among education levels concerning attitude towards food safety knowledge. Higher level of education influences the frequency of buying organic products; however only 58.5% of the respondents use different cutting board when preparing raw meat and fresh food. Also our results show that 79% of the participants don't trust their government. We can conclude that results of our study increase concerns about consumer safety knowledge and practices. Additional survey should be conducted to secure a safe food environment.

Biodiversité des Aspergillus de la section Flavi dans les épices commercialisées au Liban

Joya Makhlouf (EDST, France); Olivier Puel, Isabelle Oswald and Jean-Denis Bailly (INRA, France); Monzer Hamze (Lebanese University, Lebanon)

Les moisissures sont des contaminants fréquents de très nombreux substrats alimentaires. Leur développement incontrôlé peut entraîner: - une altération des qualités organoleptiques des aliments(goût, odeur, couleur) - une diminution des qualités technologiques(panification des céréales) et nutritionnelles - une accumulation de composés toxiques pour l'homme et l'animal: les mycotoxines. Les mycotoxines sont des métabolites secondaires produites par certaines espèces de moisissures au cours de leur développement. Plusieurs centaines de toxines différentes ont été identifiées mais, compte tenu de leur fréquence et de leur toxicité, il est classiquement admis qu'environ une trentaine de ces composés ont une importance notable en santé publique humaine et vétérinaire. Parmi ces mycotoxines, l'aflatoxine B1 (AFB1) est certainement la plus importante. Cette toxine est un contaminant très fréquent des productions en zones tropicales et sub-tropicales ou les conditions climatiques sont favorables au développement des Aspergillus de la section Flavi qui produisent ce composé. Outre son impact sur l'incidence des cancers hépatiques dans ces régions, l'AFB1 est aussi suspectée de jouer un rôle direct dans les retards de croissances observés chez les enfants et est imunosuppressive. Dans certains cas extrêmes, les concentrations retrouvées dans les aliments ont aussi pu conduire à des intoxications humaines aiguës(127 morts lors d'un épisode d'intoxication au Kenya en 2004). A l'heure actuelle, il n'y a que très peu de données disponibles sur la contamination des produits commercialisés au Liban quant à leur niveau de contamination par les Aspergillus de la section Flavi et l'AFB1. L'objectif de nos travaux est de caractériser la contamination des épices commercialisées au Liban par des espèces fongiques aflatoxinogènes. Pour cela, 70 échantillons d'épices ont été prélevés dans différents marchés sur la totalité du territoire libanais. Une analyse de la contamination fongique globale a été effectuée et lessouches d'Aspergillus de la section Flavi ont été isolées, identifiées par analyse de leurs caractéristiques morphologiques et par analyse moléculaire et leur potentiel toxinogène a été mesuré. Les niveaux de contamination fongique observés ont été très variables en fonction de la nature des épices: les échantillons de curry étant les plus contaminés alors que le niveau de contamination des échantillons de Carvi et d'anis présentaient de niveaux de contamination très faible. Au total, Quarante deux souches d'Aspergillus de la section Flavi ont été isolées sur la base de leurs caractéristiques morphologique et leur identification moléculaire est en cours. L'analyse du potentiel toxinogène de ces souches a été réalisée après mise en culture des isolats à 25°C pendant 7 jours sur milieu MEA. Ces études ont permis de montrer que plus de 80% des souches sont capables de produire une ou plusieurs mycotoxines: AFB1 mais aussi AFB2, AFG et/ou acide cyclopiazonique. Ce potentiel toxinogène global peut être utilisé pour classer les souches en fonction de leur chémotype. Les niveaux de production observés sont très variables en fonction des souches. En conclusion, nos travaux montrent que les épices commercialisées au Liban peuvent être contaminées par des souches toxinogènes d'Aspergillus de la section Flavi. L'analyse du niveau de contamination des échantillons dans lesquels des souches fortement toxinogènes ont été isolées permettra de mieux évaluer le risque associé pour les consommateurs.

P1_MATH: Poster Session 1- Mathématiques et Informatique

Room: USJ Hall CSH

Chairs: Dany Mezher (Saint Joseph University, Lebanon), Toni Sayah (Université Saint-Joseph, Lebanon)

The Integration of Web Services in Workflows for Big Data

Sara Nasr (Arts Science And Technology University Of Lebanon, Lebanon); Bilal Said (Arts, Sciences and Technology University in Lebanon (AUL), Lebanon); Ali Hamie (Arts Sciences & Technology University in Lebanon (AUL), Lebanon)

The domain of big data presents a lot of challenges due to the nature of the considered data, their volume, and number of problems faced because of the complexity of processing these data in order to analyze and extract the knowledge from them. By using web services and benefit from their advantages tested with traditional computer science fields, we may be able to build blocks for big data that are assembled with each other to form an entity with extended functionalities. The objective is to explore how the concept of components or web services can be adapted and integrated in a complete system and to propose a compositional approach for connecting entities and algorithms via workflows. In other words, We want to benefit from the importance of web services to integrate it with big data workflows. One of the scientific workflows that deal with big data is Kepler we will benifit from this workflow to merge the web services functionilies in its roles and actors. at the end we propose a generic engine that uses the capabilities of kepler and to adapt them to the complexity of the needed computation.

NFC Authentication via Social Media

Saeed Raheel and Farid Nakhle (American University of Science and Technology, Lebanon)

The present work proposes another approach for using the NFC technology in the process of authentication. The main idea is to allow the user to authenticate him/herself using his/her social media account, such as Facebook. As simple as it may seem, this idea offers lots of advantages for both the user and the second party requesting the authentication.

MovieShop

Bilal Mahmoud and Georges Badr (Université Antonine, Lebanon)

Films are full of products, each scene contains at least one product and most of the times we wonder the name of one or more products that is shown in a video scene or movie. The user may want to look for these products on the Internet to buy them. Recognizing those products may sometimes be difficult for some users who do not know what he seeing, because the product is not known or because of the lack of description. In this project (MovieShop), we tried to solve this problem by treating a screenshot from a movie to look for the products present in the scene and then access to their market. How can we develop such a program that can be able to process images, non-categorized objects and transform them to know product with a link to their market? Understanding objects and recognizing products was and still hard to implement since many constraints may limit it. In fact, any change in the luminosity may return erroneous responses and any change in the color may result in a different object. Researchers and engineers have been working to implement some methods that could answer user question. Those methods tend to handle and process images and video in order to extract and recognize objects. This is the computer vision domain that is included in many other domains like surveillance, medicine and health, image searching (i.e. image searching in Google). For that, many algorithms and Framework have been developed, Opencv, Emgu cv, SURF, SIFT, etc.). MovieShop is a C# solution with client / server architecture where the client is a web application and it is to the server to do the image processing. Both are connected via a Web service to ensure the data exchange. Object recognition is done by using a multimedia database, in which are stored different logos for different products. Hence, the identification of the product is done thru its logo. To our knowledge, this kind of solution does not exist yet. When watching a movie, the user may decide to have some information about a product that appears in the scene. The user then pauses the play and a screenshot of the scene is transmitted automatically to the server to be processed. The server then replies with the name of the products that exist in the scene as well as a link to their market. On the server we implemented SURF, the algorithm of object recognition. This algorithm is included in EmguCV and OpenCV libraries. The SURF algorithm first transforms all the images to gray scale to reduce the size and the complexity to the calculation. Then, it extracts the "keyPoints" from the screen capture and the logos in the database. The "keyPoints" define the characteristics or features of an image. An object with a number of common key points between the two images, greater than a defined threshold is considered to be a recognized product. That means that the logo of the product and the processed image contain enough common characteristics. The description and the links are then combined and attached to the product and sent to the client. The processing scenario is presented as follow: - First, the screen capture is first encoded to Base64 to be sent to the server in a XML format. This image is sent via an AJAX function connected to a Web service in the processing server. - Once received, the server decodes the Base64 code into the original image, which is temporary saved in the server and ready for process. - Products' logos, information and links are loaded from the database to be compared with the image sent by the user. - The recognition process is then run in order to detect and recognize products. - If the object is recognized, the server sends the result for the client via a JSON response. This response contains the image with the identified object(s) (when identified, a frame is drawn on it), with a description for each one and a clickable link so the user can access the online market. - The result is shown to the user in the client application. The result represents the original image where the recognized objects are framed, and a list containing their description and links. This project is a prototype that can be developed in the future and implemented on the newest technology including smart TVs. Acknowledgments go to the Faculty of Engineering of Antonine University who contributed to our training, during all the years of expertise. Keywords: Computer Vision, image processing, object recognition, movie, product.

Generating Topics with Improved Precision Using Information Extraction

Mireille Makary and Fadi Yamout (Lebanese International University, Lebanon)

This paper describes a new technique that improves the precision of a set of topics that come with a test collection based on its Relevant Judgment List (RJL) with no human intervention. The technique is considered as a component of a whole system that aims to generate a complete test collection. It is based on automatic key phrases. Automatic key phrases extraction from documents is achieved using Keyphrase Extraction Algorithm KEA implemented as a plugin in GATE. Text matching based on semantic similarity is also a part of this process which allows matching the user query and the set of key phrases obtained from KEA. Selecting the documents returned by the information retrieval system when passing the most matching key phrase to the original query, will be evaluated as opposed to the existing set of Relevance Judgment List.

A Generalized Operator of Sobel and Prewitt Based on Finite Difference Methods

Ali Ghosn (Beirut Arab University, Lebanon); Ali El-Zaart (Beurit Arab University, Lebanon); Toufic El Arwadi (BAU, Lebanon)

Edge detection is one of the most significant tasks in image processing systems. Edge map of an image contains information about an objects that exist in an image and it is used to recognize of certain objects in an image [1]. The decision of whether pixel is an edge point or not, bases on how much its local neighbors respond to a certain edge detector [4]. Over the years, many methods have been proposed for

detecting edges in images. Some of the earlier methods, such as the Sobel and Prewitt detectors [2], used gradient operators [3] to obtain spatial filter masks. This research paper presents a new mathematical formula based on finite difference methods that used to create new masks based on gradient operator. Masks are obtained by the first or second derivative of the image. Our contribution is to create new adaptive masks for each pixel of the image, in addition, all classical gradient masks (like Sobel, Prewitt, others) are special cases of our masks.

A Crank Nicolson Type Scheme for the Dirichlet-to-Neumann semigroup

Rola Ali Ahmad (Beirut Arab University, Lebanon)

Our aim is to study a semi discrete Crank Nicolson type scheme in order to approximate numerically the Dirichlet-to-Neumann semigroup. We will construct an approximating family for the Dirichlet-to-Neumann semigroup, and prove that it satisfies all the assumptions of the Chernoff's product formula, and consequently the Crank Nicolson scheme converges to the exact solution. The variational formulation of this problem can be resolved by (P1)- finite elements to illustrate this convergence through a FreeFem++ implementation.

Speech to Sign Language Recognition System

Mohiba Hassan, Haitham Maarouf and Alaaeddine Ramadan (MUBS Lebanon, Lebanon)

The purpose of a Sign Language Recognition System is to enable communication between the deaf and non-deaf by translating a real time of dynamic signs into voice commands and from voice commands into signs for deaf [1]. This paper present Speech Recognition techniques that is a part of the sign language recognition system. This paper gives an overview of major technological perspective and appreciation of the fundamental progress of speech recognition and also gives overview technique developed in each stage of speech recognition. This paper present a significant methods used to develop a software that provide significant help for the people with disabilities. The system translates the voice commands to sign with high accuracy (≈90%) using a dataset of 30 words, the accuracy decrease when increasing the number of words due to the spelling similarity (such as "hi" and high), this problem can be solved using Audio-Visual speech recognition [2] by comparing image transforms of an appropriate video region-of-interest (mouth), and subsequently, audio speech Recognition.

Using NoSQL databases for building heterogeneous annotated corpora

Elie Dannaoui and Michel Georges Chammas (University of Balamand, Digital Humanities Centre, Balamand, Lebanon, Lebanon)

A corpus (plural corpora) is a collection of pieces of language text in electronic form, selected according to external criteria to represent, as far as possible, a language or language variety as a source of data for linguistic research (statistical analysis, hypothesis testing, checking occurrences or validating linguistic rules within a specific language territory…). This paper highlights the difficulties related to building corpora using heterogeneous textual sources and suggests an adequate solution. The textual transmission of a written work may contain various types of sources (manuscripts, printed, citations, allusions…). This diversity in terms of media and forms creates a major difficulty in the process of building the corpus because it requires that all these types to be predefined previously. This operation gets more complicated when the text is a translation from another language. The main obstacle in studying the history of such texts is their heterogeneous aspect. This is due to many elements: the wide spectrum of translation dates, the different vorlagen of the translations and their lingual origins, the plurality in terms of compilations and forms. To achieve these objectives, the project will proceed in the following way: • Collecting digital copies of all known textual testimonies. • Building a digital corpus containing the transcriptions of the identified texts. • Defining types and techniques of analysis that will be performed on the corpus contents. • Designing, developing and implementing appropriate tools for textual analysis. The text may be present in two formats: • Explicit (direct): This format includes the text as the author wrote it. • Implicit (indirect): This format includes allusions to the text or contents in different types of writings. These allusions are witnesses of a certain version of the text and may contribute in identifying this tradition if they were formally presented and integrated in the corpus. Both explicit and implicit formats of text will be consolidated in the corpus by a formal taxonomy. This approach will allow the corpus, when queried, to return all the occurrences of a specific textual occurrence regardless of its format or type. Taking into consideration the diversity and the heterogeneity of these sources, the main challenge was to conceive a database capable of handling and consolidating these different types of content. Traditionally, relational databases are used in similar projects and the main issue for decision makers was mainly to select the appropriate relational database to use. In our project, we decided to go in the opposite direction. Instead of a well-designed relational database schema, we decided to use an unstructured database. This family of databases also known, NoSQL is non-relational, distributed, open-source and horizontally scalable. Its schema-free approach will enable us to anticipate the emergence of new text formats and will allow the corpus to host different types of texts. This approach will guarantee the following properties: • Data has a flexible schema. Corpus does not enforce document structure. This means that transcribed texts in the corpus do not need to have the same set of fields or structure, and common fields in corpus's documents may hold different types of data. • One of the most important advantages of this technological approach is the shift from developer-centered to user-centered application. In Relational Database Management Systems, the load is put on the back-end operations (analysis, design, development, programming…). The end user (the researcher in our case) is a consumer of the system and any modification on the level of data structure requires an intervention at the back-end, and affects the front-end on several levels. Our approach gives the user the possibility to interact with the platform not only on the client side, but allows

the scholar for example to define a new document type, populate it with appropriate existing fields or even add new fields. Data integrity is guaranteed by a set of validation schemes. • The platform supports indexes on any field or sub-field contained in documents within the corpus. This allows the scholar to locate word occurrences in all the transcribed texts of the corpus.

Enhancement of Transfer Matrix Method Using Scattering Matrices

Mohammad Haroun, Hussam Ayad and Jalal Jomaah (Lebanese University, Lebanon); Marta Cabedo-Fabrés (Universidad Politécnica de Valencia, Spain)

Transfer Matrix Method Using Scattering Matrices is being a very efficient method in computational electromagnetism. In this paper a new approach is introduced that enhance the speed of calculation of the transmitted and reflected fields. The enhancement is represented by introducing parallel computations and making use of GPU cores to calculate the parameters of the layers simultaneously

Evaluation of Mobile-based Keystroke Dynamics Systems

Mostafa Dafer, Ramzi El Khayat and Mohamad El Abed (Rafik Hariri University, Lebanon)

Keystroke dynamics authentication solution is receiving more and more attention since it is well accepted by users. In addition, it is considered as a low cost solution as none additional sensor is required for logical access control applications (eg. E-commerce). However, in order to be used in real life applications, the performance evaluation of such solution should be carefully considered. To do so, we need generally to compute their performance using a predefined protocol. The goal of this abstract is to present the performance metrics used and the available benchmark to quantify the performance of mobile-based keystroke dynamics matching algorithms. In addition, a comparison of the collected features between both a desktop/laptop keyboard and a phone keyboard is presented.

P1_SOC: Poster Session 1- Sociologie, Siences humaines, Traduction

Room: USJ Hall CSH

Chairs: Christine Babikian (Université Saint Joseph, Lebanon), Amal Habib (CNRS, Lebanon)

Traduire ou adapter ? Telle est la question

Maribelle EL Hokayem (Holy Spirit University of Kaslik USEK, Lebanon)

Le verbe « traduire » n'est pas uniquement un verbe du troisième groupe comme l'indique les règles grammaticales, c'est un horizon large et plein de nouveautés intellectuelles, linguistiques et culturelles qui va de pair avec le développement des langues et des littératures nationales, le progrès du savoir, des sciences. La traductologie est alors une science qui vise à comprendre la traduction. Toutefois, elle est à la traduction ce que la muse est au poète: passionnante et inspirante, sans elle il sera perdu et dépourvu d'inspiration. La naissance de la traduction est une énigme à l'Homme. Elle se perd dans la nuit des temps. Certains spécialistes dans le domaine des sciences du langage tels que Cicéron, Saint Jérôme, Walter Benjamin et autres ne se rendaient pas compte de la pratique utilisée lors de la transmission d'un texte de la Langue Source à la Langue Cible. Il s'est avéré l'existence de deux démarches lors du passage d'un texte d'une langue à une autre, à savoir: les démarches traductives et les démarches adaptatives. On ne naît pas traducteur, on le devient. Pour le devenir, il faut connaître des langues, avoir une vaste culture. Il faut posséder des compétences linguistiques et être créateur, tant dans la langue source que dans la langue cible. Mais cela n'est pas suffisant, le traducteur est censé être constamment au courant de tout ce qui se passe dans le monde. D'ailleurs, cela le met en mesure de comprendre le texte à traduire et de le faire comprendre aux lecteurs étrangers qui en ignorent le contenu. Toutefois, il est appelé à tenir compte de toutes les différences entre les deux cultures et les deux langues en présence, au niveau des modes de vie et de pensée, des expressions figées, des métaphores, des traditions sociales, religieuses, historiques et du climat de chacune des cultures, pour mener à bien son opération traduisante. Le traducteur est un « caméléon », un médiateur entre les cultures, et c'est grâce à lui que plusieurs civilisations s'entrecroisent. Il détient une compétence interculturelle lui permettant de relier les civilisations entre elles en transmettant à chacune les savoirs, les traditions, les coutumes et les savoir-faire de l'autre. Vu que chaque civilisation a sa propre vision du monde, le traducteur saurait-il réussir sa tâche ? Quelle démarches est-il censées entreprendre ? Se trouvant aux prises de deux cultures, il lui est difficile de tracer une ligne de démarcation entre la traduction et l'adaptation, étant donné que les deux établissent un acte de communication original et supposent une interprétation. Mais ce qui est certain, c'est que cet acte n'est pas le même. L'adaptation apparait tantôt comme une trahison de l'original, une déformation, tantôt comme une solution à l'intraduisibilité. A cet effet, y aurait-il une certaine tactique ou stratégie dont le traducteur devrait tenir compte ? Dans ma thèse, je ferai une étude de comparaison et d'analyse entre plusieurs versions de textes traduits ou adaptés qu'ils soient juridiques, économiques, littéraires, religieux… des proverbes, figures de style et autres… et en fin de compte, j'appuierai la proposition du Québécois Michel Garneau (cf. Jean Delisle 1986) qui a proposé le concept et terme TRADAPTATION, affirmant que toute traduction est adaptation. Traduire ou adapter ? Telle est la question.

Trois Cultures, un Seul Texte

Maribelle EL Hokayem (Holy Spirit University of Kaslik USEK, Lebanon)

Le traducteur est libre de traduire un texte à sa façon puisque chacun possède son propre style, ses propres expressions qui lui permettent de transférer un texte d'une culture à une autre, d'une langue à une autre ; toutefois, chaque culture a son propre mode de vie, ses propres expressions, ses propres métaphores, ses propres traditions sociales, religieuses, historiques et son propre climat. De ce fait, le traducteur est censé prendre compte de toutes ses distinctions pour mener à bien l'opération traduisante. Néanmoins, plusieurs traductions sentent la culture du traducteur soit par les ajouts, les suppressions et les modifications des informations du texte de départ. En effet, dans tous genres de textes certains lecteurs qui ont recours au texte original et qui connaissent bien la langue de départ ainsi que la langue d'arrivée remarquent l'existence de certaines différences entre le texte original et le texte. Ces différences ne sont autres que des ajouts, des suppressions ou des modifications des informations faites dans le texte d'arrivée par les traducteurs lors de l'opération traduisante. Ceci dit, l'auteur du texte original a écrit ses idées d'une certaine façon ; les traducteurs, qui généralement transmettent les idées d'une langue à une autre, d'une culture à une autre, n'ont pas traduit les idées de l'auteur telles qu'elles étaient mais ils en ont ajouté quelques notions, quelques détails, ils en ont modifié d'autres et supprimé le reste. Les lecteurs, ne comprenant pas pourquoi les traducteurs ont transféré ainsi le texte, se posent plusieurs questions: Pourquoi les traducteurs traduisent-ils le texte de cette façon ? Est-ce pour montrer qu'ils sont des êtres à tout connaitre, détenant un bagage linguistique et culturel qui dépasse les connaissances de l'auteur et des lecteurs ? Est-ce parce que leur milieu, leur entourage et leur société les poussent, les obligent à le faire ? Craignent-ils de décevoir les lecteurs, de les choquer et de ne pas être à la hauteur de leur mission en leur donnant de nouvelles choses ? Quel est alors le rôle des traducteurs ? Ajoutent-ils des informations pour expliquer, clarifier ou pour préciser des idées confuses dans le texte de départ ? Jugent-ils que les lecteurs ne comprennent pas le message de l'auteur ? Pensent-ils que le texte de départ est incomplet ? Suppriment-ils des informations mentionnées par l'auteur dans le texte original compte tenu la culture des lecteurs ? Jugent-ils que ces informations ne doivent pas être transmises aux lecteurs ? Modifient-ils les notions écrites dans le texte d'origine parce qu'ils les jugent incorrectes ? Jugent-ils qu'un auteur d'un pays déterminé donne de fausses informations aux lecteurs d'une autre société ? Les traducteurs ont-t-ils le droit d'ajouter ou de supprimer des mots, des idées et des informations contenus dans le texte de départ ? On constate que pour transférer un message quelconque d'une culture à une autre le traducteur lit le texte original le comprend et le fait comprendre au lecteur, il essaye de le transférer en éliminant son caractère d'étranger afin que le lecteur comprenne l'idée donnée par l'auteur. Mais, pour pouvoir intégrer l'œuvre original à la culture d'arrivée et pour exceller dans le passage d'un cadre culturel à un autre, le traducteur est censé renouveler constamment ses connaissances culturelles. Toutefois, l'excès de connaissance est-il mauvais dans l'opération traduisante ? Est -il un signe de trahison pour le texte original ? Au cas où, le traducteur se trouve médiateur entre deux cultures dont l'une est toute à fait différente de l'autre, comment préserve-t-il alors la culture de l'auteur tout en respectant la culture du lecteur ? Ainsi lorsque la culture du lecteur ne s'accorde pas avec la culture de l'auteur, la conscience du traducteur le pousse-t-elle à modifier le contenu du texte original afin qu'il soit accepté par le lecteur ? Y a-t-il une certaine loi ou un certain principe à suivre impérativement qui le pousse à le faire ? Le vécu du traducteur est-il un élément clé dans le transfert d'un texte d'une langue à une autre ? Le traducteur libanais qui connait la culture américaine et vit au Liban traduit-il un texte qui parle de la société ou de la politique américaine de la même façon que le traducteur libanais qui a passé un bon moment aux Etats-Unis ? Ces deux traducteurs ont-ils le même bagage culturel ? Comprennent-ils les connotations culturelles et socio-politiques de la même façon ? La culture est-elle un facteur primordial pour la réussite de l'opération traduisante ? Faciliterait-elle la tâche du traducteur ou la rend-elle plus compliquée ? On remarque que certains textes sont écrits par des auteurs à un public bien déterminé lorsque le traducteur les transferts à un autre public dont la culture est totalement différente de la culture du public original, comment le fait-il ? Métamorphose-t-il les textes pour qu'ils soient acceptés aux lecteurs du texte d'arrivée ? Réussit-il à garder le même effet éprouvé par les lecteurs de l'original ? Quelle sera la réaction de ses lecteurs vis-à-vis des textes traduits ? Le traducteur remplacera-t-il quelques notions par d'autres pour qu'elles soient compatibles au climat culturel d'accueil ? Ce travail consiste à déceler l'existence de trois cultures différentes (culture de l'auteur, culture du lecteur et sa propre culture) lors de l'opération traduisante afin d'en étuder leur impact sur l'auteur et le lecteur.

Gamification in academic libraries: The wave of the future

Helene Nehmeh Frangieh and Antoine Melki (University of Balamand, Lebanon)

Gamification is an emerging trend gaining increased attentiveness and understanding in various fields. Literature review shows that the application and incorporation of gamification techniques into the services of academic libraries is increasing. This paper demonstrates why now, more than ever before, gamification must be the core attention of academic libraries. It explains how developing a gamification project can neither be random nor chaotic. It's a continuous process that has to follow clear and steady steps beginning by explicitly stating the library goals and objectives. Once targets are identified, several parameters should be taken into consideration including game types, game formats, rules, reward systems, locations and setups, frequency, timing and budgets. And most importantly, the gamification project must investigate the gamers, their backgrounds, preferences and categories. This paper prepares academic libraries for future gamification projects. It raises the curtain on how gamification can fit into library services and where does it have the highest potential? How and where do games fit in library operations and how and where does education intervene? How organized, interactive and fun a game needs to be in order to meet library goals and insure gamers' full involvement?

Adaptation du WiscIv à la culture arabe

Viviane Touma (USJ, Lebanon); Youmna Moussallem (Lebanese University, Lebanon); Souhaila Salloum (Holy Spirit University Kaslik, Lebanon); Mirna Ghannage (Saint Joseph University, Lebanon)

L'examen psychologique est une démarche diagnostique intégrative qui utilise l'ensemble des outils disponibles au psychologue. Le but est de cerner la nature des troubles dont souffre l'enfant, en déterminer la portée, en comprendre la dynamique et, repérer les secteurs d'activité psychique. Dans une société multiculturelle, comme le Liban, certains facteurs risquent d'influencer le déroulement de l'examen psychologique, et, par le fait même de biaiser les résultats de l'évaluation:les croyances et traditions, l'image attribuée au praticien, le matériel d'évaluation non adapté à la culture. Le matériel psychologique (le TEST) utilisé reste un facteur des plus importants. Une gamme non négligeable de tests psychologiques est importée et utilisée par les praticiens libanais, malgré les obstacles qu'ils présentent:un contenu non adapté à la population orientale, une langue qui n'est pas la langue première du pays, une absence d'étalonnage sur la population libanaise etc.Pour délimiter les résultats biaisés aux tests nous avons décidé d'adapter une batterie de tests classée n.1 sur l'échelle mondiale:WISC IV Wechsler Intelligence Scale for Children 4eme édition de david Wechsler. Le projet d'adaptation du WISC IV , à la culture arabe - est né d'une nécessité professionnelle sur le terrain libanais. Ce projet a pris une forme définitive et sérieuse en 2009, autour d'une table de discussion entre quatre psychologues chercheurs . Il a soulevé l'importance de l'évaluation qui cible les compétences de l'enfant, tenant compte de l'aspect culturel du pays d'origine. Le projet d'adaptation du WISCIV, a été mené par Viviane Matar TOUMA , il a duré 3 ans (2010-2013). Ce projet intéressait également l'équipe de professionnels du ministère de l'éducation du Sultanat d'Oman (MOE), qui a exprimé le besoin d'avoir un test cognitif adapté à la culture arabe. Suite à notre rencontre avec les représentants du ministère, un accord a été signé entre les deux partis. Les professionnels participants à ce projet, au Liban et au Sultanat d'Oman, ont suivi des ateliers de formation créés à cet effet, de 2010 à 2012, sous la direction de V.M.Touma, formatrice et chef du projet. Le projet d'adaptation du WISC IV au monde arabe a démarré en 2010 et, a réuni des psychologues chercheurs, des enquêteurs, des coordinateurs, et des didacticiens, tant au Liban que dans le Sultanat d'Oman. Il a été également supervisé par des spécialistes dans ce domaine au Liban, en France et aux Etats Unis. Le traitement statistique a été finalisé par Jianjun ZHU , suivant les normes américaines. Le WISC IV-AR est actuellement utilisé par des centaines de psychologues dans le monde arabe. Les psychologues rattachés au CNRS et au ministère des affaires sociales au Liban, ont été formés à son utilisation. Le praticien qui utilise les tests étrangers dans les évaluations d'enfants, d'adolescents ou d'adultes, purement arabophones se trouve contraint à la traduction des consignes;à une modification du contenu de certaines épreuves non adaptées à une population de culture orientale ou encore à une annulation de certains subtests.Ces changements ne passent pas inaperçus et risquent de biaiser les résultats. En tout cas, toute modification ne permet plus au clinicien de faire des interprétations sujettes à généralisation. Il ne peut que constater ou confirmer une hypothèse de départ. Certains tests ne sont pas utilisés dans leur totalité. Ce manque de précisions est par moment décourageant et pas assez satisfaisant. Le WISCIV-AR est une adaptation et non pas une traduction. La traduction intégrale donne l'équivalent du sens du mot mais ne change en rien le contexte. Tant que la traduction est intégrale et non adaptée, c'est-à-dire, ne tient pas compte de la culture et des spécificités de la langue du pays ciblé, le résultat de l'enfant au test restera biaisé. Par ailleurs, lorsqu'un professionnel se fit à sa propre traduction, on ne peut espérer avoir des résultats objectifs et valides, d'où l'importance d'une adaptation à la culture arabe, une version unifiée et standardisée du test. Les étapes du projet (2010- 2013:Dans un premier temps, une étude du vocabulaire, se basant sur la culture arabe, a été nécessaire pour donner une première forme aux différents items du WISCIV. Une équipe de didacticiens, d'enseignants de la langue arabe et des orthophonistes ont été impliqués dans cette étape. Une première traduction et adaptation des items du test a été fait. Dans un deuxième temps, deux pré- tests ont eu lieu permettant d'apporter les dernières modifications avant la phase de l'administration du test et le recueil des données. Les données normatives du WISC-IV AR (version arabe) ont été établies à l'aide d'un échantillon collecté, en janvier 2010:1400 enfants âgés de 6A0M-16A11M, y compris un groupe d'enfants à cas spécifiques:enfants sourds avec appareils auditifs conventionnels, enfants sourds avec implant cochléaire, retard mental léger, troubles d'apprentissage. L'échantillon a été stratifié sur les principales variables démographiques (âge, sexe, région géographique) et a été recueilli dans deux pays:le Liban et le Sultanat d'Oman, suivant les normes basiques.Une étude corrélationnelle, selon les normes américaines , et une analyse factorielle des différentes données recueillies ont permis de mesurer la fidélité et la validité du WISCIV AR. Cinq groupes d'âge ont été pris en compte dans le Test Retest:6:0-7:11, 8:0-9:11, 10:0-11:11, 12:0-13:11, and 14:0-16:11. Ci-joint les différents tableaux qui témoignent de la cohérence interne entre subtests, de la fidélité et de la validité du WISCIV AR.

Textes Techniques entre Traducteur ou Spécialiste

Maribelle EL Hokayem (Holy Spirit University of Kaslik USEK, Lebanon)

La traduction est un miroir d'une culture quelconque qui reflète et transmet la coutume et la culture des peuples d'une langue à une autre, révélant ainsi les mystères, les racines et les connaissances de ces peuples au monde entier. La traduction est un domaine qui va de pair avec le développement et le progrès économique, scientifique, culturel, technique, astrologique et autre. Pour ce, le traducteur doit maitriser les compétences méthodologiques et avoir une culture générale qui dépasse les frontières de sa spécialité. Le traducteur est doté d'un pouvoir surhumain celui de jongler entre les langues et d'inventer, de créer des équivalents(ou des néologismes) dans la langue cible afin de transmettre le message à la perfection au lecteur qui ignore le contenu du texte source. Le traducteur est un réconciliateur des langues, un

médiateur entre les cultures et un ambassadeur des connaissances et du savoir. Toutefois, ce caméléon et dans des textes techniques se trouve face à un problème de la traduisibilité et de l'intraduisibilité lors de l'opération traduisante. Détient-il un bagage culturel lui permettant de traduire des textes écrits dans divers domaines, tels la Médecine, l'Economie, l'Architecture et autres ? Ces textes médicaux, économiques, juridiques et autres sont-ils mieux traduits par un expert, une personne appartenant au domaine de la médecine, de la gestion et qui connaissent cette terminologie ? Plusieurs études et statistiques souligne sur le fait que l'expert, le spécialiste dans le domaine cible la terminologie du texte source étant donné qu'il est dans le bain. Mais sait-il passer d'une langue à une autre sans commettre des erreurs au niveau de la structure et de la forme; grammaticalement parlant ? Dans ces textes, remplace-t-elle le traducteur en jouant son rôle ? Chose qui est sûre et certaine l'un ne peut remplacer l'autre, vu que le traducteur ne peut opérer un patient ou lui prescrire un médicament. Cependant, pour mieux traduire des textes techniques suffit-il de posséder un dictionnaire bilingue et connaitre la terminologie du texte dans les deux langues ? Le traducteur est-il capable de traduire un texte technique si dès le départ il était orienté à poursuivre ses études de traduction dans un domaine précis ? Etant donné que la technologie évolue à grands pas, le traducteur est appelé à être à la une dans le domaine qu'il est en train de traduire. Sa connaissance dans le domaine lui donnerait l'avantage et l'expertise lors de la traduction d'un texte technique d'une langue à une autre. Un texte comprenant des termes médicaux est-il mieux traduit par une personne appartenant au domaine de la médecine ? Les textes techniques sont-ils traduits facilement par des hommes qui connaissent cette terminologie ? Ce travail consiste à déceler que le traducteur et le spécialiste doivent s'entraider lors de l'opération traduisante afin de mener a bien le message du texte source. L'un ne peut exister sans l'autre.

The role of values in change management: the case for quality management in technology-supported higher education

Manale Khalil (Islamic University of Lebanon, Lebanon)

Values are defined as "enduring beliefs that influence the choices we make among available means or ends"(Kernaghan 2003). They are desirable states, goals or behaviors on which individuals place a high worth(Elizur et al. 1991) and that guide them in making choices and decisions. These decisions are sometimes related to the introduction of a new change initiative in the workplace. So how can values influence decision-making? How can they facilitate(or inhibit) the process of change management? Total Quality Management is the application of processes and systems in order to achieve effectiveness and efficiency. The paper proposes a change in the values of the institution to foster quality management practices in the mind and soul of staff and faculty to get as near as possible from achieving improved performance on all levels, academic and administrative. The role of values in the change management process, and how the organization can practice "values management" to encourage the process is highlighted.

Effet de la culture du traducteur

Joelle Rayess (Holy Spirit University of Kaslik USEK, Lebanon)

Le papier est redige en Arabe. Veuillez regarder le papier complet dans le proceeding

La traduction technique et scientifique

Joelle Rayess (Holy Spirit University of Kaslik USEK, Lebanon)

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Le traducteur- Espace et temps

Joelle Rayess (Holy Spirit University of Kaslik USEK, Lebanon)

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Comment se fait la fidelite en traduction?

Dana El Ahmar (Holy Spirit University of Kaslik USEK, Lebanon)

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'La traduction littérale - une méthode efficace pour traduire

Dana El Ahmar (Holy Spirit University of Kaslik USEK, Lebanon)

Le papier est redige en Arabe. Veuillez consulter le proceeding pour le voir

P1_TECP1_Physics: Poster Session 1- Theoretical and Experimental Chemistry and Physics I

Room: USJ Hall CSH

Chairs: Bilal Habib Beydoun (Lebanese University, Lebanon), Nicolas Louka (Saint Joseph University, Lebanon)

Localized surface plasmon resonance of dimer copper nanoparticles

Salem Marhaba and Abdallah El Chakik (Beirut Arab University, Lebanon)

The plasmonic nanoparticles are widely utilized in spectroscopy and sensing applications. In this work, we use the coupled dipole approximation (CDA) to study the behaviors of Localized Surface Plasmon Resonance (LSPR) of spherical copper(Cu) nanoparticles, including monomers and dimers, with emphasis on what size and environment leads to the largest magnitude of the extinction cross-section (σext) and longest wavelength dipolar excitation. In addition, for the dimer calculations we investigate the influence of interparticles separation and the polarization of the incident light. The dimer copper nanoparticles separated by a few nanometers exhibits distinct dipole, quadrupole and higher multipole plasmon resonances. We find that the largest σext values for dimers are about a factor of 10 larger than those for all the monomers examined. We find that the interparticles separation in the dimer plays a crucial role to obtain the spectral characteristics of the (LSPR).

Theoretical Framework for Microporosity in Non-graphitizing Carbon

Jean Eid, Mohammad Bzeih, Charbel Matta and Jimmy Romanos (Lebanese American University, Lebanon)

Recent advances in high resolution scanning transmission electron microscopy (STEM) show that activated carbon grains are formed of corrugated carbon sheets with typical dimensions of 2-10 nm. In this work, we present a theoretical framework for pore morphology in microporous activated carbon. The interdependency between specific surface area and microporosity is discussed. In addition, we apply this model to non-graphitizing carbon derived from polyvinylidene chloride (700 m2/g) and activated carbon created by potassium hydroxide chemical activation (2600 m2/g). Moreover, this model is used to compute gravimetric and volumetric methane adsorption at room temperature and up to 35 bar. Finally, we use Langmuir equation and Ono-Kondo model to calculate the binding energy, film thickness, and the density of the adsorbed film at saturation.

Ion beam analysis and superconductivity investigation of (Cu0.5Tl0.5)-1223 added with Co0.5Zn0.5Fe2O4 nano-Ferrite

Nermine Al Sayyed (Beirut Arab University, Lebanon)

The effect of nanosized Co0.5Zn0.5Fe2O4, prepared by Co-precipitation method, on (Cu0.5Tl0.5)-1223 superconductor was studied. Therefore, superconducting samples of type (Co0.5Zn0.5Fe2O4)xCu0.5Tl0.5Ba2Ca2Cu3O10-δ, wt.%, were prepared by the conventional solid-state reaction technique. Moreover, nanosized Co0.5Zn0.5Fe2O4 was characterized using X-ray powder diffraction (XRD) and transmission electron microscope (TEM). The results revealed that a nanosized ZnFe2O4 was achieved with average grain size 7 nm. On the other hand, the superconducting samples were characterized and investigated through XRD, scanning electron microscope (SEM),particle induced X-ray emission (PIXE), non-Rutherford backscattering spectroscopy (RBS) and electrical resistivity. XRD results showed that the volume fraction of phase decreases as x rises from0.0 to 0.2 wt.%, while the SEM results showed that the grain connectivity between the grains increases with increasing x.The real elemental content of the prepared samples was determined from PIXE analysis and their values are close to those of stoichiometric values. Moreover, the oxygen content was calculated using 3MeV proton elastic backscattering by fitting non-Rutherford backscattering cross-section for O in the SIMNRA simulations [1]. A little change in O-content was found by adding nanosized Co0.5Zn0.5Fe2O4 to the (Cu0.5Tl0.5)-1223 superconducting phase. The superconducting transition temperature Tc, determined from electrical resistivity, increases up to x=0.04 wt.%, and then it decreases.

Development of a proton therapy treatment plan for small animals

Lena Mouawad (Lebanese University & University of Strasbourg, Lebanon); Ahmad Osman (Lebanese University, Lebanon); Ziad Francis (Université Saint Joseph, Lebanon); Mohamad Khalil (Lebanese University, Lebanon); Ziad El Bitar (Cnrs France, France)

Cancer figures among the main causes of death and is the biggest health scare worldwide. With the rise of cancer rates, research has also progressed in the fight against cancer allowing the rise in survival rates as well. Pre-clinical studies on small animal models of human disease are particularly valuable in cancer research. Repeated investigation in small animal test subjects is an important tool to validate treatment plans before they are applicable in human radiotherapy. Dose calculation engines are also essential in predicting therapy results and refining treatment plans. Many Monte Carlo (MC) codes have been developed to assist treatment planning. One of the most popular MC codes for medical application is the Geant4 (GEometry ANd Tracking) toolkit; a platform for the simulation of the passage of particles through matter. Presently proton beams are successfully used for cancer treatment and many proton therapy centers have been established around the world to deliver treatment to cancer patients. The objective of this work is to develop a proton therapy treatment plan for small animals. More particularly, it suggests a range modulator design that allows the covering of a tumor that has a spherical shape. The geometry and performance of this modulator is set and evaluated through simulations with Gate; a MC simulator based on Geant4. Gate code is written in C++ but has a scripting interface allowing the user to easily define a representative model of the real system and simulate the interactions of the beam with this system based on calculated probability density functions. A detailed description of the software can be found in the electronic address opengatecollaboration.org.

Study of the irreversibility line of GdBa2Cu3O7-δ added with nanosized Ferrites ZnFe2O4 and CoFe2O4

Hadi Basma (BAU, Lebanon); Salem Marhaba (Beirut Arab University, Lebanon); Mohamad Roumieh (CNRS, Lebanon); Samih Esper (American University of Beirut, Lebanon); Ramadan Awad (Beirut Arab University, Lebanon)

(CoFe2O4)xGdBa2Cu3O7-δ and(ZnFe2O4)xGdBa2Cu3O7-δ superconducting samples were synthesized by using conventional solid state reaction technique. The nanosized ferrites were prepared by chemical coprecepitation method and characterized by the means of XRD, TEM and magnetic hysteresis measurements. The nanosized contents x varied from 0 to 0.1wt% of the samples' total mass. Characterization of the prepared samples was carried out using X-ray powder diffraction(XRD) and scanning electron microscopes(SEM).The effect of the addition of(ZnFe2O4) and(CoFe2O4), which act as flux pinning centers, was investigated by measuring the ac magnetization at different applied dc magnetic fields. The real and imaginary parts of the ac magnetic susceptibility under different values of the external dc magnetic fields and different concentrations of the added nanoparticles were also discussed. It was found that addition of the nanosized(ZnFe2O4) and (CoFe2O4) for x up to 0.06% and 0.01% respectively enhanced the superconducting transition temperature Tc. The thermal dependence of the irreversibility line was investigated by the logarithmic plot of the irreversibility field Hirr versus(1 − Tirr/Tc(0)) .These plots shows a crossover at a field of 500 Oe and 1000Oe for ZnFe2O4 and CoFe2O4 , respectively. This crossover indicates that there is three to two dimensional flux creep fluctuations. Furthermore, the Hirr-T curves were well fitted according to a theoretical model proposed by Matsushita, based on the de-pinning mechanism caused by thermally activated flux creep.

Dielectric properties of (Bi,Pb)-2223 phase added with nano-ZnO

Raafat Mawasi and Ramadan Awad (Beirut Arab University, Lebanon); Mohamad Roumieh (CNRS, Lebanon); Mahmoud Korek (Beirut Arab University, Lebanon)

Superconducting samples of type Bi1.8Pb0.4Sr2Ca2Cu3O10+δ , added with nano-ZnO(0.0- 1.5 wt. %), were prepared by a solid-state reaction technique. The prepared samples were characterized using X-ray powder diffraction(XRD), scanning electron microscopy(SEM), and ion beam analysis for phase analysis and microstructure examination. The superconductivity of the prepared samples was investigated by electrical resistivity and I-V characteristic. The volume fraction, superconducting transition temperature and critical current density were improved at nano-ZnO concentration = 0.04 wt%. Furthermore, dielectric measurements at different temperatures(113 K- 298 K) and frequency ranges(102- 4x106 Hz) were carried out for examining the dielectric response of the studied samples. The dielectric constants(ε' and ε''), dissipation factor(tanΔ(and real ac conductivity(σ'ac) were investigated as a function of frequency, temperature and nano- materials content. The results showed high dielectric constants strongly dependent on frequency. The high content of nano-material enhanced ε' and reduced tan Δ of(Bi, Pb)-2223 phase, which is a desirable demand for practical applications.

Effect of Fe2O3 nano-oxide additions on the superconductivity and dielectric properties of Bi1.8Pb0.4Sr2Ca2Cu3O10+δ superconducting phase

Raafat Mawasi and Ramadan Awad (Beirut Arab University, Lebanon); Mohamad Roumieh (CNRS, Lebanon); Mahmoud Korek (Beirut Arab University, Lebanon)

A series of high-temperature superconducting samples of type Bi1.8Pb0.4Sr2Ca2Cu3O10+δ, added with nano-Fe2O3(0.0- 1.5 wt. %), was prepared by a solid-state reaction technique. The prepared samples were characterized using X-ray powder diffraction(XRD) and ion beam analysis for phase analysis and microstructure examination. The superconductivity of the prepared samples was investigated by electrical resistivity and I-V characteristic. Also, The dielectric constants(ε' and ε''), dissipation factor(tan Δ) and real ac conductivity(σ'ac) were investigated as a function of temperature(113- 293 K) and frequency(102- 4X106 Hz). The results clarified that all these dielectric parameters show a strong dispersion with temperatures at low and moderate frequency ranges. Moreover, they are strongly dependent on nano-Fe2O3 addition. Furthermore, the high content of nano-Fe2O3 addition(x = 1.0 wt. %) enhanced ε' and reduced tan ?.

Refined Adaptive Optics simulation with wide field of view for the ELT

Manal Chebbo (CRITIC-AUL & Durham- UK, Lebanon); Alastair Basden, Richard Myers, Nazim Bharmal and Tim Morris (Durham University, United Kingdom)

Refined simulation tools for wide field AO systems (such as MOAO, MCOA or LTAO) on ELTS present new challenges. Increasing the telescope diameters and the new higher-resolution applications on planned for AO systems, makes the standard codes useless due to the huge number of operations to be performed at each step of the AO loop process. This computational burden requires new approaches in the computation of the DM voltages from WFS data. The classical matrix inversion and the matrix vector multiplication have to be replaced by a cleverer iterative resolution of the Maximum A Posteriori (MAP) criterion. In this paper we present an E2E simulator code based on an iterative resolution of the linear model with high degrees of freedom (using the sparse matrix). New concepts of filtering and coupling between LGS and NGS to eectively manage modes such as tip / tilt and defocus in the entire process of tomographic reconstruction will be also investigated. The first application of this tool under the EAGLE project, a flagship instrument of the future E-ELT, which from the point of view of adaptive optics combines all of these issues, will be presented.

Characterization of Bacillus thuringiensis parasporal crystals using laser speckle technique

Rana Nassif (Université Saint Joseph, Lebanon); Christelle Abou Nader (Université Saint Joseph & Université de Bretagne Occidentale, Lebanon); Jihane Rahbany (Faculty of Science, Saint Joseph University, Lebanon); Fabrice Pellen (Université de Bretagne Occidentale, France); Dominique Salameh (Université Saint Joseph, Lebanon); Roger Lteif (Saint Joseph University, Lebanon); Guy Le Brun and Bernard Le Jeune (Université de Bretagne Occidentale, France); Mireille Kallassy Awad (Biotechnology Laboratory, UR TVA, Saint Joseph University, Lebanon); Marie Abboud (Saint Joseph University, Lebanon)

A SPECKLE pattern is an intensity pattern produced by the mutual interference of light scattered by diffusing objects. During the past years, it presented multiple applications either in biology, agriculture or even industrial sector. Here, we present an application tackling with biopesticides and aiming the characterization of proteic crystals produced by Bacillus Thuringiensis. Bacillus Thuringiensis (Bt) is a Gram-positive, soil-dwelling bacterium. During sporulation, Bt bacteria produce protein crystals composed of one or more toxins with insecticidal properties. These crystals are used as biopesticides and each has a specific spectrum of target insects. Hundreds of Bt strains have been isolated from various Lebanese soil samples. We are interested in characterizing crystals grown by these strains using the speckle technique. It will therefore lead to the development of a characterization system capable of identifying and classifying protein crystals produced by the Bt bacteria, knowing that these crystals may have bi-pyramidal forms, cubic, rectangular or even spherical. In our study, the speckle pattern is produced by the free propagation of the wave oncoming from crystals sample illuminated with a laser beam. The image is acquired and recorded using a CMOS camera using different configurations: once with a linear polarized beam and once with a circular-polarized one. Polarizer and analyzer are set with their polarization axes perpendicular to each other thus we can remove still polarized surface-reflected light and conserve strongly-depolarized light coming from the volume. Three strains of Bt, isolated from the Lebanese soil, are selected. After fermentation, crystals and spores are separated using a technique based on flotation in order to obtain large quantities of relatively pure crystals. Crystals are then embedded in an agarose matrix gel and illuminated by a laser. Speckle grain size and diffused light polarization characteristics are extracted from the acquired images in order to characterize the diffusion properties of the medium depending on the crystals nature and concentration. Results show that when crystals concentrations increase in the sample, the values of light linear polarization degree and speckle grain size decrease, and the negative values of light circular polarization degree increase. A transition from a Rayleigh scattering regime to a Mie regime is also observed. Furthermore, when the diameter of spherical crystal increases, the normalized value of light linear polarization degree and the grain size diminish drastically for a given concentration of crystals in the matrix, whereas the normalized value of light circular polarization degree increases.

Radiothérapie et Assurance de Qualité: Gafchromic film EBT3 un outil de contrôle de la dose délivré par un accélérateur linéaire

Nicolas Farah (Saint-Joseph University & Hotel-Dieu de France Hospital, Lebanon); Ziad Francis (Université Saint Joseph, Lebanon); Marie Abboud (Saint Joseph University, Lebanon)

Objectif: Etudier l'effet des irradiations sur le film Gafchromic EBT3 utilisé dans l'assurance qualité des plans de traitement en VMAT. Matériels et Méthodes: Des échantillons rectangulaires de film Gafchromic EBT3 (lot n° A01231202) de dimensions 6 cm x 5 cm. ont été irradiés par des faisceaux de photons de 6MV et d'électrons de 6MeV à l'aide de l'accélérateur linéaire de l'HDF TrueBEAM - Varian Medical Systems, avec un débit de dose de 600 MU/min. L'effet de doses, allant de 0 cGy à 500 cGy a été considéré. De plus, des atténuateurs Cerrobend de différentes épaisseurs sont utilisés et leur effet sur la dose déposée dans les films est étudié. Afin de permettre la stabilisation de la couleur du film, ce dernier est analysé vingt-quatre heures après irradiation en mode réflexion par deux scanners (HP 4850 et EPSON 10000XL). Orientés en mode paysage « Landscape », les films sont analysés par deux procédures différentes: dans un premier mode, chaque film est exposé individuellement aux scanners. Dans une deuxième approche, c'est l'ensemble des films qui est scanné d'un seul coup. Le scan est fait en prenant en considération les 3 composantes de la couleur (rouge, verte et bleue) ; aucun filtre n'est appliqué. Les images obtenues sont traitées par le logiciel Image J (version 1.46r) et la densité optique NetROD est calculée: NetROD = ⟦log⟧ _10 (I_(non irradié)/(I_irradié)). Résultats: L'analyse du film Gafchromic EBT3 en considérant la composante rouge de la couleur montre une plus grande sensibilité que l'analyse avec les 3 composantes rouge, verte et bleue. De plus, le scan des films en configurations « paysage » et « portrait » ne montre pas de différence significative. Par ailleurs, les résultats d'irradiation d'électrons et de photons montrent que la réponse de l'EBT3 est indépendante du type de particules. D'autre part, la technique en scan simple ou multiple n'a pas montré de différence significative entre les résultats. En outre, l'analyse suite aux scans par les 2 scanners Epson et HP montre la possibilité d'utiliser tout type de scanner en dépit des différences considérables obtenues. Finalement, les résultats obtenus avec différentes épaisseurs de Cerrobend permettent d'atteindre des doses plus élevées tout en évitant la saturation de la densité optique du film. Conclusion: Le film EBT3 est adapté pour être utilisé comme un outil de contrôle de la dose dans le domaine clinique pour différents types de rayonnements et différentes doses. Les analyses en mode réflexion sont fiables, et l'analyse en considérant la composante rouge montre une plus grande sensibilité. References: "Analysis of the EBT3 Gafchromic film irradiated with 6

MV photons and 6 MeV electrons using reflective mode scanners", N.Farah, Z. Francis, M. Abboud, Physica Medica, 30, 6,p. 708-712 (2014)

13:00 - 14:00

LUN 1: Déjeuner

14:00 - 15:00

SP2: Séance plénière 2

Imagerie optique des milieux diffusants : applications aux sciences de la vie
Prof. Guy Le Brun, Université de Bretagne Occidentale (France)

Room: USJ Salle Polyvalente E5
Chair: Marie Abboud (Saint Joseph University, Lebanon)

15:00 - 16:30

BIO4_Medicale: Biological, Medical, Pharmaceutical, Health Sciences IV

Room: USJ CSM Amphi B
Chairs: Faten El Hage (Holly Spirit University of Kaslik, Lebanon), Mireille Kallassy (Université Saint Joseph, Lebanon)

Analysis of interactions between genomic loci through Chromosome Conformation Capture (3C)

Belal El Kaderi (Lebanese International University, Lebanon); Scott Medler and Athar Ansari (Wayne State University, USA)

Genome architecture plays a significant role in the regulation of DNA-based cellular processes such as transcription and recombination. The successful accomplishment of these processes involves coordinated interaction of DNA elements located at a distance from each other. The 'Chromosome Conformation Capture' (3C) assay is a convenient tool for identification of physical association between spatially separated DNA elements in a cell under physiological conditions. The principle of 3C is to convert physical chromosomal interactions into specific DNA ligation products, which are then detected by PCR. The 3C protocol was originally used to identify long-range, stable chromosomal interactions in yeast. Here we describe a modified 3C procedure that can detect transient, short-range interactions of DNA elements separated by a distance of less than 700 bp. This method has been successfully used to detect dynamic interaction of transcription regulatory elements in yeast and can be used for detecting similar interactions of other genomic regions.

Screening and Chemical Identification of Antimicrobial Compounds Produced by Bacteria Isolated from Lebanese Soil Samples

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Soil is a reservoir of macroorganisms and microorganisms. Most of these latter produce antimicrobial compounds. The quick widespread of microbial resistance to commercial antibiotics neutralize their effects. This problem requires discovery of new antibiotics that have the ability to counteract this catastrophic phenomenon. The aim of this study was to find new antibiotic producing bacteria isolated from Lebanese soil samples. After recovery of soil bacteria, bacterial metabolites were extracted and assessed against resistant test organisms. Six of these extracts showed activity against either Extended Spectrum Beta Lactamase (ESBL) producing Escherichia coli or Acinetobacter baumannii. The gas

chromatography/mass spectrometry (GC/MS) allowed the identification of potential antimicrobial agents that exerted the antibacterial activity. The identified compounds might be used as potential antibiotics.

Biological Activities of Intact and Degraded Glucosinolates on Salmonella spp. and HaCaT Cells

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Glucosinolates, naturally existing organic compounds, are nitrogen and sulfur containing secondary metabolites found mainly in the Brassicaceae family and are responsible for the pungent taste of most cruciferous plants, such as broccoli, horseradish and cabbage. Up to 120 glucosinolates have been identified, having the same core structure but different side chains, making them aromatic, indolic, or aliphatic. Glucosinolates' biological activity largely depends on the structure of these side chains, which determine the nature of hydrolysis products. The hydrolysis of glucosinolates is catalyzed by an endogenous thioglucosidase enzyme, commonly referred to as myrosinase. Myrosinase is physically separated from glucosinolates. The enzyme and its substrates are normally either located in different cells or in different compartments within the same cell. Upon tissue damage, myrosinase comes in contact with glucosinolates and hydrolyses them into a number of bioactive compounds, including isothiocyanates, thiocyanates, and nitriles. These compounds are known to exhibit biocidal activity against different micro-organisms, as well as anti-carcinogenic effects. Previous studies have shown that glucosinolates breakdown products exhibit significant antimicrobial activity against food-borne pathogens, including bacteria. Salmonella is known to be a classical cause of food-borne infections worldwide. In this study, glucosinolates extracted from broccoli, radish and turnip, along with their hydrolysis products were tested for their biological activity against 15 strains of Salmonella collected from different Lebanese patients. In addition, the effect of these compounds was tested on the eukaryotic HaCaT cells, an immortalized, non-tumorigenic, human epidermal keratinocyte-derived cell line. Samples of purified glucosinolates from all three plants were subjected to HPLC in order to detect and quantify intact glucosinolates, and to detect hydrolysis products after degradation with myrosinase. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of degraded glucosinolates from broccoli ranged between 4.7 mg/ml and 9.3 mg/ml. These were between 12 mg/ml and 25 mg/ml for radish.,No inhibition was detected with turnip at the concentrations used in this study. In contrast, intact glucosinolates from both broccoli and radish produced higher MIC and MBC results, and that of turnip ranged from 21 mg/ml to 42 mg/ml on all Salmonella strains. On the other hand, the effect of these compounds has shown different viability percentages at different concentrations when tested on the HaCaT cells. Intact glucosinolates from Broccoli showed 88.6% cell viability at 1 mg/ml, 14.6% cell viability at 10 mg/ml and only 1% cell viability at 20 mg/ml. Likewise, intact glucosinolates from turnip showed the same cell viability percentage at 1 mg/ml but an almost 100% cell viability at both 10 mg/ml and 20 mg/ml. The effects of the other intact and degraded glucosinolates are still being tested. Among different Brassicaceae species, glucosinolate types vary from one plant to another, yielding different profiles of biological activities. Glucoraphanin, is a glucosinolate found in both broccoli and radish, but is absent in turnip. Degradation of glucoraphanin yields the potent isothiocyanate, sulforaphane. The latter is known for its strong antineoplastic activity. Accordingly, sulphoraphane might also account for the antimicrobial effect of degraded glucosinolates from both radish and broccoli. This, of course, requires further investigation. At low concentrations, intact glucosinolates might have no effect on eukaryotic HaCaT cells. However, at higher concentrations, the effect is quite significant. Intact glucosinolates are normally harmless. The observed biological activity might be due to the presence of myrosinase-like enzymes in eukaryotic cells which hydrolyze the intact glucosinolates into bioactive products. Future studies include the effects of degraded glucosinolates on HaCaT cell line, as well as the study of both intact and degraded glucosinolates on the viability of the cancerous cell line, II-4.

Protective Effects of Surfactant Protein D (SP-D) Treatment in 1,3-β-glucan-modulated Allergic Inflammation

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SP-D is a pulmonary collectin involved in innate immunity. SP-D-deficient mice (Sftpd-/-) are more susceptible to allergen-induced pulmonary hypersensitivity and exogenous SP-D has both therapeutic and prophylactic effects in pulmonary disease models. Fungal β-glucan modulates allergic inflammation, and SP-D is recognized as a down-regulator of β-glucan mediated effects. In this study, we aimed to investigate the effects of SP-D on pulmonary inflammation modulated by 1,3-β-glucan using a mouse model of allergic asthma. Allergic inflammation was induced by OVA sensitization and challenge with and without 1,3-β-glucan co-challenge and intranasal treatment with a recombinant fragment of human SP-D (rfhSP-D) in Sftpd-/- and Sftpd+/+ mice. The bronchoalveolar lavage cellular profile, lung histology,

mucus production and secretion, serum IgEs levels, and endogenous murine SP-D levels in BAL were examined. Combined OVA+1,3-β-glucan challenge induced neutrophil and macrophage infiltration. rfhSP-D treatment reduced OVA+1,3- β-glucan-induced total cell infiltration and macrophage infiltration in bronchoalveolar lavage (BAL) to OVA-induced levels. Neutrophil numbers were partly reduced. rfhSP-D treatment further reduced BAL eosinophil numbers comparable to control levels. Mucous cell metaplasia was significantly increased due to SP-D deficiency after OVA challenge. 1,3-β-glucan reduced the OVA-induced mucous cell metaplasia and rfhSP-D treatment further reduced the metaplasia to background levels. There were no significant effect of endogenous SP-D or rfhSP-D treatment on either total IgE or specific IgE levels. However, rfhSP-D dampened the levels of endogenous murine SP-D in BAL fluid. Our data are supporting a limited role of endogenous SP-D levels in OVA-induced allergy, demonstrating both pro- and anti-inflammatory effects of insoluble 1,3-β-glucan in allergic inflammatory signaling, and showing significant protective effects of supraphysiological SP- D levels in reducing both 1,3-β-glucan-induced cellular infiltration and allergic inflammation.

Neutralization of TNF-α reduces the hyperalgesic response in Leishmania major-infected mice and down regulates pro-inflammatory cytokines

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Cutaneous Leishmaniasis is a disease caused by flagellated promastigotes called Leishmania major parasites. The infection of the susceptible BALB/c mice with a high dose of this intracellular parasitic protozoan induces a sustained hyperalgesic response accompanied by the up- regulation of the pro-inflammatory cytokines Interleukin-1β (IL-1β) and Interleukin - 6 (IL-6). On the other hand, Interleukin-13 (IL-13) was shown to reduce this hyperalgesia during the period of treatment when the levels of IL-6 were increased and to reduce the levels of IL-1β during and after the treatment period. Those results favor the cytokine cascade leading to the production of sympathetic amines through TNF-α and KC and not to prostaglandins involving IL-1β and IL-6 as the final mediators of hyperalgesia. However, it is not yet known whether the L. major induced hyperalgesia is due to a direct nociceptive effect of TNF-α or it is mainly mediated by the sympathetic amines. In this study, we investigated the effect of Infleximab (anti TNF-α antibody) on L. major-induced inflammation in mice with respect to hyperalgesia as well as the levels of many inflammation related cytokines. L. major susceptible BALB/c mice were injected with high dose of the parasite in the presence of Infleximab. Both Hot plate and Tail Flick experiments showed that Infleximab is capable of reducing the L. major induced hyperalgesia in a dose dependent manner increasing the threshold of pain to a level comparable to that of naïve mice. The effect of this anti TNF-α antibody on the level of cytokines was assessed using ELISA kits. Preliminary results showed that TNF-α neutralization up-regulated "anti-inflammatory cytokines" as IL-10 and down-regulated "pro-inflammatory cytokines" as TNF- α, IFN-γ and IL-17 as compared to non-treated mice. In addition to the assessment of other related cytokines, the course and outcome of the infection will be assessed as to the parasite burden and lesion size.

Multi-Copper Ferroxidases (MCF) Expression Characterization in Murine and Human Monocytes and Derived Macrophages

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Introduction: Iron is an essential element in most forms of life. It is an absolute requirement to eukaryotic life and it is used by most bacterial species and plants, in addition to animals. In fact, iron is a component of many functional proteins that contain heme, especially oxygen-carrying proteins such as hemoglobin of red blood cells that transport oxygen from the lungs to the tissues as well as myoglobin that stores and transports oxygen in muscles. Iron is also a component of enzymes involved in the ferroxidatixe phosphorylation reactions that produce energy. Maintenance of iron homeostasis throughout human life is essential for proper growth, development, and overall health. Generally, iron is absorbed in the small intestine and then delivered to target tissues by the plasma iron transport protein transferrin (Tf). Transferrin-iron complexes bind to transferrin receptor (TfR) on the cell membrane and undergo internalization by receptor-mediated endocytosis. Iron is then used for cellular metabolism, and excess iron is stored in the storage protein ferritin. Intracellular levels of transferrin and ferritin are controlled by the iron regulatory proteins IRP-1 and IRP-2, which regulate expression of several proteins by binding to iron-responsive elements (IREs) on their mRNA. Ion export from cells is facilitated by Multi-Copper Ferroxidases (MCF) and the subsequent iron loading onto transferrin (Tf). It is suggested that the oxidation of Fe2+ to Fe3+ by the MCF facilitates iron binding to the transporter protein, apo-transferrin, thus creating a negative free-iron gradient that stimulates iron efflux from the cell. On the other hand, the link between iron metabolism and cell-mediated immunity is crucial. Regulation of iron release and uptake by macrophages is essential for their mediated toxicity. It was suggested to play a role in the host defense mechanisms against pathogens. In fact, the ability of iron to generate reactive oxygen species (ROS) inside the cell could be an advantage to the macrophage, which can use these species against pathogens. In addition, certain intracellular pathogens that infect macrophages need iron as a nutrient for growth, and as a result, the release of iron from these cells may limit their growth. On the other hand, besides their important role in immunity, macrophages are crucial mediators of iron homeostasis through phagocytosis of senescent red blood cells, which is a central iron source for erythropoiesis. Nevertheless, polarized macrophages differ greatly in the expression of immune-regulatory genes and

profoundly influence immune responses and tissue homeostasis. Macrophage activation results in different immunological phenotypes with different metabolic properties and, in specific, varied iron metabolic profiles. Monocytes mature into non-polarized M0 macrophages that have been documented to polarize into two populations. M1 macrophages are pro-inflammatory macrophages characterized by high levels of pro-inflammatory cytokines (interleukin-12, interleukin-23, tumor necrosis factor), and induced by the Th1 cytokine interpheron-γ (IFN-γ). They are implicated in host defense against invading pathogens as well as in anti-tumor immunity. M2 or activated/anti-inflammatory macrophages, whose polarization is stimulated mainly by Th2 cytokine interleukins 4/13 (IL-4/IL-13), participate in wound healing and tissue repair in addition to immuno-regulatory functions. M1 and M2 macrophages differ significantly in the expression of immunoregulatory genes which influence immune responses and tissue homeostasis. To date, out of (MCF) members Ceruloplasmin (Cp), Hephastin (Heph) and Zyklopen (Zp), which mediate iron release, Cp is the only MCF member whose role was investigated in macrophages. Cp was shown to be secreted by activated U937-derived macrophages. Furthermore, the ferroxidase activity of Cp stimulates iron release from U937-derived macrophages under hypoxic conditions. In a previous study by Sobh et al., THP-1 monocytes were used as a model to study MCF expression in monocytes and macrophages. THP-1 cells were differentiated into M0, M1 or M2 macrophages. Expression of the MCF in THP-1 monocytes and derived macrophages was investigated by reverse transcription-PCR (RT-PCR). Cp and Heph transcripts were not detected in THP-1 monocytes and all the derived macrophage populations. Zp expression was absent in THP-1 monocytes but Zp transcripts were detected in THP-1 derived M0, M1 and M2 macrophages. Protocol: In the current study, the expression of MCF was investigated in murine monocytes and derived macrophages as well as in human peripheral blood monocytes (PBMC) and derived macrophages M0, M1 and M2 in order to identify the MCF expressed in these cells. In the murine model, C57BL6/J wild type mice were obtained from the animal facility, University of California, Berkeley at 6-8 week of age fed on normal diet. Mice were euthanized by cervical dislocation after which tissues were collected for subsequent RNA and protein study. Mouse monocytes were negatively isolated by negative magnetic selection. In the human study, whole blood was collected and pooled. Isolation of peripheral blood mononuclear cells (PBMCs) was carried out using Ficoll-Paque™ protocol followed by monocytes negative selection. Using the Magnetic-activated cell sorting technique (MACS), monocytes remain completely unlabeled which preserves their physical properties and which is appropriate for downstream applications of cell culture and functional studies. In order to generate human and mouse macrophages, monocytes were cultured in special medium. RNA extraction, Reverse Transcription and PCR was performed in order to identify MCF expression. Immunoblotting was performed to confirm RT-PCR results. Results: RT-PCR showed the expression of only Cp in murine macrophages. In human cells, RT-PCR immunoblotting using MCF-specific antisera revealed the expression of Cp in human M1 macrophages only. Aim: The present study is directed to elucidate the expression profiles of MCF in monocytes and derived macrophage. RNA sequencing (next generation sequencing) was used in a previous study to compare transcriptomic profiles of THP-1 monocytes and the derived macrophage populations. Using this approach, differential expression of nearly all genes can be studied among the different cell types. Future Directions: We aim to compare transcriptomic profiles of human peripheral blood monocytes and derived macrophage populations which will enable detailed comparison of the expression of genes involved in iron metabolism between monocytes, M0, M1 and M2 macrophages. By performing cluster analysis, we can understand differences in absorption, storage and release of iron between monocytes and macrophages as well as between the different macrophage populations.

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Chairs: Wissam Faour (Lebanese American University, Lebanon), Andre Megarbane (Saint Joseph University, Lebanon)

Pathological effects and motor response threshold changes following radiofrequency application of L-5 nerve root: Experimental rat study and potential clinical application

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Aim of investigation: Radiofrequency (RF) ablation is a minimally invasive technique often used percutaneously in the treatment of many conditions with many applications in neurosurgery like spasticity, pain, and osteoid osteoma. The aim of this experimental study was to assess the value of motor response threshold (MRT) as an indirect indicator of the distance between the RF generator's electrode and nerve, and to evaluate the effects of RF at various distances from a nervous structure. Material and Methods: The L-5 nerve root was studied in 102 Sprague-Dawley rats (sham contralateral side). Motor response thresholds at variable distance from the nerve root (0, 2, 4, 5, and 6 mm) were assessed before and after RF application for 2 minutes at 80°C on Days 0 and 7. Radiofrequency was applied 0, 2, 4, 5, and 6 mm away from L-5 and with the addition of interposed cortical bone. The effects of RF application

on MRT were studied, and subsequent nerve injury was evaluated using light microscopy pathological examination. Results: There is a significant correlation between MRT and the distance between the electrode tip and L-5, with a MRT less than 0.5 V indicating that the electrode was in direct contact with the root. Electrical and pathological changes following RF application were more pronounced at 0 mm, with worsening seen on Day 7. Radiofrequency at 2 and 4 mm produced fewer electrical and histological deleterious effects on the nerve on Days 0 and 7, with an obvious improvement on Day 7. At 5 mm, electrical and histological abnormalities were minimal on Day 0 and were fully reversible on Day 7. Finally, at 6 mm and with interposed cortical bone, MRT and pathological findings were unchanged on Days 0 and 7. Conclusions: The MRT proved to be a useful and reliable tool in decreasing nerve morbidity following RF ablation in animals and may be used in humans for the same purpose. It serves as an indirect indicator of the proximity of the RF generator's electrode tip to any adjacent motor nervous structure. A minimum safe distance of 5 mm between the electrode tip and the nerve is required to avoid irreversible nerve injury, unless a bony wall is interposed between them, thus serving as a nerve shield. In medical conditions that require RF ablation of the nerve, such as spasticity and pain, the MRT must be lower than 0.5 V. On the contrary, when a nerve lesion is to be avoided such as in cases of osteoid osteoma near a nerve, an MRT higher than 2.5 V is considered safe, reflecting a distance greater than 5 mm between the electrode and the nerve root.

Reduced high fat appetite after gastric bypass surgery is due to dorsal striatal dopamine signalling

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Background: Unlike other treatment modalities for obesity, gastric bypass surgical procedures cause pronounced weight loss in the morbidly obese that is sustained in the long term. This dramatic outcome is believed to be independent of restrictive and mal-absorptive processes and has instead been attributed to reduced hunger, increased satiety, changed eating habits, and increased energy expenditure. Models of gastric bypass procedures have been developed in rodents in order to gain more insight into the mechanisms behind maintained bodyweight reduction. In a rat model of Roux-en-Y gastric bypass surgery (RYGB), the most commonly employed and successful variant of gastric bypass surgery, reduced preference for foods high in fat has been observed mirroring the situation with human patients. The brain dopamine system has been heavily implicated in the rewarding aspects of feeding particularly of foods high in fat and has been reported to be dysregulated in obesity. Previous studies have demonstrated alterations in brain dopamine signalling after RYGB surgery in preclinical models and in patients but a causal role for this system in changes in feeding is lacking. Methods: Male Wistar rats weighing 250-300g were placed on a high fat diet for 5 weeks until attaining diet induced obesity (500g). Animals were then randomized into 2 surgical groups: RYGB (n=8) and sham operated bodyweight matched (BWM) controls (n=8). After abdominal surgeries, animals were placed on a regular laboratory chow diet and left to recover for one month before brain cannulations when animals were implanted bilaterally with guide cannulas (CMA Microdialysis) in the dorsolateral striatum (from bregma in mm: A 0.5, L 3.0, V 4.0) under Ketamine/Xylazine induced anaesthesia. Following another one month recovery period, animals were then subjected to fat intake tests with increasing concentrations of IntraLipid fat emulsions. The standard 20% IntraLipid solution (Sigma) was freshly diluted daily with deionized water to provide low (1%), and high concentrations (5%). Rats ad libitum fed on standard laboratory chow were then treated in the early light phase with bilateral dorsal striatal microinfusions of either the mixed D1/D2 receptor antagonist flupenthixol (Sigma) at a concentration of 15µg/500nl or 500nl aCSF (Sigma) using microdialysis probes with a 4 mm membrane length and 0.24 mm outer diameter (CMA) at a rate of 1 µl/min using an infusion pump (Harvard Apparatus). Implementing a crossover study design, animals were then presented with two pre-weighed bottles; one containing 100ml deionized water and the other containing 100ml 1% IntraLipid solution on the low fat concentration experimental session, and 100ml 5% IntraLipid on the high fat concentration experimental session performed after a one week recovery period. Readings were taken over the course of 17h after starting the oral intake test with an automated system (TSE systems). Results: Both groups had similar bodyweights before the fat intake tests (427.7 +/- 20.4g for RYGB and 477.6 +/- 20.5g for sham BWM; p=0.64). Both groups treated with aCSF consumed similar amounts of low concentration fat emulsion (13.48 +/- 2.54g for RYGB and 10.49 +/- 1.72g for sham BWM; p=0.47). Flupenthixol treatment significantly decreased consumption of low concentration fat emulsion for both groups (5.60 +/- 0.94g for RYGB and 3.10 +/- 1.34g for sham BWM; p=0.015 and p=0.016 respectively). The RYGB group treated with aCSF consumed significantly less high concentration fat emulsion than the sham BWM group treated with aCSF (42.90 +/- 4.47g for RYGB and 86.83 +/- 10.73g for sham BWM; p=0.0008). Flupenthixol treatment significantly increased consumption of high concentration fat emulsion for the RYGB group but not for the sham BWM group (73.66 +/- 5.56g for RYGB and 91.56 12.26 +/- g for sham BWM; p=0.0013 and p=0.74 respectively). Conclusions: These results confirm that dorsal striatal dopamine signaling increases the reward value of low fat food. They further suggest that RYGB surgery engages dorsal striatal dopamine signalling to selectively reduce the reward value of high fat food thereby leading to long term bodyweight loss.

Regulation of the conversion of white to brown adipocytes by arachidonic acid metabolic pathway

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Introduction: The recent discovery of functional brown adipocytes in adult humans has led to the consideration of their use to increase energy expenditure in the treatment of obesity and associated metabolic disorders. We aimed to study the effect of an excess of poly-unsaturated fatty acids ω6 on brown adipocytes formation. Methods: Our team developed a unique cell model for studying human

brown adipocyte formation, the hMADS cells (human-Multipotent Adipose-Derived-Stem). We studied the effect of arachidonic acid (ARA) or its metabolites, prostaglandins (PGs) of series 2 treatments of hMADS cells, on the differentiation process. Results: Our data show that arachidonic acid strongly inhibited brite adipocyte formation via a cyclooxygenase pathway leading to secretion of PGE2 and PGF2α. Both prostaglandins induced an oscillatory Ca++ signaling coupled to ERK pathway and triggered a decrease in UCP1 gene expression and in oxygen consumption without altering mitochondriogenesis. Recruitment of brite adipocytes of subcutaneous white adipose tissue of mice fed a standard diet enriched with ω6 arachidonic acid decreased. This effect was associated with a significant increase in the synthesis of PGF2α and PGE2. Conclusion: our data demonstrate the specific nutrient regulation of the browning process in white adipose tissue by ω6 ARA in addition to its role in stimulating the formation of white adipocytes and thus favoring development of overweight and obesity.

Analyse microbiologique de la viande bovine et de volaille au Liban et recherche des bactéries résistantes aux antibiotiques

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Introduction et rationnel de l'étude Les intoxications alimentaires causées par des micro-organismes est un véritable problème de santé publique et porte des enjeux tant sur la sécurité sanitaire des aliments que sur la sécurité sanitaire de l'homme. Au Liban, les mesures entreprises par l'état dans le contrôle alimentaire, l'inspection et la détermination des normes régulant les industries alimentaires et agro-alimentaires semblent être insuffisantes d'après les derniers rapports du Ministère de Santé publique. Ceci se traduit par un risque accru sur la santé du consommateur Libanais. De plus, les bactéries multi-résistantes (BMR), telles que entérobactéries porteuses de β lactamases à spectre étendu (βLSE), les souches de staphylocoque doré résistants à la méthicilline (SARM) ainsi que les entérocoques résistants à la vancomycine (ERV), posent un véritable défi pour les systèmes de soins.. Ainsi, au cours des dernières années, ces bactéries multi-résistantes ont été de plus en plus détectées en dehors du milieu hospitalier. Objectifs Les objectifs de cette étude ont été d'évaluer les risques inhérents à la consommation de viande (bovine et de volailles) par l'identification des bactéries retrouvées ainsi que la détermination de leurs profils de résistance. Nous avons particulièrement recherché la présence des Entérocoques résistants à la Vancomycine (ERV) induits par l'utilisation de l'avoparcine chez les animaux comme promoteur de croissance ainsi que les entérobactéries porteuses de multirésistance. Matériels et méthodes Il s'agit d'une étude d'analyse microbiologique réalisée à deux intervalles de temps différents auprès de 60 boucheries réparties dans tous les secteurs du Grand Beyrouth: un premier échantillonnage a été réalisé en 2005 et un deuxième en 2013, le but étant d'évaluer la qualité de la viande à Beyrouth à 7 ans d'intervalle. De plus, en 2005, l'analyse a été pratiquée à deux reprises pour évaluer l'influence des variations saisonnières. Au total, 120 échantillons de viande bovine ont été analysés en 2005 contre 50 en 2013 et 50 échantillons de viande de volaille ont été testés en 2013. Brièvement, 100 g de viande crue ont été prélevés et transportés dans des conditions standardisées et conservés à une température comprise entre 0 et + 2 ºC dans un récipient isotherme contenant de la glace. Des milieux de culture sélectifs et non-sélectifs ont été utilisés dans la recherche des germes (gélose au désoxycholate pour les coliformes, milieu Baird-Parker pour Staphylococcus aureus, milieu S.P.S pour les anaérobies sulfitoréduteurs, gélose bile-esculine pour les entérocoques, milieu Hektoen pour les Salmonelles et les Shigelles). Le système API 20E (Biomérieux, Marcy l'Etoile, France) a été utilisé pour l'identification des coliformes retrouvés dans la viande bovine. L'interprétation des résultats a été faite selon Le journal Officiel français du 19 janvier 1980 qui fixe, au moins pour les denrées d'origine animale, les critères d'acceptabilité, tenant compte des incertitudes des méthodes utilisées. Les échantillons sont ainsi classés en quatre catégories: satisfaisant, acceptable, non satisfaisant et corrompu. La sensibilité des bactéries BMR a été réalisée par la technique de diffusion des disques selon les recommandations de la société française de microbiologie CA-SFM. Résultats et discussion En 2005, parmi les échantillons récupérés au cours de la première collecte (n=60), 10 échantillons étaient corrompus (16,7%), 3 non satisfaisants (5%), 3 acceptables (5%) et 44 satisfaisants (73,4%). Lors de la seconde série de collecte (n=60), 8 échantillons étaient corrompus (13,4%), 5 non satisfaisants (8%), 3 acceptables (5%) et 44 satisfaisants (73,4%). Aucune souche de Salmonelle, de Shigelles ou de Staphylococcus aureus n'ont été identifiées. Par contre, 19 souches d'ERV ont été retrouvées (huit souches lors de la première collecte et onze souches lors de la deuxième collecte). La plupart des souches d'ERV étaient sensibles à l'amoxicilline, et à moindre degré au chloramphénicol, minocycline et à la clindamycine. 94,75 % avaient un bas niveau de résistance aux aminosides, 84% étaient résistantes au sulfométhoxazole-triméthoprime et 26% étaient résistantes à la rifampicine. De plus, 88 souches d'entérobactéries ont été isolées appartenant aux genres Enterobacter, Citrobacter et Klebsiella et toutes les souches isolées étaient sensibles à la Pipéracilline et au Pipéracilline-Tazobactam. La plupart des souches étudiées étaient résistantes à l'ampicilline, à la céfalotine, à la tétracycline et à la nitrofurantoïne. Parmi les 88 souches identifiées, cinq souches étaient résistants à plusieurs antibiotiques (plus que six antibiotiques) dont les fluoroquinolones. En 2013, sur le total des 60 échantillons de viande bovine testés, 27 étaient non satisfaisants (54%) et 8 échantillons (16%) étaient corrompus. Parmi les 60 échantillons de viande de volaille testés, 28 (56%) étaient non satisfaisants et 8 autres étaient corrompus (12%). Un échantillon de volaille était positif pour l'ERV (1/60). Récemment, Une étude est en cours portant sur la détection des BLSE dans la viande de boeuf, veau, mouton et de volaille où un échantillonnage était fait au hasard de Tripoli, Akkar, Sud, Beirut et banlieues. Les résultats préliminaires des 50 premiers échantillons montrent que ¾ des échantillons sont porteurs de bactéries multi-résistantes (BMR, BLSE et AmpC) des genres Pseudomonas, Acinetobacter baumannii, Esherichia et Chryseomonas. Conclusions Cette étude révèle un véritable problème d'ordre sanitaire au Liban et les résultats sont en faveur d'une mauvaise conservation de la viande à Beyrouth surtout dans la banlieue de Beyrouth et les quartiers populaires. Plusieurs hypothèses peuvent expliquer cet état des lieux alarmant et découlent

toutes d'une utilisation inappropriée des antibiotiques chez l'animal et chez l'homme. Ainsi, la présence d'ERV et d'entérobactéries BMR peut être le résultat de l'utilisation d'antibiotiques comme promoteurs de croissance en élevage (effet zootechnique) mais aussi de l'utilisation non contrôlée des antibiotiques en clinique humaine à cause de la vente des antibiotiques sans prescription médicale. Enfin, cette étude a montré que la viande bovine et de volaille constitue une source potentielle de BMR pouvant coloniser la population Libanaise. L'étude se poursuit actuellement par une analyse microbiologique d'autres types de viande.

Effect of Using Closed versus Open Suction System on Mechanically Ventilated Patients

Alaa Murrah (Beirut Arab University, Lebanon)

Tracheal suctioning is an essential and frequently performed procedure for patients requiring mechanical ventilation. There are two methods of tracheal suctioning: open or closed suctioning systems. So far, the evidence to prefer one method over the other is still not be confirmed. This study was conducted to determine the effect of using Closed System Suction (CSS) versus Open System Suction (OSS) on a number of physiological parameters and collected secretions. A comparative study, following single case repeated measure design, was carried out at the Adult Intensive Care Unit (AICU), Rafik Hariri University Hospital (RHUH), Beirut, Lebanon. It included a sample of 30 adult mechanically ventilated patients of both sexes who were ventilated for more than 24 hours. Studied sample was assigned randomly into two groups; group (I) included 15 patients and received OSS prior to CSS. Group (II) included 15 patients and received CSS prior to OSS. One tool of 3 parts was developed and used to collect the required data. It involved two parts: part "1" contained patient's health bio-medical characteristics such as: age, sex, diagnosis, medical history, taken medications….etc. Part "2" involved a patient clinical assessment sheet used for documenting changes in physiological parameters, immediately before, immediately after and 10 minutes after suctioning. Part III was used to document the characteristics of aspirated secretions such as their weight, color and consistency. Study results indicated no significant difference between the effects of two methods on peripheral oxygen saturation (SpO2). On the other hand, the changes in pulse, respiratory rates and rhythm appeared to be significantly less in CSS than OSS. Moreover, a significant difference was found concerning the effect of both systems on systolic blood pressure, in which CSS caused significantly less changes. On the other side, the effect of both systems on diastolic and mean arterial pressures significantly differed between the readings collected immediately and 10 minutes after suctioning. CSS caused significantly less changes immediately after suctioning in diastolic blood pressure and mean arterial pressure than OSS, while no significant changes appeared between the two methods at 10 minutes after. An obvious study finding was that CSS aspirated smaller amount of secretions than OSS in patients with mucopurulent and blood tinged secretions. Thus results showed that CSS caused less physiologic changes than OSS, yet removed smaller amount of mucopurulent and blood tinged secretions.

Déterminants de l'état nutritionnel des personnes âgées dans le Grand Beyrouth

Rosy Mitri (Saint Joseph University, Lebanon); Salim Adib (Co-author, Lebanon); Christa Boulos (St Josephs University, Lebanon)

Problématique et objectifs La population libanaise vit une transition démographique dont la conséquence est un allongement de l'espérance de vie et du pourcentage des sujets âgés. Le statut nutritionnel de ces personnes est une composante cruciale de leur santé et de leur bien-être. Nous proposons de décrire le statut nutritionnel de la population urbaine âgée de 65 ans et plus, et d'identifier d'éventuels facteurs de risque de la malnutrition. Méthodes Il s'agit d'une étude transversale, sur un échantillon de sujets âgés de ≥65 ans, dans le Grand Beyrouth. Un total de 905 personnes âgées ont été interrogées à domicile par des enquêteurs qui ont reçu une formation préalable: 548 (60.5%) en ville et 357 (39.5%) en banlieue. L'échantillonnage a été réalisé sur la base d'un processus de « multistage random cluster sampling » avec 3 étages de sélection. L'enquête a été menée avec un questionnaire constitué essentiellement d'échelles standards utilisées mondialement et validées en milieu gériatrique. Le questionnaire mesurait les variables suivantes: les caractéristiques sociodémographiques, la santé, le comportement alimentaire, et l'autonomie. Le statut nutritionnel a été exploré grâce au Mini-Nutritional Assessment (MNA). Résultats L'échantillon comprenait prés de 533 d'hommes (59%) et 372 de femmes (41.1%), dont l'âge moyen était de 72 ans (ET=6.6) avec au moins 5% âgés de 85 ans ou plus. L'IMC moyen des participants était de 27.28 kg/m2 (ET=5.05) avec 40.8 % présentant un surpoids (25-29.99 kg/m2) et 26.1% une obésité (IMC ≥ 30). Basé sur le MNA, 2.8% des participants étaient malnutris, 45.5 % à risque de malnutrition et 51.7 % avaient un état nutritionnel normal. Parmi les personnes âgées en surpoids ou obèses 40.7% et 39 % souffraient d'un mauvais état nutritionnel respectivement ($p<0.001$). Les femmes étaient plus malnutries ou à risque de malnutrition que les hommes ($p<0.001$). De même la malnutrition était plus fréquente avec un âge avancé mais la différence en terme de moyenne d'âge restait limite ($p=0.062$) entre les personnes en mauvais état nutritionnel (72.4 ans) et celles en bon état (71.6 ans). Un niveau d'éducation élevé, un revenu suffisant ainsi qu'une aide médicamenteuse procurée par une association/ONG étaient significativement associés à la malnutrition. En effectuant une analyse multivariée, les variables sociodémographiques ne faisaient plus d'effets. Par contre, les variables qui continuaient significativement associées à un plus grand risque de dénutrition étaient: une plus grande perception d'un mauvais état de santé (OR=1.29 ; [1.00-1.67]), un plus grand nombre de maladies chroniques (OR= 1.11 ; [1.01-1.23]), une mauvaise perception de la santé bucco-dentaire selon le GOHAI (OR= 1.03 ; [1.01-1.05]), un sentiment de bien-être suggérant un état dépressif (indice OMS) (OR= 1.58 ; [1.11-2.27]), un IMC plus bas (OR= 1.10 [1.06-1.13]), une autonomie réduite dans les activités de la vie quotidienne (échelle KATZ) (OR= 2.49 [1.13-5.48]). Discussion/conclusions Les résultats ont montré une prévalence de risque de malnutrition inacceptable, et qui devait amener les

autorités de santé publique libanaises à envisager des décisions législatives et correctives pour protéger les libanais âgés. Les médecins qui traitent des patients souffrant de multiples morbidités doivent se rendre compte que la poly-pharmacie à cet âge augmente les risques d'anorexie. La polymédication est aussi un facteur de dépression chez les sujets âgés, et cette analyse a montré que la dépression est associée à une plus grande malnutrition. La santé orale des sujets âgés, elle aussi associée à un plus grand risque de malnutrition pourrait s'améliorer grâce à un dispositif de provision de dentiers chez les sujets incapables d'en faire les frais. Dans la population gériatrique comme d'ailleurs dans la population pédiatrique, l'importance d'initier un programme de santé et de protection dentaire commence à se faire sentir.

ENG4_ENERGIE: Engineering IV

Room: USJ CSH 206

Chairs: Mohamad Khalil (Lebanese University & Doctoral School of Sciences and Technology, Lebanon), Abed Ellatif Samhat (Lebanese University, Lebanon)

Power generation management of the Lebanese electric sector due to renewable energy integration

Joseph Al Asmar (Université de Technologie de Belfort-Montbéliard, France); Raed Kouta (UTBM, France)

The action plan number 5 of the Lebanese energy policy highlights the integration of renewable energy into the grid. To optimize the multi-source cogeneration (renewable energy, cogeneration systems and conventional generation), we will develop a power management algorithm.

Conception of an autonomous residential photovoltaic system in Lebanon

Antonella Bou Gharios (USEK, Lebanon)

For thousands of years, the sun has always been viewed as an inexhaustible form of energy. In the past, Man was aware that the sun provides warmth additionally to light. Nowadays, man took more benefits from the sun; it became viewed as a major alternative source of power. In recent years, due to both the governments' and associations' awareness and support to renewable energy, in addition to cost reduction caused by continuous technological improvements, solar energy has experienced noticeable growth. The first step of this study analyzes the technical, financial and feasible aspects of an autonomous photovoltaic system in Lebanon. In fact, the cost of consumed electricity from EDL is high due to the importation of fuels. However, Lebanon still have blackout hours which make the Lebanese subscribe to private generators which cost even much higher than the EDL tariff's.

Towards clean power production using wave energy

Charbel Bou-Mosleh (Notre Dame University, Lebanon); Pierre Rahme (Lebanese University, Lebanon); Jean Matar and Joseph Youssef (Notre Dame University-Louaize, Lebanon)

There exists nowadays an ever-increasing demand for clean and renewable energy, due to the high level of pollution conventional energy production plants produce. In this work, the potential of harvesting wave energy to produce electrical power on the Lebanese shore is investigated. As such, a conceptual wave-harvesting device will be detailed. It consists of a float-rack-pinion system that transmits the vertical heaving motion of waves and converts it into a rotating motion that is the used to produce electricity through an alternator. A prototype was built and successfully tested near shore to light up a 3-W lamp. The results of the test will be summarized. The efficiency of the system was relatively low. As a result, a new and improved version of the device is currently under design and construction. This latter device will also be presented in this paper.

Greening Thermal Power Plants in Lebanon

Anthony Kattaa, Hanna Trad and Ali H Assi (Lebanese International University, Lebanon); Hayssam EL Hajj (LIU, Lebanon)

The global trend towards more environment friendly technologies dictates that countries implement new policies and initiatives for cleaner energy production. The present idea is a modest contribution in this direction to alleviate the severe electricity problem striking Lebanon and to deliver our share in reducing the global warming effect threating the whole world. The objective of this paper is to propose a way to improve the power output of polluting thermal power plants in Lebanon by integrating some renewables in the unexploited space of the plants and their surrounding related areas. The energy produced by the additional renewables will be connected directly to the national grid in order to avoid the heavy cost of storage systems (i.e. batteries). This will eliminate the two major factors that make the price of PV energy very high compared to other types of energy. Studies will be made for all existing thermal plants in Lebanon, way of integrating renewables will be investigated. For instance, the right types of renewables, the available space for implementation, and the power capacity that can be added in each plant. The idea of supporting existing thermal power plants in Lebanon with some renewables was first introduced by Dr. Ali Assi through a communication with the CNRS (Centre national de la recherche scientifique) and

adopted later by the LCEC (Lebanese Center for Energy Conservation) in a real PV project supporting the power output of Zahrani plant - South Lebanon. The 1st phase of our study will be Zouk thermal power plant, where we estimate the amount of green power that can be added to the power capacity of this plant. Figure 1 shows the aerial "civilized" top view of zouk power plant. Preliminary calculations of areas that can be covered by PVs in this plant revealed the possibility of having more than 4 GWp additional power capacity (i.e. the ability to install approximately 36,600 PV modules with 130 Wp each).

Comparative life cycle assessment of vegetative and traditional gravel asphalted roofs: A Lebanese case study

Makram El Bachawati and Rima Manneh (University of Balamand, Lebanon); Thomas Dandres (École Polytechnique de Montréal, Canada); Carla Nassab (UNDP, Lebanon); Henri El Zakhem (University of Balamand, Lebanon); Rafik Belarbi (University of La Rochelle, France)

Introduction A vegetative roof is "a sophisticated system including different components that compensates the functions of nature that is missing on the roof" [1]. Aside from their attractive appearance, vegetative roofs offer numerous advantages. For instance, they protect the roof assembly from solar radiation, hence reducing temperature fluctuations in spaces beneath it ranging up to 3 floors, which implies a reduction in the building energy consumption [2]. If installed on large surfaces, vegetative roofs might also attenuate the urban heat island effect [3]. Furthermore, from a water management perspective, vegetative roof could be a useful tool to capture the water in the substrate, managing flooding during heavy rains and reducing water runoff. The implementation of vegetative roofs could be an interesting option for Lebanon, as the country lacks a clear sustainability plan as well as an infrastructure update and management, leading to road floodings in urban area amongst other things. So far, a few extensive green roofs have been installed in Lebanon. In order to determine if vegetative roofs are truly superior to traditional roofs for Lebanon, a Life Cycle Assessment (LCA) is done, comparing the case study at hand, an 834 sqm extensive green roof at the Lebanese Central Bank, with two other roofs: intensive and traditional. Materials and methods Goal and Scope This study aims on a comparative life cycle environmental impacts of an existing extensive roof and two fictitious roofs (intensive and traditional gravel asphalted roofs). The extensive green roof, installed at the Lebanese Central Bank (Hamra branch), is the first to be installed in Lebanon of this area. The SimaPro 8.0 [4] software is used to do the LCA modelling, while the IMPACT 2002+ methodology [5] is used to evaluate the environmental impacts. The functional unit is: "The installation of an 834 sqm roofing system and for a period of 45 years". Life cycle inventory The traditional gravel asphalted roof is a modified bituminous membrane roof. It is formed of bricks, steel, ready mixed concrete, asphalt and pebbles. The lifespan of such a conventional roof is considered 15 years. The components of the traditional gravel asphalted roof are assumed supplied from local manufacturers, while the specifications were provided by some technicians and civil engineers. A vegetative roof is made of the following layers: waterproof membrane, thermal insulation layer, root resistant barrier, drainage layer, filter sheet, growing medium, and vegetation layer (the latter is not considered in the study). The substrate of the studied extensive vegetative roof is 150 mm in depth and its lifespan is fixed at 45 years. The intensive green roof has the same lifespan and involves the same layers as the extensive roof, but the depth of its substrate is 1,200 mm. The components of the vegetative roofs were shipped from a German manufacturer, while their specifications were gathered from the United Nations Development Program, C EDRO project. Results: Life cycle impact assessment Figure 1 shows the contribution of the different components of the extensive green roof to the potential impacts. It can be noted that iron is the main contributor, followed by the concrete and waterproof membrane. When comparing the different types of roofing systems, Figure 2 indicates that the extensive green roof is better than the other roofs for all impact categories. This is because, for the same lifespan (45 years), the amount of materials used for the traditional roof is three times more than the amount used for the intensive or the extensive green roofs. Conclusion Results of this research showed that the extensive green roof is the better option from an environmental perspective. However, it should be noted that the results obtained in this case study are limited to the roof type (flat or sloped) and are specific to the Lebanese context. References [1] Zinco.ca,. 'Green Roof Systems'. N.p., 2015. Web. 3 Mar. 2015. [2] Christian J.E, Petrie T.W. 1996. Sustainable Roofs with Real Energy Savings. Proceedings of the Sustainable Low-Slope Roofing Workshop, Oak Ridge, Tennessee, p.99. [3] Peck S.W, Callaghan C, Kuhn M.E, Bass B. 1999. Vegetative backs from Vegetative Roofs: Forging a New Industry in Canada. Canadian Mortgage and Housing Corporation Research Report. [4] Goedkoop M, Oele M. 2013. SimaPro User Manual. The Netherlands: PRe´ Consultants B.V. [5] Jolliet O, Margni M, Charles R, Humbert S, Jérôme P, Rebitzer G, and Rosenbaum R. 2003. IMPACT 2002+: A new life cycle impact assessment methodology. International Journal of Life Cycle Assessment, 8(6), 324-330.

Power from PV under High-Voltage Transmission Lines in Lebanon

Abdallah Al Zarif and Monah Al Kadri (Lebanese International University & KVA sal, Lebanon); Ali H Assi (Lebanese International University, Lebanon); Mohamad Arnaout (LIU & Electrical Engineer, Lebanon); Hussein Kassem (Lebanese International University (LIU), Lebanon)

Lebanon suffers since more than 30 years from a severe electricity shortage. The power demand is more than 2600 MW which is greater than the power generated by existing thermal and hydropower plants (1600 MW). This problem may be alleviated through the use of renewable technologies. Photovoltaic (PV) energy is a suitable renewable to be used in Lebanon due to the important sunny days we are enjoying in this country. However the use of PVs to produce a large amount of energy requires large

areas of land in addition to large bank of batteries. Both, land and batteries are very expensive and may economically kill the benefit of using renewables. The present work suggests an original idea to produce PV power with almost zero cost of land and energy storage. This idea can be summarized as follows: In any country respecting the power transmission line guidelines, especially the right-of-way (ROW) needed under high voltage (HV) transmission lines, we have large areas of land that should be kept empty, where no habitation nor agriculture activities, making these areas unexploited. This paper discusses developing a standard procedure for the design of large-scale institutional grid-connected solar PV plant using the areas under HV transmission lines in Lebanon, thus saving the cost of land and batteries. Google earth is used in this study to calculate approximately the available land areas and to indicate the nature of each land section under HV transmission lines. Preliminary investigation showed that the output power of the proposed PV plant, which will be directly connected to the public grid, can be as high as 4,650 MW.

Modélisation thermique et aéraulique d'un toit incliné. Evaluation du potentiel de récupération de chaleur

Chantal Maatouk (Saint Joseph University, Lebanon)

Le soleil envoie jour après jour des quantités gigantesques d'énergie vers la surface de la Terre sous forme de rayons solaires - environ 20'000 fois plus que les besoins actuels en énergie du monde entier. L'exploitation de l'énergie solaire remonte déjà à fort longtemps. Les populations primitives avaient déjà découvert comment utiliser efficacement le soleil pour chauffer et éclairer leurs bâtiments. De nos jours, et grâce à divers procédés de transformation, l'énergie solaire permet de nombreuses applications utiles à l'homme, les plus utilisées sont: la production d'électricité et le chauffage. Ces deux types de transformation énergétique de l'énergie solaire paraissent attractive et intéressante, mais pour quel prix ? Pour la plupart des panneaux solaires, le seuil de rentabilité est de plusieurs années. En moyenne, les panneaux solaires photovoltaïques atteindront le seuil de rentabilité au bout de 10 à 15 ans. Les panneaux solaires pour l'eau chaude ont un temps de retour sur investissement plus court, de 6 à 8 ans. Les maisons typiquement libanaises sont caractérisées par leurs toits à quatre pans en tuiles. Un toit en pente, soumis à des conditions climatiques extérieures, se réchauffe par le rayonnement solaire toute l'année, même pendant la saison d'hiver. La lame d'air sous les tuiles se chauffe également par convection avec des tuiles chaudes. Dans le contexte libanais, il est important de trouver une solution économique permettant de valoriser l'énergie solaire reçue sur le toit. L'objectif de ce travail est de déterminer le potentiel de récupération d'énergie reçue sur une toiture en tuiles de terre cuite et de valorisation de cette énergie pour le chauffage. Dans cette étude, le comportement aérodynamique et thermique d'un toit en pente est évalué par une modélisation couplée entre la simulation thermique et aérodynamique (CFD). Le but de ce travail est de prédire la variation de la température dans la lame d'air située sous les tuiles en fonction de la quantité d'air infiltré à travers les tuiles et les conditions climatiques. Description de la géométrie de la toiture en pente Une charpente classique est constituée de fermes qui soutiennent les contre-liteaux, qui soutiennent les chevrons ; de chevrons qui soutiennent les liteaux, qui soutiennent les éléments de la couverture comme les tuiles. La figure 1 présente une charpente de toiture classique. Les tuiles et l'écran de sous-toiture forment ensemble un volume d'air qu'on va appeler lame d'air. Aperçu du modèle mathématique de la toiture Une approche de modélisation basée sur l'assemblage de modèles zonaux et nodaux, couplés avec des résultats CFD, est utilisé pour simuler les phénomènes thermiques et aéraulique dans la lame d'air située sous les tuiles en pente (Roy et al., 2001). Ce modèle numérique permet d'évaluer le comportement thermique de la lame d'air et d'estimer le potentiel de récupération d'énergie pour le chauffage, dans des conditions climatiques réalistes. Le couplage des modelés se fait selon l'organigramme suivant. Modélisation de l'aéraulique Ce modèle consiste à calculer, à partir du champ de vitesse et de l'orientation du vent, la répartition de la pression statique sur le toit et au niveau de la section ouverte de la lame d'air, ainsi que d'évaluer les débits d'air infiltré et/ou exfiltré à travers les points de raccordement des tuiles à la charpente. La géométrie est dessinée sous Gambit, et le calcul est réalisé par CFD (computational fluid dynamics) sous Fluent. Modélisation de la thermique de la toiture La modélisation dynamique de la thermique de la toiture est réalisée. Ce modèle permet de simuler le comportement de la lame d'air tout le long de l'année. Le modèle permet de calculer, en fonction de la température de l'air ambiant, de la vitesse du vent et du flux solaire, l'évolution de la température de l'extrados et de l'intrados des tuiles ainsi que la variation de la température de la lame d'air toute l'année. Résultats et Discussions Le calcul est réalisé sur un an complet. Les données météorologiques horaires d'un village libanais situé à 600 m d'altitude sont utilisées, plus précisément: - Température et humidité relative de l'air ; - Vitesse et la direction du vent ; - Flux solaire direct rayonnant sur la surface d'un toit exposé Sud et incliné de 30° par rapport à l'horizontal. Le calcul a montré que la lame d'air se chauffe de 8 a 20 ºC. L'air chaud provenant de lame d'air peut être utilisé de deux manières différentes: - Soit directement soufflé dans la maison pour chauffer l'ambiance. Dans ce cas, un système de distribution d'air adéquat doit être mis en place, couplé à un autre système de chauffage qui fait la relève la nuit et les jours de pluies ; - Soit comme source chaude d'un système thermodynamique de chauffage (pompe à chaleur) permettant ainsi à ce dernier de fonctionner avec un rendement élevé. Le plus important à noter c'est que ce système de chauffage nécessite un coût d'investissement très réduit, négligeable par rapport au prix des panneaux solaires et permettant toutefois de récupérer quelques calories du toit, surtout sans modifier son architecture.

ENG3_BIOM: Engineering III

Room: USJ CSH 208

Chairs: Rony Darazi (Antonine University, Lebanon), Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Gait Ground Reaction Force Analysis - Balancing Parameters

Rami Alkhatib (RHU, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon); Christophe Corbier (Université Jean-Monnet, France); Bassam Moslem (Rafik Hariri University & RHU, Lebanon); Mohamed ElBadaoui (University of Jean Monet, France); Ramzi Halabi (Rafik Hariri University, Lebanon)

Analysis of ground reaction force (GRF) helps in understanding how well a person in balancing. Consequently, a prediction of fall could be made. An understanding of the main differences between normal and Parkinson gait, whom most probably struggle with balance, is to be developed through a series of studies. Vertical Ground reaction force retrospective database is obtained from Physionet. A collection of signal measures force (in Newton) as a function in time extracted from 8 sensors (Ultraflex Computer Duyno Graphy, Infotronic Inc.) underneath each of the right and left foot. Two groups of elderly persons were recorded: the normal case and forms 18 subject, also named control, and patient with Parkinson forms 29 subjects. In a previous work we have shown that inner arch of the sole of the foot (i.e. at the mid foot) holds the most relevant information needed for better classification and it is assumed that this could holds the most information for body balancing. This was unlike the usual work that focuses only at the toe and heel or at the total GRF underneath each foot. That's why a careful choose of sensor is to be made in classification. In this paper, the study is extended to cover the covariance at different time lags between the sixteen sensors in both right and left foot. Then processing the matrix generated by extracting the highest eigenvalues to track their behavior in both healthy and Parkinson diseased subjects. Knowing that, the first three principle components count for 92.66% of total variance while the first four counts for 96.29%. Therefore, most of the data structure can be captured in three or four underlying dimensions. The remaining principal components account for a very small proportion of the variability and are probably unimportant. In addition, plotting the maximum absolute value of the eigenvalue as a function of time lag, the trend decreases smoothly indicating the nonstationarity of the signal. However, a clear repeated patterns appeared. That's why GRF are considered to be stationary from macroscopic point of view but microscopically they are non-stationary. To prove the nonstationarity of signal, the signal that recorded for 2 minutes are divided into strides and the first order statistics are then computed for each step. The results indicate a high variability with a certain range of values for each of the sixteen sensors. Then the signal characterized deterministically as the Pearson correlation between two successive steps are recorded to be higher than 0.9 on average. K-means algorithm cluster is then used to classify the subjects. Results indicate that 89% of normal subjects are clustered in one group and 76 % of Parkinson's were classified in the second group. As the accuracy of classification is not high, a new classifying algorithm is to be built for GRF after trying the other existing ones. In the upcoming future study, a tracking of the behavior of the first up to the fourth principle components of both normal and Parkinson subjects is to be conducted. Then those are to be compared to each other. It's expected a higher classification results will attained where the difference in the pattern of the maximum Eigen values between normal and Parkinson will increase. After all some balancing parameters the result from a combination of all sensors is to be figured out.

Effect of Binaural Beats on Consciousness Levels

Alaa Seif, Myriam Chamaa, Abdulaziz Alshaheen, Rascha Awada and Ramzi Halabi (Rafik Hariri University, Lebanon); Mohamad O. Diab (Rafik Hariri University & College of Engineering, Lebanon)

Surgical procedures usually use high dosage of anesthetic agents, which might cause potential overdose. The purpose of our research is to lessen the dosage of the anesthetic agents by introducing the concept of Binaural Beats, in conjunction. The aim of our work is to prove that making a subject listen to binaural beats alters his level of consciousness and to integrate them within the sedation process in surgical procedures. For that, time-frequency analysis of the Alpha (8-12.5 Hz) and Delta waves (0.5-3.5 Hz) of EEG signals is performed to assess consciousness levels before and after introduction of binaural waves. In fact, Alpha and Delta EEG rhythms have been extensively studied and proven to be reliable consciousness indicators. In addition to the sedation effect when given along with anesthesia, binaural beats would be used as a form of relaxation during uncomfortable medical treatments such as lithotripsy and renal dialysis and sleep apnea solution. The Binaural Beats used in this study are Intra-op from Surgical Series, Monroe Products and Lethargic. Database was collected from 30 male and female subjects aging between 18 and 25 years. The differential signals of leads (C3-C4) and (O1-O2) were selected upon revision of previous studies and confirmed upon analysis using a 20-10 electrode cap system. Wavelet analysis and Short-time Fourier Transform were assessed to track the temporal variation of the Alpha and Delta EEG rhythms, pre- and post- Binaural Beats introduction. As a result, Alpha wave activity showed significant decrease while Delta wave activity showed significant increase, indicating the beginning of the "unconscious state" without the use of any drugs or additional external factors.

Breast Tumors Segmentation Algorithm

Antoine Sawma, Elie Younes and Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

One of the main causes of death for women is Breast Cancer. The abnormal division and reproduction of breast duct will induce the formation of malignant tumors. It has been proven that early detection

could lead to successful treatments and therefore, reducing the death rate. Early-stage detection is best made via Mammogram. The objective of this paper is to present an accurate and efficient algorithm for tumor segmentation. The presented algorithm will use the modified Gradient Vector Flow (MGVF) to detect the breast region, connected component labeling to extract the pectoral muscle and region growing to segment the tumor. The tests were made on mammograms from the Mammogram Image Analysis Society (MIAS).

Body Balance Detector

Nour AL-Zein, Nafez Haddad and Walid Kamali (AL-Manar University of Tripoli, Lebanon)

Some people suffer from variety of foot disorders that would lead to imbalances such as Hallux-Valgus, Bow legs, Hammer toe etc…. Orthopedists and surgeons evaluate such cases by performing bed examination to diagnose the severity and make proper decisions that may include surgery and/or recommend the use orthopedic accessories like braces, shoe sole, etc. This project focuses on efforts to come up with a design of a device that measures the compression forces on the foot to determine the normal acting balance forces versus abnormal ones. Such cases have been the main target of this study since such foot disorders may worsen with time if left unattended and uncared for. Data has been collected from candidates and volunteers whose foot/leg conditions reflect the aforementioned cases. The pressure values that were obtained from this device have been used to assess the balancing forces and to, later on, give the proper recommendation to wear (a) shoe/shoes with different types of cushioning to bring about balance back to concerned subjects. Thanks to this technique, young children will not have to wait until adulthood to have extreme corrective measures. They can alternatively start earlier their preventive treatment and at a younger age. Older people, on the other hand, can also benefit from such study to avoid surgery and to seek alternative solutions.

FEA3_ENV: Food security, Environment, Agriculture III

Room: USJ CSH 305

Chairs: Jocelyne Gerard (Université Saint Joseph, Lebanon), Carla Khater (CNRS, Lebanon)

An Experimental Study on the use of Pervious Concrete in Parking Garages

Sanaa El Sayed (Rafik Hariri University, Lebanon); Riad Wardany (Rafic Hariri University, Lebanon); Ahmad El Hajj and Rosaline Chemali (Rafik Hariri University, Lebanon); Lana Haidar and Aline Al Karak (Balamand, Lebanon)

Rain water can sometimes lead to flooding since storm water systems cannot handle its amount. This study proposes the use of pervious concrete as an alternative drainage solution for outdoor parking garages. Thus, pervious concrete mixes using two types of aggregates were prepared where their compressive strength and permeability were tested.

Study of catch effort production by fishing gears, in the marine waters of Tartous Department

Adib Saad, Waad Sabour and Ahmad Soliman (Tishreen University, Syria)

This work aims to obtain a field and real data about the amount of exerted fishing effort and productivity per unit effort in the marine waters of Tartous, determine the qualitative and quantitative composition of the catch. The study on a fifteen artisanal fishing boats, by doing tours field and interview fishermen on a regular basis at a rate of twice a week, and over the year) July 2012 - August 2013). The results show that Most of the vessels based on passive gears with clear exceed for gillnets nets ,The average number of fishing trips for studied boats 16 ±4.3 trip / boat / month, and the average productivity of fishing effort for Boats sample 8.4±2.15kg /boat/day, the highest average of catch rate per unit of effort during November was9.9±4.3kg/boat/day and the lowest during December was5.7±2.23kg/boat/day, the most fish species abundance in the catch is found Sargous spp 11.4%.the proportion of invasive species from the Red Sea 27. %5, it is Concluded that fishing effort is high and its quantity and specific efficiency is low

Effets de la pollution atmosphérique sur la santé à Beyrouth: Etude BAPHE

Marc Henri Karam (University of Saint Joseph- Faculty of Sciences, Lebanon); Wehbeh Farah (Faculty of Sciences- USJ, Lebanon); Myriam Mrad Nakhle (USJ Faculty of Sciences and UPMC UMR S 1136 EPAR, Lebanon); Nelly Ziade Zoghbi (Medical School USJ and HDF, Lebanon); Maher Abboud (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon); Isabella Annesi-Maesano (INSERM UMR S 1136 and UPMC paris 6, France)

Les résultats de BAPHE I ont mis en évidence l'effet des polluants sur la santé des habitants à Beyrouth surtout chez des groupes vulnérables (enfants et personnes âgées) et ont souligné la nécessité de mener des études supplémentaires. L'étude BAPHE 1 est la première initiative complète pour évaluer les effets de la pollution atmosphérique sur la santé à Beyrouth, cependant, comme toute étude scientifique elle

présente des limites Dans l'étude BAPHE II nous proposerons d'étendre la durée de l'étude et de prendre en compte les polluants et cofacteurs omis dans la première phase. L'objectif ultime de BAPHE est d'avoir des preuves pour nos décideurs afin de réduire les émissions de polluants et d'émettre des objectifs adéquats de santé publique.

Elaboration et caractérisation de nanoparticules superparamagnétiques de Fe3O4 - Vers des applications environnementales et biomédicales

Maher Abboud and Georges Germanos (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon); Wehbeh Farah (Faculty of Sciences- USJ, Lebanon); Roland Habchi (Lebanese University, Lebanon); Jean Podlecki (IES, Université Montpellier, Lebanon); Alain Foucaran (IES - Universite Montpellier, France); Ralph Nasr (FS -USJ, Lebanon); Sami Youssef (ESIB, Université Saint-Joseph, Lebanon)

Notre intérêt porte sur les nanomatériaux hybrides de type « core-shell » à base de cœur magnétique type Fe3O4 pouvant avoir des propriétés superparamagnétiques intéressantes dans le but de leur intégration dans des biocapteurs de dépollution et/ou pour d'autres applications spécifiques comme des tests de diagnostic in vitro en tant que marqueurs biologiques moléculaires, des vecteurs dans la délivrance de médicaments, des agents thérapeutiques, d'excellents candidats pour la quantification de contaminations bactériennes dans les produits agro-alimentaires et dans l'eau. Il s'agit dans ce travail de mettre au point un procédé d'encapsulation de nanoparticules de magnétite par une coque ou plusieurs coques en polymères et ce par des techniques de polymérisation en suspension, émulsion ou encore coprécipitation. Le défi majeur réside dans la maîtrise du maintien des particules à une taille nanométrique car ces dernières auraient tendance à s'agréger par attraction électrostatique. Pour ce faire, nous projetons de stabiliser les solutions de magnétite pour résister et vaincre leur aptitude d'attraction. Nous nous proposons de modifier ultérieurement la surface de ces particules par dépôt de couches de silice et/ou par fonctionnalisation via des agents de greffage dits aussi de couplage, à caractère bi fonctionnel. Ces agents de greffage bi fonctionnels de type silanique devraient rendre organophile la surface du minéral en vue de faciliter son incorporation ultérieure au sein des coques en polymère. Le matériau final se présente sous la forme de particules cœur - écorce.

Matériaux hybrides fonctionnels à base de nanoparticules de magnétite et d'alginate de calcium, vers une application en tant que capteurs spécifiques d'ions métalliques

Georges Germanos (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon); Wehbeh Farah (Faculty of Sciences-USJ, Lebanon); Sami Youssef (ESIB, Université Saint-Joseph, Lebanon); Ralph Nasr (FS -USJ, Lebanon); Stephane Rioual and Benoit Lescop (University of Brest, France); Maher Abboud (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon)

Notre travail porte sur l'élaboration et la caractérisation de nouveaux matériaux renfermant une composante nanomagnétique modifiée en surface, ces matériaux pouvant jouer le rôle de capteurs. Il s'agit d'étudier leur potentialité en tant que capteurs de pollution, portables, basés ainsi sur des matériaux actifs sensibles aux polluants. Pour ce qui est du cœur magnétique, il s'agit d'utiliser la magnétite, oxyde de fer II et III Fe3O4, (Aldrich) dans un premier temps, puis synthétisée dans un deuxième temps au sein du laboratoire de l'équipe des nanomatériaux hybrides de la faculté des sciences en collaboration avec la faculté d'ingénierie de l'USJ. Ces MNPs nanoparticules magnétiques sont caractérisées par spectrophotométrie infrarouge, diffraction aux rayons X, microscopie électronique à transmission, analyse thermogravimétrique et analyse magnétique SQUID. Dans un deuxième temps, des billes d'alginate de calcium renfermant ou non les MNPs de magnétite ont été élaborées avec des taux de magnétite avoisinant les 20% en masse. Ces billes laissées à maturation lors de la gélification ont été ensuite séchées et ont servi à la conduite d'essais d'absorption de polluant cuivrique Cu2+. Les capsules sont caractérisées avant et après absorption à l'aide de la spectrophotométrie infrarouge FTIR, la microscopie électronique à balayage SEM-EDX, absorption atomique du cuivre et du calcium et spectrophotométrie des électrons X. Les premiers résultats montrent la bonne incorporation de la magnétite au sein des billes d'alginate, leur rétention est assez évidente et leur pouvoir magnétique est bien notable. Quant au pouvoir d'adsorption, il semble qu'il est très important même après deux heures d'immersion où plus de 99% du polluant auraient été éliminés par adsorption après deux heures de mise en contact. De plus, la cinétique d'adsorption répond bien à un modèle de pseudo-ordre 2 avec une corrélation de plus de 99%.

Conservation de la biodiversité méditerranéenne continentale et réseaux d'aires protégées: au carrefour entre descripteurs écologiques et socio-économiques

Rita Sawaya (Aix-Marseille Université (IMBE) & CNRS-Lebanon, Center for Remote Sensing, Lebanon); Carla Khater (CNRS, Lebanon); Errol Vela (Université Montpellier II, Lebanon); Thierry Tatoni (Aix-Marseille Université (IMBE), France)

Défiée par les tendances accentuées de développement, la méditerranée, berceau de l'humanité et des civilisations et point chaud pour la biodiversité, se trouve secouée à l'interface entre les besoins de croissance socioéconomiques et les priorités écologiques de conservation. Dans cette complexe

réalité socio-écologique, la conservation de la biodiversité demeure un défi ardu à relever face aux nécessités vitales d'exploiter les richesses naturelles pour satisfaire les principaux besoins de survie socio-économiques. Dans ce cadre, toute initiative de protection d'un espace naturel nécessiterait non seulement une prise en compte de son intérêt écologique de conservation, mais aussi, des aspects socio-économiques qui y prévalent et qui parfois l'emportent sur la nécessité écologique de sa protection. Ainsi, toute tentative de conservation d'un écosystème naturel devrait être fondée sur un ensemble de critères et d'indicateurs écologiques et socioéconomiques pertinents, qui soient les plus objectifs possible, permettant d'orienter de façon appropriée les types et les modalités de protection. Les aires protégées constituent les piliers et les outils fondamentaux des stratégies nationales et internationales de conservation de la biodiversité. Toutefois, les types et les modes de classification de celles-ci diffèrent d'un pays à l'autre et ne sont nécessairement pas comparables. Cette différence émane de la diversité des régimes législatifs, des besoins de conservation spécifiques à chaque pays et des contextes socio-économiques relatifs à chacun. Plus de 1000 termes différents sont connus pour être utilisés dans le monde entier pour la désignation de zones protégées. La définition de descripteurs écologiques visant la priorisation des enjeux de conservation et l'orientation des choix de conservation de la biodiversité a fait l'objet de plusieurs projets de recherche scientifique au niveau international. Une multitude de descripteurs ont été ainsi définis. Notons ceux adoptés pour la désignation des zone naturelle d'intérêt écologique, faunistique et floristique en France (ZNIEFF), ceux développés par l'Observatoire National de la Biodiversité en France, ceux développés par le protocole de Montréal en 1992 et mis à jour en 2009, les critères développés par l'Union Internationale pour la Conservation de la Nature (IUCN) pour orienter les choix de désignation des aires protégées, etc. Néanmoins, tous ces descripteurs demeurent non standardisés, ils appartiennent à des catégories différentes (quantitatifs / qualitatifs, espèces / habitats, écologiques / socioéconomiques), ils répondent à des besoins différents (protection, gestion, aménagement) et se trouvent dans la plupart des cas dupliqués et parfois non appliqués, bien que l'objectif soit commun: la conservation de la biodiversité. La définition de descripteurs écologiques et socioéconomiques répondant aux vrais priorités socio-écologiques méditerranéennes et visant une priorisation pertinente et adaptée des enjeux de conservation et la désignation des aires protégées en contexte méditerranéen demeure ainsi une nécessite incontournable. Une revue exhaustive des critères et indicateurs utilisés autour du monde pour hiérarchiser la désignation des aires protégées a permis d'identifier une série de descripteurs écologiques et socioéconomiques pertinents, pratiques et adaptés au contexte méditerranéen, qui prennent en compte à la fois les enjeux écologiques et socioéconomiques de conservation d'un milieu naturel donné pour orienter la meilleure alternative de protection. Ceux-ci renseignent le maximum de données écologiques et socioéconomiques relatives à ce site naturel, tout en étant différents les uns des autres (pas de redondance) mais très complémentaires. Ces descripteurs retiennent les aspects d'endémisme et de rareté (irremplaçabilité) des espèces et des habitats, de représentativité de l'habitat cible, de sa connectivité spéciale, intégrité fonctionnelle et dynamique régionale. En outre, ils soulignent les menaces exogènes anthropiques sur le site cible, sa valeur économique d'usage ou de non-usage, les contraintes financière et financières y afférentes, et les aspects législatifs permettant sa protection. L'ensemble des indicateurs et critères définis a ensuite servi de base pour le développement d'un outil à la décision informatique simple et pratique, orientant les priorités de conservation d'un écosystème terrestre donné, en proposant à l'utilisateur plusieurs solutions « hiérarchisées », parmi lesquels il pourra choisir l'option la moins bloquante (la plus applicable au niveau local).

MCS1_computer: Mathematics and Computer Sciences I

Room: USJ CSH 306

Chairs: Dany Mezher (Saint Joseph University, Lebanon), Toni Sayah (Université Saint-Joseph, Lebanon)

A Framework for Managing Services in Virtual Community Context

Jihad Itani (AUL & UPPA, Lebanon)

Managing services and providing them with expected quality of service from a user's point of view are considered two factors that affect the success or failure of virtual communities (VC). But usually in VC, service supply and delivery are closely restricted to the business and technical choices of the VC management. Moreover, the evolution of VCs does not take into account the real needs of their members because they are not enrolled in the VC evolution process. At the same time, open technology such as SOA promotes the concepts of decoupling and dynamic allocation of services. Service mediator, when introduced as middle layer between SOA consumer and producer actors, could bring the two parties towards an agreement that explicitly considers individual needs and QoS requirements. Moreover, using service mediator in this context could even promote service suitability from the user perspective as well as from the VC perspective. The aim of this paper is to present Service Mediator functional units such as managing and monitoring services and detail some of their activities and tasks in VC.

Re-usability of Data Distribution Service for Virtual Reality Environment

Hassan Haidar (Lab-STICC-CERV ENIB, France); Ali Kalakech (Universite Libanaise, Lebanon); Ali Hamie (Lab-CRITIC-AUL, Lebanon); Ronan Querrec (Lab-STICC-CERV-ENIB, France)

Despite all the focus on the distribution of virtual reality environment (VRE), collaboration and cooperation are getting all the attention behind distribution. Middleware solutions are addressing this need especially with stopvepiped applications. In this paper we discuss the limitation faced with DDS as an OMG standard for distributing virtual reality environments that in its turn is more simulating complex systems and we provide our proposal for a generic perspective in distributing VRE.

Meta Modelling for Procedural Learning in Virtual Environment

Joanna Taoum (École Nationale d'Ingénieurs de Brest (ENIB) & Arts, Sciences & Technology University in Lebanon (AUL), France); Ronan Querrec (Lab-STICC-CERV-ENIB, France)

Since the beginning of this century, Virtual Reality has been used for several significant applications, including learning. Classical development of a virtual environment requires the intervention of a computer scientist even in implementing a pedagogical scenario, which can create some misunderstanding between the stakeholders (involved collaborators). The goal of this paper is to propose a model and language to allow the domain and pedagogical expert to design a virtual environment. We propose an approach based to the notion of meta-modeling. Thus, the domain model and the pedagogical scenario are considered as data. In order to be formalized, we write our meta-model based on UML meta-model. For each concept of UML meta-model (classes, activities, states …) we also propose an operational semantic in the context of virtual reality and procedural learning. After defining the concepts in the UML language, that can be used to define some educational concepts, we achieve a generalization of pedagogical concepts based on specific scenarios given by domain experts. These concepts are then compared to those in UML meta-model for selecting the appropriate ones.

Intelligent Embodied Conversational Agents in Virtual Environments

Bilal Nakhal (École Nationale d'Ingénieurs de Brest (ENIB) & Arts, Sciences & Technology University in Lebanon (AUL), France); Ronan Querrec and Elisabetta Bevacqua (Lab-STICC-CERV-ENIB, France); Bilal Said (Arts, Sciences and Technology University in Lebanon (AUL), Lebanon)

In this work we propose to introduce Embodied Conversational Agents (ECA), based on SAIBA framework, in a pedagogical system. These agents, playing the role of tutors, can communicate naturally with users, facilitating their learning process. The knowledge of the environment and the entities in the environment is essential for the pedagogical system to perform activities and to manage the interaction with the user. To represent such knowledge we use the meta-model MASCARET and we propose to improve it by adding information about the virtual tutor, such as affective state, cognitive information and personality. This information will be used by the ECA to decide how to respond to the user's requests.

License Plate Character Recognition using a New Data Mining Algorithm

Salah Al-Shami (Beirut Arab University, Lebanon); Ali El-Zaart (Beurit Arab University, Lebanon); Rached Zantout (Rafik Hariri University, Lebanon); Ahmed Zekri (Beirut Arab University, Lebanon); Khaled Almustafa (Prince Sultan University, Saudi Arabia)

License plate recognition is an automatic process to recognize alpha-numeric characters in the license plate images. The application of license plate recognition is used for law enforcement in traffic violation systems by using special types of sensors and cameras along the street lanes. The need for image analysis became an essential technique in data mining and image processing. The objective is to find the optimal classification tree that leads to faster response time in addition to higher recognition accuracy. To recognize license plate in images, several techniques have been used by researchers. For example, researchers used the line detection, through the Hough transform. Other researchers used histogram processing by studying the variation of grey value in the image pixels. Other researchers used the blob analysis that primarily works with regions instead of individual pixels. In a previous work, they extracted the features using three algorithms, which rely on processing information from 6 lines strategically drawn vertically and horizontally through a character, and then they applied manual grouping designs using decision tree classification. The main advantage of the method is its simplicity and the fact that once the recognition tree is established, it is the fastest and most efficient method, plus it is a method that is highly parallelizable. The disadvantages are that the lines are currently chosen manually and the tree is constructed also manually so we are not sure that the line choices are optimal nor that the trees are optimal. In the present work, we introduced a new methodology that processes all the horizontal and vertical lines crossing through the character. We introduced the quantization process, where quantization is the procedure of constraining something from a continuous set of values to a relatively small discrete set. The need of combined features was also applied to the training datasets. Our method will take any number of patterns and train automatically to come up with the best tree. The whole processes were implemented automatically using the MATLAB tool. The result of the feature selection process is a classification tree. The experimental results are tested on different closed-set characters in license plates from different countries with Arabic and English language and the recognition rate was above 95%. The training phase of the algorithm is time consuming, but it grants us at the end with higher percentage of accuracy, more automation, and faster response time. Future research should focus on identifying the number of training sets needed to reach the optimal recognition tree with high recognition accuracy. Another challenging enhancement could be applying different quantization values in the same recognition tree.

BIO5_Phamra: Biological, Medical, Pharmaceutical, Health Sciences V

Room: USJ CSM C9

Chairs: Bassam Badran (Lebanese University, Lebanon), Richard G. Maroun (Université Saint Joseph de Beyrouth, Lebanon)

Smartphone Addiction among University Students in Lebanon

Jocelyne Boumosleh and Doris Jaalouk (Notre Dame University-Louaize, Lebanon)

Background and Objective: Nowadays, addiction not only refers to drug or substance abuse, but it also refers to behavioral addictions such as gambling, internet, games, or even Smartphone. Considering the multi-purpose, mobile, and internet capabilities of a Smartphone, a Smartphone has become a prevalent social phenomenon that has a high potential to exert an impact in excessive users such as university students. Because of the quick development, widespread use and promotion of Smartphone, it is important to quantify Smartphone addiction and study its possible negative effects. This exploratory study is the first to investigate the existence of Smartphone addiction among university students in Lebanon and the extent of problems caused by such potential abuse. Methods: A total of 271 undergraduate students at Notre Dame university (NDU), Lebanon, were asked to complete a self-administered survey constructed of two sections. One section included questions on socio-demographics, academics, and Smartphone use. The other section included a 26-item Smartphone Addiction Inventory (SPAI) Scale. The SPAI scale is comprised of four subscales: compulsive behavior (CB; 9 items), functional impairment (FI; 8 items), withdrawal (W; 6 items) and tolerance (T; 3 items). Participants were asked to rate items on a 4-point Likert scale, 1= "strongly disagree", 2= "somewhat disagree"; 3= "somewhat agree"; 4= "strongly agree" so that the total SPAI score ranges from 26 to 104. Descriptive statistics for the total sample were performed. Quantitative and qualitative measurements were summarized as mean ± standard deviation and n (%), respectively. We performed comparisons of continuous and categorical variables by using independent 2-sample T Test/ Mann-Whitney-U-test/ analysis of variance and the chi square test /Fisher's exact test, respectively. Multiple logistic regression was used to assess the relationship between academic performance (GPA) and total addiction score after controlling for confounders. Spearman correlation coefficients were used to evaluate the association among the different variables. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 22 for Windows. A p-value less than 0.05 was considered statistically significant. Results: The sample consisted of 271 undergraduate students (52% males and 48% females) with a mean age of 21 years. About 78 % of the sample reported excessive Smartphone use, with 52% reporting use for at least 5 hours on weekday. Females were more likely to report excessive Smartphone use than males (F 90% vs. M 68 %, $p < 0.001$). Females also appear to start using Smartphone at a younger age than males (F 15.0 yrs vs. M 15.5 yrs, $p=0.08$). Younger age at start of Smartphone use was found to be significantly associated with addictive characteristics. For example, the mean age at start of Smartphone use of those who reported to have been hooking on Smartphone use longer and longer, and to think about using Smartphone first thing in the morning was found to be significantly lower than those who did not report such characteristics (14.9 vs. 15.7, $p=0.016$; 15.0 vs. 15.9, $p=0.029$, respectively). More than one-fourth of the sample reported indications of CB (e.g., 36 % reported that they fail to control the impulse to use Smartphone, and 37 % reported that although using Smartphone has brought negative effects on their interpersonal relationships, the amount of internet use remains unreduced. More than one-fifth of the sample reported indications of FI (e.g., 36% reported that they made a habit to use Smartphone and the sleep quality and total sleep time decreased, 46 % reported that they feel aches and soreness in the back or eye discomforts due to excessive Smartphone use, and 33 % reported that they feel tired on daytime due to late-night use of Smartphone. More than one-fifth of the sample reported indications of withdrawal (e.g., 43% reported that they feel the urge to use their Smartphone again right after they stopped using it, 63 % reported that the idea of using Smartphone comes as the first thought on mind when waking up each morning, and 40% reported that they feel restless and irritable when the Smartphone is unavailable. More than two-fifths of the sample reported indications of tolerance (e.g.,53% reported that they were told more than once that they spent too much time on Smartphone, and 51 % reported that they have been hooking on the Smartphone longer and longer). Positive correlations were found between duration of Smartphone use and addictive characteristics (CB: $r=0.28$, $p=0.000$; FI: $r=0.26$, $p=0.000$; W: $r=0.354$, $p=0.000$; T: 0.436, $p=0.000$; total addiction score: $r=0.361$, $p=0.000$). Logistic regression results showed that, controlling for age, gender and smoking, the odds of having a lower GPA increases with an increase in SPAI score, although the association was not found to be statistically significant. Conclusion: Our results suggest high prevalence of addictive characteristics associated with Smartphone use among NDU students. Female gender and younger age at start of Smartphone use appear to be risk factors for addiction to Smartphone use. Addiction to Smartphone use seems to affect a student's academic performance. These findings highlight the phenomenon of pathological Smartphone use among university students and its clinical, social and academic implications.

Assessment of Infection Control Standards at the Outpatient Dental Clinics, Beirut Arab University

Mirna Fawaz (Beirut Arab University, Lebanon); Roula S. Abiad (Faculty of Dentistry, Beirut Arab University, Lebanon); Khaled Abd El Jalil (Beirut Arab University, Lebanon)

Introduction: Within healthcare system, there is an increasing awareness of infection control practices to achieve the best possible patient's outcomes and attain standards of clinical excellence. Aim: This study aimed to assess infection control standards at the Outpatient Dental Clinics, Faculty of Dentistry, Beirut Arab University. Methodology: Fifty Health Care Providers were selected randomly from the outpatient dental clinics during their clinical training in addition to six of the nursing staff working in the instrument processing area. Two tools were developed to collect the required data: " Ideal Dental Clinics Infection Control Structure Standards Checklist" and" Dental Clinics Infection Control Process Standards Assessment sheet". They were tested for content validity and applicability. Swab samples were also taken from the instruments and working surfaces then sent for bacteriological culture. Results: Findings indicated that all studied clinics were well equipped and almost considered as ideal clinics for education. However, certain defects were revealed and urged the need for new infection control system follow-up protocol. Conclusion: Based on the findings of the conducted research, many changes were performed to improve infection control practices in these clinics. These changes will be covered in the presentation.

Optimization of a new polymerization approach for the synthesis of water-compatible imprinted nanoparticles

Mira Daoud Attieh (Université Libanaise, Lebanon); Assem ElKak (Lebanese University, Lebanon); Aude Falcimaigne Cordin and Karsten Haupt (Compiègne University of Technology, France)

Molecularly imprinted polymers (MIPs), also referred to as artificial receptors or plastic antibodies, are tailor-made synthetic receptors that are able to specifically recognize and bind target molecules. Due to their higher chemical and physical stability, better availability, lower cost, good specificity and selectivity, MIPs are considered as an alternative to natural receptors, such as antibodies. They can thus be widely used in various applications where selective binding is required, such as immunoassays, affinity separation, and biosensors. Recently, it has been suggested that MIPs could be applied in biomedical fields, such as drug delivery systems for their release properties. Free radical polymerization is often used to prepare molecular imprinting materials such as hydrogels. For this, typical chemical initiators and/or chemical catalysts are frequently used to initiate the polymerization. However, exposure to these free-radical polymerization reagents leads to toxic final compounds, and this fact will greatly limit their use in biomedical, pharmaceutical and environmental applications. Herein, we describe, for the first time, a new approach for the synthesis of molecularly imprinted hydrogels by free-radical polymerization in less toxic conditions. Immobilized initiator systems were developed for nanoparticles synthesis in aqueous media, and applied to the MIP preparation. Different templates were imprinted, such as proteins and small analytes. Therefore, the effect of the polymerization techniques is evaluated by comparing these nanogels efficiency to MIPs prepared by the traditional free radical polymerization.

Comparison of HIV-1 integrase inhibitors shows that stronger is their binding to the substrate viral DNA, stronger is their anti-AIDS activity

Farah Ammar (Saint Joseph University, Lebanon); Zeina Hobaika (Université Saint Joseph de Beyrouth, Lebanon); Safwat Abdel-Azeim and Loussinée Zargarian (ENS Cachan, France); Serge Fermandjian (Université Paris Descartes, France); Richard G. Maroun (Université Saint Joseph de Beyrouth, Lebanon)

Integrase (IN) is the retroviral enzyme that catalyzes integration of viral cDNA into the infected cell chromosome. Integration involves two steps: the 3' processing (3'P) of viral DNA in the cytoplasm and the strand transfer (ST) in the nucleus. The DKA (diketoacid) related compounds raltegravir (RAL), elvitegravir (EVG) and dolutegravir have been approved recently by the FDA for use in anti-AIDS/HIV therapy. These are effective inhibitors of integration, acting as INSTIs (IN ST inhibitors) at the IN-viral DNA interface. However, in a recent report we have shown that the high affinity binding of RAL to viral LTR (long terminal repeat) ends does not require the presence of the enzyme. Our results suggested that a strong binding to HIV DNA is one of the prerogatives of INSTIs endowed with high antiviral activities (Ammar et al., 2012). To better understand its inhibitory activity on IN we analyzed its binding properties compared with TB11 which is one of the first DKAs synthesized with antiviral activity. Similarly to RAL, TB11 is an INSTI, but it is also a weak inhibitor of the 3'P reaction. TB11 was abandoned for its lack of efficiency and marked toxicity. We performed circular dichroism and fluorescence spectroscopy, using as drug targets oligonucleotides mimicking LTR ends and peptides from the IN active site proximity, together with DNA plasmid retardation assay. Results highlight that TB11, similarly to RAL, interacts with free processed and unprocessed LTR ends, although with a much lower affinity (Kds for processed LTR are about 100 nM for TB11 and below 10 nM for RAL). The structure and motions of the LTR terminal nucleotides-either processed or unprocessed-appear of tremendous importance for the binding of drugs. Inhibitor binding was strongly potentiated by Mg2+.With 5 mM Mg2+, Kds for binding to processed LTR matched IC50s for strand transfer inhibition (in vitro IC50 is 2-7 nM for RAL and 70-330 nM for TB11). This correlation suggests that RAL and TB11 are metal ion assisted substrate-targeted inhibitors, rather than conventional enzyme binding inhibitors. We also assume that one of the two metals required for

catalysis is brought by DNA and could serve to inhibitor recruitment on the cleavage site. Strikingly, unlike RAL, TB11 interacts with the IN peptides rationalizing its weaker bioavailability (Hobaika et al., 2010). We find also that at the higher concentration, numerous TB11 molecules intercalate into DNA base pairs, while RAL binds exclusively to the cleavable/cleaved site. This event could contribute to the higher cellular toxicity of TB11. All together, (1) Results suggested an unusual inhibition mechanism where drugs bind first the DNA substrate rather than the enzyme, and where the two Mg2+ required for catalysis are carried the one by the DNA cleavage site and the other by the enzyme catalytic site; (2) the higher ability of TB11 to inhibit 3'P could result from either its interaction with the enzyme active site, and consecutively, the hindrance of the DNA recognition, or loss of motions and/or distortions of the scissile phosphodiester bond resulting from its insertion into the adjacent terminal base pairs of unprocessed LTR; (3) a higher binding affinity for other proteins and the intercalation into DNA base pairs of TB11, could contribute to its weaker bioavailability and higher toxicity compared with RAL.

Gabapentin Modulates Hemodynamics and Atrial Effective Refractory Period in Rats

Safaa Hammoud (Beirut Arab University, Lebanon); Amal Omar Galal (BAU, Lebanon); Ahmed El-Mallah (Pharos University, Egypt)

Increasing numbers of reports have been published documenting a possible association between Gabapentin (GBP) and serious cardiovascular problems. In this study, in-vivo and in-vitro experiments were implemented to investigate the hemodynamic and cardiovascular effects of GBP. Treatment of rats with GBP (40 mg/kg/day, i.p.) as a single dose, for 3 days or 5 days significantly decreased the Mean Arterial Pressure (MAP) to 92.19±5.40, 92.8±4.43, 99.27±30 mmHg, respectively versus 109.5±1.73 mmHg in sham-operated (SO) rats. Furthermore, baseline heart rate (HR) was gradually increased reaching 439.18±14.92 beats/min after 5 days of GBP treatment, which was significantly higher than that of SO rats (341.9±10.30 beats/min). Measurement of baroreflex sensitivity (BRS) in rats showed that GBP significantly increased bradycardic responses to the vasopressor agent, phenylephrine (PE). The BRSPE in SO rats amounted to 1.97±0.16 beats/min/mmHg versus 2.92±0.23, 2.71±0.20, and 2.53±0.10 beats/min/mmHg in rats treated with GBP as a single dose, for 3 days or 5 days, respectively. In contrast, GBP blunted the tachycardic effects provoked by the vasodepressor agent, sodium nitroprusside (SNP). The BRSSNP was reduced from 3.66±0.25 beats/min/mmHg in SO rats to 2.05±0.20, 2.29±0.22, and 1.42±0.07 beats/min/mmHg in rats treated with GBP as a single dose, for 3 days or 5 days, respectively. In addition, in-vitro studies showed a reduction in the atrial Effective Refractory Period (ERP) upon GBP addition. Together, our data could explain the previously documented side effects and might shed some light on the pathophysiology of heart failure, arrhythmias, and sudden death following GBP treatment.

Teaching of Anatomical Sciences at the Faculty of Medicine and Medical Sciences

Jihad Hawi (University of Balamand & University of Balamand, Lebanon)

Teaching of Anatomical Sciences at the Faculty of Medicine and Medical Sciences, University of Balamand in Association with Saint George Hospital University Medical Center. Dr. JIHAD HAWI Faculty of Medicine and Medical Sciences, Department of Biomedical Sciences, University of Balamand. jihad.hawi@balamand.edu.lb The University of Balamand (UOB) was founded in 1988. The Faculty of Medicine and Medical Sciences started in 2001/2002 following the American model of education with two years of Basic Medical Sciences and two years of Clinical Sciences post the Bachelor degree. A major component of basic medical sciences is the human gross anatomy teaching. From 2001 till 2012, the anatomy course was given as a block course of fourteen weeks duration. From 2013 to date and following the new American advancement in the teaching program of Med I class, the course has been incorporated in the semi-integrated modular system which includes the anatomy, physiology, histology and embryology of the body systems. The anatomy teaching has been according to the objectives of the American Association of Clinical Anatomists. The anatomy course is divided into lectures and laboratory regional dissections. The lectures include the anatomical perspective given by basic anatomist, and the clinical perspective given by a specialist to stress applied anatomy in the clinical setting. The course emphasizes the importance of anatomy in the interpretation of radiographs, MRI, CT and ultrasound of the region under dissection. The laboratory sessions are cadaver-based dissections. Great emphasis is on individual dissections done by students following the Grant's dissector, studying skeletal material on display, anatomical charts and videos with a total number of 150 lab hours. Moreover, there are 90 lecture hours given by specialist in the field. In the laboratory, the students are divided into two sections. In each section, there is one anatomist and two general surgeons at a time to guide, explain and help students during dissections. Evaluation of student academic performance is done by written multiple choice exams and over the cadaver practical exams.

TECP1_Lumiere: Science et technologie de la lumière (Année internationale de la lumière- UNESCO)

Room: USJ Salle Zaarour

Chairs: Marie Abboud (Saint Joseph University, Lebanon), Mahmoud Korek (Beirut Arab University, Lebanon)

Calculation of relative biological effectiveness of ions for the domain of hadron therapy using numerical methods and the microdosimetry formalism

Sara Zein and Ziad Francis (Université Saint Joseph, Lebanon); Gérard Montarou (Université Blaise Pascal, France)

Ionizing radiation causes lethal damage to cells by directly or indirectly affecting the DNA structure. Almost all research in biophysics deals with damages and mutations of nuclear DNA; however, we are interested in effects of radiation on mitochondrial DNA. Although they seem to be small structures compared to the nucleus, mitochondria could reach to about two thousand in number inside one cell such as in liver cells and they control many vital processes such as energy metabolism, apoptosis regulation, reactive oxygen species production and cell signaling. In a way mitochondrial dysfunction may lead to carcinogenesis as well as other serious diseases such as optic atrophy and other neuromuscular pathologies. Therefore the study of damages caused to mitochondrial DNA is important in determining the mortality of cells. The mitochondrion ranges from 0.5 to 1μm in diameter so microdosimetry provides a good tool to study the detailed interaction of particle tracks inside the cells. We are interested in building a virtual model of the mitochondria and studying the microdosimetric effects of ionizing radiation using Geant4 which is a platform for the simulation of the passage of particles through matter using Monte Carlo methods. Geant4 can produce detailed tracks of particles and their secondaries along with their deposited energies in water targets. So far the main approach in microdosimetric calculations is using water targets, but we are interested in introducing the DNA as a potential target in our calculations. DNA nucleobases cross sections were calculated and will be introduced in Geant4 which will enable us to improve our simulation results. This way we are able to produce the microdosimetric spectra in DNA material as well as in water and compare the results. Moreover, hadron therapy is proving to be an effective therapy for cancer especially for radio resistant tumors. Using proton or ion beams in such treatments produces maximum damage to the tumor and at the same time prevents the negative effects of radiation on nearby sensitive organs. This is due to their high relative biological effectiveness compared to the traditional X-ray radiotherapy. Because of their high penetration ability, protons and ions will deposit most of their energy in a relatively localized position determined by their Bragg peak so that the surrounding tissues and organs are not affected. Having this in mind, we are applying the microdosimetric formalism to tracks of protons (and perhaps some other heavier ions such as carbon in the future). So we calculated and plotted the lineal energy distributions of protons in liquid water and in the 4 DNA nucleobases. We used different sizes for our targets. So far there are no experimental data to compare our results with but our work is promising and could be considered as a trigger to launch experiments in this direction.

Analysis of the speckle pattern produced by mixtures of polystyrene microspheres: an explanation of light's behavior in turbid media

Christelle Abou Nader (Université Saint Joseph & Université de Bretagne Occidentale, Lebanon); Rana Nassif (Université Saint Joseph, Lebanon); Fabrice Pellen and Guy Le Brun (Université de Bretagne Occidentale, France); Marie Abboud (Saint Joseph University, Lebanon); Bernard Le Jeune (Université de Bretagne Occidentale, France)

The study of coherent light scattered by turbid media has demonstrated its great potential for applications in many domains such as biomedical, agricultural and industrial fields. Biological media are generally composed of a mixture of different sized scatterers, which can encounter changes in their proportions and sizes because of the evolving character of such media. During the fruits ripening for example, large starch chains initially present in the unripe fruit are hydrolyzed into smaller molecules. Our experimental study aims to interpret phenomena observed on speckle pattern during fruits' maturation. Polystyrene microspheres of different diameters, suspended in deionized water, were used as scatterers in order to simulate media where both Rayleigh and Mie scatterers can be present, in different controlled percentages. It is known that Rayleigh scattering is applicable to particles that are much smaller than the optical wavelength, whereas Mie scattering is valid for homogeneous isotropic spheres of any size and it reduces to the Rayleigh theory when the particle is much smaller than the wavelength. The properties of the backscattered light are completely different in both cases. The change in the scatterers' size is controlled by the choice of spheres diameters. A He-Ne laser was used as a source of light with a half wave plate to regulate its intensity. The control of the incident beam's polarization was ensured using a polarizer generating linearly polarized light and a quarter-wave plate producing circularly polarized one. The diffused photons were collected by a CCD camera after passing by an analyzer and a quarter wave plate for polarization selection. The diffused backscattered light and the speckle pattern were studied. We determined experimentally the contribution changes in particle sizes and proportions to light depolarization and intensity distribution of the speckle pattern. The helicity flip of the circular degree of polarization showed a transition from a Mie scattering regime to a Rayleigh one for medium with a constitution of about 25% of Rayleigh scatterers. In the case of linearly polarized light, the linear depolarization induced by the sample decreases with the small particles proportions increase. For all polarizations, the larger the percentage of small particles in the sample, the larger the speckle grain size is. These results confirm that the study of the diffuse backscattered light with the means of the light's polarization degree and the speckle grain size is reliable for the detection of changes in media's particle size and proportions. Finally, the experimental observations were compared to Monte Carlo simulations and were found qualitatively consistent with experimental results, reinforcing the observations and interpretations made to explain the monitoring of fruits ripening through the study of polarized speckle pattern.

Determination of motion parameters using speckle patterns analysis techniques

Rana Nassif (Université Saint Joseph, Lebanon); Christelle Abou Nader (Université Saint Joseph & Université de Bretagne Occidentale, Lebanon); Fabrice Pellen and Guy Le Brun (Université de Bretagne Occidentale, France); Marie Abboud (Saint Joseph University, Lebanon); Bernard Le Jeune (Université de Bretagne Occidentale, France)

"Bio SPECKLE" is a phenomenon produced by laser illumination of biological media resulting from the temporally stationary interference of light scattered by diffusing objects. The visual appearance of the boiling speckle suggests the presence of a double time behavior: small grains with rapid change and large grains with a slow evolution. Scatterers movement and refractive index variation are at the origin of speckle temporal evolution. Diffusers movement varies with time in the case of a biological medium as in seeds or during fruits maturation. In our study, we aim comparing two approaches involving time resolved images and then determine which is most suited to the dynamic field regarded in terms of fidelity to the movement parameters. The main objective is to generate a priori known moving speckle, to study the capability to retrieve, through speckle images acquisition and processing, the frequency and the amplitude of the deterministic motion induced on the diffusing plate. For that purpose, we generate controlled boiling speckle by fixing the motion amplitude and frequency of a manufactured diffusing object. We considered the speckle images capacity and associated processing ability to retrieve and decorrelate imposed movement parameters. We performed different sets of experiments. For a given applied voltage Am, 100 mV or 500 mV, we vary the movement frequency Fm in the range [10, 200] mHz. Then, we fix the movement frequency to 20, 40, 60, 80 mHz or 100 mHz and vary the applied voltage between 50 and 3500 mV corresponding to a displacement in the range [0, 200] µm. Movement amplitude estimation for various applied voltages was estimated prior to conduct speckle experiment using a Michelson interferometer. Furthermore, transverse [1] and longitudinal vibration directions with respect to the incident laser beam were considered. We present two procedures to extract initial movement frequency and amplitude, either through the correlation calculus or through processing the Temporal History of the Speckle Pattern. We compare and discuss these two methods in terms of efficiency and ability to retrieve motion parameters. The first method commonly used to study speckle time variation consists in comparing recorded speckle images during a time interval by evaluating the speckle correlation coefficient C. The THSP image is the second method used to follow the variation of speckle images with time. It is generated by recording N continuous speckle images where only the middle column of each is chosen. The N columns are then juxtaposed according to their chronological order to compose a new image called the Time History of the Speckle Pattern.

Monte-Carlo modelling for radiation biology and hadrontherapy

Ziad Francis (Université Saint Joseph, Lebanon); Sebastien Incerti (CENBG, Bordeaux, Lebanon); Ziad El Bitar (Cnrs France, France); Sara Zein (Université Saint Joseph, Lebanon); Gérard Montarou (Université Blaise Pascal, France)

Monte-Carlo modelling for radiation biology and hadrontherapy Ziad Francis Saint Joseph University, Faculty of Sciences, Dep. of Physics, U.R. TVA. Radiation interaction with biological structures has been the field of interest for many studies in the last decade and the development of the applications in the medical field has been impressively fast. Such type of studies can be focused on different scales, in fact most of the results published in the literature are divided into two main fields dealing either with sub-cellular structures e.g. nuclear DNA, mitochondrial DNA or DNA bases, or studying the effects of radiation on the tissue and organic level mainly for radioprotection and radiotherapy purposes. Nowadays, biological experiments can reveal some of the reactions of the irradiated cells, in parallel, the complete understanding of the irradiation properties remains one important issue that plays a crucial role on the final radiation effectiveness. Depending on the irradiation type, the complete particle's track structure can be very difficult or even impossible to determine experimentally. Numerical simulations can be of help in this case, taking into account the necessary interaction properties and cross sections one can predict the detailed track structure of ionizing particles crossing a biological volume. Monte-Carlo simulations for radiation interactions have been a developing field since more than twenty years and it has been accompanied by the development of the microdosimetry formalism in an effort to further understand different irradiation properties on the micrometric scale. Both fields are of importance for radiobiology and radiotherapy studies, in fact, it is possible to predict many parameters that are directly related to biological radiation effectiveness e.g. DNA strand breaks ratios, base damages and cell survival probability. In this presentation the main challenges of today's radiobiology simulations will be targeted, and the solutions proposed by modeling physics are exposed. Applications including larger scale irradiations e.g. radiotherapy and cancer targeting, will be discussed.

The Geant4-DNA project: an open source platform for the simulation of ionizing radiation early biological damage on DNA

Sebastien Incerti (CENBG, Bordeaux, Lebanon); Ziad Francis (Université Saint Joseph, Lebanon); Ziad El Bitar (Cnrs France, France); Sara Zein (Université Saint Joseph, Lebanon); Gérard Montarou (Université Blaise Pascal, France)

Understanding and prediction of adverse effects of ionizing radiation at the cellular and sub-cellular scale remains a challenge of today's radiobiology research. In this context, a large experimental and modeling activity is currently taking place, aimed at better understanding the biological effects of ionizing radiation

at the sub-cellular scale. The "Geant4-DNA" project (http://geant4-dna.org) was initiated by the European Space Agency. It aims to develop an experimentally validated simulation platform for the modeling of early DNA damage induced by ionizing radiation, using modern computing tools and techniques. The platform is fully included in the general-purpose and open-source "Geant4" Monte Carlo simulation toolkit (http://geant4.org), and benefits from the toolkit's full transparency and free availability. We will present an overview of "Geant4-DNA" as well as on-going developments.

16:30 - 17:00

CB3: Pause-Café

16:30 - 17:15

conf1: Conference: Publishing tools from Nature Publishing group

Publishing tools from Nature Publishing group
Mr. Jon Giuliani-Head of NPG Middle East:

Room: USJ Salle Zaarour

17:00 - 18:30

BIO7_Medicale: Biological, Medical, Pharmaceutical, Health Sciences VII

Room: USJ CSM Amphi B
Chairs: Ziad Daoud (University of Balamand, Faculty of Medicine & Centre Hospitalier du Nord Hospital, Lebanon), Mireille Kallassy (Université Saint Joseph, Lebanon)

Anti-Tumor Efficacy of Arsenic/Interferon in Preclinical Models of Chronic Myeloid Leukemia Resistant to Tyrosine Kinase Inhibitors

Nagham Rasbieh, Rabab El-Eit, Ahmad Iskandarani, Mark Jabbour, Ahmad Santina and Ghazi Zaatari (American University of Beirut, Lebanon); Francois-Xavier Mahon (Hôpital Pellegrin, CHU de Bordeaux, Lebanon); Huges De Thé (Université Paris Diderot/ Inserm/ CNRS/ AP-HP, Lebanon); Ali Bazarbachi and Rihab Nasr (American University of Beirut, Lebanon)

Background and Aims: Chronic myeloid leukemia (CML) is a myeloproliferative disorder characterized by t(9;22) translocation that generates bcr-abl fusion gene coding for BCR-ABL oncoprotein with abnormal constitutive tyrosine kinase activity. Tyrosine kinase inhibitors (TKI) have been successfully established for the treatment of CML. Despite high rates of clinical response, CML patients can develop resistance against TKI mainly due to kinase domain mutations. Of special interest is T315I mutation, which accounts for 15-20% of mutations affecting ABL kinase domain. T315I confers resistance to almost all TKI. Ponatinib, the only TKI effective against T315I single but not T315I-inclusive compound mutations, was suspended due to its cardiac side effects and is currently limited to specific cases. Recently, we demonstrated that arsenic trioxide (ATO) and interferon alpha (IFNα) inhibited proliferation, induced apoptosis, prolonged survival and affected leukemia initiating cells activity in wild-type bcr-abl CML models. Here, we investigate the effect of ATO and IFNα on the proliferation of imatinib-resistant CML cell lines and its anti-tumor activity in CML mouse model harboring the T315I mutation. Methods: Imatinib-resistant K562 and AR230 CML cells were treated with different concentrations of ATO and IFNα. The effect of the treatment on cell proliferation was performed using MTT assay. Synergy analysis was calculated using the compusyn software. Using a retroviral bcr-abl T315I transduction murine CML model, we studied the effect of ATO/IFNα on the survival of leukemic mice harboring this famous mutation. Results: Our preliminary results demonstrated that ATO and IFNα synergized to inhibit the proliferation of imatinib-resistant CML cells. Importantly, this combination significantly prolongs the survival of CML mice carrying the T315I mutation. Conclusion: Our preliminary data provide clear evidence demonstrating a potential preclinical efficacy of ATO/IFNα in TKI-resistant CML models, specifically in CML mouse models with the T315I mutation, resistant to all available primary and secondary TKI.

Evaluation de l'Antibiothérapie et de la Résistance Bactérienne en Service de Soins Intensifs: Application en milieu Hospitalier Libanais

Souheir Ballout (Faculty of Pharmacy, Lebanese University, Lebanon); Amal El Hajj and Samar Rachidi (Université Libanaise, Lebanon); Batoul Diab (Faculty of Pharmacy, Lebanese University, Lebanon); Hussein Kanaan (Lebanese University, Lebanon); Salam El zein, Wafaa El Bawab and Pascale Salameh (Université Libanaise, Lebanon); Sanaa Awada (Faculty of Pharmacy, Lebanese University, Lebanon)

Introduction: L'émergence des bactéries multirésistantes (BMR) demeure actuellement un problème important de santé publique, favorisée surtout par une antibiothérapie inappropriée. La résistance bactérienne peut favoriser le développement d'un sepsis en service de soins intensifs. Au Liban, Les données sur l'émergence de sepsis, ses complications et son impact sur la mortalité, ainsi que sur la multirésistance bactérienne auprès des patients hospitalises sont rares et peu documentés Objectifs: Evaluer d'une part le profil des agents infectieux notamment des bactéries multiresistantes, et d'autre part le sepsis et ses critères de sévérité, ainsi que leurs impacts sur la mortalité chez des patients hospitalisés en service de soins intensifs. Méthodologie: Il s'agit d'une étude descriptive conduite rétrospectivement dans les unités de soins intensifs de deux hôpitaux libanais, incluant les patients hospitalisés, entre Février et juin 2012 ayant été traités par des antibiotiques et/ou développant un état de sepsis. Des fiches de recueil des données ont été remplies à partir des dossiers des patients. Des analyses binaires et logistiques ont été réalisées utilisant le SPSS version 20. Résultats: Au total, 248 patients ont été inclus dans cette étude dont 37.5% avaient un âge ? à 75 ans, 46.4% étaient hypertendus et 27.0% diabétiques. L'infection a été confirmée dans 70.9% des cas dont 76.7% étaient nosocomiales et 42.1% responsables d'une bactériémie alors qu'une résistance bactérienne était détectée chez 41.5% de la totalité des patients. Les pathogènes les plus rencontrés étaient l'Acinetobacter baumanii dont 84.0% étaient des BMR, les Entérobactériacés avec 63.4% des BMR, le Pseudomonas aeruginosa et Staphylococcus aureus avec 36.1% et 47.1% respectivement des BMR. L'Esherishia Coli était résistante dans 72.9% et 55.3% des cas à la ciprofloxacine et la ceftriaxone respectivement. Quant à l'Acinetobacter baumanii, il était résistant à l'amikacine et à l'imipenème dans 92.9% et 88.2% des cas respectivement. L'état de sepsis était diagnostiqué chez 90% des patients et chez 54.8% pendant les 24 premières heures d'hospitalisation. Un taux élevé de CRP, une hypo/hyperthermie, une tachycardie/tachypnée, une leucopénie/leucocytose et une hypo/hyperventilation apparaissaient respectivement dans 57.9%, 56.3%, 63.2%, 74.1% et 63.6% des cas. Ainsi, 60.8% des cas de sepsis étaient compliqués en sepsis sévère. L'hypotension, l'acidose métabolique, l'hypoxémie et l'oligurie ont été retrouvés dans 58.3%, 63.9%, 20.8% et 20.1% des patients respectivement. Le taux de mortalité était de 53.6% dont une majorité (92.5%) des patients décédés avait développé un état de sepsis avant le décès. La moyenne du score APACHE était 10.19±4.95, et son interprétation en termes de mortalité moyenne était de 13.81±8.76. Le taux de mortalité globale (53.6%) était significativement corrélée à l'âge ($p<0.001$), l'hôpital ($p<0.001$), la présence d'une bactériémie ($p=0.006$) et aux nombres d'ATB administrés ($p<0.001$) d'une part et des bactéries présents ($p=0.029$) d'autre part. Conclusion: Ces résultats préliminaires ont montré que l'état de sepsis et du sepsis sévère et la multi résistance bactérienne sont associés à un taux de mortalité élevé au Liban. Des études plus larges au niveau national seraient d'une importance cruciale afin d'améliorer la gestion de l'état de sepsis et la problématique de résistance bactérienne afin de minimiser leur incidence et leur impact sur la mortalité.

Evaluation of Comorbidities and Mortality among Lebanese Diabetic Patients by Two Comorbidity Scores: A Cohort Study

Batoul Diab (Faculty of Pharmacy, Lebanese University, Lebanon); Samar Rachidi (Université Libanaise, Lebanon); Akram Echtay (RHUU, Lebanon); Amal El Hajj (Université Libanaise, Lebanon); Souheir Ballout (Faculty of Pharmacy, Lebanese University, Lebanon); Wafaa El Bawab and Pascale Salameh (Université Libanaise, Lebanon); Sanaa Awada (Faculty of Pharmacy, Lebanese University, Lebanon)

Introduction: Comorbidity is associated with worse health outcomes, more complex clinical management, and increased health care costs. It is defined as the presence of one or more disorders (diseases) in addition to a primary disorder (disease). The aim of this study was to evaluate comorbidities in diabetic patients, and to assess the ability of Charlson Comorbidity Index (CCI) and Cumulative Illness Rating Scale (CIRS) to predict mortality in diabetic patients under study. Methods: A cohort retrospective pilot study was undertaken using data of patients admitted to Rafic Hariri University Hospital at the Internal Medicine ward during six months from November 2012 to April 2013. Only individuals diagnosed with type 2 diabetes were eligible to our study. Comorbidity information was collected using a standardized clinical form that is filled from medical records using two scores: CCI and CIRS. Bivariate analyses and Cox regression models were used to analyze the association between the two scores and mortality. Data was entered and analyzed using SPSS 17. Results: A total of 120 diabetic patients were enrolled in this study, with mean age 63.64 ± 11.81 from which 45% of them were women. Among the diabetic group 10% of comorbidities were related to diabetes, and 23.3% were not related. Neuropathy (50%) was the most prevalent diabetes mellitus (DM) related comorbidity and lung disease (67.5%) was the most prevalent non-DM related comorbidity. Based on the type of comorbidity: patients with both type of morbidity have longer length of stay compared to those with non-DM related comorbidity (18.14 vs. 9.43 days, p-value: 0.013). 12.5% of the diabetic patients died during hospitalization have both types of comorbidity. Neither

CCI nor CIRS was able to predict the mortality in patients under study. CCI score ≥5 increase the risk of death in comparison with CCI score <5 (OR: 1.41, p-value: 0.046), while those with CIRS score ≥20 double the risk of death in comparison with CIRS score <20 (OR: 1.67, p-value: 0.193). Conclusion: These results show that non-DM related comorbidity was more frequent in diabetic patients. Number of comorbidity was not associated with mortality of hospitalized patient. CCI provides a simple method of predicting mortality. But these findings, needs to be confirmed by further investigations in a larger sample. An increased awareness of the potential comorbidities in type-2 diabetes may provide insight into this disease and improve the outcome.

Co-morbidity in Lebanese Chronic Obstructive Pulmonary Disease Patients: Evaluation by two Comorbidity Scores

Lama Shamseddeen and Rana Younes (Faculty of Pharmacy, Lebanese University, Lebanon); Samar Rachidi (Université Libanaise, Lebanon); Akram Echtay (RHUU, Lebanon); Aseel Malas (Faculty of Pharmacy, Lebanese University, Lebanon); Amal El Hajj, Wafaa El Bawab and Pascale Salameh (Université Libanaise, Lebanon); Sanaa Awada (Faculty of Pharmacy, Lebanese University, Lebanon)

Introduction: Chronic Obstructive Pulmonary Disease (COPD) is associated with a relevant burden of disease and a high mortality worldwide. It is often associated with comorbidities that have a heavy burden in terms of hospitalization and mortality. However, in Lebanon resources concerning the assessment of comorbidities in COPD patients are scarce. Our aim is to assess whether the comorbid conditions related or not to COPD affect the length of hospital stay (LOS) and the mortality. Material and methods: A case-control retrospective pilot study was undertaken using data of patients admitted to Rafic Hariri University Hospital (RHUH) at the Internal Medicine (IM) ward during six months from November 2012 to April 2013. Comorbidity information was collected using the Charlson Comorbidity Index (CCI), Cumulative Illness Rating Scale (CIRS), and a standardized clinical form that is filled from medical records. CCI ranges between 0-31 and the score is considered severe if>5. CIRS ranges between 0-56, a high score (>10) is associated with poor prognosis. The outcome was the status of discharge and the mean LOS in hospital in days. Comparison between the two scores was done to check which score can predict mortality in the IM patients. Bivariate and multivariate analyses were conducted. Also, the impact of COPD on mortality was analyzed using Cox-Proportional hazard model. Data was entered and analyzed by SPSS 21. Results & Discussion: We included 250 patients (mean age 64.06 ± 11.7 years; 52.8% men). A diagnosis of COPD was found in 97 (38.8%) cases patients, while, the 153 non-COPD patients (61.2%) represent the controls. The mean number of comorbidities in COPD patients was 5.98 ±2.5 with no significant difference between cases and controls (p=0.840). Predictably, the COPD patients have higher prevalence of lung cancer (p=0.003) and sleep disorders (p =0.007). Regarding the scores, no significant difference between COPD and non-COPD patients in comorbidities assessed by the total CIRS (p=0.051) and total CCI scores (p=0.984). This difference became significant after the exclusion of COPD from CIRS score (p=0.001) but not for CCI score. This association remained after categorized the scores where most COPD patients had a CIRS-noCOPD score ≤ 10 (p=0.002) or had CCI-noCOPD score between 2 to 5 (p=0.002). However COPD by itself affected neither mortality nor the LOS in hospital. The mean LOS was 14.3±15.3 days and there was no significant difference between the cases and controls (p=0.133). The multiple linear regression analysis, demonstrates that infection (p=0.001), CIRS>5 (p=0.019), creatinine clearance (p<0.001) increase the LOS of patients. However, Mortality was estimated to be affected by age>65 y (HR: 2.653, p<0.001; 95%CI: 1.639- 4.293) and CIRS>2 (HR: 2.096, p<0.011; 95%CI: 1.187-3.701). Taking COPD group by itself, pneumonia (?=9.383, p<0.001), CIRS (?=1.083, p<0.001) and CrCl (?=0.078, p<0.001) affected LOS in hospital. Whereas those affecting mortality included age>65 (HR=5.761, p=0.007) and malnutrition (HR=3.219, p=0.049). Conclusion: This study provides insight to the association between comorbidities and COPD. The results of the first trial in this area are promising. These results underline the importance of managing comorbidities. Moreover, we suggest a large scale study which takes into account the duration of COPD, and to study the impact of COPD on the therapeutic progression. Keywords: COPD; comorbidities; Charlson Comorbidity Index; Cumulative illness Rating Scale; Mortality; Length of Hospitalization. REFERENCES 1.M. Chan-Yeung et al. The burden and impact of COPD in Asia and Africa. International Journal of Tuberculosis and Lung Disease 2004. 8(1):2-14 2.M. A. Tageldin, S. Nafti , J.A. Khan, C. Nejjari et al. 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Evaluation of colistin-carbapenems combination in clinical isolates of Acinetobacter baumannii using the checkerboard technique

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Evaluation of colistin-carbapenems combination in clinical isolates of Acinetobacter baumannii using the checkerboard technique Micheline Hajjar[a], Elias Dahdouh[b], Ziad Daoud[b], Dolla Karam Sarkis[a] [a]Rodolphe Merieux Laboratory, School of Pharmacy, Saint- Joseph University, Beirut, Lebanon. [b]Clinical Microbiology, Faculty of Medicine and Medical Sciences University of Balamand, Koura, Lebanon. Introduction: Acinetobacter baumannii is an important causative agent of health care associated infections. The high prevalence of antibiotic resistance in this organism calls for the detection of related mechanisms and for the assessment of the combination colistin- carbapenems as a treatment option in patients infected with Extensive Drug Resistant A.baumannii. Methods: 100 non-duplicate consecutive Acinetobacter baumannii isolates were collected from various clinical specimens of patients admitted at Saint George Hospital-University Medical Center, Beirut between June 2013 and June 2014. API 20 NE was used for the biochemical identification. Beta-lactamase inhibitor-impregnated and incorporated agar was performed as previously described (Birgy et al., 2012) for the detection of different beta-lactamases. Phenylboronic acid (10mg/ml), cloxacillin (0.3g/l), and EDTA (5mM) were used as carbapenemase inhibitors for the phenotypic detection of KPC, AmpC, and MBL, respectively. The difference in the inhibition zone sizes of carbapenems (imipenem and meropenem) between control and embedded Muller-Hinton agars was considered positive for the production of carbapenemase when the diameter of inhibition exceeded 10mm. ESBL was detected by the observation of a keyhole effect in presence of clavulanate and a 3rd or 4th generation cephalosporin. MICs of imipenem, meropenem, and colistin were detected by micro dilution methods and the results were extrapolated according to the CLSI guidelines (2013). The FIC (Fractional Inhibitory Concentration) was determined in order to evaluate the synergistic potential of the combination using the checkerboard technique (FIC ≤.0.5 is considered synergistic, 0.5< FIC≤ 2 additive, 2< FIC< 4 indifferent, and FIC ≥ 4 antagonistic). Results: Phenotypically, four strains (4 %) were AmpC producers, twelve (12 %) were positive for KPC, and six (6 %) for MBL (Figure 2). The keyhole effect, suggesting ESBL production, was observed in thirty-one strains (31 %). In addition, ten of the strains (10 %) phenotypically expressed more than one mechanism of resistance. The MIC results showed that 63 % of the strains were resistant to imipenem, 74% were resistant to meropenem, and 5 % were resistant to colistin. The combination of both colistin-meropenem and colistin-imipenem was additive for ninety-three strains (93%) and ninety-four strains respectively (0.5<FIC<2). Only few strains were affected synergistically by the tested combinations (FIC ≤.0.5). In addition, the effect of combination was indifferent with 2 strains (2< FIC< 4) (Figure 1). Conclusion: This study shows clearly the high prevalence of resistance to carbapenems in Acinetobacter baumannii isolated from the SGH-UMC. The combination of colistin-carbapenem tends to show an additive effect rather than synergy. This put a question mark about the efficiency of using these 2 drugs in combination when the strain is resistant to carbapenems. These results, if proven in vivo, suggest an amendment to the guidelines or common practice of Extensive Drug Resistant A.baumannii treatment. Figure 1: colistin-carbapenem combination; FIC: Fractional inhibitory concentration; ΧΣFIC: mean of fractional inhibitory concentration; Mer: meropenem; Imp: imipenem; Col: colistin FIC< 0.5: synergistic; 05<FIC<2: additive, 2<FIC<4: indifferent, FIC>4antagonism

La place des tests salivaires dans l'élaboration des plans de traitements curatifs et préventifs en dentisterie pédiatrique

Guitta Abi Nasr, Nada Farhat Mchayleh, Pascale Harb and Joyce Tannous (Saint Joseph University, Lebanon)

La carie dentaire est une maladie infectieuse, dynamique, multifactorielle et transmissible. Elle se développe à la suite des attaques acides sur la surface dentaire. L'acide est secrété principalement par les micro-organismes de la cavité buccale quand ces derniers sont en présence du sucre. L'élément prédominant, dans la réponse de l'hôte à l'activité carieuse, est la salive à travers son pouvoir tampon, ses composants reminéralisants et son action antibactérienne. Si l'équilibre de la fonction salivaire est en désordre, le risque carieux augmente. Les tests salivaires, qui sont effectués au cabinet dentaire, constituent un outil de diagnostic qui permet d'examiner et de détecter les troubles qui peuvent survenir au niveau des composants salivaires. Ces tests fournissent des renseignements sur la consistance de la salive, le pH salivaire, le débit salivaire, l'effet tampon et plusieurs autres composants de la salive. Malgré toutes ses informations, l'utilisation des tests salivaires, comme outil de diagnostic dans la pratique quotidienne des dentistes, reste limitée. Tout ceci a poussé le département de dentisterie pédiatrique et communautaire de la faculté de médecine dentaire de l'USJ, à effectuer une étude qui a pour objectifs de comparer les plans de traitements préventifs et curatifs avant et après avoir effectué les tests salivaires, et d'évaluer l'impact des résultats de ces tests sur la motivation des enfants et des parents à la prévention de la carie dentaire. Cette étude a pour but d'augmenter les chances d'identification des facteurs de risque carieux individuels du patient et d'améliorer sa motivation et celle de ses parents à la prévention de la carie. L'étude clinique a été réalisée auprès de 67 enfants âgés de 5 à 12 ans et leurs parents, qui ont visité le centre de soins de la FMD pour une première consultation. Les plans de traitements curatifs et préventifs établis avant et après les tests salivaires ont été comparés et, le nombre de modifications survenues à ces plans a été enregistré. En parallèle, les changements détectés au niveau de la motivation des parents et des enfants vis-à-vis de la prévention de la carie dentaire ont été évalués à partir d'une

auto évaluation sur une échelle numérique allant de 0 à 10. Les résultats ont montré des changements au niveau des plans de traitements curatifs de 23.9% et préventifs de 83.9%. Le nombre moyen de changement au niveau du plan de traitement curatif est de 1.00 ± 2.325 et au niveau du plan de traitement préventif est de 3.03 ± 1.992. Les résultats ont montré aussi que le score de motivation des enfants, après avoir lu les résultats des tests, a augmenté de 22.6% et celui des parents de 19.3%. En effet, ces résultats ont dévoilé que des facteurs de risque individuels, non identifiables par les examens cliniques de routine ont été repéré à partir de ces tests salivaires, ce qui a induit des modifications au niveau des plans de traitements et ceci a permis à l'opérateur de décrire une stratégie d'intervention et de prévention mieux orientée et plus individualisée. Les tests salivaires constituent un outil de diagnostic important qui pourrait aider à établir un plan de traitement curatif et préventif mieux adapté aux facteurs de risque carieux individuels du patient et contribuent à l'amélioration de la motivation des parents et des enfants à la prévention de la carie dentaire. Des études supplémentaires plus poussées pourraient consolider ces résultats et mener à l'introduction de cet outil de diagnostic dans la pratique quotidienne du dentiste.

BIO9_Biologie: Biological, Medical, Pharmaceutical, Health Sciences IX

Room: USJ CSM C3

Chairs: Bassam Badran (Lebanese University, Lebanon), Nassim Fares (University of Saint Joseph, Lebanon)

L'établissement et le développement du microbiote intestinal du nouveau-né prématuré: l'expérience libanaise

Tarek Itani (Université Saint Joseph, Lebanon); Carole Ayoub Moubareck (Saint Joseph University, Lebanon); Regina Geitani (Saint Joseph University & Laboratoire Rodolphe Mérieux, Lebanon); Imad Melki (Hôpital Hôtel Dieu de France, Lebanon); Irène Mangin and Marie-José Butel (Université Descartes, France); Dolla Karam Sarkis (Université Saint Joseph, Lebanon)

Introduction. L'établissement du microbiote est une étape importante dans la mise en place des fonctions intestinales. Le déséquilibre de ce microbiote joue un rôle direct dans la physiopathologie de certaines maladies infectieuses comme l'entérocolite ulcéro-nécrosante (ECUN) et le sepsis. De plus, ce microbiote joue un rôle indirect dans certaines maladies non-infectieuses (comme l'allergie, l'asthme, l'obésité, le diabète de type 1 et même certains cancers), conséquences tardives d'une dysbiose chez le prématuré. La cinétique d'établissement du microbiote intestinal chez le nouveau-né (NN) prématuré se distingue de celle décrite chez le NN né à terme. Les objectifs de ce travail sont: - Analyser lemicrobiote intestinal au cours du 1ermois de vie du NN prématuréà l'Hôpital Hôtel Dieu de France au Liban; pays pour lequel peu de données existent à ce jour. - Etudier l'incidence de l'ECUN à l'Hôpital Hôtel Dieu de France. - Décrire un profil de colonisation typique des NN atteints d'ECUN. Méthodes. L'étude s'est déroulée de Janvier 2013 à Décembre 2014. Tous les NN prématurés ne présentant pas de malformations ou de maladies métaboliques, ont été inclus dans cette étude.Des échantillons de selles ont été prélevés une fois par semaine au cours du 1er mois de vie. L'ADN total a été extrait par une technique de Bead-beating/phénol-chloroforme. Le microbiote de tous les NN prématurés a été analysé par 2 techniques indépendantes de la culture: i) PCR en temps réel (qPCR) en utilisant des amorces qui détectent les gènes codant l'ARNr23S (pour les entérobactéries) ou l'ARNr16S (pour Bifidobacterium, Bacteroides/Prevotella, groupe Clostridium leptum, groupe Clostridium coccoides, Clostridium du cluster I, Clostridium du cluster XI, groupe Lactobacillus/Leuconostoc, genre Enterococcus, genre Staphylococcus). ii) Electrophorèse en conditions dénaturante (Temperature Temporal Gel Electrophoresis TTGE). qui est une technique d'électrophorèse sur gel de polyacrylamide qui permet la séparation des fragments d'ADN de même taille mais de séquences différentes. Les fragments d'ADN sont soumis à un gradient de température qui provoque une dénaturation des 2 brins d'ADN dont la composition en bases, surtout en cytosine et guanine, définit le profil de migration spécifique. Le microbiote des cas d'ECUN et d'autres cas témoins ont été analysés en plus des deux techniques citées auparavant -culture-indépendantes- par culture classique réalisée en aérobiose et en anaérobiose pour rechercher des éventuelles bactéries pathogènes ou des microorganismes non-détectés par qPCR. Résultats et discussion. Cette étude a inclus 43 NN prématurés, d'âge gestationnel moyen de 32,5±2,5 SA, de poids à la naissance 1923±633g, majoritairement accouchés par césarienne (n=39), de sexe masculin (n= 28) et allaités (n=39). A la première semaine de vie, 70 % des NN sont colonisés par Staphylococcus, 56% par Enterococcus, 55% par Enterobacteriaceae, 48% par Bifidobacterium et 30% par Lactobacillus. Les genres Bacteroides et Clostridium sont plus rarement identifiés (≤11%). A 1 mois de vie, tous les NN étaient colonisés par le genre Staphylococcus à des taux élevés pouvant atteindre 10 log10UFC/g de fèces, mais environ ¼ d'entre eux n'étaient pas colonisés par Enterococcus (78% de colonisés), et Enterobacteriaceae (72% de colonisés) (niveaux moyens 6,9 et 8,9 log10 UFC/g, respectivement). Le genre Bifidobacterium a été détecté chez77% des NN, mais à des niveaux plus faibles (6±1,2 log10 UFC/g). La colonisation par Lactobacillus est restée peu importante (28%, niveau moyen 5,9 log10UFC/g). Une augmentation de la colonisation par Enterococcus, Enterobacteriaceae et Bifidobacterium et une augmentation de la colonisation par Bacteroides (22,2%) et Clostridium du Cluster I (39%) à la quatrième semaine de vie ont

été observées. Les groupes Clostridium leptum, Clostridium coccoides et Clostridium du cluster XI n'ont été que faiblement détectés. En bref, on note une prédominance des bactéries anaérobies facultatives, par qPCR et TTGE, alors que les bactéries anaérobies représentent une faible fraction du microbiote des prématurés (<13% à la première semaine et <3,5% à la quatrième semaine de vie) malgré un pourcentage relativement élevé de NN colonisés par les bifidobactéries. L'incidence de l'ECUN a été de 11,6% (5/43), ce qui est légèrement supérieur au taux de 5 à 10% dans les études publiées en Europe et aux Etats-Unis. L'analyse par culture des NN atteints d'ECUN et de quelques cas témoins a montré: - un retard de colonisation par les bactéries anaérobies strictes chez le groupe ECUN, - une colonisation supérieure par des bactéries potentiellement incriminées dans la physiopathologie de l'ECUN (Enterobacter spp., Klebsiella spp., Serratia spp.) - une colonisation par Clostridium perfringens (2 cas/5), bactérie souvent impliquée dans l'ECUN Conclusion. Les NN prématurés libanais sont colonisés au cours du premier mois de vie par une communauté microbienne simple avec une diversité limitée, comme cela a été décrit dans d'autres pays. Tous les NN sont colonisés par des staphylocoques et la colonisation par le genre Bifidobacterium, considérée comme bénéfique, est cependant relativement importante par rapport à des NN d'autres pays, mais reste à des niveaux sous-dominants. La colonisation par les lactobacilles est faible pendant le premier mois de vie. Les différences de colonisation entre le groupe ECUN et le groupe contrôle doivent être confirmées par une étude plus large.

Tracheal suctioning: Utilizing Ambu-bag versus Ventilator?!

Nesrine Hayek (Beirut Arab University, Lebanon); Eman Zahran (BAU, Lebanon)

Tracheal suctioning(TS) is periodically warranted in mechanically ventilated patients to maintain airway patency, and clear secretions. Hypoxemia is considered as the most common and serious complication of TS. This study was conducted to determine the effect of Manual Resuscitation Bag(MRB) versus mechanical hyperoxygenation on the incidence of suctioning associated hypoxemia, in critically intubated patients. This study was conducted at the Critical Care Units(CCUs) of Rafic Hariri University Hospital, Beirut, Lebanon. It included 60 mechanically ventilated patients. One tool was developed and used to collect necessary data; "Suctioning related physiological response assessment sheet". It included two parts: part(1) hemodynamic response parameters, used to collect data about heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, and presence of cardiac dysrhythmias, and part(2) respiratory response parameters, which included arterial blood gases parameters, in addition to hypoxemic index, P(A-a) gradient, respiratory rate, peak airway pressure and cough reflex. Suctioning was done for each patient using both methods, twice. When comparing between both suctioning methods, it was found that HR elevated after TS by five minutes using MV method secondary to decreased PaO2 and SaO2, where PH decreases significantly five minutes after TS using MRB method, however this drop is not clinically significant to cause fatal complications and/or arrest. Oxygen index becomes better after TS using MRB method secondary to hyperventilation and increased FiO2, but it worsens using MV method possibly secondary to lost positive pressure and PEEP. A-a gradient worsens immediately after TS using MRB method secondary to the direct loss of PEEP when patient disconnected from MV for TS. But using MV, it becomes better after TS by five minutes secondary to the maintained PEEP before disconnecting ETT from MV for TS, where hyper-oxygenating is given to the patient during inspiration using MV, then disconnected from MV for TS. Thus MRB method is little bit better than MV for hyper-oxygenation in patients with normal lung, which would be fatal in patients with poor lung compliance(i.e. ARDS), requiring high PEEP, and are already on 100% FiO2 before TS. RR increased immediately after TS using MV method as a body response to compensate slightly decreased PH, PaO2 and SaO2.

Impact of Evidence Based Guidelines of Endo-Tracheal Tube Suctioning on Decreasing Pain among Premature Neonates

Awatif Elsharlawy (Beirut Arab University & Alexandria University, Lebanon)

Annually, More than 12 million neonates are born prematurely worldwide each year. Preterm newborns transfer abruptly from the protective intrauterine environment to the neonatal intensive care unit (NICU), where they undergo essential diagnostic and therapeutic life-saving and invasive care-related procedures. One of the most routine procedures done in NICU is nasal, pharyngeal and endo-tracheal tube suctioning (ETS). It was reported that 63.6% of the procedures were done on neonates is suctioning. Even though, ETS is performed to maintain upper air way permeability, it is not a safe procedure. So, there are prudence that routine suctioning should be avoided as it causes neonatal pain and increases chance of mucosal trauma, and infection. Recently, there is sufficient evidence that pain due to painful procedures as ETS is increasing the likelihood of short and long term deleterious consequences. So, pain management requires competent pain assessment. All neonates in the NICU have standard assessments of pain, which include premature infant pain profile scale (PIPP) for preterm and term neonates less than 2 months of age. A quasi experimental design was implemented. This study was conducted at the neonatal intensive care unit of EL-Raml hospital, Alexandria , Egypt. A convenient sample of 30 neonates who fulfilled the following criteria was involved: intubated preterm neonate (at least for 8 hours and up to 24 hours), postnatal age is less than 2 months of age and connected with pulse oximeter. Four tools were used for data collection. They constitute maturity rating scale of the preterm neonate, preterm neonate health assessment sheet, endo-tracheal tube suctioning observational checklist and premature infant pain profile (PIPP). It was evident that the majority of preterm in the control group (70%) have more than 10 score in PIPP so, they had moderate pain during endo-tracheal suctioning. On the other hand, the score of 86.7% of preterm in the study group was less than or equal 5 that is mean that procedure did not cause pain for them. There was statistical significant difference between both groups. It was concluded that preterm neonates exhibited less pain when they are suctioned following evidence based guidelines of endo-tracheal tube suctioning. It was recommended that in service training program for NICU nurses about evidence based guidelines of endo-tracheal suction is crucial and must be established.

Effect of maternal diabetes on fetal programming of vascular remodeling mechanisms in adult rats

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Modifications of the intra-uterine environment are now recognized as an important cause of fetal stress, leading to several responses such as loss of structure/function and pre-emptive adaptations to an adverse post-natal environment, and finally to adult diseases. In this way, it has been demonstrated that children of diabetic mothers have an increased risk to develop cardiovascular diseases (i.e. hypertension) during adulthood. Blood vessels are able to reorganize their structure in response to physiological alteration of blood flow (i.e. physical activity or increased blood flow involving expensive remodeling) or pathological stimuli (i.e. hypertension or decreased blood flow involving constrictive remodeling). Constrictive vascular remodeling is currently associated with the occurrence of cardiovascular diseases. Thus, our objective was to study vascular remodeling in case of in utero exposure to maternal diabetes in order to investigate the effect of intra-uterine environment perturbations on vascular fetal programming. We developed an animal model of rats exposed in utero to moderated maternal hyperglycemia (DMO), which developed an hypertension around 6 months of age. We analyzed structure of elastic and resistance arteries (internal diameter, MCSA, intima-media thickness and remodeling parameters) in absence or presence of established hypertension in male DMO compared to controls (CMO) (at 3 and 18 months of age). Moreover, by in vivo sequential ligation of mesenteric arteries, we studied vascular remodeling of resistance arteries in response to low (LF), normal (NF), or high flow (HF). In old DMO, we did not observe any vascular remodeling induced by hypertension neither in aorta nor in mesenteric arteries. This could be related to the increase of smooth muscle cell attachments that we observed. Moreover, after 1 or 3 weeks of mesenteric arteries ligation, DMO did not exhibit any constrictive remodeling in LF although expansive remodeling in HF is maintained. Interestingly, in LF arteries of theses animals, we measured an increase of eNOS activity and GP91 although transglutaminase-2 protein expression is not modified. Our results demonstrate that in utero exposure to maternal diabetes induce modification of vascular remodeling mechanisms in adulthood. This absence of vascular response could be a pre-emptive adaptation to fetal programmed hypertension in these animals.

La collaboration interprofessionnelle dans un hôpital universitaire Libanais

Michèle Kosremelli Asmar and Joumana Stéphan Yeretzian (Saint-Joseph University - Institut de Gestion de la Santé et de la Protection Sociale, Lebanon)

La collaboration interprofessionnelle (CIP) est un concept novateur qui émerge en sciences de gestion qui est appliqué surtout dans le secteur de la santé. Elle devient un véritable enjeu pour les organisations et la valeur stratégique des relations étroites avec les partenaires n'est plus à démontrer. Le travail collaboratif devient ainsi un levier de réactivité, de productivité et d'innovation pour les organisations. A l'instar d'autres secteurs, le secteur de la santé subit depuis quelques années des transformations fondamentales qui ne sont pas sans avoir des implications majeures sur les structures organisationnelles, les compétences et les rôles des professionnels de santé. Tout comme les entreprises, les hôpitaux, élément central de ces systèmes, se trouvent confrontés à la remise en cause de leur organisation de travail en raison des nombreuses pressions et des problèmes de plus en plus complexes auxquels ils font face. La rareté des ressources et des moyens et le besoin de les optimiser, la quête d'une meilleure qualité de soins et la nécessité de rationaliser les coûts ont poussé à réfléchir sur la manière requise pour atteindre une meilleure intégration et coordination des compétences des acteurs de ces systèmes. L'hôpital incarne l'exemple-type d'une bureaucratie professionnelle caractérisée par des unités organisationnelles différenciées dans lesquelles œuvrent des groupes de professionnels nombreux qui travaillent selon des valeurs et des objectifs qui leurs sont propres. Ces professionnels varient non seulement d'une spécialité à l'autre mais aussi à l'intérieur de chaque spécialité et se confinent le plus souvent à l'intérieur de silos, générant ainsi des frontières intra organisationnelles. Ces organisations sont définies ces organisations comme « les plus complexes de la société occidentale ». Cette complexité émane de la double hiérarchie médicale et administrative qui caractérise les hôpitaux et elle est inhérente à la nature interdisciplinaire de l'activité des établissements de santé. Elle résulte des notions de pouvoir, de responsabilité et d'autorité qui sont le plus souvent éclatées au sein de ces établissements et de l'existence quasi permanente d'équipes hétérogènes. L'ensemble de ces caractéristiques fait donc de l'hôpital une organisation particulière, différente des organisations industrielles. Ces caractéristiques sont considérées significatives parce qu'elles existent simultanément au sein des hôpitaux. C'est en fait la confluence des professionnels, de la technologie et des attributs de la tâche qui rend les hôpitaux complexes. Aujourd'hui, les modèles de fonctionnement en silos ne semblent plus répondre de manière adéquate aux enjeux actuels des hôpitaux qui sont de générer entre les professionnels de nouvelles capacités de travail collectif. Ces dernières deviennent indispensables pour « contrer la rigidité organisationnelle intrinsèque à la plupart des organisations de santé ». Elles ne sont cependant pas faciles à instaurer puisqu'elles viennent à l'encontre de la suprématie des médecins et semblent remettre en question leur autonomie. Malgré ceci, il serait souhaitable que les hôpitaux cherchent à s'adapter à l'interne tout en accordant une plus grande place à l'innovation par l'instauration de nouvelles approches visant la réduction de la fragmentation croissante dont souffrent les services de santé. La création de valeur ne pourra se réaliser tant que les différents professionnels ne seront pas prêts à collaborer et à

coordonner leurs activités pour permettre une meilleure prise en charge des patients. Dans ce contexte, cette recherche se propose, à partir d'une étude de cas, de comprendre le phénomène de la pratique en collaboration interprofessionnelle au sein d'un centre hospitalier universitaire au Liban. La méthodologie a consisté en une revue de littérature, l'analyse de documents, des entretiens semi-directifs avec des professionnels de santé et des observations dans des unités de soins. Le résultat de notre recherche consiste en un modèle générique de la collaboration interprofessionnelle qui: • Place le patient, sa famille et ses besoins au centre de la CIP • Préserve les spécificités des identités professionnelles • Tient compte des complémentarités et des interdépendances entre les professionnels • Prend en considération les structures et contextes • Fait apparaitre les formes potentielles de collaboration Le modèle finale comprend six composantes ainsi que les liens externes et internes qui les lient. Notre recherche constitue un premier travail sur la CIP dans une institution de santé libanaise. Elle investigue l'influence des déterminants systémiques, organisationnels et interactionnels et met l'emphase sur des éléments de l'organisation qui devraient être changés pour que la collaboration interprofessionnelle réussisse. Elle permet aussi d'affirmer la nécessité d'étudier les facteurs systémiques et de comprendre comment ils influencent la CIP. Elle identifie des actions concrètes à privilégier pour favoriser la mise en œuvre de ce concept en capitalisant d'une part, sur les facteurs favorables identifiés et en agissant d'autre part, sur les facteurs contraignants qui constituent des pistes d'actions potentielles. Certaines de ces actions doivent se développer à un niveau macro, alors que d'autres visent le niveau micro des organisations.

Assessment of cardiovascular surgical infection prophylaxis in a Lebanese hospital

Diana Malaeb and Mary Younes (Lebanese International University, Lebanon)

Introduction: The appropriate use of antibiotics prophylaxis reduces the incidence of surgical site infections. Despite advances in antiseptic measures, antibiotics, and preoperative precautions, infections are common complications from surgeries. This study was conducted to assess the appropriateness of the prescription of antibiotics prophylaxis prior to cardiac surgery among hospitalized patients in the geographic area of Lebanon. Methods: This was a retrospective, observational, single center study conducted at a public Lebanese teaching hospital from February till April 2014. Data was collected from computerized data bases for hospitalized patients who did cardiac surgeries between January 2010 till December 2013. Patients above eighteen years old undergoing Coronary Artery By-pass Graft (CABG), valve surgery, or both were eligible for study enrollment. Excluded were patients younger than eighteen years of age, prior intake of antibiotics, or had another concomitant surgery with the cardiac. Consistency with the guidelines was evaluated for appropriate route of administration, choice, preoperative timing, duration, dosing, and redosing of antibiotics. The Institutional Review Board (IRB) approved the study design. Data was analyzed by the SPSS version 20.0 and presented as frequency/percentage and mean ± standard deviation (SD). Results: A total of 3000 patients were initially screened where only 245 patients met the inclusion criteria. Baseline age of the participants was 58.91 ± 13.65 years (mean ±standard deviation SD), and a body mass index of 28.19 ± 5.19 Kg/m2. The enrolled participants were on different intravenous antibiotic regimens, where 188 (76.7 percent) patients were on vancomycin and ceftriaxone , 15 (6.1 percent) on vancomycin and cefuroxime, 13 (5.3 percent) on ceftriaxone, 12 (4.9 percent) on vancomycin, 6 (2.4 percent) on cefuroxime, 2 (0.8 percent) on clindamycin), and the others were on combination of gentamicin and a cephalosporin. Only twelve (4.9 percent) from the enrolled patients were consistent with the treatment guidelines regarding the choice of the antibiotic. For those patients who were given the appropriate antibiotics, proper dose was found in only seven patients (58.7 percent), and out of five patients (2 percent) who required redosing only four were given the appropriate doses, as for preoperative timing it was appropriate for all of those cases (i.e. within 120 minutes of incision for vancomycin and within 60 minutes for cefuroxime and clindamycin). Prophylaxis was extended beyond one day in 173 patients (70.61 percent) and the average duration was 2.8531 days ± 2.07514. Conclusion: This study demonstrates that in cardiac surgery, the optimal choice of antibiotics is seldom administered, duration of prophylaxis is excessively long, and the preoperative dose timing is rarely employed. More education and communication are required to improve these practices to reduce risks of surgical site infection, prevent resistance, and limit costs potentially associated with antibiotic misuse. The role of clinical pharmacist may facilitate this process across all surgical disciplines through interventions that should be implemented to optimize the perioperative antibiotic prophylaxis in procedures.

ENG6_CCE: Engineering VI

Room: USJ CSH 206

Chairs: Rony Darazi (Antonine University, Lebanon), Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Color Image Segmentation for Agriculture Soil Images Based on Self-Organizing Maps and Hierarchical Clustering

Chantal Hajjar (USJ, Lebanon); Yolla Chamoun (University of Saint-Joseph, Lebanon); Gilles Fleury (CentraleSupelec, France)

In this contribution, we propose a color image segmentation technique for soil images in order to detect soil textures and color, the major two criteria used in soil characterization. Our technique consists of two

phases. In the first phase, a color reduction is performed through a self-organizing map. In the second phase, a hierarchical clustering of the self-organizing map is performed to ensure the final classification of the pixels. This double stage image segmentation has been proved to give better results than conventional clustering methods. Unlike other soil segmentation methods, the proposed technique is deterministic and the final number of clusters or colors is automatically detected. The main objective of this method is to provide an automatic soil plots analysis while overcoming the limitations that may arise from laboratory analysis. Encouraging results were obtained when this technique was applied to images taken from vineyards located in South Beqaa in Lebanon

A Novel Neural Networks Implementation Algorithm of Logical Circuits

Ahmad Kobeissi, Rola Kassem and Ali Massoud Haidar (Beirut Arab University, Lebanon)

Since its birth in 1943, neural networks proved itself as a powerful and efficient computational system. A system of neural networks is capable of handling tasks similar to the way a human handles it. Even though it is not yet widely recognized, many researchers around the globe are becoming interested in this field because of the tendency towards artificial intelligence it possess. There is a recent interest in the field of artificial neural networks (ANN) because of the new techniques and a better understanding of their capabilities. In order to measure the abilities of a neural design, it have been compared to a traditional logical design. Implementations of various computational designs in neural networks have been successfully done. This requires the construction of a neural design with exact computational function as the traditional logical design. The construction of an ANN is usually done manually, which is a time and effort consuming process. But the constructed neural design may contain more than the needed nodes (neurons) which will affect the testing results and time complexity of the neural design. Furthermore, manual neural networks implementation of big size designs, in terms of number of inputs and components, is extensively hard to accomplish. So we thought of a solution for this adversity by suggesting an automatic mechanism for implementing computational designs in neural networks. In our paper, an implementation algorithm for ANN is proposed for generating the smallest possible and most efficient neural design while still conserving the function of the source logical design. The algorithm uses our self-prepared neural models of logic gates. It then checks for matches of these models to the logical model at hand. Matching to logical gates is very important for the size of the networks to get less at every match. After checking for matches, the algorithm makes a direct conversion of the remaining cases, if any, into neural analogous. Finally, after taking all components into consideration, it generates an ANN design. A similar approach was done by Andrei Dinu, Marcian N. Cirstea, and Silvia E. Cirstea in their IEEE letter "Direct Neural-Network Hardware-Implementation Algorithm". They made an algorithm that implements neural networks in hardware, which generates a logical hardware description language code from an ANN with Boolean functions. The algorithm was tested on a various collection of logical designs. The ANN designs were robust. The resultant ANN was generated successfully for all input designs. The function was preserved and the network's size was minimal. The algorithm made a great degrade in implementation time. In basic simulation, it only took a few second to generate a logical design containing about fifty component and twenty inputs. Simulating the algorithm can be easily done by software; using Matlab or written in a high level programming language. It can also be hardware simulated using programmed circuitry. The algorithm can benefit some improvements in structure and design. An upgrade to the algorithm would be to fix incomplete truth tables. Another one is to consider recursive functions to implement. An important improvement also would be to check for similar neural paths and try to eliminate redundancies. We believe that this algorithm is a possible solution for implementing artificial neural designs as logical functions. It is most needed when testing the abilities of an ANN compared to its competitor the traditional logical design.

SemIndex: Semantic-Aware Inverted Index on Textual Data

Joe Tekli (Lebanese American University (LAU) & UPPA Laboratory, University of Pau & Adour Countries, Lebanon); Richard Chbeir (LIUPPA - Pau University, France); Marc Al Assad (Lebanese American University (LAU), Lebanon); Carlos Raymundo Ibanez (Universidad Peruana de Ciencias Aplicadas, Peru); Agma J. M. Traina and Caetano Traina-Jr (University of Sao Paulo, Brazil); Kokou Yetongnon (LE2I - Bourgogne University, France)

This paper covers the problem of semantic-aware search in textual (structured or NoSQL) databases. This problem has emerged as a required extension of the standard containment keyword based query to meet user needs in textual databases and IR applications. We provide here a general framework for modeling semantic-aware queries and constructing a semantic-aware inverted index called SemIndex. Our approach extends the standard inverted index by constructing a tight coupling inverted index graph that combines two main resources: a general purpose semantic network, and a standard inverted index on a collection of textual data. We also provide an extended query model and related processing algorithms with the help of SemIndex. To investigate its effectiveness, we discuss the physical design of SemIndex using a standard commercial RDBMS to store and query its graph, thus enabling the system to easily scale and handle large volumes of data. We have conducted a battery of large scale experiments to test the performance of SemIndex. Results have demonstrated the effectiveness and scalability of our approach in both index construction and query processing time.

Even-Odd Mode Analysis of a Tri-band Branch-Line Coupler Based on Double-Lorentz Transmission Lines

Jalal Jomaah and Hussam Ayad (Lebanese University, Lebanon); Majida Fadlallah (Lebanese University, France); Fabien Ndagijimana (University Joseph Fourier & IMEP-LAHC lab, France); Fatima Mazeh (Lebanese University, Lebanon)

This paper presents the even-odd mode analysis of a tri-band branch-line coupler (BLC) based on double-Lorentz (DL) transmission lines (TLs) metamaterial. This analysis utilizes superposition and circuit symmetry to solve for the structure's scattering parameters

Lignes de propagation microruban à ondes lentes sur un substrat double couche

Heba El-Halabi (Beirut Arab University, Lebanon); Hamza Issa (Beirut Arab University - Debbieh - Damour Branch, Lebanon); Darine Kaddour (LCIS, Grenoble INP, France); Akil Jrad (Lebanese University, Sciences 3, Lebanon); Soubhi Abou Chahine (Beirut Arab University, Lebanon); Philippe Ferrari (University Grenoble Alpes, IMEP-LAHC, CNRS, France)

Cet article présente une topologie de lignes microruban à ondes lentes réalisées en technologie PCB. L'effet d'onde lente est obtenu par l'ajout de vias borgnes métallisés connectés au plan de masse de la ligne microruban, engendrant une forte miniaturisation des circuits réalisés. Une miniaturisation de 35 % par rapport à la même structure réalisée en ligne microruban classique est obtenue.

COMIQUAL: Collaborative Measurement of Internet Quality in Lebanon

Marc Ibrahim (Saint Joseph University & Saint Joseph University - ESIB, Lebanon); Maroun Chamoun (Saint Joseph University Beirut, Lebanon); Rima Kilany (Saint-Jospeh University, France); Nicolas Rouhana (Université Saint-Joseph, Lebanon); Melhem El Helou (Saint Joseph University of Beirut, Lebanon)

With the continuous growth of both fixed and mobile Internet usage, measuring the Internet quality becomes of vital interest for all involved Internet stakeholders, mainly consumers, operators, and regulators. In this respect, Large-scale measurement platforms can be considered as an important tool to help all stakeholders to get a deep insight about Internet access, and this is exactly the main purpose of COMIQUAL (Collaborative Measurement of Internet Quality in Lebanon), an ongoing Internet measurement project. By building a collaborative large-scale measurement platform that coordinates and collects measurements from measurements agents (MAs) installed on fixed and mobile end-user devices, COMIQUAL is able to quantitatively assess the Internet access quality in Lebanon from the user's perspective. The MAs that execute mainly active measurements are jointly controlled by users and by a measurement center (MC) that send measurement instructions to MAs and collects the measurement results. The communication protocol between MC and MAs uses JSON messages that are exchanged via HTTP through REST calls, and secured by HTTPs. Measurement results could be openly accessed in their raw format or viewed in an aggregated format via a google map. Moreover, an online statistical tool under development will allow user-defined statistics generation. Although COMIQUAL platform is universal and can be used anywhere, some special features are tailored to the Lebanese context such as the measurement anchor installed in Beirut IXP in order to assess the performance of this important national interconnection point. All these features combined to the flexibility added to the platform management are the main drivers that will allow COMIQUAL to reach its ultimate goal, which is to create a collaborative, neutral, and transparent observatory of the Internet in Lebanon.

ENG5_BIOM: Engineering V

Room: USJ CSH 208

Chairs: Tilda Akiki (University Holy Spirit Kaslik, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

Implementation of Snoring Relief System Based on Voice Recognition & Non-invasive Nerve Stimulation

Walid Kamali, Nafez Haddad and Walid El Haj (AL-Manar University of Tripoli, Lebanon)

Numerous people young and old suffer from snoring and heavy snoring phenomenon. Snoring is a sound that is generated and produced usually during sleep by the vibration of loose tissue in the upper airway of the respiratory system. Snoring is one symptom of a group of disorders known as sleep disordered breathing. It occurs mechanically when the soft palate, uvula, tongue, tonsils and other muscles in the back of the throat rub against each other and generate a vibratory sound. Heavy snoring does not only cause cessation of breathing intermittently and abruptly, but continues to deprive the human body of much needed oxygen, increase frequent wake-ups, strains the heart, and may cause loss of focus and concentration to try to alleviate the snoring symptoms and all its effects on snorers, a device called

Snoring Relief System (SRS) is set to be our development goal. This device responds to individual's snoring by producing light vibration that forces him/her to adjust his/her sleeping position. Snoring Relief System is user friendly, totally non-invasive and can be customized to the snorer needs.

Myoelectrically Controlled Prosthetic Grip with Slip Feedback Mechanism

Rana Youssef and Wadih Sayyah (Lebanese International University (LIU), Lebanon); Ali Hage-Diab (Lebanese International University, Lebanon)

This project introduces a myoelectrically-controlled partial-hand prosthesis with automatic sensory feedback system. The design senses an electromyogram (EMG) signal from the bicep when contracted. This EMG signal is amplified and filtered and then sent to a microcontroller. The microcontroller converts this signal to a pulse signal to drive the servomotor; which opens the prosthetic hand. A novel design of slipping sensor is used to make the prosthetic hand hold different objects properly without exerting extra pressure, which might damage the grabbed object. This system tends to meet every amputee's budget to have access to the prosthetic hand.

Reverse Paternalism in Lebanon: An Engineering Ethics Dilemma

Sarah Hammoud, Zahraa Chahrour, Ali Hage-Diab and Bassam Hussein (Lebanese International University, Lebanon)

It can sometimes be very hard to distinguish between active choosing and paternalism, reverse paternalism and paternalism, which is only separated by a fine line. Basically, paternalism is usually defined as a decision taken for someone "for their own good". Alternatively, an act can only determined if paternalistic by reference to the reasons for which the state acts. Our main focus will be on the relation between paternalism and reverse paternalism with the engineering, medical, and biomedical engineering society. When has a doctor the right to hide information, and when is he/she supposed to interfere, and who decides if the doctor really does know better? Should something like reverse paternalism be allowed in certain cases? To what extent is there control and supervision over what happens at all the hospitals, and companies, especially here in Lebanon?

Management System of Medical Equipment in Hospitals

Mohammad Rammal (Nabateye & LIU, Lebanon); Ahmad Jaffal (Nabateye, Lebanon); Mohamad Hajj-Hassan (Lebanese International University, Lebanon)

In the hospital, the management of medical equipment is a series of activities from budget planning to equipment disposing. The overall activities focus on issues such as quality, safety, performance, cost, and profit. An efficient and effective management system is necessary for supervising these goals. The main problem faced in most of the Lebanese hospitals is the over load that is applied from both paper work and maintenance issues at the same time resulting in department breakdown and/or limitations. In this paper, an equipment service life-cycle model applied in these activities for in-house clinical engineering department is shown, beside an in-house cycle management, in addition to a tool of communication with the other departments in the hospital. Some information systems were built by the management system and the information of management operations in clinical engineering department can be systematic collected and revealed at different life-cycle stages by these systems. Through the management system, the management activities can be easily integrated, and medical care quality and patient's safety are improved.

FEA4_AGR: Food security, Environment, Agriculture IV

Room: USJ CSH 305

Chairs: Yolla Chamoun (University of Saint-Joseph, Lebanon), Lara Hanna Wakim (Holy Spirit University of Kaslik, Lebanon)

Pathogenicity of Verticillium dahliae isolates from olive in Lebanon

Wassim Habib (Lebanese Agricultural Research Institute, Lebanon); Chadi Berhal (Lebanese University, Lebanon); Elvis Gerges, Carine Saab, Farah Baroudy and Elia Choueiri (Lebanese Agricultural Research Institute, Lebanon)

Olive (Olea europaea L.) is a long-living and legendary tree with more than economical importance in Mediterranean region. The olive future as a strategic commodity in Mediterranean agriculture is threatened by diverse biotic (traditional and new/emerging pests and diseases) and abiotic (erosion, climate change) menaces. One of the major constraints for olive cultivation is Verticillium Wilt of Olive (VWO), a vascular disease caused by the soil-borne fungus Verticillium dahliae Kleb., and resulting in substantially reduced fruit yield and tree death. The lack of effectiveness of fungicides and the establishment of the fungus in the soil require an implementation of an integrated disease management strategy to control the disease, starting by a proper disease assessment. Indeed, the pathogen is characterized by great genetic and morphologic variability. One of the main factors of this diversity is the existence of two pathotypes based on their ability to cause leaf fall. The most severe is called Defoliant (D) pathotype and the second is named Non-Defoliant (ND) pathotype that can cause milder symptoms on olive trees (Rodríguez-Jurado et al., 1993). In a recent survey carried out on olive in Lebanon, the

frequency of V. dahliae - infected trees was 25.7% and almost half of inspected sites comprised at least one infected tree (Habib et al., 2014). Data on the pathogenicity of the collected isolates and their pathotype are yet not available. For that, the objectives of the present study were to assess the pathogenicity of 83 Lebanese V. dahliae isolates by biological test on cotton seedlings and to identify the Defoliant (D) and Non-Defoliant (ND) pathotypes among the isolates by PCR-based molecular techniques, in order to contribute to a proper IPM strategy for the management of this severe disease in Lebanon. Biological test was performed by inoculating conidial suspensions of Lebanese isolates together with three reference international isolates in cotton seedlings. The plants were allowed to grow in controlled room for two months during which three different disease parameters were studied: Relative Area Under the Disease Progress Curve (RAUDPC), maximum severity (Sm) and incubation period (IP). Analyses of variance showed significant differences between the isolates for each parameter. Cluster analysis grouped the isolates into High Virulence (Mean RAUDPC=46.0%, Sm=2.5, IP=17.7 days), Moderate Virulence (Mean RAUDPC=31.2%, Sm=1.5, IP=18.4 days) and Low Virulence (Mean RAUDPC=19.7%, Sm=1.2, IP=32.1 days) pathogenicity groups. The majority of isolates (79%) belonged to high or moderate virulence groups. Correlation was done among parameters of pathogenicity, origin and morphological characteristics of the isolates and significance was revealed between pathogenicity and morphological characteristics. On the other hand, DNA was extracted from the mycelium of all isolates and a PCR protocol to determine the Defoliant (D) and Non-Defoliant (ND) pathotypes was set up. Preliminary results showed that all the inspected isolates belonged to ND pathotype. Experiments are ongoing to confirm this finding. Further correlation with vegetative compatibility groups (VCGs) and a survey on the incidence of V. dahliae in Lebanese olive nurseries would be recommended for an efficient disease management.

Evaluation préliminaire de la teneur en huile et du profil des acides gras des variétés d'olives cultivées au Liban

Milad El Riachy (Lebanese Agricultural Research Institute, Lebanon); Rabih Ayoub (L'Université Libanaise, Lebanon); Maria Breidi (Lebanese Agricultural Research Institute, Lebanon); Lamis Chalak (The Lebanese University, Lebanon)

La teneur en huile d'olive est influencée par plusieurs facteurs comme le facteur génétique, la maturation des fruits, les conditions climatiques et la productivité de l'arbre, tandis que la composition de l'huile en acides gras semble être principalement affectée par le facteur génétique, les conditions climatiques et la phase de maturation du fruit. En outre, les normes commerciales appliquées sur l'huile d'olive vierge ont défini des critères chimiques spécifiques, y compris le profil des acides gras pour déterminer la qualité et la pureté de cette huile comme mesure pour protéger le consommateur contre l'adultération et l'industrie contre la concurrence fictive. Cette étude a consisté à spécifier les caractéristiques liées à la teneur en huile et la composition en acides gras de 12 variétés d'olive cultivées dans différentes conditions pédoclimatiques au Liban et incluant « Soury », « Ayrouni », « Baladi », « Roumani », « Edlbi », « Bou Chawkeh », et « Dal ». Les résultats ont montré une grande variabilité de la teneur en huile aussi bien sur matière sèche que sur matière humide. En effet, la teneur en huile sur matière sèche a varié entre 37,55 % (« Baladi » de Kousba) et 54,27 % (« Baladi », Ijd Ibrine), tandis que la teneur en huile sur matière humide variait entre 21,59 % (« Dal », Bakkifa) et 30,36 % (« Soury », Ain Baal). En outre, aucune corrélation n'a été observée entre l'indice de maturité et la teneur en huile sur matière sèche (R2 = 0,138) ou sur matière humide (R2 = 0,051). Ces résultats montrent que la variété est le principal facteur qui détermine la teneur en huile des olives. En outre, aucune différence qualitative des profils d'acides gras n'a été observée tandis qu'une différence quantitative a été notée dans le cas des acides gras majeurs, notamment l'acide oléique, l'acide palmitique, l'acide linoléique; l'acide stéarique; et l'acide linolénique. Les valeurs obtenues sont en accord avec le règlement CEE 2568/91 et aux normes commerciales du conseil oléicole international (COI).

Forest Mapping- A comparison Between Two Different Hyperspectral Satellite Images

Mohamad Mostafa Awad (National Council for Scientifc Research, Lebanon); Bassem Al-Awar (National Council for Scientific Research, Lebanon)

Mapping forests in Lebanon is an important process in managing such valuable natural resources. At present and due to spectral resolution limitations, multispectral satellite images cannot give complete separation between different forest species. In contrary, advances in remote sensing technology have provided hyperspectral images as a solution for accurate determination of forest species. A comparison is conducted between two different satellite hyperspectral images. The first one is Hyperion provided by National Aeronautics Space Agency (NASA), and the second one is the multi-angle CHRIS-Proba provided by the European Space Agency (ESA). Although the dates of two images are not the same, but the two images are of the same area size. Several issues related to the use of hyperspectral images will be investigated and analyzed. In addition, the classification of both images is based on using ASD FieldSpec 4 Hi-Res Spectroradiometer. The results are used to (i) prove that hyperspectral image are efficient in discriminating the forests such as Stone Pine "Pinus pinea" (ii) the superiority of one enhanced type of hyperspectral image (Hyperion) in discriminating "Pinus pinea" over the other type of hyperspectral image CHRIS-Proba. The results show that Hyperion with accuracy equal to 92% is better than CHRIS-Proba with accuracy equal to 81%

Extraction of polyphenols from viticulture and winemaking byproducts

Hiba N. Rajha (Universite Saint Joseph (usj) Lebanon & Faculte des Sciences, Lebanon); Nadia Boussetta (Université de Technologie de Compiègne, France);

Zeina Hobaika (Université Saint Joseph de Beyrouth, Lebanon); Eugene Vorobiev (Université de Technologie de Compiègne, France); Nicolas Louka (Saint Joseph University, Lebanon); Richard G. Maroun (Université Saint Joseph de Beyrouth, Lebanon)

These studies summarize our major findings in terms of vine shoots and grape pomace valorization. Conventional and innovative processes were used for phenolic compounds (PC) extraction. Vine shoots are abundant pruning wastes. Few studies were conducted on PC extraction from these byproducts. As to grape pomaces, these are the major (62%) winemaking wastes resulting from grape pressing. Consisting of skins, seeds and stems, they represent 20% of the grape weight. Environmental problems are related to vine pruning and grape pomace disposal. When burying these wastes, the quality of the soil and groundwater is changed affecting thus the fauna and the flora. If burned, vine shoots are likely to produce toxic methoxyphenols. If used as fertilizers, grape pomace might prevent germination properties. Lebanon is one of the first countries in the world to implement a vineyard. The climate, soil and parasitic conditions are very favorable to the vine cultivation. It is a traditional culture for the production of wine, table grapes and the traditional alcoholic Lebanese drink Arak. In 2012, Lebanon has produced 92,000 tons of wine grapes cultivated in 2000 ha. Seven million bottles of wine were therefore manufactured. PC are secondary metabolites of the plant, with over 8000 identified structures. They play many physiological functions, such as contributing in the pigmentation, attracting pollinators and protecting the plant from UV light. Many health beneficial effects were shown to be related to plant consumption since PC have antioxidant, antibacterial, antifungal, anticancer, antiradical and antiviral effects. The interest in the extraction process of those bioactive molecules increased since they have many applications in the food, pharmaceutical and cosmetic industries. Conventional solid liquid extraction (CSLE) process is still used on an industrial level for the extraction of PC. However, during the last decencies, innovative environmental-friendly methods have been established to intensify the extraction processes, decreasing chemical use and operational time, thus saving real and energetic costs. Amongst the non-conventional extraction methods, ultrasounds (US), pulsed electric fields (PEF), high-voltage electrical discharges (HVED) and accelerated solvent extraction (ASE) have shown their efficiency in enhancing PC extraction from vine shoots and grape pomace. In this work the effect of many experimental conditions on the CSLE of PC from grape pomace and vine shoots was studied. Grape pomace treatments have shown that particle size reduction accelerates the PC extraction. To reach almost the same polyphenol yield (PY), 0.083 hours were necessary when grape pomace is grinded, while 2.33 hours are needed without a grinding pretreatment. Temperature elevation was shown to reduce the overall duration of the process and simultaneously increase PC diffusion. Similarly, the addition of ethanol up to 70% enhances 10 times the PY. The drying process of grape pomace results in the degradation of half of the quantity of PC. The treatment of wet grape pomace with ASE permitted the amelioration of the PY up to 3 times compared to the hydroethanolic CSLE (Table 1). Pretreatment Treatment Solvent Solid Liquid ratio Time (hours) Temperature (°C) Polyphenols (g GAE/100 g DM) Grinding CSLE Water 1:4 28 37 0.52 Grinding CSLE Water 1:4 0.083 88 1.1 - CSLE Water 1:4 2.33 81 1.4 Grinding CSLE 70 % Ethanol/water 1:3 24 25 0.97 Grinding CSLE 70 % Ethanol/water 1:3 1.55 94 5.5 Grinding ASE 70 % ethanol/water 1:2.63 0.25 140 16.2 Drying and grinding ASE 70 % ethanol/water 1:2.63 0.25 140 7.28 Table 1: Experimental conditions for polyphenol extraction from grape pomace. PY is given in g of Gallic acid equivalent (GAE)/100g of Dry matter (DM). Pretreatment Treatment Solvent Polyphenols (g GAE/100 g DM) Cutting into cylinders CSLE Water 0.07 Cutting into cylinders CSLE β-Cyclodextrin 0.314 Cutting into cylinders CSLE 50 % ethanol/ water 1.3 Cutting into cylinders CSLE 1 M NaOH 2.6 Cutting into cylinders + US (3428 kJ/kg) CSLE 0.1 M NaOH 1.5 Cutting into cylinders + PEF (762 kJ/kg) CSLE 0.1 M NaOH 2.2 Cutting into cylinders +HVED (254 kJ/kg) CSLE 0.1 M NaOH 3.5 Table 2: Experimental conditions for PC extraction from vine shoots. All vine shoots used in the study had a particle size of 6cm-1 and a solid to liquid ratio of 1: 20. The diffusion time was 3 hours and the temperature 50°C. PY is given in g of Gallic acid equivalent (GAE)/100g of Dry matter (DM). Vine shoots valorization was also conducted by polyphenol CSLE with water, β-Cyclodextrin (β-CD), 50% ethanol/water and sodium hydroxide (NaOH). The addition of β-CD (37.7 mg/mL) to water enhances 5 times the extraction of PC from vine shoots, while 50% ethanol/water solvent ameliorates by 18 times the process. The alkaline (1 M of NaOH) extraction of PC from vine shoots induced the highest PY (2.6 g GAE/100 g DM) amongst all the studied solvents (Table 2). US, PEF or HVED pretreatments were conducted on vine shoots prior to the alkaline extraction (0.1 M NaOH) process to further enhance PC diffusion. HVED was the most efficient pretreatment. It enhanced 2.3 times the PC extraction from vine shoots compared to US, while PEF ameliorated the process by 1.5 times. Compared to hydroethanolic CSLE, the use of the innovative technology HVED ameliorates by 2.7 times the PY. In conclusion, wet grape pomaces are a rich source of PC, favorably extracted by ASE with 70% ethanol/water solvent under high temperature (140 ºC) and pressure. Moreover, PC extraction from vine shoots is the most efficient when the HVED pretreatment is followed by a diffusion in alkaline conditions. The importance of waste management is related to the worldwide priority of sustainable development avoiding resource depletion. In Lebanon, viticulture and winemaking byproducts valorization decreases their environmental influence and increases their economic impact

Safeguarding and Restoring Lebanon's Woodland Resources

Garo Haroutunian (Ministry of Environment, Lebanon)

The "Safeguarding and Restoring Lebanon's Woodland Resources Project" (SRLWRP) implemented 3 different sets of field trials in 8 pilot sites on different new reforestation techniques, extending from 2011 till 2014. Because of current high costs of reforestation in Lebanon estimated at around 7,000 USD per hectare (at a density of 800 seedlings/Ha), the main objective of the field trials was to assess the prospects of successful reforestation in Lebanon at low costs and possibly without any irrigation. Natural regeneration capabilities are limited in Lebanon, due to the low availability of seeds. There are a few

mature cedars and pines, but these are heavily harvested for seeds and nuts. Therefore, in the past years, planting of seedlings has been the most widely used method of reforestation in Lebanon. However, direct sowing of seeds can be another successful method and it can provide excellent results at lower cost, if implemented at the right timing and in proper soil conditions, despite of low germination/survival rates. Containerized plants produce higher quality seedlings for outplanting. Common irrigation methods in Lebanon include hand-watering, drip irrigation, or deep pipe systems; hydrogels ("solid water") are a relatively new method of supplementing water at reforestation sites and have been tested by the SRLWR Project for the first time in Lebanon. Cost estimates for reforestation in Lebanon range from 4,400 USD to over 10,000 USD per ha and are higher than those reported in most countries. Although under past nursery practices, older seedlings were thought to regenerate better, the SRLWRP planting trials indicated that younger seedlings (8-10 months old) actually do as well as the 18 months old seedlings. Three successive sets of trials were implemented throughout Lebanon for testing new techniques to reduce planting costs and improve seedling survival. These planting trials were the first test of new reforestation techniques in the country in almost 50 years. Irrigation (including two novel methods), seedling age, seeding techniques, soil preparation methods and soil texture were compared. Data gathered was used to condense and compare costs of treatment combinations for P. pinea graphically and with a generalized linear mixed model statistical analysis. C. libani results were only for one silt-clay site, where high germination for irrigated seed planting but minimal overall survival was observed. Out of the 42 different treatment combinations assessed, one of the most promising findings was that direct seeding without irrigation can be used in some cases at very low costs (1,360 USD/ha). Test results showed that for Pinus pinea, the most promising cost-effective (<1,500 USD/ha at a density of 800 seedlings per ha) planting method was seed planting without irrigation on sandy soil. (Just under half of Cedrus libani seeds planted without irrigation on a silt-clay site germinated but zero survived). The next best choice was planting seedlings on sandy soil without irrigation (2,300-3,900 USD/ha of 800 seedlings). Survival was not different among the different ages tested (range of 8 to 18-months old seedlings). Novel water methods did not increase survival rate as compared to conventional hose irrigation, and some of these were much more costly than conventional irrigation. Overall, survival of Pinus pinea was better in sandy soils than on silt-clay soils, but further study on silt-clay soils is needed. Different soil preparation methods (hand or mechanical preparation, or none) did not result in significant differences in survival. In parallel, the project provided technical support to local tree seedling producing nurseries aiming at raising their capacities and enable them to shift from conventional production methods to modern nursery techniques. It is worth mentioning that during the past 5 years there has been remarkable progress in the production of tree seedlings by Lebanese nurseries. Whereas till 2009 most nurseries produced seedlings in nylon bags, production trends have shifted towards the use of plastic containers, as recommended by international experts and as practiced in modern nurseries of the USA and Europe. The process of production of container seedlings passed through several stages, and between 2010 and 2014, 3 generations of container seedlings were produced. While the first generation seedlings (used in set 1 trials) were of relatively low quality, the third generation seedlings (used in set 3 trials and the large-scale field applications) were practically comparable to seedlings produced in developed countries. Acknowledgments. The authors acknowledge the Ministry of Environment, UNDP and GEF for their support as well as the members of the project steering committee, national and international consultants for their technical assistance. References Adili B, Aouni MHE, Balandier P. 2013. Unravelling the influence of light, litter and understorey vegetation on Pinus pinea natural regeneration. Forestry 86: 297-304. Christopoulou O. 2011. Deforestation/reforestation in Mediterranean Europe: the case of Greece. In: Godone D, Stanchi S, editors. Soil erosion studies. 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Chemical composition and antimicrobial activity of the essential oil of Juniperus excelsa M. Bieb. growing wild in Lebanon

Marc El Beyrouthy (Holy Spirit University of Kaslik, Lebanon); Didier Stein (CNRS France, Lebanon); Naim Ouaini (Holy Spirit University of Kaslik, Lebanon); Madona Khoury (USEK and ICSN-CNRS, Lebanon)

Antimicrobial resistance is neither a surprising nor a new phenomenon. However, infections are becoming more common and more severe while the research and development of new antimicrobials stagnates. Antimicrobial potential of aromatic plants has been recognized since antiquity and is mainly attributed to their chemically diverse volatile organic compounds (VOCs) [1, 2]. Inspired by plant defenses, we undertook to look for and understand possible synergies between plant VOCs. Juniperus excelsa M. Bieb. commonly known as Greek juniper is wide-spread in Lebanon and locally known as "lezzab" or "chajarit al bakhour". Juniper is well known in herbal medicine to have antifungal, disinfectant, and insect repellent properties. This particular plant has been used as a traditional remedy to treat cough, bronchitis, tuberculosis, jaundice, and hyperactive gastrointestinal and respiratory disorders [3, 4]. This study focuses on the analysis of the chemical composition of the essential oil from the twigs and foliage of J. excelsa and the evaluation of its antimicrobial activity against opportunistic human pathogens.

The oils were isolated by hydrodistillation using a Clevenger-type apparatus and analysed by GC and GC-MS. The antimicrobial activity (MIC) was evaluated using broth microdilution techniques against a Gram (+) and a Gram (-) bacterium, a yeast and a dermatophyte. Twenty-eight constituents were identified and accounted for 90.1 - 95.6 % of the total oil. The essential oils of the leaves and twigs were composed of monoterpene hydrocarbons (46.7 - 59.6 %) and sesquiterpenes (32.1 - 39.4 %) essentially. The main components were α-pinene, α-cedrol and δ-3-carene. The J. excelsa EOs revealed interesting in vitro antimicrobial activities against Staphylococcus aureus and Trichophyton rubrum (MIC = 64 and 128 µg/ml, respectively). In order to demonstrate possible interactions between the components of this oil, the three major compounds were tested separately and in combination according to their respective amounts in the oil. Its main constituents α-pinene, α-cedrol and δ-3-carene did not show any significant antibacterial activity alone (MIC S. aureus > 512 µg/ml) while the synthetic EO did recover some activity (MIC = 256 µg/ml) suggesting a potential synergy between these compounds. However, the contribution of the minor constituents cannot be neglected. With T. rubrum, the combination of α-pinene and δ-3-carene seems to account for the antifungal activity of the EOs, even though synergies are probably involved.

MCS2_computer: Mathematics and Computer Sciences II

Room: USJ CSH 306

Chairs: Rami Haddad (Université Saint Joseph, Lebanon), Raafat Talhouk (Lebanese University, Lebanon)

Factors to Consider while Choosing a WSN Routing Protocol and Simulating LEACH

Hiba Bazzi and Ali Massoud Haidar (Beirut Arab University, Lebanon)

lifetime of a node is a critical concern in wireless sensor network (WSN). Nowadays networks are becoming large, so data collected is becoming even larger, which all consume great amount of energy leading to an early death of a node .Therefore, researches are done to minimize the energy used in data sampling and collection to prolong the life time of a network. Through years several routing protocols are proposed and enhanced. In this paper we introduce several factors to consider before choosing and implementing a routing protocol.we also examined LEACH routing protocol using matlab.

Compiler for beginners

Michel Tabib and Georges Badr (Université Antonine, Lebanon)

Implementing a programming language means bridging the gap from the programmer's high-level thinking to the machine's zeros and ones. If this is done in an efficient and reliable way, programmers can concentrate on the actual problems they have to solve, rather than on the details of machines. But understanding the whole chain from languages to machines is still an essential part of the training of any serious programmer. It will result in a more competent programmer, who will, moreover, be able to develop new languages. A new language is often the best way to solve a problem and less difficult than it may sound. Our new language will be simple English language. Our compiler will be working backwards from normal compilers. We will be resulting JAVA code from simple English commands, in order to let the user (mainly a student or a beginner) learn programming and understand algorithms. How can we develop such a program that can be able to understand English, non-developer commands to transform them into java code in order to teach students how to code? And how this compiler responds to non-sense commands? If the calculations are made on every command, how to deal this the time complexity to make the best performance? Limited by the constraints, understanding human language and transforming it to machine language was and still hard to implement since it is a context grammar and language. Programming languages are context-free grammars. Humans are having problems understanding each other's so how to make machine understand them in efficient smart way and how to overcome the complexity under these calculations. Some technologies were developed to approach this target and hopefully to overcome this constraint. Between these technologies, we focus on the Natural Language Processing (NLP). NLP, as its name shows, processes human language. This is done by defining keywords, known as tokens, which will be the base of defining the language. Many researchers and engineers are using this technology especially the search engines So in order to use the Natural Language Processing technology, we should be careful of how and what tokenizing (key storing) and try to take as many scenarios as possible into consideration, because as the figure 1 shows that the behavior when using the NLP become unpredictable (just like humans) and the complexity and memory consumption may be wide due to the required large key storing. Advantages Disadvantages Relieves burdens of learning syntax Require more key storing No trainings Is unpredictable May not show context Figure 1. Advantages and Disadvantages of NLP Therefore, we are presenting a solution that reads the needs form the user and transforms it in JAVA code ready to be executed. To our knowledge, this kind of compilers does not exist yet. The main objective of this program is to show to the user the JAVA source code of what he needs, and to run the code so he can see the results. This compiler processes user data, translates it from natural language, returns the source code to be executed and displays the result. Users, especially students having their first programming course will be able to understand programming, as they will learn by example. To be able to do all this, this compiler is divided into many phases: - Definition of the grammar: we used an English dictionary to check if all the words written by the user are grammatically

correct. - Lexical analysis phase that extracts tokens and keywords from users command (i.e. sum, from, to…). In this part, we analyze the sentence word by word (for lexical errors) - Syntax analysis phase in which we verify the order of the tokens and their spelling by comparing them to the grammar defined for this purpose in order to accept the command or to output an error. (i.e. to comes after from) - Semantic analysis phase that controls the meaning of the commands; we process the whole input (for semantic errors), and in this part we used the Natural Language Processing and the algorithm of the next and previous. - Code generation phase in which user data are transformed to JAVA code. - Error generation phase, a parallel phase in which every error should be found as will as its type. Let's say that the user needs to write the code that calculates the sum of numbers between 1 and 10. He just expresses his needs with a command. For example: "compute the sum from 1 to 10". The output for the example stated before will be: int sum=0; for (int i=1; i<=10; i++) { sum = sum + i ; } The solution was developed in JAVA, and the user interacts with a friendly graphical interface. Step by step the user will be familiar to algorithms and then to development. Acknowledgments go to the Faculty of Engineering of Antonine University who contributed to our training, during all the years of expertise.

TIN CAN Client Elgg Plug-In: A Proposed Solution to Integrate Social Media with E-Learning Technology

Amine Bitar and Antoine Melki (University of Balamand, Lebanon); Michel Georges Chammas (University of Balamand & MA3BAR, IOHANES-DHC, Lebanon)

Recently, open source social networking sites have been widely used by institutions as an interactive mean to build community skills, provide teachers and students with online interactive learning opportunities, and improve students' academic performance. In Lebanon, some institutions have adopted learning management systems (like Moodle, Elgg…) as a cooperative learning platform in education. Moodle is limited to some basic features (user collaboration, group discussions, file sharing…). In contrast, Elgg does not provide full course management since it is not Sharable Content Object Reference Model (SCORM) compliant. Elgg could be integrated with next generation SCROM to form a complete management system. This paper proposes a solution to develop a TIN CAN Client Elgg Plug-In to integrate Elgg and Tin Can API which communicate through a Learning Record Store (LRS).

Social Networks Privacy Awareness Using Fuzzy Logic

Gerges Tannous and Aziz M. Barbar (American University of Science and Technology, Lebanon)

Online Social Networks have been around for more than 15 years. Yet in the last 10 years they have widely expanded in revenue, number of subscribers and amount of shared data. Using those sites, users could create their profiles (using their real identity) and connect with their peers for different purposes going from keeping in touch with an old classmate to connecting with professional entourage, but many crucial issues were left behind. Mainly the most important issue that was compromised and neglected was users' privacy. Users decided to keep making full use of those applications even when they knew that this was putting their personal information at risk and consequently making their privacy over the web vulnerable. The actual problem today is that providers are looking for their interest in data to cache and mine it, and they no do not offer to their users the right tools to control their privacy. Many studies have been conducted in order to prove to users that their privacy is vulnerable and those researchers tried to cover more than one area that can be impacted by the load of the information shared. For instance one study led by Marius Wernke has handled the location based threats and offered users a solution which could save their locations from being compromised or hacked by using third party trusted servers. Alessandro Acquisti, another researcher have discussed vulnerability based on shared images and a face recognition tool which could spot users in different contexts with one image associated to the user. Also, one other solution by Joseph Bonneau focused on the social connections that are shared and how they make a user's network insecure by studying his social graph. Additionally, IBM researchers were based on shared text from which they could generate a personality analysis out of a few tweets. In this solution, users' vulnerability is approached again, and from a different perspective by trying to classify the users based on publicly shared information to show the degree of their vulnerability and what caused it, thus making users aware of the impact of the data they post. Therefore, an expert fuzzy logic system using the Mamdani technique was introduced and implemented. To reach the set targets, an event was defined taking into account its location, timing and involved connections. The design based the collection of data on fetching data from Facebook and Twitter where some of users' information is publicly available. The retrieved data was aggregated and the results were passed to the fuzzy logic system which first layer was based on 5 rules which examined events' recurrences, amount of shared information and level of shared details. The result of the first layer was passed to the fuzzy rules predefined by identifying combinations and giving each a result. The expected system output was to identify if a user is vulnerable, potentially vulnerable or not vulnerable. As a result, the system was able to classify the users into respective classes could also provide the antecedents (being fuzzy variable) which led to the returned classification. While testing, many cases were not classified and that was due to values on the borders of the fuzzy sets. Once this was fixed, all the cases could be classified. This solution aimed at giving users a tangible evidence on how their data can make their privacy vulnerable using a rule based Fuzzy Logic system. For sure, it has room for being a better solution, which is by being connected to a web crawler able collect the required information as in this case the data was replaced by a randomized numerical datset. As well, it can be enhanced by trying to prove that users' vulnerability is correlated or even by studying the aspects non-shared information that is proving a certain theory based on the data which has not been shared by users.

Parallelizing Sobel Edge Detection Algorithm on a Multi-core processor

Hanadi Atweh and Ahmed Zekri (Beirut Arab University, Lebanon); Lama Hamandi (American University of Beirut, Lebanon)

Parallel processing is an important way to boost the performance of software running on computer systems. Lately, microprocessors have undergone a major change in architecture by dividing the processing unit into smaller cores that can operate in parallel, thus making parallel processing available to the public. The traditional way of programming computer is sequential in nature which is merely executed on a single processing unit or core. If a computer has two processors or more, only a single processor will be used for executing this sequential code, thus wasting the other processing power. For that reason, parallel processing comes to help. To use multiple processors or cores, a program must be split up into independent parts, if possible, so that each processor/core can execute its assigned part of the program simultaneously with the other processors/cores. Multi-core processors are intended to enhance the performance of the ever increasing demand of many computer applications. However, it is known that the memory hierarchy organization is crucial for the effectiveness of these processors. Since this hierarchy is organized in such a way that the upper levels of the hierarchy such as the CPU registers and L1 cache are smaller and faster compared with the lower levels such as main memory, then keeping as much data as possible in the upper levels is a key for performance. The basic unit of cache storage is the cache line. The cache holds data that is most likely to be used in the near future, based on the principle of locality, resulting in faster access by the CPU. As the CPU needs to read / write data from / to the RAM, it first checks in the L1 Data Cache if it finds the data there, a cache hit has occurred. Else, a cache miss has occurred then it checks L2 cache (L3 is also checked). If the data is not found, it is brought from main memory. In general, the L1 cache is split into two parts: L1 Data Cache for data storage and L1 instruction cache to store instructions. Our focus is on L1 Data Cache since it holds the image data and all program variables. In this research, we investigate the parallelization of the edge detection operation that is a basic step in many image analysis applications. An edge in a digital image is the border or contour that exists between two adjacent areas having different greyscale levels. Edges are used by many image applications in order to capture basic properties such as area, perimeter, and the like. We will use the Sobel algorithm which is one of the most widely used gradient-based techniques for edge detection. The Sobel Operator has two 3*3 kernels which are convolved with an image to obtain approximates of the gradient in both horizontal and vertical directions. This convolution process is calculated as two weighted sums at each pixel and is time consuming if computed on one single-core CPU. Our objective is to accelerate the computing of the summation, by dividing the image among the available cores of the CPU. We used OpenMP (Open Multi-Processing) which is a standard multithreading library used with the C/C++ and Fortran languages. In this parallelization model, a master thread (a series of instructions executed consecutively) forks a specified number of slave threads and a task is divided between them. The threads then run concurrently, with the runtime environment allocating threads to different processors. Dividing an image among the available cores of the CPU is a parallelization technique known as task parallelism. We choose to partition the image horizontally since it is laid out in memory in row-major order. First we executed the sequential Sobel code into one core. Then, we parallelized this code using the OpenMP directives and the runtimes of both codes are recorded. We tested many images of different sizes. Also, we changed the partitioning size and recorded the execution times. The experiments are tested on Intel Core i5-2410M that has the following specifications: 2 physical cores, 4 logical cores, 64-byte cache line size, 2*32 KB of L1 data cache. In order to evaluate the performance of the parallel execution, we calculated the speedup which indicates how much our parallel implementation is faster than the sequential one. Our experimental results using two logical threads on images with different sizes greater than 512x512 showed a maximum speedup of 2 compared with the sequential implementation. While using 4 logical threads, the speedup is enhanced to 2.3. This increase from 2 to 2.3 in speedup is due to the hyper-threading feature. While one logical thread encounters a miss in the data and/or instruction cache, giving the other logical thread on the same physical core time to execute. Our results show also that the optimal block size assigned to each thread is 0.5 times the size of L1 Data Cache. Since the two logical threads in each physical core are assigned equal work to perform, it was expected that the L1 cache is better divided evenly between them. The proposed approach shows the importance of fully utilizing the available cores to their maximum potential in parallelizing the traditional sequential algorithm and by using a feature that Intel introduced called Hyper-threading Technology. Moreover, the use of cache enhances the computing performance since the data loaded into the faster levels of the memory hierarchy are reused cutting down the average access latency. Finally, our future plans will concentrate on experimenting other image partitioning techniques taking into consideration the cache line size and the sizes of the data cache. We can also take advantage of the architectural features recent micro-processors included in their architecture, namely Streaming SIMD Extensions (SSE) support where data parallel operations can be performed simultaneously within the processor, which are expected to boost the computing performance.

Correlation Based Approach for Expertise Profiling and Computing

Hassan Noureddine (University of Applied Sciences of Western Switzerland & Lebanese University, Switzerland); Iman Jarkss (Lebanese University - EDST, Lebanon); Omar Abou Khaled and Elena Mugellini (University of Applied Sciences of Western Switzerland, Fribourg, Switzerland)

The accelerating progress in science with the active role of the web communication make the scientific community in front of a difficult task, in finding appropriate expects in such domain, especially with the existence of conflicted and repeated data. In this context, we propose a new approach of expertise

profiling and computing based on the correlation of researchers' information from heterogynous web sources.

EDU 1: Science and Mathematics Education I

Room: USJ CSM Amphi A

Chairs: Fadi El Hage (Universite Saint Joseph (USJ), Lebanon), Iman Khalil (Lebanese University, Lebanon)

L'enseignement des aspects de la nature de la science à l'université

Reine El Khoury (Universite Saint Joseph (USJ) & Faculty of Science Education, Lebanon); Saouma Boujaoude (American University of Beirut, Lebanon); Daniel Favre (Universite Montpellier 2, France); Fadi El Hage (Universite Saint Joseph (USJ), Lebanon)

Les récentes réformes de l'enseignement scientifique accentuent le besoin de développer une culture scientifique et technologique chez les étudiants de sciences [1]. Comme la compréhension des principaux aspects de la nature de la science1 est une composante essentielle et principale pour développer la culture scientifique des étudiants, les enseignants de sciences pourraient s'appuyer sur ces aspects pour les enseigner explicitement en classe, via des méthodes actives [1 et 2]. Ces réflexions nous ont amenés à élaborer la problématique suivante: dans quelle mesure, les conceptions des enseignants universitaires de sciences relatives à la nature de la science influencent-elles leurs pratiques pédagogiques en classe et les conceptions de leurs étudiants concernant la nature de la science ? Afin de répondre à cette problématique, nous nous sommes fixés 2 objectifs principaux, déclinés en sous objectifs. Nous rappelons que nous avons présenté, l'année passée, dans la 20ème conférence de LAAS, le détail de la méthodologie de la recherche, sans présenter les résultats ; pour cela, nous nous contenterons, dans cet article, de survoler la méthodologie de la recherche déjà présentée (et nous la résumerons lors de la présentation orale), pour s'attarder sur les résultats. Dans ce contexte, les 2 objectifs principaux de la recherche étaient les suivants: 1. Étudier la relation entre les conceptions des enseignants universitaires de sciences, et celles de leurs étudiants, concernant la nature de la science. 2. Étudier la relation entre les conceptions des enseignants universitaires de sciences relatives à la nature de la science et leurs pratiques pédagogiques. Pour atteindre ces objectifs, une méthodologie mixte de collecte des données a été mise en place, dans 4 universités privées du Liban, dont 2 anglophones et 2 autres francophones: 48h d'observations de classes ont été menées auprès de 9 enseignants universitaires de sciences, suivies d'une enquête par questionnaire menée auprès de 24 enseignants et de142 étudiants, et des entretiens semi-directifs ont été menés, aussi, auprès de 32 étudiants et de 9 enseignants. Les données obtenues ont été traitées selon une approche qualitative (analyse de contenu thématique) et quantitative (analyse descriptive et tests statistiques), tout en triangulant les informations récoltées du questionnaire, des entretiens et des observations de classes. Dans cette perspective, les résultats ont montré, qu'en moyenne, les 24 enseignants et 142 étudiants universitaires de sciences que nous avons sollicités, ont des conceptions mixtes concernant la nature de la science, tantôt constructivistes et conformes aux aspects de la nature de la science, tantôt imprégnées de positivisme et en écart avec les aspects de la nature de la science, fort probablement parce que la majorité de ces enseignants ne sont pas formés en épistémologie, philosophie et histoire des sciences ; et fort probablement parce que les étudiants ne sont pas convenablement formés aux aspects de la nature de la science en classe. De plus, les conceptions des enseignants et étudiants sont similaires, fort probablement parce que les enseignants universitaires de sciences influencent leurs étudiants, et leurs transmettent, implicitement, leurs conceptions concernant la science, via leurs pratiques pédagogiques, le contenu scientifique enseigné, les activités, documents et langage utilisés en classe. Cependant, une contradiction semble s'installer entre ce que les enseignants affirment dans le questionnaire et leurs pratiques de classes réelles. En effet, bien que les 9 enseignants universitaires de sciences observés en classe, ayant des conceptions constructivistes concernant la nature de la science, disent, dans le questionnaire, enseigner, à des fréquences variées, les aspects de la nature de la science, les 48h d'observation de classes ont montré qu'ils ne les enseignent pas, fort probablement parce que la majorité de ces enseignants ne sont pas formés en épistémologie des sciences, n'ont jamais entendu parler de nature de la science, ne sont pas au courant des intérêts et de la nécessité d'enseigner explicitement ces aspects en classe, ou pensent que les étudiants sont capables d'apprendre, implicitement tous seuls, les aspects de la nature de la science. Donc, il n'existe pas de relation entre les conceptions constructivistes des enseignants universitaires de sciences concernant la nature de la science et leurs pratiques pédagogiques observées en classe. En outre, les 48h d'observations de classes ont montré que l'enseignement de l'histoire des sciences et de la démarche d'investigation est tout à fait en écart avec les recommandations didactiques et épistémologiques de l'enseignement scientifique. Ainsi, ce travail constitue un support pour des recherches sur la même thématique, et encourage la formation des enseignants universitaires de sciences en histoire, épistémologie, didactique des sciences et en pédagogique universitaire, et la réforme du curriculum scientifique du cycle supérieur. 1) La nature de la science est la traduction française de « Nature Of Science (NOS) » [3], elle explique et explicite ce qu'est la science, elle étudie son origine, son fondement épistémologique, son fonctionnement et son évolution, les caractéristiques générales du travail scientifique et les interactions des chercheurs scientifiques, ainsi que les interactions entre la science et la société [4]. Références: [1] Boujaoude, S. & Santourian, G. 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Health Education at Schools in Lebanon. Critical Analyses of Curriculum, Textbooks, Focus Groups and Classroom Sequences in a Lebanese Public School and a Palestinian School

Hanin Fuddah (Lebanese University & UNRWA, Lebanon)

My research focused on critical analysis of health education in Lebanon according to the World Health Organization recent definitions of "comprehensive health education curriculum". Two schools were selected in the same area, a Lebanese Public School and a Palestinian one, to test the hypothesis of possible differences between them, linked to eventual differences in their students' health situations. The research also identified the students' arguments based on affective and social dimensions as well as knowledge when discussing some health topics (as smoking and nutrition), and whether these arguments are considered in the curriculum, textbooks, and in the analyzed sequences of teaching. This descriptive collective case study used different complementary methods to analyze: the Lebanese general curriculum, syllabi of disciplines, national textbooks, three classroom observations in each school for two health topics: "Nutrition" for grade 4 (English) and grade 5 (Science), "Tobacco Smoking" in grade 6 (Science), besides two focus group discussions in each school for eight students in grade 5 discussing "Nutrition", and eight students in grade 6 discussing "Tobacco Smoking". Five different grids were established according to the set criteria to collect data. The results were recorded in tables and then commented. The results indicated that the learning objectives, health lessons, and teaching sequences emphasized physical health, while mental, emotional and social dimensions of health were neglected. In addition, knowledge rather than attitudes, skills, and practices were emphasized. Health lessons and teaching sequences poorly addressed: social pressures and influences, skills that build personal competence, social competence and self efficacy. Teachers used strategies that do not engage students. Health lessons and the teaching sequences were directed toward disease prevention more than health promotion, and ignored the focus on personal perception of risk. However, gender equity was considered. The students' arguments also revealed the need to stress the items mentioned above in the textbooks, and in the teaching sequences. The research concluded the need to adapt the current Lebanese curriculum and national textbooks, to produce a separate health education syllabus according to WHO definition of comprehensive health education, include interactive teaching methods and life skills in all teachers' training courses.

TP traditionnel ou avec ExAO: quels effets sur la compréhension du langage graphique en chimie chez des élèves de 1ère année du collège

Maria Aouad (ESPE AMU, Lebanon)

Cette contribution présente quelques résultats d'une recherche conduite au Liban auprès d'élèves de 1ère année de collège (12-13 ans) dans le but de tester les effets de la mise en œuvre d'un TP sous forme d'Expérimentation Assistée par Ordinateur (désignée par l'acronyme ExAO) par rapport à une autre modalité plus classique (TP traditionnel). Nous avons retenu l'étude expérimentale de l'énergie calorifique de la réaction chimique qui présente une propriété importante et implique plusieurs registres (langage naturelle, registre graphique, registre symbolique). L'apprentissage concerné porte plus particulièrement ici sur le lien entre le graphique et la réaction chimique calorifique. Le graphique est un outil mathématique qui permet de représenter la relation entre deux variables décrites par une équation. En science, il est construit à partir de données issues d'expériences en laboratoire. La construction implique de tracer les points des données, de sélectionner les échelles des axes… L'interprétation qualitative ou quantitative exige que l'étudiant donne, pour une certaine situation, un sens au graphique, ou à une portion de celui-ci. Les recherches concernant la construction et l'interprétation des graphiques en chimie ainsi que celles qui ont relevé les difficultés dans la compréhension du langage de codage graphique sont assez répandues au secondaire et au collégial mais nettement moins nombreuses que celles qui concernent la chimie et rares celles qui ont traité la variation de la température au cours de la réaction chimique. Mokros et al. (1987) ont montré qu'il y avait une tendance chez les élèves de collège à percevoir le graphique comme une image plutôt que comme une représentation symbolique et que ceux-ci avaient du mal à relier leur connaissance d'un phénomène physique avec une représentation graphique de ce même phénomène. En situation expérimentale, le traçage des graphiques exige un délai considérable entre l'événement mesuré et l'interprétation du phénomène physique. Il s'ensuit généralement une perte d'informations relatives à l'expérience en soi. Mokros et al. (1987) ont montré qu'un délai entre l'événement et sa représentation graphique est néfaste pour la compréhension du graphique puisque l'élève doit se remémorer l'expérience puis la relier aux données pour pouvoir établir la relation entre les données de l'expérimentation et leur représentation ce qui permet de monopoliser sa mémoire à court terme et ne permet pas un transfert correct entre la donnée et sa représentation. La planification de la recherche concerne une séquence d'enseignement constituée de trois séances: la première d'entre elle, identique pour chaque groupe classe, a été consacrée à l'apprentissage d'une nouvelle notion: celle de réaction chimique calorifique ; la 3ème séance est

également identique pour les deux groupes a été consacrée au débriefing du TP en confrontant et critiquant les résultats afin de structurer les connaissances. Seule la séance intermédiaire différencie les modalités d'apprentissage expérimentées par les groupes. Les élèves du groupe 1 ont été confrontés à un TP traditionnel réalisé en laboratoire et ceux du groupe 2 ont été confrontés à un TP réalisé dans un environnement informatisé sous ExAO. Dans tous les groupes, le même principe a par ailleurs été respecté par l'enseignant de fournir les fiches de TP aux élèves en limitant son intervention au strict minimum pour lancer les tâches. Les élèves ont été soumis à deux reprises (pré-test et posttest) à une épreuve de connaissances élaborée à partir de résultats issus de la littérature et des référentiels relatifs aux capacités attendues afin d'évaluer les performances des élèves avant et après apprentissage réalisé sous deux modalités différentes de TP. Le pré-test est proposé en amont de la séquence et la passation du posttest a lieu à la fin de la séance 3. De plus, nous avons recueilli les compte-rendu des élèves correspondant aux questions posées dans la fiche de TP qu'ils ont eu à renseigner au cours de la séance expérimentale qui leur a été proposée. Dans le cadre de cette contribution, nous nous en tenons à une présentation des résultats relatifs à la comparaison entre le pré-test et le posttest des items portant sur l'interprétation des graphiques et des questions de TP à propos du lien entre le graphique et la réaction chimique. Nous avons analysé les résultats au posttest en comparant d'abord le score global moyen des groupes puis pour chaque item du domaine avant d'analyser l'évolution entre le pré-test et le posttest d'abord globalement pour chaque domaine puis item par item pour chacun d'entre eux. Globalement le score moyen des items réunis a montré que les performances des élèves soumis au TP traditionnel sont restées stables d'une passation à l'autre alors que les élèves soumis à la modalité ExAO ont réalisé un progrès non aléatoire. Dans le détail de l'un des items concernés où il s'agissait de choisir parmi six graphiques celui dont la définition des axes était appropriée à la représentation du temps nécessaire pour faire bouillir différentes quantités d'eau nous observons néanmoins un progrès dans chaque groupe mais pour les élèves ayant travaillé avec ExAO qu'il est le plus net. En ce qui concerne les questions du compte-rendu à propos du lien entre le graphique et la réaction chimique, les résultats montrent que lorsqu'il s'agissait d'indiquer sur le graphique le point de fin de la réaction et dire à quoi correspond la partie de la courbe en dehors de ce point, les performances sont médiocres pour les élèves du groupe 1 qui n'ont pas donné un sens à leur observation. Et que le score global le plus élevé est de nouveau obtenu par les élèves du groupe 2. L'accès à la compréhension est néanmoins facilitée pour les élèves du groupe 2 par la justification des phénomènes que permet l'ExAO en facilitant la mise en relation des observables qui convergent et des variables ainsi influentes. Pour que l'apprentissage du graphique puisse être efficace, il est nécessaire que sa visualisation puisse se faire en même temps que l'acquisition des données expérimentales sans même passer par les données compilées dans un tableau. C'est pour cela que nous pensons que les laboratoires, particulièrement en ExAO, semblent un moyen privilégié de mettre à profit un apprentissage efficace du graphique.

Mathematical Creativity: The Real Through The Imaginary

Sahar Khanafer and Amine El Sahili (Lebanese University, Lebanon)

Although imagination as a passage to the real through the imaginary is a tool viewed throughout the creative works of prominent mathematicians, most students are not aware of its role and do not consider it in solving mathematical problems. Such impressions prevent them from acquiring this creative method in solving mathematical problems. Exposing students to suitable and well-structured problems that illustrate the real through the imaginary can alter their view about imagination in mathematics and can open their eyes towards a new creative tool in solving mathematical problems.

Un référentiel des compétences langagières des enseignants des disciplines scientifiques au primaire

Imane Abou Ali, Samar Tfaili, Hiam Daou, Soheir El Hajj and Wajiha. Smaili (Lebanese University, Lebanon)

Les programmes scolaires libanais stipulent que la langue de scolarisation des disciplines scientifiques pour les classes primaires peut être le français ou l'anglais, l'élève doit pour communiquer « S'exprimer correctement par voie orale ou écrite, poser et répondre à des questions ». Or les enseignants de et en langue s'expriment en situation de classe souvent, notamment dans les écoles publiques, en langue maternelle. Face à cet écart entre injonctions institutionnelles et pratiques de classe, il apparait évident que les élèves des écoles publiques libanaises se trouvent en difficultés scolaires. Pour faire face à ces difficultés il parait nécessaire d'œuvrer à développer les compétences linguistiques des enseignants des disciplines scientifiques, étant donné que ces compétences constituent une composante principale des compétences professionnelles. Une communication efficace dans la langue de scolarisation permet aux élèves de manipuler la langue et de pouvoir s'en servir pour comprendre les cours et les consignes d'évaluation. Le développement des compétences linguistiques des enseignants passent nécessairement par des formations adaptées aux besoins en communication dans les pratiques professionnelles. La conception d'un référentiel des compétences linguistiques pour enseignants des mathématiques et des sciences au primaire est nécessaire pour proposer des formations linguistiques sur mesure. Un référentiel est un inventaire des compétences langagières requises par le professionnel pour exercer le métier. La référentialisation en langues selon Mangiante (2007) procèdera par une observation des professionnels en situation réelle de pratiquer leur métier: une analyse des besoins menée sur le terrain passe par le recueil de discours authentiques produits ou interprétés, la description des tâches langagières effectuées. La préparation d'un tel référentiel nécessite alors la coordination entre les spécialistes de la didactique des disciplines en question et les didacticiens des langues. Ainsi notre équipe de recherche s'est constituée des didacticiens des langues, des sciences et des mathématiques afin de collaborer à cette étude. La démarche suivie se résume en 4 étapes: - La première consiste à repérer les opérations

cognitives du domaine à savoir le contenu disciplinaire. Il s'agit de faire l'inventaire des domaines et des compétences disciplinaires en se basant sur le programme libanais des disciplines scientifiques du primaire. Les compétences seront ensuite déclinées en descripteurs. Un descripteur reflète les capacités communicatives et les capacités réflectives/analytiques pour comprendre l'organisation du discours. -La seconde étape vise à lier le cognitif avec le langagier. Il s'agit de déterminer les activités verbales au sein des opérations cognitives. Partir des différents formats de communication en classe (exposé monologal, cours dialogué, échange collective, compte rendu des élèves et production écrite dans les manuels) pour déterminer les différentes formes de la communication (les actes sociaux et affectifs, les actes et instructions organisationnels) et le noyau disciplinaire avec les interactions et les consignes factuelles du contenu du cours. -Dans la troisième étape, il s'agit de réfléchir au bilinguisme et à l'alternance codique qui se fait dans un cours donné dans une langue seconde. Quelle alternance préconisée dans les différents formats et formes de communication dans la classe? -Dans la dernière étape, il s'agit de déterminer les objectifs linguistiques par rapport aux compétences et aux formats de communication. Dans notre communication, nous nous limiterons à la présentation d'une partie du référentiel: deux séquences sont choisies, une d'un cours de mathématique et une autre d'un cours de sciences au primaire. Nous présenterons le corpus de discours recueillis sur le terrain pour le référentiel, les descripteurs des compétences, une liste des activités verbales repérées et les objectifs linguistiques qui leur sont liées. Nous soulignerons les formes d'alternance codique qui nous ont paru favorable à la communication et à l'apprentissage en classe. MANGIANTE, J.M. (2007): « Une démarche de référentialisation en français des professions: le partenariat universités - Chambre de Commerce et d'Industrie de Paris (CCIP) » in Le Français dans le monde , Recherches et Applications, juillet 2007.

Mathematical Creativity: The Unexpected Links

Nour Al-Sharif, Amine El Sahili and Sahar Khanafer (Lebanese University, Lebanon)

Our notation "The Unexpected Links", between distinct mathematical domains or even between seemingly far ideas within the same domain, is a component of mathematical creativity that is sensed by students of pure mathematics in postgraduate levels. Whereas, students of lower levels, especially school students, are deprived from the opportunity to experience such beautiful and creative links in mathematics. In addressing this problem, we hypothesize that problems that hold unexpected links can be designed to suit intermediate and secondary scholastic levels, where they can be understood by students and can catch their interest.

The relation between the use of Digital Resources and the evolution of Biology Teachers' Conceptions about Genetic Determinism

Eman Shaaban (Lebanese University, Lebanon)

The relation between the use of Digital Resources and the evolution of Biology Teachers' Conceptions about Genetic Determinism Eman SHAABAN (*), Iman KHALIL (*) (*) Lebanese University- Doctoral School of Literature, Humanities & Social Sciences dr.emanshaaban@gmail.com, khalil@ul.edu.lb This study aims to explore the relation between the use of digital resources by biology teachers and the evolution of their conceptions of genetic determinism of phenotype, particularly from hereditarianism where only genes are responsible to determine the phenotype (Forissier & Clément, 2003) to epigenetics which means interaction between genotype and environment to determine the phenotype (Morange, 2005). For this purpose we analyzed the documentary works of two Lebanese secondary biology teachers one in a public and another in a private school. Despite the emergence of the new paradigm of epigenetics at the end of the twentieth century previous researches has shown that hereditarianism still prevail in school textbooks and among teachers' conceptions in many countries including Lebanon (Castéra, Munoz & Clément, 2007; Castéra et al., 2008). However, nowadays digital resources provide ample materials and opportunities for biology teachers to update their scientific knowledge (Recker, 2006). Sabra and Trouche (2011) argue that digitalization has influenced teaching due to proliferation of Internet resources and the diverse types of technologies that can be used by teachers (e.g., USB, IWBs and software). These modifications affect both preparation and teaching practices. For the purpose of this study, we have articulated two theoretical frameworks, highlighting the fruitful nature of their interaction: the "documentational approach" to analyze the documentary work of teachers (Gueudet & Trouche, 2009) and the "KVP model" to study their conceptions about genetic determinism (Clément, 2006). Teachers' documentary work includes their collection, selection, transformation, recombination, sharing, revision and implementation of resources. According to "KVP model" conceptions are analyzed in terms of interactions between three poles: 1) scientific knowledge (K); 2) social practices (P); and 3) values (V). To articulate these two theoretical frameworks the two notions of critical resources which are the resources considered essential by the teacher for the preparation and teaching of a specific topic, and critical situations which are identified during the implementation of critical resources or induced by the researcher when asking specific questions that might reflect teachers' conceptions during interviews or in the classroom were elaborated (Khalil, Shaaban & Trouche, 2014). For the purpose of this study a specific grid was elaborated to categorize teachers' conceptions related to genetic determinism of phenotype as either hereditarianism or epigenetics based on the analysis of critical resources and the output of critical situations. This study applies a sequential mixed-method design, quantitative followed by qualitative. The quantitative part constituted of a questionnaire administered to Lebanese biology secondary teachers in order to investigate the current status of integration of digital resource in their preparation/teaching practices. The design of the qualitative part of this research was that of a collective case study following the purposive sampling technique. Based on the analysis of the data collected from the questionnaire, the two participants of the research, Maya and Tania, were selected from public and private schools respectively in order to study the influence of the working environment on teachers' documentary work and consequently on their conceptions related to genetic determinism. Data was collected from various

tools for triangulation, they include: interviews, schematic representation of the system of resources (SRSR), classroom observation (during the explanation of genetic determinism), and logbook. The SRSR and the logbook are new tools utilized in order to involve the teachers in data collection and to show their reflections on their own resources and documentary work. In the SRSR the teachers were asked to mention all the available, mobilized and implemented resources in their teaching practices and to illustrate how those resources are organized and related; and in the logbook the teachers were asked to report all their daily professional activities related to their preparation/teaching practices of genetic determinism of phenotype. The cross-analysis of the data collected using various tools for two successive years allowed us to infer the critical resources utilized by the two participants, and to identify critical situations. The analysis of these critical resources and the output of critical situations based on the elaborated grid allowed us to infer Maya's and Tania's conceptions about genetic determinism. The results revealed that Maya has hereditarianism conceptions due to her KVP interactions, the social practices of the public school implementing the outdated Lebanese curriculum (P), the outdated scientific knowledge presented in her critical resources, the Lebanese national textbook and an elaborated slide show about genetic program and its expression (K) in addition to her innate values (V). However, her interactions with digital resources, particularly Internet resources and media, allowed her to learn more about the influence of the environment and caused an evolution in her scientific knowledge (K) and helped in initiating changes in her teaching practices (P) to introduce the environmental influence on gene expression in class and in one critical resource she elaborated, an exercise about the Himalayan rabbit. Nevertheless, this did not lead to a steady evolution of her conceptions from hereditarianism towards epigenetic. While in the case of Tania KVP interactions facilitated the acquisition of her epigenetic conceptions, the social practices of her private school that follows the French program utilizing updated French textbooks reflecting the epigenetic conceptions (P), the updated scientific knowledge due to her constant interaction with updated resources (K) in addition to her beliefs about the influence of the environment on gene expression due to her higher studies in the field of environmental education and her collective work in many environmental institutions outside school (V). On the other hand the comparison between the two studied cases, Maya and Tania, allowed us to infer that the conditions of the working environment like availability and accessibility of technological tools, collective work and exchange of resources between teachers, in addition to interaction with proliferating digital resources, particularly Internet resources are factors that might influence the evolution of the documentary work and conceptions of teachers. Implications for practice and future research are discussed.

TR3: Table Ronde 3

"Oil, Gas and Green Energy in Lebanon: Challenges, Vision and Strategy"
Intervenants : Jean Chamoun, Mazen Halawi, Pascal Damien, Rabih Khairallah, Walid Nasr, Wissam Chbat

Room: USJ Salle Polyvalente E5

Chairs: Fadi A. Geara (Université Saint-Joseph & Ecole Supérieure d'Ingénieurs de Beyrouth, Lebanon), Pierre Khoury (LCECP, Lebanon)

17:15 - 18:00

Conf: Scopus: The leading gateway to the world of research, bibliometrics and university rankings

Dr. Basak Candemir

Room: USJ Salle Zaarour

Friday, April 17

08:00 - 09:00

REG DAY3: Inscription

Room: USJ Hall CSH

09:00 - 13:00

TR2: Table Ronde 2

Les nouveautés dans l'enseignement des sciences anatomiques
Intervenants: Ameed Raoof, Angelo Leone, Assad Eid, Giovanni Tomasello, Khalil Zakaria, Inaya Hajj Hussein, Rosalyn Jurjus

Room: USJ CSM C9
Chairs: Francesco Cappello (IEMEST, Italy), Abdo Jurjus (American University Of Beirut, Lebanon)

09:00 - 09:45

SP3: Séance plénière 3

Evaluation de la recherche : modèle Français
Prof. Jean-Pierre Gesson, Président du conseil d'orientation de Campus France

Room: USJ Salle Polyvalente E5
Chair: Michel Scheuer (Université Saint Joseph, Lebanon)

09:45 - 10:00

CB4: Pause-Café

10:00 - 11:30

BIO10_Medicale: Biological, Medical, Pharmaceutical, Health Sciences X

Room: USJ CSM Amphi B
Chairs: Marianne Abi Fadel (Université Saint Joseph, Lebanon), Wissam Faour (Lebanese American University, Lebanon)

A Multicenter Study for the Assessment of Switch Over from Intravenous to Oral Antibiotics in Lebanese Hospitals

Diana Malaeb and Zeina Shrayteh (Lebanese International University, Lebanon)

Background Hospitalized patients initially prescribed intravenous (IV) antibiotics can be safely switched to oral (PO) therapy within the third day of hospital to complete the remaining course of therapy, once clinical stability is established. Conversion from IV to PO treatment has many advantages, as avoidance of the adverse events attributed to IV treatment and reduced costs. It is also more comfortable, requires fewer human resources and it potentially shortens the length of hospital stay (LOS). The three types of IV to PO conversion include sequential, switch, and step-down therapy. Purpose To evaluate the practice of switching from IV to oral antibiotics based on predefined eligibility criteria and to correlate the outcomes with regard to the length of IV antimicrobial therapy, length of hospital stay, and to assess the correlation between the type of conversion and its classes. Materials and Methods This was a retrospective observational study conducted in three Lebanese hospitals over a period of six months (between December 2013 and May 2014). Patient demographics, diagnosis, IV antibiotics prescribed and treatment duration, microbiological laboratory results and white blood cell count, signs and symptoms related to the infection improvement and oral tolerance to medications and nutrition were obtained from the medical records. Adult inpatients on IV antibiotic for 2 days and more were eligible to the study. Excluded were patients admitted to care units or surgery unit, or those with gastrointestinal malabsorption diseases, infections that require prolonged course of IV antimicrobial therapy, or malignancies. Statistical

analysis was performed using SPSS 20.0 Results A total of 2073 admissions were screened, 383 patients treated with 491 IV antibiotic courses fulfilled both inclusion and exclusion criteria were enrolled in the study. Thirty-nine (7.9%) IV antibiotic courses were not eligible for the switch. Out of 452 IV antibiotic courses from 356 patients eligible for conversion, only 118 (26.1%) were switched to PO treatment and the others continued on IV antibiotics beyond day 3 (p-value <0.0001). The mean number of days for the switch was 3.81 ± 1.15 where 111 patients (94.1%) were switched within 3 to 5 days of hospital admission and 7 patients (5.9%) beyond day 5. The mean duration of IV therapy of converted and non-converted patients was 2.79 vs 6.61 days respectively (p-value <0.0001) and the mean LOS was 6.29 vs 6.69 days respectively (p-value of 0.227). The IV antibiotic courses were divided into 300 (60.4%) β-lactams, 33 (7.3%) macrolides, 78 (17.3%) fluoroquinolones, 25 (5.5%) metronidazole, and 16 (3.5%) aminoglycosides and glycopeptides. The most converted antibiotic class was fluoroquinolones (60.3%) followed by macrolides (45.5%). From the IV converted antibiotics, 30.5% were discontinued when no definitive oral equivalent is available and 69.5% were converted to PO therapy. Two-third of the converted courses were done through sequential therapy, 100% for metronidazole, 89.4% for fluoroquinolones and 80% for macrolides (p-value <0.0001). Switch and step-down therapy were minimally done. Conclusion The study results showed that a significant proportion of patients can be considered for switch over from IV to PO antibiotics based on clinical and laboratory criteria and lead to reduced length of IV treatment while reduction of LOS was not noticeable. The switch over from IV to PO therapy was more practiced when the same antibiotic exists in both IV and PO forms. This emphasizes the need for integration and reinforcement of the IV to PO conversion guidelines in Lebanese hospitals.

Vertical bone regeneration with deproteinized bovine bone mineral or biphasic calcium phosphate in the rabbit calvarium: Effect of autologous platelet lysate

Carole Chakar (University of st Joseph, Lebanon)

Although bone substitutes associated with platelet concentrates are widely used to vertically reconstruct alveolar ridges, their respective and specific contribution remain controversial. The aim of this study was to evaluate the benefit of using either biphasic calcium phosphate (BCP) or demineralised bovine bone mineral (DBBM) alone or with autologous platelet lysate (APL) in vertical bone regeneration. The study involved fourteen New Zealand rabbits. Autologous APL was prepared by freeze - thawing from a platelet suspension (109 platelets/ml). Four CP titanium (cpTi) cylinders were fixed to each calvarium; one cylinder was empty, one was filled with APL alone and the others were filled either with BCP or BCP+APL or DBBM or DBBM+APL. New bone formation and biomaterial resorption were evaluated using non-demineralised histology and histomorphometry. After 6 weeks, new bone formation was observed in all cylinders. The newly formed bone in the cylinders filled with APL alone, DBBM and BCP was significantly increased by (0.6-, 2.5- and 3.3-fold, respectively) (p<0.0001) compared to results obtained with the empty cylinders. Vertical bone height in the cylinders filled with BCP was greater to that observed with DBBM. The residual material in the cylinders filled with BCP was significantly (p<0.0001) lower (0.35-fold) than that with DBBM. Both newly formed bone and residual material in the cylinders filled with BCP+APL or DBBM+APL were similar to those filled with either BCP or DBBM, respectively. This study provided evidence that APL alone, as well as DBBM and BCP, have a beneficial effect on vertical bone formation and remodelling. APL associated with either DBBM or BCP did not provide additional benefits.

Novel homozygous PTPRD gene microdeletion causes trigonocephaly, hearing loss, and intellectual disability

Nancy Choucair and Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Pierre Cacciagli (Faculté de Médecine de la Timone, France); Ali Fawaz (Lebanese University, Lebanon); Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

The premature fusion of metopic sutures results in the clinical phenotype of trigonocephaly. In this study, we describe a 30 month old boy with intellectual disability, trigonocyohaly, and dysmorphic facial features. Microarray chromosomal analysis revealed the presence of a homozygous deletion involving the PTPRD gene, located on chromosome 9p22.3. Reverse Transcription PCR (RT-PCR) amplifications all along the gene failed to amplify the patient's cDNA in fibroblasts, indicating the presence of two null PTPRD alleles. Synaptic PTPRD interacts with IL1RAPL1 which defects have been associated with intellectual disability (ID) and autism spectrum disorder. The absence of the PTPRD transcript leads to a decrease in the expression of IL1RAPL1. These results suggest the direct involvement of PTPRD in ID, which is consistent with the PTPRD -/- mice phenotype. In addition, deletions of this gene have been previously suggested as a cause of trigonocephaly in patients with monosomy 9p. As the patient also shows this characteristic, and other gene family members are considered as regulators of craniofacial morphogenesis, we confirm the possible function of this gene in the occurrence of trigonocephaly. Other hypotheses suggest PTPRD defects as responsible for the patient's hearing impairment, as a genome-wide association study suggested variations in PTPRD are associated with hearing loss. In conclusion, the wide contribution of this gene in the phenotype of the patient supports many previous hypotheses on its function in ID, hearing loss, and trigonocephaly. However, more investigations of similar deletions in patients are required.

Ten years' experience using conventional karyotyping at the Medical Genetics Unit of Saint Joseph University

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Conventional cytogenetic analysis, introduced in the 1970's, allows the detection of numerical and structural chromosomal abnormalities. Constitutional studies present a resolution of 5 Mega bases, and are employed for the diagnoses of the commonly known congenital conditions, such as Down syndrome, Turner syndrome and Klinefelter syndrome, but are also employed in numerous other clinical situations, such as miscarriages or infertility. Between 2005 and 2014, 8383 patients were referred to the Medical Genetics Unit of Saint Joseph University for karyotyping. Classical cytogenetic (R-banding) study was performed and chromosomal abnormalities were found in 1002 or samples corresponding to a percentage of 11.95%. 920 patients out of 1002 (91.8%) presented homogeneous abnormal karyotypes while 82 patients (8.2%) presented abnormalities in mosaic state. 574 patients out of 920 (62.39%) had a free trisomy 21, 14 patients (1.5%) had a linked trisomy 21, 35 patients (3.8%) had trisomy 18 and 10 patients (1.1%) had trisomy 13. Among the 82 patients with mosaic abnormalities, 71 patients (86.6%) had numerical abnormalities while 11 (13.4%) had structural abnormalities. Whether at homogenous or mosaic state, Klinefelter's syndrome diagnosis was confirmed in 94 patients and Turner's syndrome was confirmed in 55 patients. This study shows quite similar results compared to international data. However, the introduction in our laboratory, in 2010, of molecular cytogenetic techniques (FISH and CGH arrays), able to perform high-resolution analysis and useful for the detection of small genetic imbalances, increases the rates of detected chromosomal abnormalities. Unfortunately, balanced chromosomal rearrangements (i.e., translocations, inversions, etc.) cannot be detected by these new techniques and required conventional karyotyping testing; confirming thus and undoubtedly the result of combination of both techniques.

Malpositioning of the Patient during X-Ray Acquisition Can Affect the Assessment of Sagittal Pelvic Parameters: Evaluation in Adults and Children

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Introduction In order to assess sagittal balance, clinical parameters are measured on lateral X-rays of the pelvis [1,2]. These radiographs require standard positioning of the patient during acquisition. To our knowledge, there are no studies that have investigated the effect of pelvic axial rotation on sagittal clinical parameters. The aim of this study was to estimate the effect of erroneous positioning of patients, during pelvis lateral X-ray acquisition, on the reliability and validity of sagittal pelvic parameters. Methods Helical pelvis CT-Scans (slice thickness: 0.6mm) of 8 children (3 F and 5 M, age: mean 12 - SD 2.2) and 9 adults (5 F and 4 M, age: mean 51 - SD 26) were considered. Lateral Digitally Reconstructed Radiographs (LDRRs) were reconstructed from CT-Scans using a homemade software. Then, for each patient, axial rotation of the pelvis was simulated and the corresponding LDRRs were reconstructed at 5°, 10°, 15° and 20° of axial rotation. Clinical parameters were measured digitally on each radiograph using the SterEOS® 2D toolbox: sacral slope (SS), pelvic incidence (PI), pelvic tilt (PT), pelvic inclination (PIL), sagittal pelvic thickness (SPT), bifemoral distance (BFD) and pelvic depth (PD). Three trained operators repeated the measurements 3 times each, in each axial rotation position and for each radiograph (Figure 1). The Intraclass Correlation Coefficient (ICC) was evaluated for inter-observer agreement. The 95% confidence interval (95%CI) was calculated as 2SD of inter-observer reliability. The bias of each clinical parameter, in each axial rotation position, was calculated as the absolute mean difference relatively to the 0° position. Results Inter-observer agreement was shown to be very high (ICC>0.88) for all parameters and in all axial rotation positions. In the absence of axial rotation of the pelvises (0°), the 95% CI of the SS and the PI were lower than 4°, lower than 2° for PT and PIL and lower than 1 cm for both SPT and BFD. The 95% CI increased with pelvic axial rotation; at 20° of rotation it exceeded 7° for SS and PI, 7° and 4° for PIL and PT respectively, and remained constant for SPT and BFD. All the parameters showed an increase in the bias during axial rotation of the pelvis, where PI showed the greatest bias by reaching 6° at 20° position. Only SPT and PD exhibited a bias which was minimal and constant (< 0.5cm) for all axial rotation positions. Even though insignificant ($p>0.05$), the bias on PI and SS was shown to be higher in children than in adults. Conclusion Clinical parameters measured on lateral radiographs were shown to be less accurate and less reliable when pelvic axial rotation increased. The bias exceeded 10% of the normative values of each clinical parameter when the AR exceeded 10°. This bias could significantly affect orthopedic decision-making in patients with sagittal malalignment. References [1] Roussouly et al., Eur Spine J, 20: 578-585,2011 [2] Vrotvec et al., Spine J, 12: 433-446, 2012

A 20 years success story of newborn screening at USJ: 1800 Lebanese benefit from a better quality of life

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In 1996, a Lebanese community-based university established a newborn screening laboratory (NSL) offering a voluntary, hospital-based, out-of-pocket program, not otherwise occasionally covered by any insurance or social security schemes even with the symbolic-cheap price. The screening initially covered four diseases: CH, PKU, G6PD deficiency and congenital galactosemia (GAL). Among 280,000 newborn screened to date, 150 cases (6 per 10,000) of CH; 1520 cases (1% among males) of G6PD deficiency; 20 cases (1 per 14,000) of PKU variants and 7 cases of GAL variants (0.35 per 10,000) have bee diagnosed. In late 2006, the laboratory expanded its panel of diseases screened by using MS/MS. Among 150,000 newborn samples tested on the MS/MS, except PKU, 130 (15 per 10,000) were recalled for result confirmation. Of those, 85 were confirmed as cases different metabolic diseases, giving a positive predictive value (PPV) of 66%. Currently, the USJ screening laboratory covers yearly 24.000 life births with the collaboration with 50 hospitals. The efforts of the laboratory had been recognized internationally, it had been awarded the "2008 Dussault award". An estimated 40% of all annual live births in Lebanon are not currently screened. Efforts should continue to obtain that they benefit from a nationally mandated and publicly paid scheme so major human tragedies can be averted.

BIO12_Biologie: Biological, Medical, Pharmaceutical, Health Sciences XII

Room: USJ CSM C3

Chairs: Lydia Khabbaz (Université Saint Joseph, Lebanon), Amal Omar (Beirut Arab University, Lebanon)

Validity and Reliability of Hip Parameters with Pelvic Axial Rotation During X-Ray Acquisition

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Introduction In order to assess hip disorders in children and adults, clinical parameters are measured on frontal X-rays of the pelvis [1,2]. These radiographs require standard positioning of the patient during acquisition. To our knowledge, there are no studies that have investigated the effect of axial rotation of the pelvis on the clinical parameters of adults' and children's radiographs. The aim of this study was to estimate the effect of erroneous positioning of patients, during pelvis frontal X-ray acquisition, on the reliability and validity of hip parameters. Methods Helical pelvis CT scans (slice thickness: 0.6mm) of 8 children (3 F and 5 M, age: mean 12 - SD 2.2) and 9 adults (5 F and 4 M, age: mean 51 - SD 26) were considered. Frontal Digitally Reconstructed Radiographs (FDRRs) were reconstructed from CTs. Then, for each patient, axial rotation of the pelvis was simulated and the corresponding FDRRs were reconstructed at 5°, 10°, 15° and 20° of axial rotation (Figure 1). Clinical parameters were measured digitally on each radiograph, for both the left and right sides of each patient: Vertical Center Edge (VCE) angle, HTE angle, Sharp's angle, Lateral Subluxation (LatSub) angle, Acetabular Fossa relative to the ilioischial line (AcetFossa), Acetabular Depth (AcetD) distance, Acetabular Width (AcetW) distance and Migration Percentage of the Femoral Head (MPFH). Three trained operators repeated the measurements 3 times each, in each axial rotation position. Intraclass Correlation Coefficient (ICC) was evaluated for intra and inter-observer agreement. The 95% confidence interval (95%CI) was calculated as 2SDs of inter-observer reliability. The bias of each clinical parameter, in each axial rotation position, was calculated as the absolute mean difference relatively to the 0° position. Results Intra and inter-observer agreement was shown to be very high (ICC>0.9) for all parameters and all axial rotation positions except for the AcetFossa (ICC= 0.5) in adults. In the absence of axial rotation of the pelvises (0°), the 95% CI of HTE, VCE, Sharp's angle and MPFH were lower than 5 measurement units (m.u.) and lower than 1 cm for the AcetabD, AcetW, AcetFossa and LatSub. The 95% CI increased with pelvic axial rotation: it exceeded 5 m.u. for VCE, MPFH and reached 7° for HTE at 20° of axial rotation. However, it remained constant for the remaining parameters. All the parameters showed an increase in bias during axial rotation of the pelvis , where MPFH and VCE showed greatest bias (7.5% and 6° respectively in children and 5.5% and 4.6° in adults) at 20° position. AcetabD, AcetW, AcetFossa and LatSub exhibited a bias <1cm. Discussion Hip parameters measured on frontal radiographs were shown to be less accurate and less reliable when pelvic axial rotation increased. The AcetFossa showed a smaller ICC in adults because the location of the ilioischial line differed from the anatomical situation with increased pelvic rotation and thus led the operators to confusion. The bias was systematically higher for all parameters in all axial rotation positions in children compared to adults. It exceeded 10% of normative values for most of the clinical parameters in both children and adults, when axial rotation exceeded 10°. This bias could significantly affect hip

disorders' assessment. References [1] Brurås et al. , Pediatrics, 127:661-666, 2011 [2] Anderson et al., Orthopedics, 34: 86, 2011

Etude de répétabilité de différentes méthodes de mesure des angles rachidiens chez des sujets scoliotiques: techniques manuelle vs. numérique

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Introduction L'angle de Cobb est la méthode classiquement utilisée pour la mesure des courbures de la colonne vertébrale. Il a été souligné que les plateaux des vertèbres limites de la scoliose et des courbures sagittales, choisis lors de la mesure de cet angle, ne sont pas représentatifs de l'amplitude de la courbure [1,2,3]. Le but de cette étude est de comparer la répétabilité de différentes méthodes de mesures de courbures rachidiennes, par les techniques manuelle et numérique, sur les vues frontale et sagittale. Matériels et Méthodes Cinquante trois patients scoliotiques, n'ayant pas d'antécédents chirurgicaux et qui ont effectué une radiographie biplanaire basse dose EOS® dans notre centre, ont été inclus dans cette étude (47 F, 6 M, moyenne d'âge: 15 ans, SD: 2.7). L'angle de Cobb moyen était de 40° (min: 16°, maximum: 86°, SD: 20°). Les paramètres qui ont été mesurés sur la vue de face sont: angles de Ferguson, de Cobb et des Centroïdes [3] sur chaque courbure scoliotique. Les paramètres qui ont été mesurés sur la vue de profil étaient: angles de Cobb, des Centroïdes et des tangentes aux murs vertébraux postérieurs [2] pour la cyphose thoracique et la lordose lombaire ainsi que les paramètres pelviens (incidence pelvienne, pente sacrée et version pelvienne). Le choix des vertèbres limites des courbures n'a pas été imposé. Trois étudiants en médecine, formés aux mesures et au choix des vertèbres limites et apex, ont effectué une mesure chacun: manuellement sur film radiologique, utilisant le même type de goniomètre (Medizintechnik®, Ka We CE U03) et de crayons (Faber-Castell® 7B), et numériquement sur image numérique utilisant le logiciel Surgimap®. La répétabilité inter-opérateur de chaque paramètre a été évaluée en calculant l'Intervalle de Confiance (IC) à 95%. Les différences significatives ont été recherchées sur les angles mesurés par les techniques manuelle et numérique. Résultats et Discussion Les IC à 95% des différentes méthodes ont été reportés dans le Tableau 1. La technique digitale a montré en général une meilleure répétabilité inter-opérateur que la technique manuelle pour les mesures rachidiennes. Ceci pourrait être dû à la précision apportée par les outils de mesures numériques et par la possibilité d'agrandissement de l'image et du changement de contraste et de luminosité sur les images numériques. Les angles de Ferguson, Cobb et Centroïdes ont été identiquement répétables quand ils ont été mesurés numériquement dans le plan frontal sur les courbures scoliotiques (IC à 95%: ±6°). La mesure de Cobb était légèrement plus répétable que les mesures de Ferguson et du mur postérieur, en thoracique, dans le plan sagittal. Néanmoins, les 3 mesures étaient également répétables sur la courbure lombaire. De plus, les mesures lombaires étaient plus répétables que les mesures thoraciques, ceci étant dû à la mauvaise visibilité des vertèbres thoraciques, surtout les plus proximales. Les mesures pelviennes ont montré une répétabilité identique entre les techniques manuelle et numérique. Des différences significatives ont été retrouvées sur les valeurs angulaires mesurées par les techniques manuelle et numérique pour la méthode du mur postérieur en lombaire ($p=0.013$) et la mesure de la version pelvienne ($p=0.02$). En revanche, ces différences entre les valeurs angulaires (<2°) restent cliniquement non pertinentes. Conclusion La méthode de Cobb a été, du moins, aussi répétable que les autres méthodes (Ferguson, Centroïdes et des tangentes aux murs postérieurs) pour les mesures des courbures rachidiennes scoliotiques et sagittales. La technique digitale a montré une meilleure répétabilité surtout pour la mesure de la déformation scoliotique. La répétabilité de ces différentes méthodes de mesure est en cours d'évaluation par des opérateurs experts et semi-experts. Références [1] Vrtovec et al., Eur Spine J, 2009; [2] Harrison et al., Spine, 2001 ; [3] Chen et al., Orthopedics, 2007

Validity and Reliability of Adult Pelvic 3D Reconstructions Using low dose Biplanar X-Rays

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Introduction & Objectives Pelvic 3D reconstructions are usually computed from CT-Scan acquisitions. However, this technique exposes the subject to high levels of radiation. A novel technique, the EOS® low dose biplanar X-Ray system, can be used to perform 3D reconstructions of skeletal structures such as the spine and the lower limbs [1,2,3]. Yet, the technique of 3D reconstruction of the pelvis, using this same system, is not fully validated, particularly when the pelvis is more or less rotated in the horizontal plane, which usually occurs because of malpositionning of patients during X-ray acquisition. The purpose of this study is to evaluate the validity and reliability of the main pelvic parameters using this new technique, in comparison with 3D reconstructions obtained by CT-Scan. Methods Helical pelvis CT-Scans (slice thickness: 0.6mm) of 6 adults (3 F and 3 M, age: mean 48 - SD 29) were considered. A three-dimensional reconstruction of each pelvis was obtained using the Avizo® software, by detecting

the outlines of the pelvis on each slice and was considered as the reference. Lateral and Frontal Digitally Reconstructed Radiographs (DRRs) were computed from the CT-Scans, in order to simulate the lateral and frontal radiographs which would be obtained from a typical EOS exam. Then for each patient, axial rotation of the pelvis was simulated and the corresponding DRRs were calculated at 5°, 10°, 15° and 20°. The 3D reconstruction of each pelvis was obtained from each pair of X-Rays in each axial position, using the research version of the SterEOS® software (Figure 1). Four qualified observers repeated the 3D reconstruction 3 times each at each axial rotation. A total of 360 reconstructions in 3D were obtained (6 patients, 5 axial rotations, 3 operators, 3 times each). Clinical parameters were calculated on the reference 3D scan and the biplanar X-ray reconstructions: pelvic angles (pelvic incidence, pelvic tilt, sacral slope), % of acetabular coverage of the femoral head (%ACFH), bicoxofemoral distance, frontal pelvic tilt, acetabular angles (abduction, anteversion, tilt) and center edge angle of the acetabulum (CEA). The bias was calculated as the mean difference between CT-based (reference) and biplanar X-Ray reconstructions. The 2SD of interobserver reliability was calculated in order to assess the 95% confidence interval (95%CI) of each pelvic parameter. The Intraclass Correlation Coefficient (ICC) was also used to evaluate the interobserver agreement. Results At 0° position, the bias was lower than 2° for all angles, lower than 3 mm for bicoxofemoral distance, and lower than 1% for the %ACFH. The 95% CI was lower than 2° for pelvic tilt and frontal pelvic tilt, between 2 measurement units (m.u.) and 4.5 m.u. for acetabular angles, pelvic incidence, %ACFH and bicoxofemoral distance, and higher than 5° for CEA. For rotated positions, the bias remained under 1.5° for pelvic angles but increased with the extent of axial rotation for CEA and acetabular angles, reaching 3.5° at 20° of rotation. The 95% CI increased with axial rotation and exceeded 7° in the 20° position for most of the studied angles. The ICC for all parameters and in all axial rotations was superior to 0.8. Conclusion Clinical measurements performed on 3D reconstructions of the pelvis from biplanar X-rays were shown to be accurate and reliable. A pelvic rotation of more than 15° significantly decreased the accuracy of CEA and acetabular angles. A pelvic rotation of more than 10° significantly decreased the reproducibility of pelvic angles, CEA and acetabular anteversion. The 3D reconstruction technique of the pelvis using biplanar X-rays was not affected by axial rotation when it did not exceed 10°, which is rarely exceeded by malpositionning of patients during X-ray acquisitions in clinical practice. Further research is underway in order to evaluate this technique on radiographs of children, where non-ossified portions of the pelvis could affect the visibility of bony landmarks and therefore the validity and reproducibility of 3D reconstructions. References [1] Humbert L, Med Eng Phys, 2009. [2] Baudoin A, MBEC, 2008. [3] Chaibi Y, CMBBE, 2012.

A Better Understanding of Cerebral Palsy Pathology using 3D Subject-Specific Musculoskeletal Modeling

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INTRODUCTION Spasticity in children with cerebral palsy (CP) affects muscle function and geometry and is related to the development of skeletal malalignments during growth, which can both cause gait alterations [1,2]. Assessment of the pathology is usually based on the evaluation of muscle function, the medical imaging of skeletal lower limbs and gait analysis. Generic models are widely used in the literature in order to understand CP pathology. The aim of this study is to use 3D subject-specific data obtained from musculoskeletal modeling along with gait analysis in order to better understand motor dysfunctions in CP and to compare these to normal locomotion in typically developing (TD) children. METHODS Twenty-two spastic CP children (mean age: 11±3; diplegia N=16, hemiplegia N=6; GMFCS I N= 14, GMFCS II N=6, GMFCS III N=2), with neither medical nor surgical histories, had undergone 3D gait analysis. Joint kinematics of the lower limbs were calculated in the frontal, sagittal and horizontal planes. An EOS® biplanar X-ray exam was performed in order to calculate the 3D skeletal parameters of the pelvises and the lower limbs: femoral anteversion, tibial torsion, neck shaft angle, acetabular parameters and pelvic parameters [3]. This was performed on 44 lower limbs of CP children. Axial MRI acquisitions were performed on 28 lower limbs of the CP group, in order to obtain 3D subject-specific reconstructions of 18 muscles in each limb [4] (Figure 1). Based on these reconstructions, each muscle's length and volume were calculated and then normalized to lower limb length and body mass respectively. All kinematic and musculoskeletal parameters were age-matched to 22 lower limbs of TD children. Statistical differences were investigated between the CP and TD populations for all parameters (T-test and Wilcoxon). Correlations between the parameters were evaluated using the Pearson and Spearman tests. RESULTS Femoral anteversion, pelvic incidence and sacral slope were significantly increased in CP when compared to TD children ($p<0.001$). Anova test showed a significant difference for the femoral anteversion between TD children and CP children with GMFCS level II. The normalized lengths of the gracilis, vastus intermedius, soleus, adductor brevis and longus were significantly smaller in CP children with GMFCS level II compared to TD children ($p<0.001$). The normalized muscle volumes of the CP children were smaller for the femoral biceps longus, rectus femoris, gastrocnemius medius, vastus intermedius, adductor brevis and longus in CP children with GMFCS II when compared to TD children ($p<0.001$). Fifteen lower limbs of children with CP presented excessive internal hip rotation during gait when compared to normative values. For these 15 lower limbs, femoral anteversion was significantly increased in children with CP ($p<0.001$), when compared to TD children, and was correlated to mean hip rotation during stance phase ($R=0.54$). 3D acetabular anteversion and abduction were correlated to hip rotation at initial contact ($R=0.64$) and peak hip rotation during stance phase ($R=-0.5$) respectively. CONCLUSION For the first time, musculoskeletal 3D subject-specific parameters in CP could be compared

to those of TD children. In these preliminary results, femoral anteversion, pelvic parameters and hip adductors, among other muscles, were only shown to be significantly altered when GMFCS was higher than I. These results showed that 3D femoral anteversion might contribute to internal hip rotation during gait, which is not in concordance with previous studies based on generic models [5,6]. Moreover, 3D acetabular parameters, studied for the first time in CP, were shown to be related to internal hip rotation during gait. Larger groups of subjects will allow us to better understand the evolution of the musculoskeletal deformities that occur during the growth of spastic CP children, when compared to the growth of TD children. REFERENCES [1] Shortland A., Dev Med Child Neuro, 2002. [2] Mohagheghi AA., Clinical Biomechanics, 2007. [3] Assi A, Eur J Radiology, 2013. [4] Jolivet E, CMBBE, 2008. [5] Aktas S., JPO, 2000. [6] Carriero A., JPO, 2009.

Nutrition Related Health Behaviors Among University Students in Tripoli-Lebanon

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Nutrition Related Health Behaviors Among University Students in Tripoli- Lebanon Germine M.El-Kassas MD, Ph D *, Zeina El -Ali MS, LD.* *Nutrition & Dietetics Department, Faculty of Health Sciences, Beirut Arab University , E- mail: g.elkassas@bau.edu.lb. Abstract Background: Poor eating habits is a major public health concern among young adults who experienced transition into university life. Rapid changes in physical growth and psychosocial development have placed these young adults as nutritionally vulnerable groups with poor eating habits that fail to meet dietary requirements. Some common unhealthy eating patterns among young adults included meal skipping, unhealthy snacking and fast food consumption. As with their dietary behaviors, most university students' physical activity patterns are not at optimal levels and deteriorate over time. As a consequence, overweight and obesity are increasingly observed among them. Objective: To evaluate the lifestyle and nutrition related behaviors and overweight and obesity prevalence among Beirut Arab University students -Tripoli Campus. Design and setting: Through a cross sectional study approach a total number of 497 students males and female students aged 17 - 25 years had participated in the study. Data were collected using an interview questionnaire, anthropometric, and dietary tools. BMI was determined using the CDC BMI- for- age growth charts for students less than 20 years. . Main outcome measures: Dietary patterns, fast food consumption , physical activity levels , overweight and obesity trends, sedentary behaviors and lifestyle factors among BAU students. Results: The results showed that (76.8%) of students have disturbed meal pattern. The overall prevalence of overweight and obesity among the whole studied sample was (26.6)% with a statistically significant difference between males (67.4%) & females (32.6%). The percentage of students who skip breakfast(16%) was significantly higher among the overweight and obese group. In addition more than half of the studied sample reported low frequency of weekly intake of fruits and vegetables, high consumption of fast food meals and low physical activity levels . Conclusion: The overall high prevalence of overweight and obesity, low physical activity levels, disturbed meal pattern and unhealthy dietary intake indicates the necessity of formulation of policies and nutritional strategies to stop the rise of overweight and obesity among university students in Tripoli, Lebanon. . .

ENG8_civil: Engineering VIII

Room: USJ CSH 206

Chairs: Aziz M. Barbar (American University of Science and Technology, Lebanon), Fadi A. Geara (Université Saint-Joseph & Ecole Supérieure d'Ingénieurs de Beyrouth, Lebanon)

Rheological Characterization of Asphalt Binders in Lebanon

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The bitumen specifications in most developing countries are based on the "conventional" test methods: the penetration, softening point and viscosity testing. Climate and traffic conditions, long-term aging are not yet directly recognized. The Performance Grading system (Superpave), which has proved its superiority over other systems in North America, is a comprehensive system that allows consideration of such factors in selecting asphalt binders. Its application to the country of Lebanon is possible and is expected to result in better practice than using the conventional methods. This study includes a first trial of developing a Performance System for the country of Lebanon. Weather data obtained from fourteen reporting weather stations is used to develop climatic zones that are used as basis for implementing performance grading. To validate the concepts, samples of local asphalt were tested using the Superpave technology and the results are compared with those estimated using available approximation methods such as Shell Pavement Design software packages (BANDS 2.0). The study also aims to show how the rheology and the performance of a bituminous binder mixed with modifying agents such as LSBS, ELV, Polyphosphoric Acid PPA and CBE can be improved. As a result, the major components of this new technology for asphalt binders' characterization in Lebanon have been identified and established. The country of Lebanon was divided into three zones: Shoreline 70-4, Inland 70-10 and High Mountains 64-16. Various samples of the imported bitumen were found to be PG64-16; this was modified using different polymers. It was found that the observed rheological properties depend upon the dosage and type of the

modifier used. Based on the obtained results a number of conclusions can be drawn that may guide the transition procedure using these innovative products.

Influence des propriétés des bâtiments en maçonnerie sur les tassements différentiels admissibles

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Influence des propriétés des bâtiments en maçonnerie sur les tassements différentiels admissibles Résumé L'objectif de ce papier est d'étudier l'effet des propriétés mécaniques et géométriques des bâtiments en maçonnerie sur les valeurs seuils du ratio de déflection utilisées pour évaluer leur dommage. Les ouvrages en maçonneries sont susceptibles de subir des dommages d'intensités diverses lorsqu'ils sont soumis à des tassements différentiels pouvant provenir de différentes origines (retrait-gonflement, creusement de tunnels, affaissement miner…). Ces dommages sont divisés en différentes catégories selon leur sévérité. Une analyse de sensibilité réalisée avec la méthode analytique développée par Burland (1995) basée sur la théorie des poutres, est présentée dans ce papier. Cette méthode analytique est utilisée pour évaluer les dommages d'un bâtiment en fonction de sa déflection relative (déflection divisée par la longueur du bâti). Dans ce modèle, un bâtiment est modélisé comme une poutre simplement appuyée soumise à l'effet de son propre poids. Cette poutre est également soumise à une flèche qui représente le tassement différentiel. Une relation entre la déformation principale d'extension maximale dans la structure et son ratio de déflection est alors déterminée en fonction des propriétés mécaniques et de la géométrie de la structure. Cette déformation maximale est alors comparée à des valeurs seuils pour évaluer le degré de dommage. Burland a considéré une géométrie particulière de la structure (ratio longueur sur hauteur L/H égal à 1) et des propriétés particulières de la structure (ratio du module d'Young sur module de cisaillement E/G égal à 2,6). Cependant, Son et Cording (2007) ont montré que ces paramètres ont une large plage de variation, pour les bâtiments en maçonnerie. Afin de généraliser l'approche de Burland, nous avons réalisé une étude de sensibilité à l'ensemble des paramètres du modèle. L'analyse de sensibilité concerne des propriétés du bâti (géométrie, rigidité, la position de l'axe neutre dans la section de la poutre (dépendante de l'interaction sol-structure)) sur l'évaluation des dommages. Les résultats montrent que les propriétés des bâtiments en maçonnerie peuvent modifier les seuils du ratio de déflection utilisés pour évaluer les catégories de dommage. Les valeurs de E/G et L/H présentent une influence notable sur les seuils du ratio de déflection. Le choix de la position de l'axe neutre dans la section de la poutre a affecté le changement de l'état critique entre la flexion et le cisaillement de la poutre. Les résultats sont finalement tracés et comparés à des valeurs seuils empiriques issues afin de justifier une plage de variation des valeurs seuils de la déflection relative associée à différentes catégories de dommages. Des intersections des catégories de dommages sont observées en fonction des valeurs du ratio de déflection. Autrement dit, une même valeur du ratio de déflection peut noter différentes catégories de dommages. Cela dépend des propriétés du bâti.

Analyse numérique du comportement mécanique, à long terme, des composites renforcées avec des fibres de verre

Elias Dib (ESIB-USJ & ENPC, Lebanon); Wassim Raphael and Fouad Kaddah (Université Saint Joseph, Lebanon); Jean-François Caron and Ioannis Stephanou (ENPC, France)

Les matériaux composites jouent un rôle de plus en plus important dans notre société dans de très nombreux domaines (aéronautique, naval, génie civil…), grâce à leurs avantages en terme de légèreté, d'inaltérabilité et de rigidité. Cependant, ils ont des faiblesses qui peuvent poser des problèmes pour une utilisation aux ouvrages du génie civil. Ces faiblesses concernent notamment leur durabilité. A cause de phénomènes viscoélastiques, les propriétés mécaniques des structures en composites évoluent dans le temps. Le fluage ou/et la relaxation sont des facteurs importants qui peuvent considérablement affecter l'application des composites aux structures. Dans ce but, l'objectif de notre travail est de poursuivre une étude numérique sur le comportement mécanique, à long terme, des composites renforcés avec des fibres de verre (GFRPs).

Determination Of The Bearing Improvement Ratio For Clay Soil Improved With Group Of Stone Columns and Lime Columns

Maki Jafar Mohammed Al-Waily (Fondation of Technical Education, Iraq)

This experimental study was conducted to identify the behavior of stone columns and lime columns. The soft clay soil treated with stone or lime column(s) were used in the model tests with two values of undrained shear strength (cu = 8 kPa and cu = 14 kPa). The loading tests were carried out on a single column and a set of columns (two, three and four) for both methods of improvement. The simple compression machine was made for this purpose of caring out the loading tests. The main parts of compression machine were a rigid steel frame and hydraulic jack and it modified by adding the electronic load cell with capacity of 50 kPa connected to digital unit for getting readings with accuracy of 0.001 kN. The value of "Bearing improvement ratio" were calculated for all of the model tests.

Modélisation des déformations sismiques des bâtiments au Liban - Étude du mode fondamental de vibration

Fadi A. Geara (Université Saint-Joseph & Ecole Supérieure d'Ingénieurs de Beyrouth, Lebanon); Christelle Geara (Ecole Supérieure d'Ingénieurs de Beyrouth - ESIB, Lebanon)

Résumé Le mouvement pendulaire des immeubles sous l'action des rafales de vent ou des séismes peut provoquer, surtout chez les personnes sensibles, des troubles nerveux assez importants. Un cas extrême peut être cité, où les derniers étages d'un bâtiment de 25 étages construits en Suède ont dû être évacués à cause des perturbations provoquées par les vibrations trop prononcées. D'après certains auteurs il semble que l'origine de ces troubles se trouve dans l'accélération du mouvement pendulaire. Toutefois, à défaut d'une méthode de calcul dynamique appropriée, on est amené à limiter, par une méthode statique équivalente l'amplitude des déformations. Or, les études de vibration des bâtiments deviennent de plus en plus importantes et de plus en plus répandues chez les ingénieurs grâce à plusieurs facteurs dont la connaissance plus approfondie de ce phénomène, les exigences de résistance et de confort des codes actuels de calcul et les risques naturels existants et relativement bien connus. Cet article traite la déformation des bâtiments d'habitation, essentiellement sous les effets sismiques. Le travail consiste à formuler d'une façon précise, les fonctions de déformation du mode fondamental de vibration en dynamique des structures, des bâtiments à étages contreventés par des portiques, par des refends ou par un contreventement mixte (portiques + refends). Pour cela on a choisi de travailler sur des types de bâtiments, couramment utilisés au Liban, et modélisés par la méthode des éléments finis afin de trouver les déplacements réels obtenus. On calcule ensuite les déplacements avec les formules proposées par le code parasismique PS92 afin de les comparer aux valeurs réelles et d'analyser la différence entre ces deux calculs. Le calcul a été réalisé pour les structures suivantes: 1) Structure à base rectangulaire contreventée par des portiques, formée de 5, 10 et 15 étages. 2) Structure à base rectangulaire contreventée par des murs refends ou voiles, formée de 5, 10 et 15 étages. 3) Structure à base rectangulaire avec un contreventement mixte (portiques et voiles), formée de 5, 10, et 15 étages. La modélisation a été faite en utilisant le logiciel ROBOT pour chercher les déplacements des différents étages. Une comparaison entre les résultats trouvés et les formules données par le code PS92 a été ensuite établie afin de tirer des conclusions quant à l'adéquation des modèles de déformation du code PS92 aux structures réelles au Liban. Ce choix a été fait, étant donné que les structures étudiées couvrent pratiquement la majorité des constructions au Liban, bien sûr en dehors des tours de très grande hauteur où des méthodes tridimensionnelles ou bidimensionnelles plus sophistiquées doivent être prises en compte, et ne pas se contenter uniquement du mode fondamental de vibration. En conclusion, une nouvelle formulation va être proposée pour chaque type de bâtiment, et qui présente plus de précision que les formules simplifiées du code PS92. La méthode développée dans cet article peut être utilisée dans des projets réels ; elle permet de calculer les déplacements d'une façon simple et précise, pour des bâtiments avec tout type de contreventement. Cette étude a démontré que les formules trouvées donnent des résultats plus corrects que la méthode approchée du PS 92 et par conséquent permettent un calcul plus précis du mode fondamental de vibration et des effets qui en résultent.

Rejuvenators for Asphalt Binders from Spent Coffee Grounds and Waste Cooking Oil

Rita Jalkh, Mohamad Abiad and Ghassan Chehab (American University of Beirut, Lebanon)

Increased environmental awareness combined with rising fuel costs and energy demands have encouraged researchers around the globe to explore novel and sustainable resources for energy, polymers as well as alternative binders and modifiers. Such resources are highly treasured especially if they stem from reusing existing material and/or waste recycling. These initiatives have pushed for sustainable asphalt production and paving practices in an attempt to reduce carbon emissions, reduced consumption of natural resources, and alleviated pressure on landfills whilst increasing the materials' cost effectiveness. Currently, alternative binders are produced from biomasses which is considered as one of the largest sources of energy worldwide. On the other hand, utilizing biomass residues such as waste cooking oil (WCO) and spent coffee ground (SCG) could add a new array of applications for two hazardous byproducts from the food industry. SCG is a by-product of the coffee industry and it has shown to contain high percentages of oil,10-18% (w/w dry basis). On the other hand, waste cooking oil is generated in large quantities by the food sector, mainly food services. In Lebanon, the coffee industry imports around 26,000 tons of green coffee beans annually, whilst the food service industry consumes around 60,000 tons of vegetable and other frying oils. In this study, oil was extracted from spent coffee grounds (SCG), collected from various coffee shops, using a reflux extractor with hexane as the solvent. The extracted oil was further oxidized at 135℃ for 6, 9, 12, 24 and 48 hours under a controlled air flow of 50ml/min. The waste cooking oil (WCO) was filtered and oxidized in a similar manner as the SCG oil extracts. The oxidized oil was then physically and chemically characterized prior to its use as a rejuvenator for aged asphalt binder. For this purpose, a PG-58 asphalt binder was aged for 24 hours at 165oC using a thin film oven yielding an aged binder with PG of 76. Basically, the objective of this aging was to obtain a more brittle binder simulating an overheated or damaged binder which could then be modified using various percentages of the oxidized oils. Accordingly, mixes incorporating 1, 5, 10, 12 and 15% oil were prepared. The samples were tested for their rheological characteristics, rutting and fatigue performance under constant shear loading as well as multiple stress creep and recovery (MSCR)as per ASTM and AASHTO standards. Testing results showed that the SCG oil at reception was less oxidized (6.73 meq peroxide/ kg) than the WCO (64.47 meg peroxide/kg)and with a higher acidity10.92 mgKOH/gas compared to, 3.39

mgKOH/g for the WCO. As the oxidation time increased, the oil acidity also increased; however, it was observed that beyond 12 hours of oxidation there was a significant decrease in the iodine value for both oils, a phenomenon associated with the breaking of double bond. Upon oxidation, the peroxide value reached a maximum of 13.35 meq peroxide/kg for SCG oil and 174.25 meq peroxide/kg for WCO after 6 hours of oxidation, followed by a constant decrease until a plateau is reached at 10 meq peroxide/kg for both oils. Furthermore, the rheological characterization results showed that the addition of 1, 5, 10, 12 and 15% of either SCG oil or WCO was able to restore the linear behavior of the asphalt binder that had been lost after the induced aging process. It is also worthy to note that adding extracted SCG oil or WCO also led to increased softening of the mixes thus decreasing the high temperature grade. Moreover, compared to the control un-aged binder, all mixes resulted in higher recovery at low stress levels; this can be translated into an improved performance with a lower susceptibility to rutting. Based on analysis of the testing results, this research proposes a new potential application for recycling spent coffee grounds and waste cooking oil by incorporating oxidized bio-oils in asphalt binders to help recover the loss of desired properties andthus increase their resistance to permanent damage.

Solar Technology Concept Penetration in MENA Region (2010 - 2030)

Loren Makki (LIU, Lebanon); Marc Anthony Mannah and Mahmoud Kazma (Lebanese International University, Lebanon); Rabih Rammal (LIU, Lebanon)

This paper focuses on quantifying the solar power mix in the MENA region by defining the existent capacities of Solar Photovoltaic (PV), Concentrated Solar Power (CSP) and Solar Water Heating (SWH) systems. Moreover, the targeted and noted projected capacities of solar power in selected MENA counties are also presented. Distinguished present and forthcoming projects in specific MENA countries will also be revealed with their prominent funding organizations. The overall situation will be evaluated and discussed.

ENG7_CCE: Engineering VII

Room: USJ CSH 208

Chairs: Rony Darazi (Antonine University, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

Amélioration de l'efficacité énergétique des machines électriques par action sur la commande

Gabriel Khoury (Université Saint-Joseph, Lebanon); Ragi Ghosn (Saint Joseph University, Lebanon); Flavia Khatounian (Université Saint Joseph de Beyrouth, Lebanon); Maurice Fadel (Laplace University, France)

L'amélioration de l'efficacité énergétique des machines électriques constitue de nos jours, un domaine de recherche essentiel. En effet, les pertes dans une machine électrique sont une source importante de consommation d'énergie, qui peut être régulée par la commande du système dans le but d'aboutir à une commande à énergie minimale. Dans ce contexte, ce résumé présente un bref aperçu des différentes commandes déjà développées dans le but de réduire la consommation énergétique d'un système donné, et ce afin de déterminer la démarche à suivre pour la mise en place d'une commande performante au niveau de l'efficacité énergétique.

Green Electronics for Cognitive Radio Systems

Ibrahim Serhan (LIU, Lebanon); Hussein Hijazi (Grenoble-INP, GIPSA-Lab, France); Ali Chamas Al Ghouwayel (Lebanese International University, Lebanon)

This paper addresses the concept of Cognitive Radio(CR) systems. This concept permits equipment to communicate with any radio communications standard by only modifying the embedded software. This technology, which may appear very simple at first glance, not only introduces many new advantages, but also raises numerous technological challenges. The design of a CR system imposes the implementation of intelligence simultaneously into both network and the equipment to satisfy user needs and resource constraints, ultimately resulting in an increase in spectral efficiency. In this paper we discuss the implementation of intelligent terminal and we emphasize on the fact that the design process should consider simultaneously the algorithmic and electronic-architectural perspectives in order to achieve a smart green system with the minimum cost and lowest energy consumption

Model Predictive Control for Electrical System Applications

Jean Sawma (Université Saint-Joseph, Lebanon); Flavia Khatounian (Université Saint Joseph de Beyrouth, Lebanon); Eric Monmasson (Université de Cergy, Lebanon); Ragi Ghosn (Saint Joseph University, Lebanon)

Control techniques are methods based on applying a series of actions on a specific system in order to achieve a set of objectives. To define the control objectives, it is mandatory to translate the objectives into an equation called evaluation function. Model Predictive Control (MPC) techniques are control methods based on minimizing a simpler form of evaluation function. This paper develop MPC techniques concept

and present the experimental results of applying a dual MPC cascaded control to an active front-end rectifier.

Calcul du taux de ressemblance entre les images temps fréquence relatives à la corrélation du bruit ambiant: application à la localisation de source

Karl Hourany (Lebanese University, Lebanon); Farouk Benmeddour and Emmanuel Moulin (Université de Valenciennes et du Hainaut Cambrésis, France); Youssef Zaatar (Lebanese University, Lebanon); Jamal Assaad (IEMN - DOAE - MIMM Team, UVHC, France)

Beaucoup d'études dans différents domaines ont montré la possibilité d'extraction des informations d'un milieu en exploitant le bruit acoustique naturel présent dans ce dernier et ce qui est le cas dans le domaine de l'aéronautique et du transport fluidique. En effet, le bruit généré par les moteurs des avions en condition de vol ainsi que celui généré sur les canaux de transport et causé par l'écoulement turbulent du fluide est considéré comme une source acoustique naturelle. Ceci permet d'aboutir à une méthode de détection passive (récepteurs en écoute passive uniquement). Il a été montré récemment le potentiel prometteur d'une technique acoustique passive. Cette dernière est basée sur la corrélation d'un champ acoustique non cohérent pour le contrôle de l'état des structures. L'idée est donc d'étudier le champ produit dans les structures par les sources de bruit ambiant. Donc en réalisant de façon périodique l'intercorrélation des signaux reçus sur deux capteurs dits « de mesures » (A et B), placés sur la structure, on aboutit donc à un suivi de l'évolution de son état. La présence d'un endommagement dans la structure induit des modifications dans ces fonctions de corrélation or ceci peut être interprété comme une fausse alarme de détection vu que ces dernières sont sensibles non pas seulement à la présence d'un endommagement mais aussi aux configurations de la source (sa position par exemple). Donc dans cette situation il devient difficile de séparer, dans l'information mesurée, les contributions des caractéristiques de la structure et celles de la source. Ce problème peut être contourné en utilisant un troisième capteur dit de référence (C), permettant d'identifier la configuration de la source en cours au moment de la mesure. Le principe est donc de construire une base de données contenant les intercorrélations des signaux reçus sur les deux capteurs de mesure pour l'état sain de la structure ainsi que ceux des autocorrélations des signaux reçus sur le capteur de référence (qui permet d'identifier les caractéristiques de la source) pour les configurations possibles puis, à chaque mesure, comparer l'intercorrélation à sa référence pour la configuration de source identifiée. Enfin, plutôt que de travailler sur des corrélations brutes, une représentation temps-fréquence est plus judicieuse pour mettre en évidence les effets intéressants. Dans la littérature, on trouve beaucoup de méthode permettant de faire la comparaison entre les images ainsi que l'étude des dissimilarités entre ces dernières. Dans ce travail, une nouvelle méthode proposée et basée sur les minimums locaux présents dans l'image temps-fréquence, pour de tester le degré de ressemblance entre ces images, sera décrite. L'algorithme de comparaison sera utilisé pour pouvoir localiser une position inconnue de la source.

Smart Metal Detectors for Landmine Detection and Classification

Mohamad Homsi, Mohamad Amine Soudki, Abdallah Chebaro, Lise Safatly and Mohammed Al-Husseini (American University of Beirut, Lebanon); Mariette Awad (AUB, Qatar); Ali El-Hajj (American University of Beirut, Lebanon); Hassan Ghaziri (Beirut Research and Innovation Center, Lebanon)

Numerous countries around the world suffer from landmines as a persistent and threatening result of wars. Although sophisticated tools have been employed to localize the buried explosives, many of these still suffer from high detection error rates, have high costs, and require special training and experience of the operators especially at the level of target discrimination. The goal of this work is to design a low-cost and automated detection and classification system based on the widely used metal detector. The conventional metal detector is enhanced to: 1. Take and record the response signals at precise coordinates in a designated part of the suspected field, 2. Extract a pattern of the taken readings, 3. Compare this pattern to a database of the patterns of known landmines and other non-threatening objects, and 4. Based on the above comparison classify the detected object as harmless or as a land mine. To implement the above solution, the conventional metal detector is equipped with acoustic sensors for determining its exact coordinates, and a Raspberry PI computer to record the metal detector responses and extract the detection pattern. A client-server program is developed, which interfaces the Raspberry PI with the classification database.

Electric power system simulator

Houssein Taleb and Rawad AL Masri (LIU, Lebanon); Mohamad Arnaout (LIU & Electrical Engineer, Lebanon); Khaled A. Chahine and Marc Anthony Mannah (Lebanese International University, Lebanon)

An electric power system is sometimes very complex to analyze using hand calculations. Especially if there are non-linear equations, and high number of buses. Human can deal with little number of buses. However, if the number of buses is very high hand calculation becomes very complex. For this reason, our aim will be focused on the implementation of new software that computes the essential features of a power system as the power flow calculation, the faults analysis and economic dispatch interpretation. Several numerical methods that applied to electric power system are used. Concerning the power flow calculation, the Newton-Raphson method with its decoupled form is adopted. However, the different types of faults analysis as single line to ground fault, line to line fault, and double line to ground fault are

considered. Finally, the economic dispatch interpretation is discussed for different strategies: with and without limited fuel supply and the "take or pay" concepts.

FEA5_env: Food security, Environment, Agriculture V

Room: USJ CSH 305

Chairs: Claude Daou (Lebanese University, Lebanon), Wehbeh Farah (Université Saint Joseph, Lebanon)

Characterization of UVB -induced damage immediately and 24 hours post exposure using in vitro cytotoxicity assays

Christian Khalil (Lebanese American University, Lebanon)

There is a great deal of concern resulting from the impact of UV light on human skin especially when skin damage levels are predicted to rise due to ozone layer depletion. The skin acts as an important biological barrier, and plays an important physiological and immunological role. This study reports the UVB-induced effect on skin fibroblasts one of the most abundant cells in the dermis. Two time points, immediately and 24 hour post UVB exposure were used to measure the magnitude of UVB-induced cytotoxicity. The induced cell membrane damage was assessed by neutral red (NR) dye uptake while cellular metabolic activity was assessed by the 5-(3-carboxy-methoxyphenyl)-2-(4.5-dimethylthiazolyl)-3-(4-sulphonyl) (MTS) cytotoxicity assay. Cell membrane damage was further assessed by measuring lactate dehydrogenase (LDH) enzyme release from UVB exposed cells. A correlation was found between the MTS and neutral red (NR) assay in measuring UVB-induced cellular damage in exposed skin fibroblasts cultures immediately post exposure. These findings together with LDH levels post irradiation indicated that doses higher than 2.2 J/cm2 were needed for the immediate expression of measurable cell membrane damage by the assays systems used. This should not indicate that no damage is triggered by lower irradiation levels, since our observations 24 h post UVB-irradiation of the same cells showed cellular membrane damage for doses as low as 80 mJ/cm2 as measured by the LDH assay. The assessment of cellular metabolic activity indicated that MTS displays a higher sensitivity in detecting early cell damage by comparison to the NR assay. The UVB induction follows a dose dependent response, and the cellular damage induced by exposure is best-measured 24 h following exposure using the LDH assay.

Scale up of the production of a biopesticide based on a Bacillus thuringiensis strain isolated from the Lebanese soil

Jihane Rahbani and Dominique Salameh (Université Saint Joseph, Lebanon); Cedric Brandam (Université de Toulouse, France); Roger Lteif (Université Saint-Joseph, Lebanon)

Bacillus thuringinesis (Bt) is a facultative anaerobe, gram positive, spore forming bacterium. The biotechnological importance of this bacterium resides in its ability to produce, during sporulation, crystal proteins known as δ-endotoxins which express specific insecticidal activity. Commercialization of Bt products depends on the low cost production [1]. On commercial scale the objective is to complete the fermentation in minimal duration, without compromising on the amount of δ-endotoxin produced, which will reduce the cost of energy consumption involved in running the bioreactors and also greater number of batches could be completed ultimately becoming cost effective. As part of the development of an industrial production of Bt based biopesticides in Lebanon, our work aimed to scale up the production of a Bacillus thuringiensis kurstaki strain "Lip" isolated from Lebanese soil. Fermentations were performed in a 1000 L bioreactor. An alternative mono-component culture medium (cereal milling byproduct CMB 6 % m/v) was used [2]. The agitation speed was maintained at 500 rpm and three values of the flow rate were tested (0.12; 0.29; 0.58 L.L-1min-1).The temperature was maintained at 30 ºC and the pH was not controlled. Process performance was analyzed in terms of quantity and rate of Bt crystals produced, and quantity and rate of δ-endotoxins achieved. Kinetics of fermentations were followed and compared to those obtained at the laboratory scale in a 2 L bioreactor. The spores and crystals concentration obtained were of the same order in the different aeration conditions tested. The toxin proteins concentrations and productivities increased with the air flow rate. Patterns of variations of the toxin proteins productivity as a function of air flow rate were similar in the bioreactors of 2 and 1000 L but the comparison of the absolute values showed differences between the two scales. [1] Ben Khedher S., Kamoun A., Jaoua S.,Zouari N. (2011). Improvement of Bacillus thuringiensis bioinsecticide production by sporeless and sporulating strains using response surface methodology. N Biotechnol. 28(6):705-12. [2] Rahbani-Mounsef J., Salameh D., Kallassy-Awad M., Brandam C., Lteif R., (2014). Evaluation of a cereal milling byproduct for the low cost production of Bacillus thuringiensis kurstaki in submerged fermentation, European Journal of Biotechnology and Bioscience, 1(6): 10-16.

Concevoir et planifier l'infrastructure à l'âge du changement climatique: Cas de la gestion de l'eau d'un projet de développement urbain en Arabie Saoudite

Antoine Hreiche (Universite Saint-Joseph & ESIB, Lebanon)

Le changement climatique a des effets directs considérables sur les infrastructures d'une ville. Ces effets vont de l'augmentation de la fréquence des phénomènes météorologiques extrêmes et des inondations

à l'élévation des températures. Les inondations, catastrophes naturelles les plus coûteuses et les plus destructrices, devraient devenir plus fréquentes sous l'effet de l'intensification des précipitations. Aussi, les sources d'approvisionnement en eau seront compromises du fait de l'augmentation des températures et de la modification des modèles de précipitations (raréfaction des cours d'eau, baisse des niveaux des nappes phréatiques et intrusion saline dans les aquifères côtiers). Parallèlement, la demande en eau des villes augmentera sous l'effet de l'accroissement de la population et de l'augmentation des températures. Pour cela, une adaptation des villes s'avère nécessaire et il faudrait repenser l'infrastructure de l'eau dans les villes. Ce travail présente une initiative de « développement à faible impact » d'un projet d'une très grande envergure, le projet « Makkah Gate », dans la région de la Mecque en Arabie Saoudite. Makkah Gate, également connu sous le nom arabe « Bawabat Makkah » sera une ville nouvelle qui s'étendra sur environ 84 km ² de terres et abritera une population estimée à environ 690 000 personnes. Le site est traversé par l'autoroute Jeddah-Makkah et se trouve à une trentaine de kilomètres de la Sainte Mosquée en direction de Jeddah. Le développement proposé est situé dans un climat aride qui se caractérise par des précipitations peu fréquentes, mais intenses. Le couvert végétal est rare et les formations superficielles sont peu perméable. Dans ces conditions, les précipitations de fortes intensités produisent des ruissellements importants. Le site est situé dans le Wadi Al Maqar et se compose d'un terrain très plat. Dans le but de préserver les caractéristiques naturelles et l'hydrologie du site, les quartiers ont été planifiés en fonction des caractéristiques hydrologiques du site et le réseau routier en fonction des directions du ruissellement. L'approche novatrice adoptée à l'échelle du bassin versant consiste à traiter l'eau de pluie le plus près possible de sa source en décentralisant le réseau de drainage pour gérer le ruissellement sur de petits sites, et en créant des zones tampons riveraines avec des milieux humides à l'intérieur de ces zones pour entreposer les eaux de ruissellement, retenir les polluants et les sédiments et filtrer l'eau. Pour ce qui est de la gestion des eaux pluviales à l'échelle des quartiers, l'approche conventionnelle classique considère l'eau de pluie comme une nuisance en milieu urbain. Pour l'évacuer le plus rapidement possible, l'approche consiste à recueillir le ruissellement des chaussées et des surfaces imperméables, de l'acheminer vers des caniveaux puis vers les conduites du réseau d'assainissement d'eau pluviale dont le diamètre s'agrandit au fur et à mesure avant de déverser dans des stations d'épuration ou des wadis naturels. Les approches « infrastructure verte » et « développement à faible impact » permettent de réduire les impacts des eaux pluviales sur la qualité de l'eau en appliquant des pratiques d'aménagements favorisant l'infiltration, la rétention et l'épuration tout en engendrant des retombées sociales et économiques bénéfiques. Les quantités d'eau qui atteignent le système de drainage sont réduites et la charge sur le réseau est allégée. Au lieu d'acheminer trop rapidement les eaux pluviales vers des réseaux de drainage coûteux, les aménagements et pratiques qui retiennent, ralentissent et filtrent le ruissellement à l'échelle locale sont utilisés. Le ruissellement est dirigé vers des fossés végétalisés en bordure des routes et traité sur place dans les jardins de pluie. Deux méthodes d'analyse ont été utilisées pour la modélisation des aménagements proposés. Les résultats montrent que les pratiques proposées d'infrastructure verte peuvent réduire de manière significative les volumes de ruissellement et les débits de pointe pour différentes périodes de retour, par rapport aux volumes et débits de pointes relatives au stade de pré-développement. À l'échelle d'un quartier, l'utilisation de fossés végétalisés en remplacement d'un système d'égout pluvial entraîne des économies allant jusqu'à 80%. Pour les eaux usées, elles seront traitées localement par une station de traitement des eaux usées situées au voisinage du site. La station de traitement traitera les eaux usées en quatre phases; primaire, secondaire, tertiaire et désinfection. Le recyclage de l'eau traitée permettra une réduction de l'utilisation conventionnelle de l'eau potable de 66%. Un double système de distribution d'eau sera installé et desservira les quartiers: Un réseau de distribution de l'eau potable et un réseau de l'eau usée traitée. Tous les bâtiments seront desservis par ces deux réseaux. Ces approches de conservation de l'eau à l'échelle du bassin versant, permettent de produire des impacts économiques directs et indirects considérables. Le déploiement du développement à faible impact devra être accompagné d'une révision des réglementations afin d'encourager son implantation dans tous les nouveaux projets dans la région.

The Environmental Databases: Challenges and Standards

Hicham Hajj Hassan (Université Montpellier & National Council for Scientific Research, Lebanon (CNRS-L), Lebanon); Laurent Drapeau (Centre d'Etudes Spatiales de la Biosphere CESBIO, Toulouse, Lebanon); Olivier Lobry (OSU OREME, CNRS, Universite Montpellier, France)

The Environmental Databases: Challenges and Standards Hicham Hajj Hassan, Laurent Drapeau, Olivier Lobry Géosciences,Université_Montpellier OSUOREME,CNRS,Université_Montpellier Centre d'Etudes Spatiales de la Biosphère, Toulouse hishamhh@cnrs.edu.lb, olivier.lobry@um2.fr, laurent.drapeau@cesbio.ups-tlse.fr Environmental studies rely more and more on the implementation of databases as a reference system over time and as essential input to the initial conditions, calibration and validation of numerical models. Datasets available to characterize environmental problems are nowadays growing at a very fast pace. Big data management is becoming a key element to address environmental issues. Coming from researches and studies carried out by diversified stakeholders including research organizations, universities, national communities or consortia and national and international associations, the rich diversity of datasets leads to high heterogeneity of chosen observables and observations, both from the point of view of the methods and results of their quality. As environmental data sets are becoming larger, they are also increasingly dense and complex to manage such as high-resolution and hyperspectral satellite images. During the last 30 years, the amount of geospatial data available has grown dramatically following the evolution of the communication means and the rapid development of spatial data capture technologies such as Global Positioning System (GPS), remote sensing images, sensors, and the Internet of Things etc… .However, this huge amount of geospatial data is stored in different places, managed by different organizations, and the vast majority of the data are not being

used as effectively as they should and without effective long-term preservation, these environmental data (both current and historical) face the risk of becoming unusable over time. Therefore lack in data accessibility, availability, interoperability and sustainability is among the most frequent difficulties that are negatively influencing the way that researchers, decision-makers and the public are accessing and using these data. Moreover, users are often lacking the appropriate storage and computational resources to analyze these data. This explains why currently data sources are often fragmented, and information diffusion of information is problematic and not applied efficiently. To be able to preserve and use effectively such environmental datasets, we should take into account the compulsory integration of the standards formats that require the adoption of common implementation rules for metadata, data specifications, network services, and data sharing. Known as Spatial Data Infrastructures (SDI) these solutions provide institutional, organization and technical foundation of policies, interoperable standards and procedures that enable organizations and technologies to interact in a way that facilitates spatial data discovery, evaluation and applications. As an answer to the need for interoperability, the Open Geospatial Consortium (OGC) has specified a suite of standards that allows interoperable access either to data or metadata. This allows users to retrieve, use and integrate geospatial data coming from different sources and stored in different formats using HTTP protocol to communicate. The project presented aims at establishing such national Spatial Data Infrastructure (SDI) ensuring acquisition, archiving and management of multi-scale satellite imagery and in-situ datasets for the Lebanese territory and making it accessible by the scientific community and by various public actors involved in environment and management. It induces major breakthroughs: ? providing scientific teams with in-depth spatio-temporal information on the systems they study, enabling progress in the understanding and dynamics ? progressive involvement in the use of satellite images, as a communication and negotiation support, as a tool for a synoptic understanding, and as an operational source of information for monitoring and decision making ? networking between actors (research, public, private) around a mutualized information and share experience and knowledge) This project takes place within the framework of the Lebanese-French Environmental Observatory, O-Life project is gathering French and Lebanese partners around the notion of observation and sharing of environmental data to better understand and anticipate the evolution of resources (water, biodiversity, …) and risk (climatic, seismic, …) in the Mediterranean. It is intended to avoid duplication of efforts and expenses by enabling users to save resources, and time when trying to acquire or maintain data sets, to increase the benefits of using available data, store and protect data for long term, export data to users or external databases and to establish key partnerships with academia and other observatories which would have a positive effect on the national and regional level. The O-LiFE SDI is designed as a start for a National Spatial Data Infrastructure (NSDI). Built upon a complete stack of open source software like GeoNetwork, GeoServer, OpenLayers, and PostGIS, it provides full OGC web services with extensive digital rights management controls. The solution is based on a service-orientated architecture (SOA) conceived with a modular design to set up services of discovery, visualization and download in a secure and multilingual environment. It acts as aggregating technologies to offer an interoperable solution allowing orchestrations of OGC compliant web services. The complete platform, enabling dissemination and interoperable processes to organize, edit, process and publish spatial through standardized services (WFS, WMS, WCS and SOS) is presented. The O-LIFE SDI will confidently increase information sharing across the research community, allowing for the reuse and adaptation of geospatial datasets. This availability is cost-savings, and offers wider use of crucial datasets by offering access to datasets elaborated only once but used many times allowing scientists to spend more time in data analysis than in data collection and discovery, and enable more people to benefit from using environmental data. The SDI priorities with respect to common data, services and applications include (i) discovery of spatial data services and applications, (ii) inventory and selection of geospatial data and services, (iii) enforcement of standards, (iv) identify priorities for new common data, services and applications, (v) make more metadata public. Thus, the results of this work contribute to the scientific community of environment analysts and researchers that require effective interdisciplinary environmental management policies relying on geospatial data, analysis and environmental modeling. This involves improved standardization, management and sharing of information implying technology, standards, and policies to acquire, process, distribute, and increase use of geospatial datasets. This is an LIA O-LiFE contribution number OC 14-2015.

Influence des Chlorophytaes sur les Paramètre de croissance des éléments minéraux ainsi que sur l'accumulation de la chlorophylle et la proline dans les plants de tournesols

Sandy Majed (Lebanese University, Lebanon); Asma Chibani (Lebanese University-Health 3, Lebanon); Fawaz Omar (Lebanese University, Lebanon)

Les problématiques relatives à l'utilisation massives de pesticides chimiques dont les effets néfastes pour la santé et l'environnement ne sont plus à prouver nous a pousser a fabriquer lors des études précédentes, un matériau à base d'algue brune Padina pavonica comme biofertilisant. La pénurie d'eau qui découle du réchauffement climatique nous impose une meilleure gestion des ressources hydrique. C'est à cet effet qu'une fibre lignocellulosique; la Luffa aegyptica a été incorporé à ce support comme rétenteur d'eau. De l'Agar-agar, gélifiant naturel est utilisé comme liant. Ce support remplacera les pots en plastique non biodégradables ainsi que les engrais chimiques utilisés en horticulture. La problématique de retard de croissance des plants cultivés dans ce support est paliée en remplaçant l'algue brune Padina pavonica par les algues vertes Ulva lactuca et Ulva linza. L'analyses quantitatives(éléments minéraux, proline, chlorophylle) et qualitatives(paramètres de croissance) ont montré les taux les plus intéressants pour les plants cultivés dans les supports à base d'Ulva lactuca. Le support qui a permis une meilleure croissance des plants est celui qui contient l'algue verte Ulva lactuca comme biofertilisant, la luffa aegyptica comme rétenteur d'eau et l'Agar-agar comme liant.

Hospital Wastewater Genotoxicity: A comparison study between two Lebanese University hospitals

Jina Farah and Jean-François Jabbour (University of Balamand, Lebanon); Hiam Sidaoui (CHN Hospital, Lebanon); Roula M. Abdel-Massih (University of Balamand, Lebanon)

Hospital wastewater is a major source of hazardous chemical waste. This wastewater ends up draining into many aquatic bodies, causing environmental hazards. Genotoxic tests were performed on two different Lebanese hospitals: "Hospital A" situated in the city, holds around 300 beds and 'Hospital B" in a rural area, holds around 140 beds. Another significant difference between the two hospitals is that Hospital B carries out special procedures to decrease the amount of chemicals thrown down the drain. Genotoxicity studies were performed on samples taken from the two hospitals. Samples from hospitals A and B were taken from different pits on a 5-day period, twice per day, morning and afternoon. Two genotoxic tests were performed: the SOS Chromotest (Escherichia coli PQ37) and the Ames Fluctuation Test (Salmonella Typhimurium TA98) with and without metabolic activation. The results of the SOS chromotest revealed that 60% of the samples taken from Hospital A range from intermediate to high levels of genotoxicity without metabolic activation, in addition to 30% increase in the genotoxicity after metabolic activation. On the other hand,the samples tested without metabolic activation from Hospital B show low genotoxicity. In the tests with metabolic activation, 60% of the samples exhibit a decrease in genotoxicity, while the other 30% show an insignificant increase. The Ames tests are currently still in progress. Consequently, these results may be an indication that the strategy followed by Hospital B is more effective in decreasing the levels of its wastewater genotoxicity.

SOC 2: Social, Economic and Behavioral Sciences II

Room: USJ CSM Amphi A

Chairs: Joseph Gemmayel (Université Saint Joseph, Lebanon), Christophe Varin (Université Saint Joseph, Lebanon)

Are Accounting Graduates Prepared For Their Careers? A Comparison Of Employees' And Employers' Perceptions

Rima Rosa Chaar Hakim (Rafik Hariri University, Lebanon)

There has been considerable discussion about the perceived gap between accounting education and the needs of the students and employers in the accounting profession. The aim of this research is to examine the perception of two main stakeholders: employees at entry level and their employers. We examine fresh accounting graduates' self assessment and employers' assessments of skill sets acquired in the accounting university programs. Moreover, we survey the perception of employees and employers of the importance of technical and non technical skills at entry level employment in accounting. We found an existing perception gap between fresh graduates employees and employers about the preparedness of the students and the importance of the skills at entry level employment in accounting.Moreover, findings suggest that even though practitioners and employees acknowledged the importance of generic skills, they both prioritize technical skills. This empirical study provides a deeper understanding of the skills expected for accountants to succeed in their professions. It sheds light on the accounting education gap in Lebanon and suggests approaches to narrow the gap.

Toxicomanie et politique sociale au Liban: mesures et pratiques, limites et perspectives

Houwayda Matta Bou Ramia and May Hazaz (Université Saint-Joseph, Lebanon)

Au Liban, plusieurs recherches se sont effectuées au fil du temps sur le thème de la toxicomanie. Bien que différentes de par leur objet, elles convergent toujours sur un même point qui souligne la nécessité d'élaborer une politique sociale globale et intégrée dans le vrai sens du terme en faveur d'un groupe fragilisé de la société et qui représente les personnes toxicomanes. Ces recherches ainsi que l'expérience de différents acteurs remarquent d'une part une expansion et un nouveau visage de cette problématique qui prend l'ampleur d'un fléau. Comme elles font dégager d'autre part l'existence d'une politique fragmentée, réduite à un cadre légal plus ou moins appliqué, occasionnant des lacunes dans la pratique. Dans ce contexte, la nécessité d'une politique sociale globale s'avère capitale tout en tenant compte des particularités du pays et de l'expérience des différents acteurs. Ainsi, la présente étude se propose d'analyser la substance de la politique sociale actuelle en matière de toxicomanie au Liban et ce, à la lumière des pratiques des différents acteurs concernés. Le but est celui de proposer les grandes lignes d'une politique sociale globale dans ce domaine. Les objectifs spécifiques découlant de cet objet d'étude visent à: -Brosser l'état des lieux de la politique sociale actuelle en toxicomanie. -Analyser la substance de cette politique, souligner ses forces et ses faiblesses et tous les enjeux sous-jacents à son application et ce, en référence à: oLa pratique des différents acteurs intervenant dans les deux secteurs associatif et public. oLa perception des personnes toxicomanes et de leurs familles de la problématique ainsi que de l'approche gouvernementale et des services dont ils ont profité. -Proposer les lignes directrices d'un « Policy Design » avec ce qu'il implique comme réformes à différents

niveaux et dans différents secteurs. C'est une recherche qualitative de type exploratoire descriptif qui a impliqué deux types d'acteurs principaux: des intervenants directes dans la problématique de la toxicomanie au Liban ainsi que des personnes toxicomanes et des membres significatifs de leur famille. Elle s'est également basée sur une analyse de la « Loi 673/98 relative aux stupéfiants, aux substances psychotropes et aux précurseurs ». Les résultats obtenus permettent de dégager des éléments de compréhension de la problématique de la toxicomanie au Liban. Ils font surgir également les forces et les lacunes de la politique sociale existante à différents niveaux et finissent par proposer les grandes lignes des paramètres reliés à une politique globale qualifiée de globale et intégrée qu'il importe d'élaborer et de mettre en œuvre. _____ Recherche menée sur trois ans (2010-2013) par l'École libanaise de formation sociale (ELFS), en collaboration avec le Centre de coordination de la recherche (CCR) de la Fédération internationale des universités catholiques (FIUC) et le Conseil de la recherche de l'Université Saint-Joseph (USJ).

Agritourism: A Sustainable Alternative for Income Generation and Ecological Preservation to Rural Lebanon

Mohamed Ragy Darwish (Arts, Sciences and Technology University in Lebanon, Lebanon); Youssef Doughan (Ministry of Environment, Lebanon)

Agritourism: A Sustainable Alternative for Income Generation and Ecological Preservation to Rural Lebanon M. Ragy Darwish and Youssef AR Doughan Associate Professor of Economics, School of Business, Art, Sciences and Technology University in Lebanon (AUL); Economist and Advisor to H.E. Minister of Environment PhDc/PMP/Eng. E-mail: Ragy.Darwish@aul.edu.lb ; y.ar.doughan@gmail.com The agricultural sector in Lebanon is experiencing major problems that hinder the sector development. Significant shortage in capital for investment and operation, depletion of scarce natural resources and progressive environmental degradation in rural areas are some of these problems. The impact of these problems is readily seen in the low earning levels of rural Lebanese, which in turn fosters continuous migration from rural areas to cities. The phenomenon of continuous flow from rural areas to cities imposes financial burdens on local municipalities and the government, if the basic needs of these newcomers were to be provided. The above stated problems and impacts can be mitigated by introducing alternative approaches to traditional agricultural activities that produce additional incomes and create new working opportunities and consequently boost the community's economic standard, thus encourage rural citizens to stay in their land. Furthermore, such economic boost, once realized, may encourage even reverse migration from cities to rural areas. One of these non-conventional approaches is Agritourism, the focus of this study. The term agritourism refers to any farm-based activity offered for the enjoyment and education of the public, to promote the products for the farm, and thereby generate additional farm income. These activities may generate sufficient off-farm income and motivate rural populations to remain in their lands. The general objective of this study is to assess the economic and financial feasibility of sustainable agritourism in Lebanon. Data was collected by conducting field and personal structured surveys to determine the potential availability of human and natural resources that could be used in agritourism; as well as, the acceptance of both farm owners / managers (supply side) and visitors (demand side) to be engaged and participate in such ventures. Additional costs of preparing each site for potential activities was developed and assessed for the supply side. As for the demand side, Contingent Valuation Method technique was used to estimate the Willingness to Pay (WTP) for potential visitors to engage in each activity. Three types of agritourism were considered in this study; Organic Farming, Ecotourism and Farm Tourism, thus, three sites were selected and each represents a type. Analysis of the supply side revealed that suppliers are; willing to engage in agritourism, invest to establish the required activities, and have no restriction set on visitors' type. Demand side analysis revealed that 92% of the surveyed potential visitors are willing to participate in the three considered types of agritourism. The results also indicate that Ecotourism is the first preferred activity, amongst the three selected types, by potential visitor, followed by Organic farm, and then Farm tourism. As for the average WTP per visit, as entry fee per person, values of US$ 4.11, 3.37 and 3.22 are estimated for Organic Farming, Farm Tourism and Ecotourism, respectively. The average WTP for all the considered activities, in this study, are also estimated, and the WTP for camping is placed as the highest and estimated at US$10.77/person/day. In conclusion, the estimated average WTP values for: entry fee, lodging and the various activities considered in the three selected types, given the calculated costs, indicate that agritourism will; generate additional income, provide new working opportunities and introduce new perspective of agribusiness establishments. This will consequently lead to the reduction of rural migration, preservation of rural communities and cultural settings, as well as ecological terrains.

Leadership éducatif: Une nouvelle répartition du pouvoir et des responsabilités

Dina Sidani (Universite Saint Joseph, Lebanon)

Leadership éducatif: Une nouvelle répartition du pouvoir et des responsabilités Dr Dina SIDANI Faculté de Gestion et de Management - Université Saint Joseph de Beyrouth dina.sidani@usj.edu.lb Les établissements scolaires n'échappent pas au défi actuel de toutes les organisations: la mise en place d'environnements de travail, de moyens et pratiques visant la fidélisation de leur capital humain. L'enjeu est de taille, l'éducation scolaire constituant l'un des indicateurs de développement et de croissance d'un pays. La qualité et le développement de l'enseignement sont directement affectés par le rôle des établissements scolaires en tant que systèmes organisationnels mus par la distribution des rôles, pouvoirs et responsabilités de leurs acteurs du centre opérationnel, de qui dépend le perfectionnement professionnel. Les travaux de Mintzberg (1982, 2003) vont nous permettre d'analyser la configuration structurelle de l'établissement scolaire en termes de coalition interne et de distribution de pouvoir entre ses acteurs au sein de la structure organisationnelle. L'objectif serait ainsi de comprendre comment

ce type de structure organisationnelle influence et structure les comportements de ses acteurs puis de réfléchir, de façon simultanée, à la meilleure façon de mettre en place les ajustements éventuels pour orienter les attitudes et comportements de ces acteurs dans un sens favorable à l'organisation. Selon la classification de Mintzberg (1982, 2003), l'établissement scolaire se rattache à une configuration structurelle de type bureaucratie professionnelle, où le pouvoir, décentralisé au niveau du centre opérationnel, est détenu par ses acteurs professionnels, les enseignants. Pichault et Nizet (2001) complètent l'approche de Mintzberg en donnant une meilleure visibilité de la localisation du pouvoir au sein de la structure. Les modalités de la relation d'emploi spécifique qui s'établit entre les différents acteurs au sein de la structure organisationnelle des établissements scolaires est essentiellement tributaire du mode de fonctionnement de ce type d'organisation en termes d'échange social. A cet effet, la théorie de l'Echange Leader-Membre (ELM, Liden et Maslyn, 1998; Epitropaki et Martin, 2005) nous est d'un précieux apport car se situant au cœur de la relation d'emploi dans les établissements scolaires. De par le pouvoir détenu par les professionnels du centre opérationnel, les mécanismes de coordination et d'interactions sont liés à un système de compétences spécialisées au sein de cette organisation de type bureaucratie professionnelle. La coordination s'opère en fonction de la reconnaissance des compétences de chacun et pour cette raison, ce type de configuration structurelle a recours à des experts ou professionnels. Cette opposition entre la caractéristique bureaucratique et la caractéristique professionnelle aboutit à l'affaiblissement de la fonction direction au profit d'un leadership exercé en communauté. De fait, la performance organisationnelle de l'établissement scolaire est en grande partie dépendante de la qualité des échanges et interactions qui s'établissent entre les experts, acteurs du centre opérationnel, avec les cadres superviseurs de la ligne hiérarchique, appelés à exercer, selon Bouvier (1994, 2001), un rôle de leadership professionnel plus qu'un contrôle bureaucratique. Pour Bouvier, le leadership serait l'une des exigences de qualité dans le système éducatif, au service d'un « management » de l'établissement scolaire, visant l'adhésion de ses acteurs professionnels. Ainsi, la notion de leadership s'est peu à peu imposée pour caractériser la création de nouvelles fonctions intermédiaires entre l'équipe de direction et les enseignants et pour définir le rôle prépondérant que sont appelés à jouer les cadres superviseurs (représentants de l'organisation) dans la perception qu'ont les enseignants de leur environnement de travail. La conduite et la gestion des professionnels du système éducatif réclament donc, pour leur mise en œuvre, une formation aux modèles et techniques de management adaptés à la structure organisationnelle spécifique à laquelle se rattache l'établissement scolaire. A ce jour les données de la littérature suggèrent que les mécanismes bureaucratiques sont totalement inadaptés pour réguler les attitudes et comportements des enseignants. Cette formation inclut la compréhension du fonctionnement du sujet au travail et de la dynamique du ou des groupes dont il fait partie. La caractéristique bureaucratique centrale s'efface au profit d'un leadership qui consiste à animer, motiver et inspirer les acteurs du système, de qui dépendent l'évolution et le perfectionnement professionnels. Le manager-éducateur ou leader passe ainsi d'une logique d'autorité et d'obéissance à une logique d'interactivités et d'échanges avec les membres du centre opérationnel. Nous mettons ainsi en exergue une nouvelle répartition du pouvoir et des responsabilités au sein de cette structure professionnelle. Cette nouvelle approche managériale nécessite la mise en place de leviers spécifiques adaptés à la configuration structurelle des établissements scolaires et valorise le rôle des cadres superviseurs de la ligne hiérarchique dans le sens d'un leadership visant la contribution de ses acteurs au progrès des performances personnelles et organisationnelles et à l'innovation permanente des savoirs.

Mémoires dévoilées pour une nouvelle lecture de notre société

Liliane Kfoury (University of History, Lebanon)
Liliane Kfoury Centre d'Études pour le Monde Arabe Moderne (CEMAM) Université Saint Joseph e-mail: liliane.kfoury@usj.edu.lb Les travaux de recherche de l'UIR Mémoire portent sur les questions de mémoire, du vécu et des souvenirs des individus en période de conflit ou en temps de paix. La mémoire peut être considérée comme une mine de savoirs et de connaissances importante à connaitre, à préserver et à conserver. Avec une équipe composée de chercheurs de différentes spécialisations dans les sciences de l'homme et de la société, l'UIR Mémoire peut présenter une partie des résultats de ses travaux qui concernent les domaines suivants: Initiation et introduction de l'histoire orale dans les écoles du secondaire dans le cadre du projet badna naaref par la pratique de l'entretien auprès des membres de leurs familles sur la vie quotidienne durant les guerres civiles du Liban. A la recherche des traces patrimoniales au Liban Les vestiges au niveau architectural: le patrimoine bâti traditionnel: les maisons en terre de la Bekaa et du Hermel. Les photographes libanais de la première moitié du XXème siècle: collecte des œuvres photographiques, recherche des membres de leur famille, établir leurs biographies et leurs parcours. Les espaces publics en Méditerranée: les escaliers urbains de Beyrouth et d'Alger Le Liban, carrefour de mobilités Pays d'émigration continue et d'immigration ponctuelle ou de courts séjour, pays d'accueil et de refuge pour des migrations forcées est dans une dynamique de circulations, de mobilités et d'ancrages qui sur le temps plus ou moins long est en train de refaçonner le tissu urbain et social. Présence des travailleurs migrants au Liban: passage de l'invisibilité à la présence active dans les espaces publics. La place des réfugiés au Liban au XXIème siècle: entre un inévitable refuge, une complexité économique et une difficulté d'insertion.

TR4: Table Ronde 4

Exigences croissantes sur les autorités nationales concernant la sécurité alimentaire : Contrôles et inspections des aliments

Intervenants: Antonio Khabbaz, Atef Idriss, Bassel Al Khatib, Charles Arbid, Christiano Passini, Dana Bou Raslan, Elie Bou Yazbeck, Ewen Todd, Hiba Dbouk, Khalil Helou, Laura Hjeij, Mona Jamil Aassaf, Mounir Bissat, Youssef Doughan

Room: USJ Salle Polyvalente E5

Chairs: Lara Hanna Wakim (Holy Spirit University of Kaslik, Lebanon), Toufic Rizk (Université Saint Joseph, Lebanon)

TECP4_Chimestry_Physics: Theoretical and Experimental Chemistry and Physics IV

Room: USJ Salle Zaarour

Chairs: Michel Nakhl (Lebanese University, Lebanon), Joseph Saab (Université Saint-Esprit de Kaslik & Faculty of Sciences, Lebanon)

Studying the Contamination of Fishes by Six Trace Elements (Cd, Cr, Cu, Ni, Pb and Zn) in Lebanon as a Function of the Season Climate and the Type of Species

Wadih Skaff (Université Saint-Joseph, Lebanon); Natalie Estephan (Holy Spirit University of Kaslik, Lebanon); Valérie Camel (AgroParisTech, France); Naim Ouaini (Holy Spirit University of Kaslik, Lebanon)

The Lebanese coast is subjected to a strong urban, touristic and industrial pressure, leading to a pollution of its marine waters. The fisheries sector, in particular, suffers from this situation. In this contribution, we are going to present our study conducted on the metallic contamination of two endemic fish species (Diplodus sargus and Siganus rivulatus) in Lebanese marine waters. The fishes were sampled from three sites (Dora, Tabarja and Ouzaï) assumed to be affected by pollution. Six trace elements (Cd, Cr, Cu, Ni, Pb and Zn) were analyzed by atomic absorption spectroscopy. Despite the pollution of the environment, the two fish species do not seem to strongly accumulate trace elements measured, including cadmium, chromium, copper, nickel and lead. Seasonal fluctuations were recorded for the six trace elements in the two concerned fish species: Diplodus sargus and Siganus rivulatus. The last one, herbivores, seems to be the most affected by the metal pollution.

Etude des conditions expérimentales optimales pour la remédiation des sédiments fortement pollués en ETM(Pb et Cd) de Dora(Liban)

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Dans ce travail, un intérêt particulier est attribué au suivi de la contamination en Pb et Cd dans les sédiments superficiels de la région de Dora(Beyrouth). 6 sites de prélèvements ont été choisis à Dora, région subissant l'impact d'un dépotoir avoisinant et des activités anthropiques sur une profondeur allant de 3 à 7 m. Les sédiments étudiés sont anoxiques, avec un pH variant entre 7,1 et 7,8 et pE variant entre - 24 mV et - 71,2 mV. Cette anoxie empêche la dégradation oxydative rapide de la matière organique, d'où les teneurs de carbone organique relativement élevées et variant entre 2,3 % et 10,56 % à l'intérieur du port. Les analyses des éléments majeurs Ca, Fe et Mg montrent que les sédiments étudiés sont un mélange de sédiments carbonatés et silicatés. Les concentrations de Pb et de Cd indiquent que la région d'étude est fortement polluée avec des teneurs élevées en Pb et en Cd fluctuant entre 27,105 - 614,05 µg.g-1 et 0,23 - 1,86 µg.g-1, respectivement. Afin de déterminer les conditions expérimentales optimales pour la remédiation des sédiments, nous avons appliqué des extractions chimiques en utilisant deux réactifs d'extraction: EDTA(acide éthylène diamine tétraacétique) 0,05 M et CaCl2 0,05 M avec deux rapports masse du sédiment/ volume extractant 1/20 et 1/50 pendant deux temps d'agitation différents 2h et 24 h. Les extractions effectuées par l'EDTA 0,05 M varient légèrement en variant le rapport m/v, ce qui montre le pouvoir complexant fort de l'EDTA. Celles effectuées pour deux temps différents 2h et 24h ont permis d'extraire 81,6 à 90,4 % de Cd et 36,6 à 60,8 % de Pb. Cependant, les extractions par le CaCl2 0,05 M ont uniquement extrait 3,85 % et 6,03 % de Cd, par contre le Pb est non extrait ce qui confirme que la fraction d'ETM en position d'échange ionique est très faible pour le Cd et absente pour le Pb. En conclusion, les conditions expérimentales optimales pour la remédiation sont: EDTA 0,05 M ; temps d'extraction = 24h ; rapport masse/ volume = 1/20.

Biphasic microfluidic system for octanol-water partition coefficient determination

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On June 1, 2007 (EC 1907/2006) , Europe has introduced the REACH Registration, Evaluation and Authorization of Chemicals whose main objective is to improve knowledge of environmental properties (physicochemical) and sanitary (Ecotoxicology) of this chemicals spices studying the interest of the evolution of theses substances in representative conditions of the environment. This physicochemical characterization requires, among other, the knowledge of vapor pressures (estimated risk of inhalation), aqueous solubility's (estimating water concentrations), their air/water partition (estimating volatilization from aqueous medium), and finally their octanol/water partition (Kow or logKow, estimation of bioaccumulation potential in living organisms). In this work, LogD for fluorescein natrium molecules is determined using a microfluidic device. Using this method, time and coast of analyze are reduced compared to conventional shake-flask method [1]. The microfluidic circuit is a double Y serpentine microchannel, to ensure laminar two-phase flow in microfluidic channel. The rapid and low cost fabrication of this microfluidic device using dry film photoresist is already mastered [2]. Epifluorescence microscopy is used to measure the intensity of fluorescence molecules in microchannel. Using microfluidic parallel diluter this intensity show a strong linear correlation with molecule concentration in solution [3]. We have optimized the ratio of flow rates of the two liquids to obtain stratified laminar flow between water and octanol [4]. The advantage of our microfluidic method is that the equilibrium is reached within seconds using samples volume less than 10µL. However, the conventional static method requires twelve hours using some hundred milliliters of solvent. The obtained value compare well with published values using Shake Flask or microfluidic droplet flow methods [5]. Acknowledgements:The authors are grateful to CEDRE program and AUF PCSI (Agence Universitaire de la Francophonie) for funding this work. NanoLyon clean room facilities were used during this work. [1]J. Saab et al. Salting-out phenomenon and 1-octanol/ water partition coefficient of metalaxyl pesticide. Salting-out Phenomenon 1-octanol/water and partition coefficient of pesticide metalaxyl. Chemosphere (2011), vol.82, p 929-934 [2] K. Sephan et al., Fast prototyping using a dry film photoresist: microfabrication of soft-lithography masters for microfluidic structures, J. Micromech. Micromech. Microeng. Microeng. 17 (2007) N69-N74. 17 (2007) N69-N74. [3] K. Stephan et al., Amperometric quantification based on serial dilution microfluidic systems, Analyst 134 (2009),472-477. [4] K. Stephanet al., Characterization of biphasic flow in microchannels M2 Research Internship Report, (2004) University Claude Bernard Lyon 1. [5] K. Stephan et al., Continuous-flow microfluidic method for octanol-water partition coefficient measurement, Fluid Phase Equilibria (2014), vol.380, p 116-120.

Combinatorial Approaches to Photochemical Reactions

Rony Khnayzer (Lebanese American University, Lebanon)

High-throughput screening has been widely utilized in the pharmaceutical and manufacturing industry targeting the development of new molecules and materials for numerous applications. To enable more rapid progress in photochemical transformation, the construction of high-throughput combinatorial photoreactors enabling the parallel optimization of relevant compositions under varieties of experimental conditions seems appropriate. This contribution describes a photoreactor apparatus permitting the evaluation of photochemical reactions operating in parallel, illustrated with molecular-based homogeneous compositions. Finally, applications of the setup to solar fuels production and the photodynamic therapy of cancer are discussed.

Allumage de flammes dans des couches de mélange

Remi Daou (Universite Saint Joseph, Lebanon)

L'allumage d'un mélange réactif par dépôt d'une quantité externe d'énergie (comme une étincelle électrique) requiert une valeur critique minimale. Dans les mélanges homogènes, des études théoriques associent cette valeur à l'énergie thermique contenue dans une flamme sphérique (Zeldovich Flame Ball ZFB) qui est solution des équations de réaction-diffusion stationnaires. Dans des mélanges non homogènes nous n'avons pas trouvé d'études théoriques consacrées à ce problème dans la littérature. Ces solutions non sphériques, généralisant les structures (ZFB) aux mélanges non homogènes, ont fait l'objet d'une étude analytique que nous avons publiée récemment dans Combustion and Flame. Une investigation numérique nous a permis ensuite de valider la théorie et de l'étendre. Nous présentons ici un aperçu graphique des solutions numériques trouvées ainsi qu'un test numérique de leur stabilité.

Structural Relation Between Specific Surface Area and Porosity in Carbon Nanostructures

Mohammad Bzeih, Jean Eid, Charbel Matta and Jimmy Romanos (Lebanese American University, Lebanon)

Activated carbon is a class of adsorbent material with applications ranging from water treatment, gas and chemical purification, medical poisoning treatment, to gas storage and sequestration. The complex structure of activated carbon can be described as a three-dimensional network of graphene layers oriented in random directions. In this work, we derive a universal structural relation between porosity, skeletal density, specific surface area, and the number of multi-layered graphitic components. In addition, we show that the specific surface area is a function of the length and thickness of the carbon sheet. Moreover, the interdependency between microporosity and surface area is discussed. Finally, we compute hydrogen gravimetric and volumetric adsorption at 77 K and we determine adsorption parameters using the lattice gas model.

AlN interlayer preventing the migration of channel electrons in normally-off fluorinated MIS-HEMTs

Saleem Hamady and Bilal Habib Beydoun (Lebanese University, Lebanon); Frédéric Morancho and Patrick Austin (Univ de Toulouse, France)

MIS-HEMTs with normally-off operation can be achieved by implanting fluorine ions below the channel. However, when high gate voltages are applied, a portion of channel electrons migrate from the AlGaN/GaN interface to the insulator/AlGaN interface. This causes a drop in the transconductance. To resolve this issue, the introduction of the AlN interlayer is proposed. Simulation results have shown that a thin AlN interlayer is capable of imprisoning the channel electrons at the AlGaN/GaN interface at high gate voltages. This will eliminate the drop in the transconductance, and hence, increases the current density of the device.

11:30 - 13:00

P2_BIO1_medicale: Poster Session 2- Biological, Medical, Pharmaceutical, Health Sciences I

Room: USJ Hall CSH

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Magda Bou Dagher Kharrat (Université Saint Joseph, Lebanon), Wissam Faour (Lebanese American University, Lebanon), Zeina Hobaika (Université Saint Joseph de Beyrouth, Lebanon)

Chemical composition, antimicrobial activity and ethnopharmacology of Lebanese oregano

Monay Al Hafi (Holy Spirit University & Agroparistech, Lebanon); Marc El Beyrouthy and Naim Ouaini (Holy Spirit University of Kaslik, Lebanon); Sylvain Chaillou (AgroParisTech, Institut Jean-Pierre Bourgin INRA., France)

Ethnopharmacological relevance: Lebanon, due to its biogeography and its climate, presents a wide ecological and floristic diversity (2607 species.), besides being one of the Mediterranean country having an exceptionally rich traditional medicine based on medicinal plants. It's regarded also as an important gene center for the Lamiaceae family comprising Origanum species. Among them, O. libanoticum and O. ehrenbergii are endemic to Lebanon, O. syriacum is endemic to the Levantine. O. ehrenbergii and O. syriacum are used as condiment and in traditional medicine, as tea, owing to its stimulating carminative, antirheumatic, antispasmodic and antibacterial effects to treat various ailments such as nausea, indigestion, muscle pain, diarrhea and infection diseases. However, O. libanoticum is used mainly as ornamental and less used for its health benefits. Therefore, in order to gain scientific support for the ethnopharmacological value of Lebanese oregano species, we were directed toward evaluating their chemical composition and antimicrobial activity. Materials and methods: The essential oils (EOs) were analyzed by GC and GC/MS and they were investigated for their antimicrobial activity against a yeast and Gram + and Gram - bacteria by determining their minimal inhibitory concentrations (MIC) using broth microdilution technique. Results: The average of the total identified constituents accounted 95.1% of the EOs extracted from the aerial parts of oregano species. Carvacrol was the major component of O. syriacum EO (79.0%) and O. ehrenbergii EO (60.8%). Whereas, it was absent in O. libanoticum EO that had a major fraction of β-Caryophyllene (26.8%), Caryophyllene oxide (22.6%) and Germacrene D (17.2%). The O. libanoticum EO didn't reveal any antimicrobial activity, which was in agreement with the fact that Lebanese population does not use it. However, the other EO's showed moderate antimicrobial activity with MIC varying from 400 µg/ml to 1200 µg/ml according to the microorganism sensitivity. The comparison of EO and pure standards MIC shows that EO exhibited stronger inhibition than pure Thymol and Carvacrol which prompts the hypothesis of biocide potential related to synergy and may point the way to the non-negligible role of minor components in determining the antimicrobial potential of plant extracts. Conclusions: The results of the pharmacological activities on the tested species provided an in vitro scientific support for the use of these plants in traditional herbal preparations.

Interactive teaching in Anatomical sciences:a Case Based Approach

Inaya Hajj Hussein, Mallikarjuna Barremkala, Brent Thompson, William Forbes and Mitual Amin (Oakland University, USA)

Anatomical sciences which are mostly visual sciences lend themselves very well to interactive, team based and group case -based learning. At Oakland University William Beaumont School of Medicine(OUWB), integration has progressed beyond the basic concept of horizontal and vertical integration. We now emphasize student-directed learning, active learning, development of interpersonal skills, problem solving, and self-reflection. Inflammatory Bowel disease(IBD) has two major constituents: ulcerative colitis and Crohn's disease. It can involve any segment of the GI tract, as well as other systems that share

clinical and pathological characteristics. As such, IBD serves as an excellent model for how we accomplish integration within our curriculum. We will use clinical scenarios of IBD cases, with learning objectives defined by the students. Students will address comprehensively the anatomy, histology, histopathology, and pathophysiology in a manner that will provide a thorough understanding of the disease. Then, they will establish a final diagnosis. This approach will be facilitated by making available to the students a wide variety of resources. Students and instructors will grade these activities along with formal evaluations based on well-defined criteria. This student-directed strategy requires a major shift in the way educators think about medical school teaching. It is a successful integration approach whereby students themselves take initiative and responsibility for determining what is worthwhile to learn. In addition to horizontal integration and vertical integration, it offers several intangible benefits. Chief among those benefits is building a community of students with high level of skills and professionalism. As time goes on, new educational activities will be initiated that will promote student-directed learning, critical thinking and working collaboratively.

Thymoquinone Combination with Arsenic and Interferon Enhances Cell Death in Adult T-cell Leukemia

Maamoun Fatfat, Hala Gali Muhtasib and Hiba El-Hajj (American University of Beirut, Lebanon)

Thymoquinone(2-methyl-5-isopropyl-1,4-benzoquinone,TQ) is a naturally derived drug that has shown promising anticancer activity in vitro and in vivo as well as selectivity to several cancer systems. In recent work, we have documented that TQ induces cell death in both HTLV-1 positive cells and HTLV-1 negative cells by generating reactive oxygen species(ROS). TQ is known to protect organs from standard chemotherapy induced damage, and to enhance the efficacy of many chemotherapeutic agents even in resistant types of cancer. Here we investigated the outcome of combining the natural compound TQ with Arsenic trioxide(As) and interferon(IFN), two drugs that are used in the clinic against adult T-cell leukemia(ATL). Our goal is to use lower concentrations of As and IFN in combination with TQ to increase their efficacy and sensitize drug resistant HTLV-1 positive cell lines. The efficacy of single and combination treatments was investigated using several assays including cell viability, cell cycle analysis, apoptosis, and measurements of production of ROS by CM-H2DCFDA, cytochrome c release and mitochondrial membrane disruption and western blot analysis. Our results show that TQ alone or its combination with As and IFN induced cell death in both HTLV-1 positive cells (HuT-102 and C91) and HTLV-1 negative cells(CEM and Jurkat). The combination of As/IFN/TQ induced greater inhibition of cell viability than each drug alone in resistant HTLV-1 positive HuT-102 cells. However, HTLV-1 negative cells didn't show a clear correlation in the results. As expected, the HTLV-1 negative cells were more sensitive to TQ, As, IFN than the HTLV-1 positive cells. Cell cycle analysis revealed an increase in the number of cells in PreG1 phase for HuT-102 and Jurkat cell lines after the treatment with the combination TQ/As/IFN. This was correlated with an increase in mitochondrial membrane potential. Single treatments and combinations in HuT-102 cells resulted in the release of cytochrome c from the mitochondria to the cytosol which indicates intrinsic apoptosis. CEM cells showed a significant disruption of mitochondrial membrane potential upon treatment with the combination. However, in C91 cells, this enhanced effect was not observed. Annexin assays demonstrated that the combination treatment enhanced apoptosis significantly in CEM, C91 and HuT-102 cell lines. This was further confirmed by PARP cleavage which serves as a potential marker of apoptosis. This combination was also found to down-regulate the key driving oncoprotein(Tax) and to up-regulate the tumor suppressor protein p53 in HuT-102 cells. These findings collectively suggest that the use of the combination(TQ/AS/IFN) which targets two independent pathways(NF-kB and ROS), requires lower concentrations of the drugs, hence, resulting in a better efficacy and lower toxicity especially in the resistant HuT-102 cell line.

New Actor in Diabetic Nephropathy: Role of VEGF-A

Assaad Eid and Kawthar Braysh (American University of Beirut, Lebanon)

Diabetic nephropathy (DN), a major complication of type 1 and type 2diabetes, is the leading cause of end stage renal disease in 30%-40% of patients diagnosed with diabetes. DN is characterized by alterations in kidney structure and function leading to microalbuminuria which is considered as the earliest clinical manifestation of DN that often progresses to overt proteinuria. Glomerular epithelial cells or podocytes are terminally differentiated cells located on the glomerular basement membrane (GBM). They constitute the filtration barrier of the kidney. Due to their unique architecture and extremely complicated cytoskeleton, podocytes are considered as an early player in the initiation of disease and their presence in urine (podocyturia) is considered as the hallmark of diabetic kidney injury. Podocytes injury or podocytopathy manifests as phenotypic changes that are characterized by foot processes effacement and loss of slit diaphragm as a result of altered localization or expression of specific slit diaphragm proteins. These alterations will eventually lead to the detachment of podocytes from the GMB and their death. However the molecular mechanism(s) that causes podocytes injury in diabetes is still not fully understood. Oxidative stress is one of the critical pathogenic factors involved in the development of DN; it contributes to podocytes apoptosis and plays a key role in hypertrophy, fibrosis and other pathophysiological processes underlying renal dysfunction. In addition to NADPH oxidases, CYP450s are another significant source of ROS in kidneys. CYP450 metabolizes arachidonic acid (AA) into hydroxyeicosatetraenoic acids (20-HETEs), the ω-hydroxylation product of AA, and EETs (epoxyeicosatrienoic acids). 20-HETE is formed by CYP4A and 4F, and is one of the major CYP eicosanoids produced in the kidney cortex, while EETs is produced by CYP 2B, 2C and 2J. We have recently shown that diabetes is associated with alteration of CYP450 and their metabolites in diabetic kidney damage. Our results also show that 20-HETE and EETs have multiple and opposing functions depending on the location of their production and target

cells/tissues. High glucose induces ROS production and apoptosis in cultured mouse podocytes through the upregulation of CYP 4A and increased production of 20-HETE. The inhibition of 20-HETE using a selective CYP4A inhibitor (HET0016) was able to prevent podocytes depletion, reduce oxidative stress and albuminuria in type 1 diabetic mice model. In parallel experiments, the involvement of CYPA4 and CYP2C and their corresponding metabolites 20-HETE and EETs was also seen at the level of proximal tubular cells and it was found to is associated with the induction of ROS, extracellular matrix accumulation and hypertrophy. Furthermore, Vascular endothelial growth Factor (VEGF-A) is a secreted glycoprotein which belongs to PDGF superfamily of growth factors. In the Kidney, podocytes are the major source of VEGF-A, whereas its expression is also seen in mesengial, tubular and endothelial cells. The human VEGF-A gene is organized in eight exons cleaved by alternative messenger RNA splicing to form VEGF-A isoforms, podocytes synthesize three VEGF-A isoforms (VEGF121, VEGF165, and VEGF189) of which VEGF165 appears to be the most abundant in human kidney. VEGF-A acts as chemo-attractant for endothelial cells during the development of renal glomeruli and its essential for their survival. It is also required for normal development of renal vasculature and fenestrated phenotype acquirement. Upregulation and down regulation of VEGF during kidney development are associated with glomerular diseases. Thus, tight regulation of VEGF expression is highly demanded to establish normal podocytes phenotype. Podocytes and tubular cell persist to express VEGF during the adult stage but at a much lower levels, suggesting the critical role of VEGF in maintaining a normal glomerular hemodynamics. VEGF-A exerts its effect through direct binding to its tyrosine kinase receptors VEGFRs (VEGFR1, VEGFR2, NRP1 and NRP2) which are shown to be expressed in podocytes. Several studies indicate the association of diabetic nephropathy with VEGF-A altered production in kidney, though its pathophysiological effect is controversial and the mechanistic signaling pathway by which it exerts this effect is still to be elucidated. In our study, we investigate the role of VEGF-A production on podocytes injury as well as on the progression of diabetic nephropathy in an animal model of type 1 diabetes. We also study the crosstalk between VEGF-A and the alteration in CYP4A and CYP2C. Cultured rat podocytes and Streptozotocin induced type 1 diabetic rats were used. In parallel experiments, type 1 diabetic rats were injected intraperitoneally with either 3mg/kg SU-5416 or 5mg/kg anti-VEGF neutralizing antibody (bevacizumab or Avastin) to inhibit VEGF-A signaling. Rats injected with sodium citrate buffer alone served as control. Cellular apoptosis and proliferation, proteinuria, ROS production, protein, mRNA expression and enzymatic activities were assessed as well as. Our results show that hyperglycemia/diabetes cause kidney cellular damage as assessed by increased extracellular matrix accumulation and microalbuminuria. These results were paralleled by an increase in ROS production through an NADPH oxidase dependent mechanism and increased VEGF-A expression and accumulation. Blockade of VEGF-A using a selective tyrosine kinase inhibitor (SU-5416) or the neutralizing anti-VEGF antibody (Bevacizumab or Avastin) was able to reverse the effect seen in the diabetic milieu. Interestingly, and in order to study the cross talk of VEGF-A with the cytochromes P450 family, our results indicate that the alteration of CYP4A expression and 20-HETE production seen in the diabetic milieu tightly correlates with the increase in VEGF-A expression and accumulation. Treatment with HET0016, a selective inhibitor of CYP4A, was able to reverse the increase in VEGF-A expression and accumulation and to restore kidney function. Our results suggest that VEGF-A is a major pathophysiological factor and its blockade could have an important therapeutic potential in the treatment of diabetic nephropathy.

Differential Expression of the Multi-Copper Ferroxidase Ceruloplasmin in Invasive Ductal Carcinoma

Zouhair K Attieh (American University of Science and Technology, Lebanon); Pamela Nabhan (AUST, Lebanon)

Iron is an essential trace element required for normal body functions. Reduced iron levels could lead to anemia whereas elevated cellular iron contents could lead to a host of neurodegenerative diseases and hemochromatosis. Recent studies have pointed to a role for iron in carcinogenesis. Several studies have implicated elevated cellular levels with cancer development and metastasis. Cellular iron levels are regulated by a number of different proteins including the iron transporter ferroportin (FPN), in addition to a member of the multicopper ferroxidase family (MCF) including ceruloplasmin (Cp), hephaestin (Heph) and zyklopen (Zp). Iron import proteins including DMT1 and heme transporter were reported to have higher expression in cancer patients compared to normal ones. Conversely, the iron export protein ferroportin (FPN) expression was reported to be down-regulated in breast ductal carcinoma and the expression was further reduced as the tissue became more invasive. In previous work in our laboratory, Zp has been shown to be expressed and down-regulated at the RNA level in invasive ductal carcinoma model cell lines and at the protein and RNA levels in ductal carcinoma (DC) tissue. Reduction levels correlated with the study that reported a decrease in FPN expression in DC. No Heph expression was observed at either RNA or protein level in model cell lines, normal or DC. In this present study, the expression of Cp was investigated in model cell lines at the RNA level and in normal and DC tissues at the RNA and protein levels. Our results show that in concordance with Zp studies, Cp is expressed in model cell lines, normal and DC and its expression is significantly decreased at the RNA and protein levels in DC tissues compared to normal ones. The results collectively point to the role of iron regulatory proteins in carcinogenesis. Future work will investigate the mechanism(s) of this regulation and the possible role of microRNAs in its modulation.

Oral pretreatment with saffron (crocus sativus) afforded cardioprotection against ischemia-reperfusion injury in isolated rabbit heart

Sharel Salem, Jessy Chidiac and Antoine Daccache (Lebanese University, Lebanon); Nathalie Chahine (Université Libanaise, Lebanon); Hassane Makhlouf and Ramez Chahine (Lebanese University, Lebanon)

Myocardial ischemia-reperfusion (I/R) represents a clinically relevant problem associated with thrombolysis, angioplasty, and coronary bypass surgery. Radical oxygen species generated during early reperfusion are the primary activator of many pathways leading finally to cardiomyocyte death. In this context, saffron is thought to be a cardioprotective agent via its antioxidant activity. The present study aimed to determine whether supplementation with saffron (cultivated in Lebanon) can provide sufficient protection for the myocardium against I/R insult and considered possible underlying mechanisms. Adult male rabbits were allocated into 3 groups (n=12 each): Control group, Ischemic group received tap water alone and Ischemic treated group received saffron (5 mg/kg bw) orally for 6 weeks. Isolated hearts were then perfused in Langendorff mode. Ischemia was subsequently induced by stopping the perfusion fluid for 30 min, followed by 30 min of reperfusion for groups 2 and 3. Left ventricular pressure, end diastolic pressure, heart rate, coronary flow, and the incidence of arrhythmias were recorded before and post ischemia. At the end of the protocol, hearts were used for assessment of malondialdehyde (MDA) levels, glutathione activity, and for histological examination. Moreover we used western blot technique to determine the phosphorylation of AKT, mTOR, p38 and 4EBP1 on proteins extracted from heart homogenates. Results show that saffron treated group showed enhanced post I/R cardiodynamic recovery, which was accompanied by decreased MDA and increased glutathione activity compared to the ischemic group, (P<.05). Western blot analysis showed a p38 activation in ischemic group which has been lowered in saffron pretreated group (P<.05). In conclusion, oral pretreatment with saffron afforded substantial recovery of post I/R cardiac functions, an effect that may involve its antioxidant and antiapoptotic properties.

Ovarian Cancer Cells are Auxotrophic for Arginine and Sensitive to Human Recombinant Arginase I [HuArgI(Co)-PEG5000]-Induced Arginine Depletion

Malak Reda, Amira Bekdash and Ralph Abi Habib (Lebanese American University, Lebanon)

Introduction: Arginine is a non-essential amino acid synthesized from L-citrulline and catalyzed by argininosuccinate synthetase. Some tumor cells, due to down-regulation of argininosuccinate synthetase, are unable to synthesize arginine and are, therefore, auxotrophic for arginine. Subsequently, targeting extracellular arginine for degradation in the absence of argininosuccinate synthetase induces cell death in arginine auxotrophs, rendering arginine depletion a potential therapeutic method for arginine auxotrophic tumors. HuArgI(Co)-PEG5000, a pegylated recombinant human arginase I, has shown promising results in several tumor types that display low levels of argininosuccinate synthetase such as acute lymphoblastic T cell leukemia (T-ALL), acute myeloid leukemia (AML), hepatocellular carcinoma (HCC) and glioblastoma multiforme (GBM). Materials and Methods: In this study, we sought to investigate potential arginine auxotrophy in ovarian cancer cell lines (Caov-3, Sk-ov-3 and SW626) and attempt to target them using HuArgI (Co)-PEG5000-induced arginine depletion. Furthermore, we investigate the contribution of autophagy to arginine depletion-induced cell death using the autophagy inhibitor, chloroquine (CQ). Results and Discussion: All three cell lines tested were auxotrophic for arginine and sensitive to HuArgI (Co)-PEG5000-induced arginine depletion with IC50 values ranging from 95 to 410 pM and percent cell death at highest concentration of approximately 90%. Addition of L-citrulline led to the rescue of SW626 and Caov-3 cells, indicating partial arginine auxotrophy in these cell lines, while Sk-ov-3 cells were not rescued by L-citrulline at the highest concentration used (11.4 mM) indicating complete arginine auxotrophy of this cell line. Inhibition of autophagy by CQ increased the sensitivity of SW626 cells to HuArgI (Co)-PEG5000-induced arginine depletion, with the IC50 of HuArgI (Co)-PEG5000 decreasing from 240 pM to 13 pM in the presence of CQ, indicating that autophagy is activated and it plays a protective role following arginine depletion in ovarian cancer cells. Conclusion: We have shown that ovarian cancer cells are either partially or completely auxotrophic for arginine and can be effectively targeted using arginine deprivation. Further investigation of the tumor selectivity of this targeting and its mechanisms in ovarian cancer cells is currently underway.

Evolution du génotypage du VHC au Liban

Danielle Chaaya, Aline Hajj, Tarek Itani, Rita Beyrouthy and Dolla Karam Sarkis (Université Saint Joseph, Lebanon)

Evolution du génotypage du VHC au Liban Rationnel et objectif de l'étude L'infection par le virus de l'Hépatite C (VHC) est un véritable problème de Santé Publique. Le dernier rapport de l'Organisation Mondiale de la Santé (OMS) estime de 350 000 à 500 000 le nombre de personnes qui meurent chaque année de pathologies hépatiques liées à l'hépatite C (notamment cirrhose du foie ou hépatocarcinome) (www.who.int/mediacentre/factsheets/fs164/fr, consulté le 09/03/15). Au Liban, seuls 709 cas d'Hépatite C ont été signalés au Ministère de la Santé Publique depuis 2006 jusqu'en 2014 (www.moph.gov.lb/prevention/surveillance/documents/south.htm, consulté le 09/03/15). L'efficacité des traitements antiviraux est estimée à 50-90% dans la mesure où ils permettent de limiter l'évolution vers les complications précitées. Cependant, cette efficacité est conditionnée par une détermination préalable du génotype du VHC. Ainsi, les patients porteurs des génotypes 2 et 3 répondent mieux au traitement antiviral alors que ceux porteurs des génotypes 1, 4 et 6 sont plus « résistants » au traitement nécessitant par conséquent des doses plus importantes et une durée de traitement plus prolongée. L'objectif de cette étude a été d'évaluer sur 9 ans (de 2006 jusqu'en 2014) la distribution génotypique des VHC de patients admis au Laboratoire Rodolphe Mérieux pour analyse moléculaire. Matériels et méthodes Il s'agit d'une étude rétrospective de collecte des données de génotypage obtenues sur l'ensemble des patients admis au laboratoire Rodolphe Mérieux du Liban pour la détermination de la charge virale du VHC. Cette étude a été conduite du 1er Janvier 2006 au 31 Décembre 2014. Les patients éligibles au typage du VHC sont ceux dont la charge virale est supérieure à 103 Unité Internationale/ml (UI/ml). La méthodologie

adoptée comprend trois grandes étapes: i) extraction de l'ARN viral ii) transcription inverse de l'ARN cible afin de produire l'ADN complémentaire (ADNc) suivie d'une amplification de ce dernier par PCR à l'aide d'amorces spécifiques du VHC iii) hybridation des ADNc sur des bandelettes de génotypage du VHC (détermination des six différents génotypes). Résultats Au total, 1119 patients ont été génotypés pour le VHC. Le calcul du nombre total de chaque génotype au cours des années a permis d'évaluer la distribution génotypique. Sur l'ensemble des neuf années, le génotype le plus fréquemment identifié est le génotype 1 (46,2%), suivi des génotypes 4, 3 et 2 avec des pourcentages respectifs de 33,7% ; 14,5% et 3,3%. Le génotype 6 a été identifié une seule fois en 2011 et il constitue, à notre connaissance, le seul cas signalé au Liban. De plus, de nombreux cas de co-infection ont été identifiés dans des populations de patients particulières: insuffisants rénaux sous dialyse et toxicomanes. Conclusion Cette étude rétrospective constitue la première estimation de la prévalence des génotypes du VHC dans la population Libanaise. Elle nous a permis de conclure que le génotype le plus fréquent est le génotype 1. Par ailleurs, elle nous a permis d'identifier une faille dans le système de signalisation des patients infectés par le VHC auprès du Ministère de la Santé Publique Libanais puisque les chiffres recensés par notre laboratoire sont plus importants que ceux déclarés auprès du Ministère. Enfin, les résultats de l'analyse moléculaire incluse dans notre étude sont d'une importance clinique majeure dans la mesure où ils permettent une individualisation des traitements du VHC par les antiviraux (la détermination des doses et des durées de traitement recommandées est fonction du génotype identifié).

Bone metabolic disorders associated with NAFLD in patients undergoing bariatric surgery

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Backgrounds and aims: Metabolic bone disorders are known complications of chronic liver disease. Osteoporosis has been described in cirrhosis, alcoholic, cholestatic, autoimmune and viral liver pathologies. However, few studies have assessed bone disorders in Nonalcoholic fatty liver disease (NAFLD). In this study, we evaluate bone mineral density (BMD) and serum parameters of bone metabolism in patients with NAFLD and we compare the bone markers before and one year after bariatric surgery. Methods: Fifty-two obese, non-alcoholic patients, candidates for bariatric surgery and devoid of viral and autoimmune hepatitis, were selected. Serum samples were collected before surgery for all patients and one year after surgery for sixteen of them and served to measure blood glucose, Total Cholesterol (TC), Triglycerides (TG), Alanine and Aspartate Aminotransferases (ALT and AST), Gamma Glutamyl Transferase (GGT), Calcium (Ca), Phosphorus (Ph), Insulin, 25-OH-Vitamin D, Parathormone (PTH), Bone Alkaline Phosphatase (BAP) and C-terminal telopeptides, collagen type I fragments (CTx,). BMD was assessed for forty patients before surgery. Wedge liver biopsy was performed at the time of bariatric surgery. Nineteen sera of healthy non-obese individuals served as controls. The results of blood parameters and BMD were compared according to the liver pathological lesions. Results: Sixteen patients (30%) had no significant liver lesions, eighteen (35%) had simple steatosis and eighteen (35%) had borderline or definitive Nonalcoholic steatohepatitis (NASH), defined as NAFLD activity score (NAS) ≥3. In obese patients, comparison of BMD between patients without liver lesions and those with NAFLD did not show statistical significance. Levels of BAP were significantly higher in the group of borderline or definitive NASH compared to patients with milder liver pathology and controls. Levels of 25-OH-Vitamin D were significantly lower in obese patients than in controls. Significant increase in the levels of 25-OH-Vitamin D, BAP and CTx was noticed one year after bariatric surgery. Conclusion: In obese patients with NAFLD, severe liver lesions were associated with elevated BAP, suggesting increased bone formation. Bariatric surgery was associated with the elevation of BAP and CTx levels, indicating accelerated bone turnover in these patients.

Consequences of a methyl donor deficiency on cerebral development and neurodegenerative diseases: Role of homocysteine

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Background: Brain development is highly sensitive to nutritional conditions. A large body of evidence supports the hypothesis that maternal malnutrition can affect the fetal brain and predispose the offspring to a wide range of pathologies. The micronutrient folate (vitamin B9) is essential for brain development, and folate deficiency is one of the commonest vitamin deficiencies worldwide, especially in pregnant women. Cobalamins (Vitamin B12) work closely together with folate to regulate the one carbon metabolism that plays a key role in regulating the transmethylation reactions of epigenomic pathways. Thus, these vitamins, also known as the methyl donors, are essential for proper brain development and maintenance of neuronal integrity. Deficits in folate and vitamin B12 are frequent in pregnancy and are a risk factor for neurological and developmental disorders, such as neural tube defects or abnormalities that can lead to spontaneous abortion. In addition, folate deficiency has been particulary shown to influence the normal development of the brain, with impaired cognitive functions involving the hippocampus causing its atrophy in rodents, rarefaction of microvasculature, apoptosis, and imbalanced differentiation of neuronal cells. However, the exact mechanisms leading to these effects are poorly understood and that need to be better investigated. Methyl donor deficiency increases homocysteine levels, a potentially toxic amino acid, and thus constitutes a risk factor for various diseases (spina bifida, cardiovascular diseases and more importantly to us, neurodegenerative diseases...). Plasma level of homocysteine increases with age, which might lead to cumulative effects related to aging through its binding to circulating and tissular proteins. Independently of folate deprivation, exposure to high concentrations of homocysteine exerts neurotoxic effects through mechanisms that include oxidative stress, leading to

neurological disabilities. Homocysteine is also one of the metabolic markers most closely associated with some neurodegenerative diseases, particulary Alzheimer's disease. Its accumulation is a predictor of the onset and severity of the disease and a risk marker of severe cognitive decline. Methods and Results: In the present work, we studied the consequences of folate deficiency on a line of hippocampal neuronal progenitors, H19-7, which is known to possess the properties of embryonic neurons upon differentiation. We also investigated wether homocysteine-neuronal proteins binding could be considered as one of the patho-mechanisms of age-related protein accumulation in neurodegenerative diseases. Additionally, we used an in-vivo model of methyl-donor-deficient wistar rats to confirm our results on the mechanistic but most importantly functional level. Our results showed that the deficiency leads to the disruption of the one-carbon metabolism responsible for an increase of Hcy concentration, abnormalities of neuronal differentiation and synaptic dysfunctions. The ability of neurons to polarize is crucial for the process of neurite growth, emergence of the axon and for synaptic plasticity. Results show that although deficiency doesn't prevent neuronal determination and the occurance of differentiation, but the latter process is disrupted with a decrease of cells with characteristic neuronal morphology (loss in number of dendrites and/or axons emergence). Pre-synaptic and post-synaptic activity are also partially lost. Cytoskeletal proteins involved in the formation of microtubules and neurofilaments are determinant factors of neuronal polarity. We studied the effects of folate deficiency on these proteins and our results showed a disruption of the cytoskeleton and a loss of cell polarization. Analyses by Western blot and immunocytochemistry revealed significant abnormalities in the expression and localization of the cytoskeletal components (Actin, tubulin, motor proteins..). Furthermore, we showed that folate deficiency was associated with a post-translational modification corresponding to an irreversible N-homocysteinylation of neuronal proteins associated with the cytoskeleton. This interaction was evidenced by mass spectrometry that also allowed us to establish a growing list of several homocysteinylated neuronal proteins. Co-immunoprecipitation experiments showed that the aggregation and degradation of actin, a component of neurofilaments, was a result of the binding of homocysteine to this protein. This binding, also confirmed by duolink interaction assay, showed that actin binding to homocysteine prevents it from binding to vinculin, its natural partner. Such a process leads to protein aggregation, a phenomenon highly involved in all neurodegenerative diseases. Cytoskeleton disruption is associated with serious repercussions in terms of synaptic plasticity with a loss of function as shown by the analysis of motor proteins leading to a default in the transport of synaptic vesicles. Also, homocysteinylation of microtubule associated-proteins such as Map1, Map4 and Tau leads to their aggregation. This is particulary interesting as it is well-known that hyperphosphorylation of Tau and its accumulation in aggregates in neurofibrillary tangles is the ultimate marker of Alzheimer's disease. Knowing that memory loss is one of the symptoms of the disease, and that at the functional level, the hippocampus is a key structure for learning and memory, we evaluated the effects of methyl donors deficiency, associated with disruption of the cytoskeleton, on the cognitive function. Behavioral tests to assess learning and memory abilities (Homing test, Multiple T-maze) were conducted, and showed a significant disorder in deficient rats. The combination of these different mechanisms provides new insights into developmental defects and cognitive impairment associated with an early methyl donor deficiency, highlighting the importance of "fetal programming" and maternal intake in the occurrence of some neurological and neurodegenerative diseases.

Conditions de vie et état de santé des sujets âgés libanais vivant en milieu rural

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Contexte: Le nombre de sujets âgés augmente partout dans le monde. Au Liban, selon les projections, environ une personne sur dix aura plus de 65 ans en 2025. Cependant, les conditions de vie et l'état de santé de cette tranche de la population restent peu connus. Cette étude présente les caractéristiques sociodémographiques, l'état de santé et le statut fonctionnel d'un échantillon représentatif de sujets âgés libanais vivant en milieu rural. Méthodes: L'étude s'est déroulée entre mars 2011 et mars 2012 incluant 1200 sujets âgés de 65 ans et plus, tirés au hasard dans toutes les régions libanaises et interrogés à leur domicile. Les données suivantes ont été recueillies: caractéristiques sociodémographiques, conditions de vie, état de santé, statut nutritionnel (MNA), autonomie (ADL/IADL) et fonctions psycho-cognitives (MMS/GDS). Résultats: L'échantillon a inclus 591 hommes et 609 femmes. L'âge moyen était de 75,3 ans (écart-type 7,1) et comparable dans les deux sexes. Près de 45% des sujets étaient illettrés dont une majorité de femmes (59,4% versus 29,7%). Près de deux tiers des individus dépendaient partiellement ou totalement de leurs enfants sur le plan financier et 41,1% n'avaient aucune couverture maladie. Concernant l'état de santé, 54,7% présentaient plus de trois maladies chroniques et 62,2% prenaient plus de 3 médicaments par jour. Par ailleurs, plus d'un tiers des individus étaient considérés « fragiles » et une personne sur deux présentait des troubles de l'équilibre. En ce qui concerne l'autonomie, la majorité des personnes interrogées, soit 76%, était capable d'assurer les activités de la vie quotidienne, mais seuls 30,9% des sujets étaient indépendants au niveau des activités instrumentales (IADL). Quant aux fonctions cognitives, près d'un quart des personnes non illettrées et 68,9% des personnes illettrées présentaient un déclin cognitif (MMS<24). En plus, une proportion élevée d'individus (40,8%) montraient des symptômes dépressifs. Enfin, indépendamment de l'âge, les femmes étaient significativement plus touchées par des problèmes de santé, la perte d'autonomie et les troubles psycho-cognitifs. Conclusion: D'après cette étude le contexte social et sanitaire de la population âgée en milieu rural est préoccupant et devait faire l'objet de mesures appropriées au niveau gouvernemental afin de permettre à nos ainés de vieillir dans de meilleures conditions.

La qualité de sommeil chez les adolescents: Une étude pilote à Beyrouth et au Mont Liban

Michèle Chahoud (Université Libanaise, Lebanon); Farah Rammal (Lebanese University, Lebanon); Rita Farah (Université Paris-Est, France); Ramez Chahine (Lebanese University, Lebanon)

La qualité de sommeil chez les adolescents: Une étude pilote à Beyrouth et au Mont Liban Michèle Chahoud, Farah Rammal, Rita Farah, Ramez Chahine ER 007, Stress Oxydatif et Antioxydants, EDST et Faculté des sciences médicales, Université Libanaise Le sommeil est un état dans lequel nous passons environ le tiers de notre vie. Il fait partie des fonctions vitales de l'organisme et est essentiel à une bonne qualité de vie. Cependant on ne lui accorde pas la place qu'il mérite, notamment chez les adolescents d'aujourd'hui qui ont un rythme de vie infernal. En effet, durant la puberté, le cycle sommeil/ éveil s'allonge et la plupart des jeunes sont plus vifs et éveillés en soirée, se couchent tard et aiment dormir tard…or l'école commence à 8h ; il n'est donc pas étonnant qu'ils soient épuisés au matin! Cette situation pourrait affecter le développement, le comportement et le bien-être de l'adolescent. Il est donc important de détecter les causes et trouver une solution. Comme il n'existe pas d'études sur les troubles du sommeil concernant les adolescents Libanais, nous avons donc mené une vaste étude ayant pour objectifs de connaitre les habitudes de sommeil et les facteurs de risques environnementaux des adolescents scolarisés de Beyrouth et du Mont Liban afin de découvrir s'il existe éventuellement chez eux des troubles de sommeil. Un questionnaire informatisé comportant 25 items a été rempli par environ 1500 étudiants des écoles de Beyrouth et du Mont Liban âgés entre 14 et 19 ans. Le but est d'évaluer le style de vie, les habitudes et la satisfaction du sommeil des adolescents. Une analyse statistique des résultats (SPSS) nous a permis de trouver que ces ados ont un sommeil insuffisant durant la semaine (moins de 9 heures de sommeil nécessaires à cet âge). Ils ont cependant un sommeil réparateur (qui reste inadéquat) le weekend. Ils consomment souvent des substances énergisantes contenant de la caféine. Egalement, plus de la moitié des élèves interrogés n'est pas satisfaite de son sommeil et a un réveil difficile le matin, une analyse plus approfondie nous a permis de déceler une prédisposition aux troubles du sommeil puisqu'un pourcentage assez élevé d'adolescents souffre de difficultés d'endormissent, de réveils précoces pendant la nuit, et de somnolence diurne. La prise de stimulants, l'usage de l'internet ou du téléphone mobile avant de se coucher et les diners tardifs semblent être les facteurs qui prédisposent à un sommeil inadéquat. Par exemple, si l'adolescent utilise son téléphone avant de se coucher il a 3 fois (IC=1.2-5.7, p=0,024) plus de risques de manquer l'école à cause d'un sommeil insatisfaisant. Dans ce contexte, les différences ne sont pas significatives par rapport au sexe, aux tranches d'âges ou entre villes et villages supposés être a l'abri de l'urbanisation! Il n'existe pas d'études qui proposent un mode d'intervention thérapeutique visant le rétablissement d'un cycle veille/sommeil adapté pour des adolescents souffrant de troubles du sommeil. Le traitement est plutôt une approche comportementale basée sur l' « hygiène du sommeil » qui est abordée d'une façon multidimensionnelle. Une campagne de sensibilisation pour un bon sommeil est en cours dans les écoles en collaboration avec le Centre de Recherche et de Développement Pédagogique et l'Agence Universitaire pour la Francophonie. Nous visons à faire rentrer l'hygiène du sommeil dans le cursus. Les classes primaires sont dans notre perspective, il faut commencer à inculquer cette notion déjà à ce stade.

Anti-tumor Activities of the Synthetic Retinoid ST1926 in 2D and 3D Human Breast Cancer Models

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Background and Aims: Breast cancer prevalence has been tremendously increasing over the past decades and is the most common malignancy in females. Despite recent advances in the use of chemotherapy in breast cancer, achieving complete remission in aggressive and metastatic breast cancer patients remains a challenge. Retinoids are major regulators of cellular proliferation, differentiation, and cell death, and have shown potent chemotherapeutic and chemopreventive properties. All-trans retinoic acid (ATRA) is a naturally occurring retinoid that failed phase-II clinical trials in patients with metastatic breast cancer. Hence, synthetic retinoids, namely ST1926, emerged as potent anti-cancer agents overcoming the acquired resistance of cancer cells to ATRA. In the present study, we investigated the anti-tumor activities of ST1926 on the proliferation and cell death of human breast cancer cell lines in 2D and 3D cell culture models, and the molecular mechanisms involved. Methodology and Results: Using MTT cell proliferation and trypan blue exclusion assays, we have shown that in 2D models MCF-7 and MDA-MB-231 are resistant to ATRA while being sensitive to ST1926 at pharmacologically achievable micromolar (μM) concentrations. ST1926-induced growth inhibition was irreversible in both cell lines upon drug removal. Interestingly, ST1926 had no effect on the 'normal-like' breast epithelial cell line MCF-10A even at suprapharmacological concentrations. ST1926 induced apoptosis in MCF-7 cells, as demonstrated by their accumulation in the pre G1 region of the cell cycle and TUNEL assay; while an S-phase arrest was observed in ST1926-treated MDA-MB-231 cells. ST1926 increased the expression of the tumor suppressor protein p53 and caused DNA damage as shown by the increased expression of γH2AX at early time points. Anchorage-independent growth of MCF-7 and MDA-MB-231 cells was examined using the soft agar colony formation assay where ST1926 at sub-μM concentrations was shown to reduce the size and the number of breast cancer colonies assessed by DNA labeled fluorometric analysis. Finally, anchorage-dependent growth of MCF-7 and MDA-MB-231 in the 3D 'on top' assay was assessed by trypan blue exclusion assay. ST1926 drastically induced cell death in the 3D culture of breast cancer cells. Conclusion: These results hold great promise in the

treatment of aggressive and metastatic breast cancer. Importantly, ST1926 was shown to display more potent antitumor properties in 3D human breast cancer models than in 2D. Because a 3D culture model offers a more accurate representation of the tumor microenvironment in vivo, ST1926 is predicted to be potent in patients with luminal A and triple negative breast cancer.

Highlights on Anatomy Teaching at the AUB: 1866 to 2015

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Anatomy is the oldest of medical sciences. It started and still remains as a distinct discipline constituting an integral component of any medical curriculum. Dissection of the human body goes far back in history to the Pharos, the Greeks, and the Romans. However, it is Mundino and then Vesalius, in the middle ages, who started to include dissection as a requirement for training medical students. Over the centuries, the anatomy of the body did not change and its importance is still recognized and emphasized, however, the approach to teaching and learning anatomy has evolved over the years. Many landmarks have affected such an evolution, including information technology and radiology. In Lebanon, the first medical school was founded at the American University of Beirut in 1866. The teaching of anatomy took a good part of the curriculum and cadaveric dissection was given a special attention. After 150 years, anatomy and dissection of the whole human body remains an essential core of the medical curriculum. On the other hand, the approach to teaching this discipline has evolved tremendously taking into real consideration the international and, in particular, the American approaches in order to keep pace with the accreditation process. Radiology was introduced in 1981- 1982 and in 1997 was integrated in the various course. Clinical anatomy lectures and case discussions go back also to the same years and nowadays more and more clinical correlations are being thought through a series of Team-based learning sessions which cover the various regions of the body. Adjunct resources of video tapes of live dissection, real skeletons (complete and parts), selected plastic models and charts are also used to enhance the learning process. Plastinated specimens were acquired last year and were proven to be very useful to teaching and to review sessions. The anatomy course at the AUB consists of 100 hours of regional dissection, 12 embryology lectures, 12 clinical lectures/discussions, 8 radiology lectures plus an interactive computer based program, and 6 team-based learning sessions; all units are fully integrated. All these aspects of the course are assessed by multiple instruments including board-type multiple choice questions, practical on the cadaver exam, radiology labeling and NBME. The course has been steadily evaluated by students over the years as very good or excellent. The performance of the students is consistently very good and many times above the national average of American medical students. Teaching anatomy is a very dynamic process that needs to be continuously updated especially with the introduction of the integrated curriculum in the past two decades.

Alzheimer's disease and Neuronutrition Management

Georges Rammouz and Najib El Haddad (American University of Technology, Lebanon); Maya El Mir (Americna University of Technology, Lebanon); Karen Merhi (Amercan University of Tehnology, Lebanon)

Alzheimer's disease (AD) is a complex, progressive, yet irreversible, neurodegenerative disease for which there are limited means for its ante-mortem diagnosis (Rammouz et al. 2011). It is a devastating disease which recent increase in incidence rates has brought implications for rising health care costs. Huge amounts of research money are currently being invested in seeking the underlying cause, with corresponding progress in understanding the disease progression. It is fairly common for AD Patients not to have any changes in weight fluctuation and energy metabolism. However, there is growing evidence in AD and Cognitive patients in developing a possible dietary risk factor with age; such as antioxidant nutrients, dietary fats, and B-vitamins. Antioxidant nutrients can protect the brain from oxidative damage. However, there is more substantial epidemiological evidence from a number of recent studies that demonstrate a protective role of docosahexaenoic acid (DHA), since some saturated lipids may play another role in cognitive defects in AD secondary to their effects on neuronal membrane lipids (Morris, 2009). In addition, evidence suggests that diets rich in polyphenols suppress the onset of AD by scavenging free radicals and preventing oxidative damage, since metal ions are known to catalyze the production of free radicals. As such, several dietary polyphenols are known to chelate metals, their routine use may also be protective against the onset of AD (Ramesh et al. 2011). There are limited data available from epidemiological studies, thus our study will focus on epidemiological evidence investigating the relationship between neuronutrition the ongoing development of cognitive changes in AD, focusing particularly on the roles of dietary fats, polyphenols and antioxidants.

Randomized double-blind controlled study of 5 mg amitriptyline versus placebo in the management of chronic neck pain

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Background and objective: Although chronic neck pain (CNP) is a common and disabling condition, it has few successful evidence-based treatments. Amitriptyline has a well-established efficacy in many chronic

pain conditions but is not yet investigated in idiopathic CNP. The aim of the present study is to investigate the efficacy and safety of low-dose (5 mg) amitriptyline in the management of idiopathic chronic neck pain (CNP). Methods: In this prospective controlled double-blind study, 220 patients suffering from non-traumatic CNP and fitting inclusion criteria (Age between 20 and 60 years, normal neurologic exam, X-ray normal or with loss of lordosis) and having no exclusion criteria were enrolled in this study. They were randomly allocated into 2 groups in a double blind fashion to receive either a placebo pill (n=108) or 5 mg of amitriptyline (n=112) at bedtime for two months. The primary outcome parameter was pain improvement measured by visual analog scale (VAS). The 5 secondary outcome parameters were: 1) neck pain related disability measured by the Neck pain Disability Index (NPDI), 2) sleep problems measured by Bergen Insomnia Score (BIS), 3) anxious symptoms measured by the Hospital Anxiety and Depression Scale (HAD-A) for anxiety, 4) depressive symptoms measured respectively by the Hospital Anxiety and Depression Scale (HAD-D) for depression. All these scores were measured before and after the treatment period (two months). 5) The percentage of patient global satisfaction was measured at the end of the treatment period (two months). The percentage of improvement of the different scores before and after treatment (except the percentage of satisfaction) was obtained for making comparison between groups by using the following formula: (Value before treatment - Value after treatment)*100/ Value before treatment. No significant difference in demographic (Age, sexe ratio, BMI, smoking and alcoholism) or medical variables (symptoms duration, X-ray findings and the rate of accompanying CTTH) was found at baseline between the Amitriptyline and the placebo group. Results: Eight out of 112 patients (7.14%) in the amitriptyline group withdrew from the study because of intolerance. The Placebo group did not show any statistically significant improvement after 2 months of treatment compared to baseline. On the contrary, the amitriptyline group showed significantly better percentages of improvement from baseline compared to the placebo group in the primary outcome measure VAS (64.84±20.8% vs 9.37±9.84%; p<.0001), as well as in secondary outcome measures: NPDI (45.07±15.35% vs 3.97±4?4%; p<.0001), BIS (34.89±22.98% vs 6.02±12.38%; p<.0001), HAD-A (11.47±13.35% vs 2.95±11.47%; p<.0001), HAD-D (10.36±14.37% vs 5.04±11.83%; p=.003) and in the percentage of patient satisfaction at the end of this study (66.39±23.54% vs 8.52±9.23%; p<.0001). These improvements remained significant after backward stepwise regression analysis without any baseline demographic or medical variable influencing the results other than amitriptyline intake. Among patients in the active group, patients who smoke more than ten cigarettes per day showed significantly better improvement of their neck pain (79% vs 62%; p=.01) and greater satisfaction (79% vs 64%; p=.02) than patients who smoke less. The other outcome measures were not significantly influenced by smoking. Conclusion: Low dose (5 mg) of Amitriptyline is effective for the management of CNP as well as its subsequent disability and comorbidities, with few side effects and better patients' satisfaction. The action of Amitriptyline on CNP related disability and comorbidities is probably indirect via its action on pain. The better response in smokers can be explained by a peripheral analgesic action on nicotinic receptors of pain fibers or by an action of nicotine on the pharmacokinetics of low doses of Amitriptyline by decreasing its elimination rate.

Efficacité de la Radiofréquence dans la Prise en Charge des Ostéomes Ostéoïdes Spinaux

Joe Faddoul and Yara Faddoul (Université Saint-Joseph, Lebanon); Sandra Kobaïter Maarrawi (Saint Joseph University of Beirut, Lebanon); Elie Samaha (Hôtel-Dieu de France, Lebanon); Joseph Maarrawi (St Joseph University & Laboratory of Neurosciences, Lebanon)

Introduction: Le traitement interventionnel des patients ayant un Ostéome Ostéoïde (OO) spinal est indiqué dans le cas d'une douleur intense non soulagée par les médicaments. Cette modalité thérapeutique comprend l'excision chirurgicale et la technique d'ablation par radiofréquence qui n'est pas largement répandue vu la présence d'un danger lésionnel théorique sur les structures nerveuses avoisinantes. Dans ce contexte, une étude expérimentale (JNS, 2011) précédemment menée au laboratoire de Neurosciences de l'Université Saint-Joseph de Beyrouth sur des rats a montré qu'un seuil de réponse motrice supérieur à 2,5V est considéré sans danger et une distance de sécurité minimale de 5 mm entre le bout de l'électrode de thermocoagulation et le nerf est nécessaire pour éviter les dégâts nerveux irréversibles. Objectifs de l'étude: Evaluer la sécurité de l'ablation par radiofréquence se basant sur les résultats expérimentaux de l'étude réalisée chez le rat, et l'efficacité de cette méthode de traitement dans la prise en charge des OO vertébraux à court et long terme. Description de l'étude: Il s'agit d'une étude prospective menée sur 8 patients diagnostiqués avec un OO spinal et traités par ablation percutanée par radiofréquence à l'Hôtel-Dieu de France, Beyrouth. Méthodes: Un examen neurologique est effectué directement en post-opératoire, et une cotation de la douleur est évaluée à J1 post-opératoire par l'échelle visuelle analogique (EVA). Le suivi clinique ultérieur des patients est pratiqué à 1 mois, 6 mois et 1 an après la procédure. Un dernier contrôle est effectué à distance (moyenne = 36.5 mois ± 30.79). Durant ce dernier contrôle, la douleur du patient est cotée sur l'échelle EVA avec un examen neurologique, le pourcentage de satisfaction du patient est recueilli, et un contrôle radiologique a pu être effectué chez 4 patients (50%) jusqu'à présent. L'EVA pré et postopératoire a été comparée à J0, J1 et au dernier contrôle en utilisant le test de Wilcoxon. Une valeur de $p < 0,05$ a été considérée comme statistiquement significative. Résultats: En post-opératoire, 100% des patients ont un examen neurologique normal. On note une diminution nette de la douleur à J1, avec une différence statistiquement significative ($p= 0,005$). Une régression de la lésion radiologique typique de l'OO est notée chez tous les patients. Conclusion: La technique d'ablation par radiofréquence des OO spinaux est une méthode thérapeutique efficace et peut être effectuée sans danger dans les lésions situées à proximité des structures nerveuses, se basant sur le seuil de réponse motrice effectué en peropératoire.

Randomized double-blind trial comparing the post-operative analgesic added value of local wound infiltration with clonidine in posterior spine surgery

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Background and objectives: If the synergistic effect of clonidine with bupivacaine is well established in peripheral nerve blocks, it remains less evident for analgesia by local wound infiltration, especially in posterior spine surgery. The main objective of our study is to investigate a potential analgesic benefit of adding clonidine to bupivacaine in a pre-incisional wound infiltration in posterior spine surgery, based on experimental studies in rats showing differed analgesic effects of clonidine via an anti-inflammatory effect. The secondary objective is to identify the surgical subgroups that may eventually benefit more than others from this association. Methods: 150 patients fitting inclusion criteria (Age between 18 and 90 years, 1st spine surgery, ASA I or II) were enrolled in this study. 69 patients operated of Arthrodesis (A) and 81 of lumbar micro-discectomy (D) were randomly assigned to different study arms in a double blind way: 81 patients received a pre-incisional local infiltration with 20 mL of Bupivacaine 0.25% alone (1) among whom 41 patients operated of Arthrodesis (A1) and 40 patients operated of lumbar micro-discectomy (D1). 69 patients received a pre-emptive local infiltration with 150 µg (1mL) of clonidine in addition to 20mL of Bupivacaine 0.25% among whom 28 patients operated of Arthrodesis (A2) and 41 patients operated of lumbar micro-discectomy (D2). No significant difference in demographic (Age, sexe ratio and BMI) or medical pre-operative (ASA ratio mean pre-operative pain) and per-operative (duration of surgery and blood loss) variables was found at baseline between groups with and without clonidine. 4 outcome parameters were considered: 1) the mean intensity of daily pain, obtained by calculating the average of day and night values of pain assessed by VAS from D0 to D8. 2) The pain load (Area Under Curve, AUC) calculated between D0-2, D3-5, D6-8 and total AUC between D0-8 (expressed in pain unit x hour). 3) Rescue morphine consumption daily and total between D0-3 (expressed in unit = consumption of 5mg morphine s/c). 4) The percentage of global patient satisfaction from 0-100 assessed at the end of follow-up at D8. Results: We found a reduced pain intensity from D0 till D8 in group (2) with clonidine, the onset of this reduction being delayed to Day 1 in the subgroup (D2) vs (D1), as well as a significant improvement in pain load (AUC) in group (2) over all the follow-up (474 vs 724 pain unit x hour p<.0001). The total rescue morphine consumption was reduced in group (2) (0.9 vs 2.0 unit p=.001), particularly at Day1-2, a benefit that was exclusive to the subgroup (A2). The percentage of global patient satisfaction was better in group (2) (87.0 vs 70.2% p<.0001). Conclusion: The addition of clonidine to bupivacaïne in a pre-incisional wound infiltration provides better analgesia in posterior spine surgery. The analgesic efficiency of locally infiltrated clonidine is probably independent from that of bupivacaine as it is weaker at D0 and increases with time. However, despite the absence of direct synergy, these 2 substances have a complementary analgesic action since bupivacaine is more efficient during the first post-operative hours while clonidine provides a longer lasting analgesia. Clonidine exerts its local analgesic effect probably through an anti-inflammatory action responsible for the delayed onset and the durability of action. The pattern of local analgesia of clonidine is in fact similar to that of local corticosteroids in posterior spine surgery found in previous studies.

P2_BIO2_Pharma: Poster Session 2- Biological, Medical, Pharmaceutical, Health Sciences II

Room: USJ Hall CSH

Chairs: Aline Hajj (Universite Saint Joseph, Lebanon), Amal Omar (Beirut Arab University, Lebanon)

The molecular basis of familial hypercholesterolemia in Lebanon

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Introduction: Autosomal Dominant Hypercholesterolemia (ADH) is associated with mutations in the LDLR, APOB and PCSK9 genes, while recessive forms are very rare and are due to mutations in the LDLRAP1 gene. Familial Hypercholesterolemia (FH) is very frequent among the Lebanese population because of the presence of the "Lebanese allele/mutation" p.C681X in the LDLR gene, presumably with a founder effect. Furthermore, the high level of consanguinity in the Lebanese population leads to a very high frequency of homozygotes. Recessive cases have also been reported. The aim of our study is to investigate the genetic causes of FH in Lebanese families with consanguinity and in homozygotes patients with severe phenotype. Methods: Fifty patients suffering from ADH were recruited from different Lebanese regions. The p.C681X mutation in the exon 14 of the LDLR gene was investigated by sequencing. The PCKS9 gene was also sequenced in order to determine the impact of some polymorphisms in this gene on cholesterol levels in ADH patients sharing the Lebanese mutation. Two subjects from a family with known ARH (autosomal recessive hypercholesterolemia) were also recruited and mutations in the LDLRAP1 gene were

investigated by sequencing. Investigation of mutations in LDLRAP1 gene was also performed in families with suspected ARH (autosomal recessive hypercholesterolemia). Results: The Lebanese mutation of the LDLR (p.C681X) was identified in 85 % of the studied subjects. . Furthermore, an in frame insertion of Leucine (p.Leu21dup) to the stretch of 9 leucines in exon 1 of PCSK9 is associated with a significant reduction of LDL-cholesterol levels in ADH patients heterozygous for the p.C681X mutation in the LDLR confirming our previous results (Abifadel et al. 2009). The sequencing of the LDLRAP1 gene allowed us to identify a mutation in a patient with ARH, in according with a previous report of this mutation in a Lebanese family (Garcia et al, 2001). Conclusions: These results confirm that the high frequency of FH among the Lebanese population is mainly due to the Lebanese mutation in the LDLR and that recessive forms exist as well. It highlights the severity of the homozygous phenotype. The homogenous genetic background of FH in the Lebanese population facilitates genotype-phenotype correlation and the research of modifier genes. Our results highlight the importance of considering a genetic test to assess and to prevent cardiovascular risk in families suffering from FH, especially in young patients.

Effet saisonnier et circadien d'extraits d'aubergine sur le pouvoir antioxydant de la salive

Randa Diab, Mounir Doumit and Ramez Chahine (Lebanese University, Lebanon)

Longtemps estimé pour sa beauté aussi bien que son goût unique, l'aubergine (solanum melongena) qui est disponible tout le long de l'année sur le marché contient une foule de vitamines et de mineraux, également des phytonutriments importants qui ont une activité antioxydante et anti-inflammatoire incluant les composés phénoliques, acide caféique et chlorogénique, et les flavonoïdes, telles que le nasunin. Nous avons déjà mis en évidence que la salive possède un pouvoir antioxydant qui baisse fortement chez les personnes atteintes de maladies parodontales (MPD). Le but de cette étude est de tester in vitro si des extraits d'aubergine récoltés dans deux saisons différentes sont capables de booster l'effet antioxydant de la salive recueillie à deux moments de la journée chez des personnes atteintes de MPD. Le protocole expérimental consiste à générer une cascade de radicaux libres (RL) par électrolyse d'une solution physiologique de tyrode dans une cuvette munie de 2 électrodes en platine reliées à un stimulateur qui délivre un courant de 10 mA appliqué pendant 5 min. À chaque minute d'électrolyse un volume de 1 ml de tyrode électrolysée est ajouté à 2 ml d'une solution de tyrode non électrolysée dans laquelle on a ajouté 2 ml de DPD (N, N di-éthyl-P-Phenylènedialanine) (25 mg/L). Les espèces oxydantes induites par électrolyse réagissent instantanément avec le réactif DPD pour produire une couleur rouge, mesurable au spectrophotomètre à 515 nm et dont l'intensité varie selon la quantité de RL libérés en fonction du temps. On mesure ainsi l'absorbance, en absence ou en présence d'extrais aqueux du fruit lui-même et de ses pédoncules, provenant d'aubergine récoltées en mars et d'autres récoltées en septembre. Par ailleurs plusieurs concentrations de salive recueillie le matin ou le soir ont été ajoutées au milieu provenant de patients atteints de MPD en comparaison avec une salive provenant de personnes ayant une cavité buccale saine. Les résultats ont montré qu'à concentrations égales, les extraits des pédoncules d'aubergine diminuent l'absorbance (possèdent donc un pouvoir antioxydant) qui est 22 % supérieur à celui provenant du fruit lui même. De plus les extraits provenant d'aubergine récoltés au mois de septembre possèdent un pouvoir antioxydant 28 % supérieur à celui provenant de la récolte de mars. Par ailleurs, ces extraits sont capables de ramener de manière significative le pouvoir antioxydant de la salive qui chute fortement (40%) le soir chez les patients atteints de MPD. Nous proposons les extraits aqueux de pédoncules d'aubergine comme traitement préventif et même curatif permettant de rétablir le pouvoir antioxydant de la salive qui baisse lors de l'installation des MPD et empêchent ainsi cette pathologie de progresser. La saison de récolte de l'aubergine et le moment du traitement semblent jouer un rôle dans ce processus qu'il faut prendre en considération afin de maximiser la protection.

Berberis libanotica Extract Targets NF-?B/COX-2, PI3K/Akt and Mitochondrial/ Caspase Signaling to Induce Human Erythroleukemia Cell Apoptosis

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It has been demonstrated that different species of the plant "Berberis" possess anticancer effect on several cancer cell lines. This is exerted via multiple mechanisms, dependent of each cell line. In this study we investigated the anticancer potential of the Lebanese endemic specie: Berberis libanotica(Bl). Most of anticancer drugs exert their effect through the decreasing of cell proliferation and the induction of an apoptotic cell death. On the other hand, it is also well known that natural products usually increase the expression of cyclooxygenase-2(COX-2). COX-2 is generally up-regulated in cancers and can influence apoptosis susceptibility, generally implicated in resistance to apoptosis. We thus investigated the effect of an ethanolic extract from Bl on erythroleukemic cell lines. Therefore, we choose three erythroleukemic cell lines that differ from their level of COX-2 expression: HEL, K562(COX-2 deficient) and transfected K562(COX-2 +). Bl induced apoptosis through disruption of $\Delta\psi m$, caspase-9 and caspase-3 activation. Furthermore it induced PARP cleavage and DNA fragmentation, two well known hallmarks of apoptosis. Finally, we showed that Bl treatment induced a down-regulation of COX-2 expression which is correlated with the inhibition of the two survival pathways: NF-κB and phospho-Akt. When we put together, these data suggest that Bl has a potential chemopreventive effect through the regulation of Akt/NF-κB/COX-2 pathways in human erythroleukemia.

Protein content analysis and biological activities of Montivipera bornmuelleri's venom

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Nature has been a source of medicinal products for thousands of years, among which snake venoms form a rich source of bioactive molecules with important pharmacological activities. Montivipera bornmuelleri is one of venomous viper species found in Lebanon. Therefore, the aim of this work was to describe the protein content of M. bornmuelleri's venom and to screen its biological properties.

EAPB0503 Imiqualines derivatives:Effect on tubuline polymerization

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Microtubules are the key components of the cytoskeleton of eukaryotic cells and have an important role in various cellular functions such mitosis, exocytosis, maintenance of cellular morphology, active transport, cell shape and polarization1, 2. They play a critical role in cell division being involved in the movement and attachment of the chromosomes during various stages of mitosis. Therefore microtubule dynamics are an important target for the development of anti-cancer agents3. Imidazoquinoxalines derivatives have been designed by our laboratory since 2004 using different strategies of synthesis. Among these derivatives, EAPB0203 and EAPB0503 have shown potent antitumor properties in vitro and in vivo against melanoma and T-cell lymphomas. The studies on EAPB0203 and EAPB0503 revealed their ability to block A375 melanoma cells in M phase of the cycle, to inhibit purified tubulin polymerization, to disrupt tubulin network in A375 and MCF7 cell lines, and to bound tubulin on the colchicine binding site4, 5, 6, 7. In the present study, we have investigated whether the antiproliferative activities of EAPB0503 and a series of new derivatives were related or not to the interaction with tubulin. Their ability to increase the denaturation time of tubulin was determined in order to assess their capacity for binding and inhibiting tubulin polymerization. We found that these new compounds exhibited remarkable antiproliferative activity with micromolar IC50 values against A375 melanoma cell line, which is comparable to that of EAPB0503 and Colchicine. Derivatives also showed potent inhibition of the tubulin polymerization at 5 µM. We founded thatantitubuline polymerization is one of the mechanism of action of EAPB0503 and tested derivatives. Reported studies contribute to better understand and explain structure-activity relationships for further synthesis in order to obtain new drugs with improved properties for the development of novel antitumor agents.

Effets cardiovasculaires et antioxydants des extraits des racines, des feuilles et des fruits de l'arbusier Libanais (Arbutus Andrachne L)

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La popularité de la phytothérapie augmente dans le monde entier en raison des effets secondaires associés à la pharmacothérapie. Les plantes médicinales sont les sources potentielles de composants bioactifs, dont les plus importants sont les composés phénoliques. Arbutus andrachne L, ou arbousier du Liban est une plante native de la région méditerranéenne et du sud de l`Asie. Communément appelé arbousier grec, Arbutus andrachne L., est un arbuste à feuillage persistant de la famille des éricacées. Traditionnellement, les fruits et les feuilles de l'arbre Arbutus sont bien connus et ont été utilisés comme antiseptiques, diurétiques, et laxatifs. Les données concernant les effets biologiques des composés dérivés de l'Arbutus andrachne libanais ne sont pas connus. Dans le présent travail, nous avons étudié l'activité antioxydante des extraits au méthanol des feuilles, des fruits et des racines de cette plante contre les radicaux libres générés par électrolyse d'une solution physiologique in vitro et quantifiés par une méthode colorimétrique. Ces extraits ont également été testés sur la pression artérielle systolique de rats, Wistar mâles adultes, hypertendus, et ex vivo par mesure des paramètres cardiodynamiques de cœurs isolés de lapin perfusés selon la méthode de Langendorff. Enfin, des tranches de cœurs de lapin perfusés avec les extraits au méthanol et ceux des cœurs témoins ont été soumis à l'électrolyse suivie par des études histopathologiques ou dosage de la peroxydation des lipides. Les résultats ont montré que les extraits au méthanol provenant des racines ont la plus forte activité antioxydante in vitro. De même, ces extraits possèdent une activité antihypertensive la plus élevée et un effet inotrope négatif sur le muscle cardiaque. Un rôle protecteur contre les dommages des radicaux libres a également été observé en se basant sur la peroxydation lipidique et la lésion tissulaire qui ont augmenté dans le myocarde après électrolyse, et qui ont diminué de manière significative dans les cœurs prétraités avec les extraits de racines.

Design, synthesis and biological evaluation of novel hydroxyalkylpiperidinylpentanol, hydroxyalkylpiperazinylpentanol and their isosteric ethoxyethanol derivatives as potential antidepressants

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Depression is defined as a neuro-modulatory disorder with disturbances in central nervous system serotonin majorly, norepinephrine and dopamine. Drugs affecting serotonin and norepinephrine are mostly prescribed in depression. The bicyclic antidepressant Venlafaxine, a potent serotonin and norepinephrine reuptake inhibitor, showed significant results in treating major and bipolar depression. Seventy percent of diagnosed patients with chronic depression administering antidepressants are not responding to treatment or show partial improvement. Treatment failure is probable even with two medication regimens leading to decrease in possibility of complete remission hence treatment resistant syndrome. The combination of Venlafaxine and the atypical antipsychotic, Quetiapine, 5-HT2A antagonist, is efficient in treatment of resistant depression. Benefiting the structural features of Venlafaxine, enabling its serotonin-norepinephrine reuptake inhibition properties, along with the Quetiapine pharmacophoric groups responsible for its activity and selectivity, we aimed at the design and synthesis of hybrid scaffolds of novel hydroxyalkylpiperidinylpentanol, hydroxyalkylpiperazinylpentanol and their isosteric ethoxyethanol derivatives targeting the evaluation of their antidepressants activities, molecular docking and pharmacophore mapping as 5-HT2A receptor antagonists and serotonin-norepinephrine reuptake inhibitors (SNRI). The chemical structures of the target compounds are shown in schemes 1, 2 and 3. The molecular docking and pharmacophore mapping are accomplished by MGL tools, AutoDock, software. Screening for 5-HT2A receptor antagonist activity of synthesized compounds is carried out by radioligand binding assay using [3H]-ketanserin in CHO cells expressing human 5-HT2A receptors. Serotonin-norepinephrine reuptake inhibition is measured as function of screening serotonin transporter (SERT) and norepinephrine transporter (NET) by radioligand binding assay using [3H]-citalopram and [3H]-nisoxetine respectively, in rat brain tissues. References 1. Li, X.; Xing, B.; Yu, E.; Chen, W. and Wu, H., The combined treatment of venlafaxine and quetiapine for treatment-resistant depression: A clinical study. J Neuropsychiatry Clin. Neurosci. 2013, 25, 157-160. 2. Klein, N.; Sacher, J.; Wallner, H.; Tauscher, J.and Kasper, S., Therapy of treatment resistant depression: Focus on the management of TRD with atypical antipsychotics. CNS Spectr. 2004, 9, (11), 823-832. 3. Koc, J. H.; Gelenberg, A. J.; Rothbaum, B. O.; Klein, D. N.; Trivedi, M. H.; Manber, R.; Keller, M. B.; Leon, A. C.; Wisniewski, S. R.; Arnow, B. A.; Markowitz, J. C. and Thase, M. E., Cognitive behavioral analysis system of psychotherapy and brief supportive psychotherapy for augmentation of antidepressant nonresponse in chronic depression. Arch. Gen. Psychiatry 2009, 66, (11), 1178-1188. 4. Shelton, R. C.; Osuntokun, O.; Heinloth, A. N. and Corya, S. A., Therapeutic options for treatment-resistant depression. CNS Drugs 2010, 24, (2), 131-161. 5. Sekhar, K. V. G. C.; Vyas, D. R. K.; Nagesh, H. N. and Rao, V. S., Pharmacophore Hypothesis for atypical antipsychotics. Bull. Korean Chem. Soc. 2012, 33, 2930-2936. 6. Sarita, P.; Akhilesh, R. and Sanjay, W., Synthesis, docking and antipsychotic assessment Am. j. pharm. res. 2013, 3, (7), 5044-5054.

Hypotensive effect of the venom of Montivipera bornmuelleri viper on vascular contractility

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Molecular richness of snake venoms is an important source of proteins and toxins with a potent cardiovascular activity. The alteration of the vascular system in the victim after a venomous snake bite is usually expressed by a significant decrease in blood pressure. Exploring the snakes crude venom to extract and characterize its biomolecules is an important scientific issues on which are founded our works. Here we assess the potential of the venom of Montivipera bornmuelleri, a viper from Lebanon, to induce relaxant effect on isolated Wistar rat aorta via several mechanisms of action. The overall hypotensive effect of this venom results from a synergic action on different channels for the reduction of blood pressure. By actions of its metalloproteinases and its PLA2, the venom may induce the production of nitric oxide acting accordingly a vasodilator effect. It could act on the voltage-dependent potassium channels and/or the L-type calcium channel, inhibiting angiotensin converting enzyme and/or inhibiting the α1-adrenoceptors.

P2_BIO3_Biologique: Poster Session 2- Biological, Medical, Pharmaceutical, Health Sciences III

Room: USJ Hall CSH

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Wissam Faour (Lebanese American University, Lebanon), Monzer Hamze (Lebanese University, Lebanon)

Search for Substrates and Activators of a New Family of Bacterial Protein Kinases

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The regulation of metabolic pathways in living organisms is a key mechanism to enable their adaptation to environmental changes. Phosphorylation is a very effective and almost instantaneous control of a multitude of cellular processes. It is a post-translational modification induced by specific enzymes: "protein kinases". These enzymes use ATP as a phosphate donor to phosphorylate target proteins at the level of specific residues, i.e. serine, threonine and tyrosine, allowing a fine regulation of their enzymatic activity, their intracellular localization and their ability to interact with partners. In prokaryotes, the existence of serine/threonine and tyrosine kinases was, for a long time, a subject of controversy. However, over the past two decades, many studies have shown that these types of phosphorylation (Ser/Thr/Tyr) do exist in bacteria and are involved in the regulation of a wide variety of biological processes. In addition to protein kinases related to eukaryotic enzymes, bacteria also have some protein kinases having no structural resemblance to their eukaryotic homologues which made them a target for efficient antimicrobial agents. The present project aims to understand the operating mechanism and the physiological role of YdiB, a new family of protein kinases found only in bacteria, and to identify its partner proteins. YdiB belongs to a new family of specific bacterial proteins but of unknown function, UPF0079 ("Uncharacterized Protein Family") family, and it is a prototype of this family in the archetype of the Gram-positive Bacillus subtilis bacteria specifically. It has been shown that YdiB has a very weak ATPase activity which is regulated by its oligomerization state: The monomer is much more active than the multimeric forms (dimers, tetramers and octamers). Another member of this family had been previously crystallized and its 3-D structure revealed a unique topology among proteins laying down nucleotides, thus defining UPF0079 as a new structural analogue of the ATPases family. In addition, it has been shown that YdiB is capable to autophosphorylate (like most protein kinases) and phosphorylate in vitro conventional substrates of protein kinases, such as the MBP ("Myelin Basic Protein") and the Histone H1 (Figure 1). Figure 1. Autophosphorylation and transphorylation of YdiB. YdiB was incubated in the presence or absence of MBP or of Histone H1 and in the presence of ATP-γ-32p. After migration on SDS-PAGE, the gel electrophoresis was put in contact with a film and subjected to autoradiography to detect the phosphorylated proteins. Only YdiB is autophosphorylated and this autophosphorylation is increased in the presence of MBP or Histone H1. It is then accompanied by a phosphorylation in Trans of the substrate protein. These results have been extended to YdiB orthologous proteins from Streptococcus pneumoniae (Gram + pathogen) and Escherichia coli (Gram-). This has allowed revealing, for the first time, that the UPF0079 family, which is highly conserved in most bacteria, is actually a new family of protein kinases. The very weak ATPase activity detected previously is a parasitic activity observed in vitro in many protein kinases, in the absence of phosphorylated partner proteins. A search of proteins of Bacillus subtilis which would be phosphorylated by this protein kinase and for physiological partners of YdiB was undertaken. This quest has proved to be quite laborious and unsuccessful; but very recently, we opted for an approach based on derived peptides of the phosphoproteome of Bacillus subtilis, using a strategy previously described for the study of other protein kinases in Mycobacterium tuberculosis. The analysis of the phosphoproteome of Bacillus subtilis helped to highlight that there are at least 78 phosphorylated proteins in vivo for a total of 103 phosphopeptides. Many biotides were phosphorylated in vitro by YdiB, including those belonging to the superoxide dismutase (SodA), elongation factor of EF - G protein synthesis (Fus) or glycogen phosphorylase (GlgP). Interestingly, an YdiB deletion mutant strain of Bacillus subtilis (ΔydiB) is much more sensitive to paraquat, a chemical agent that generates oxidative stress. These results suggest that one of the cellular roles of YdiB is to control oxidative stress. However, the results of the biotides also indicate that YdiB may regulate many other bacterial functions. On the other hand, many ribosomal proteins are phosphorylated in vivo in different bacteria (e.g., E. coli) but the role of these phosphorylations and the corresponding protein kinases remain to be elucidated. Our preliminary results show that YdiB would be a substrate in vitro for a transmembrane tyrosine kinase present in Bacillus subtilis, PtkA, and it was also shown that the cellular localization of YdiB would be close, or in association with, the plasma membrane. Thus, as has been shown for eukaryotic protein kinases, e.g. MAP Kinases involved in the cellular signaling process, there could be close connections between the different protein kinases that co-exist within a same bacterium.

Identification of a new expandable embryonic endodermal progenitor via de-differentiation of adult hepatocytes

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The isolation of primitive endoderm progenitors from mice embryos is quite a hopeless endeavor. Thereby, the main biological concept is the development of distinct organs such as the liver and pancreas from the primordial gut endoderm. We thus have developed and isolated embryonic endodermal self-renewing progenitors called Endodermic induced tissue stem cells (Endo-iTSCs), by dedifferentiating adult mouse hepatocytes through transient expression of Oct-4, Sox2, Klf4 and c-Myc. Our global strategy was to initiate a dedifferentiation process and to select the Endo-iTSCs subclones before acquisition of pluripotenty. These Endo-iTSCs, did not express CD90, CD 105, CD117, CD34 nor CD49a thus proving that these progenitors do not represent a novel source of oval cells nor of mesenchymal stem cells and express hepatoblastes and endodermic markers such as CD29, CD51, CD166, Sca1, CXCR4, Foxa2 and Sox17. Interestingly these progenitors, expressed markers involved in liver and pancreatic ontogeny. In addition, these Endo-iTSCs were differentiated easily into functional albumin-secreting hepatocytes and insulin-secreting β-like cells in vitro and were found to colonize the liver, the gut and βeta pancreatic tissues in vivo. Fortunately, one in vitro step of differentiation was sufficient to generate from Endo-iTSCs, hepatocytes able to produce albumin and that were found to be extremely similar to mouse primary hepatocytes. Moreover the Endo-iTSCs were found to proliferate and differentiate extensively in vivo after mice partial hepatectomy. Furthermore, we reached, within a one-stage protocol, the differentiation of some sub-clones of Endo-iTSCs into endocrine insulin-expressing cells, whereas all other studies required 5 in vitro-steps to derive insuline secreting cells from iPSCs and ESCs. Our data highlights for the first time, the existence of a multipotent embryonic endodermal progenitor, providing a unique approach to produce functional endodermal lineages for drug and toxicity assays and, ultimately for cell-based therapies.

Role of the Retinoblastoma protein, pRb, in the Survival of Adult-Born Neurons in the Olfactory Bulb

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Adult neurogenesis is an ongoing developmental process that is persistent in two major sites in the mammalian brain throughout life: the subventricular zone(SVZ) linked to the olfactory bulb(OB) and the subgranular zone in the dentate gyrus of the hippocampus. We have recently shown that induced temporal deletion of Rb in the mouse adult brain increases proliferation of neural progenitors derived from adult Neural Stem Cells(aNSCs) found in the SVZ, but does not affect subsequent migration of neuroblasts(immature neurons) along the rostral migratory system(RMS) to the OB nor terminal differentiation of adult-born neurons in the OB. Hence, loss of Rb leads to enhanced neurogenesis in the adult OB(Naser et al. 2015; submitted). Here, we study whether Rb is required for the survival and proper integration of adult-born OB neurons into pre-existing olfactory circuitry. 8-week old Rb flox/flox and Rb flox/+ mice were stereotaxically injected in the SVZ with a mixture of CAG-GFP/Cre(Cre virus) and CAG-RFP(control virus) retroviruses, and, sacrificed 28d later. Fast proliferating cells(type C) were randomly transduced with GFP/Cre virus, RFP control virus or both viruses. Exon 19 of the Rb floxed allele(s) was/ere excised by Cre thus inducing Rb's deletion. In addition, we used a second NestinCreERT2-YFP/YFP line and conducted a birth-dating study by administering a series of BrdU injections following tamoxifen treatment and sacrificing the animals 28d later. we determined the proportion of RFP-GFP double-labeled cells among the RFP control cells and found the percentage of GFP+;RFP+ cells in the OB identical in both genotypes indicating normal survival of new born neurons in Rb-/- mutant(n=3) vs Rb+/- control(n=3) animals. Neuronal maturation was also identical between genotypes as assessed by the percentage of GFP+ cells co-expressing NeuN, and, CR, separately. Also, after analysis of the second NestinCreERT2 line, we detected no significant increase in GFP+, BrdU+ and GFP+;BrdU+ cells in the mutant OB compared with controls. Thus, Rb is not required for the survival and terminal differentiation of adult-born GABAergic neurons in the OB and this is not consistent with its role during development when its loss severely affected neuronal differentiation and migration in the telencephalon.

Evaluating the Contribution of Melanization to Antibacterial Defense in the Malaria Vector Anopheles gambiae

Tamara Abou Matar and Mike Osta (American University of Beirut, Lebanon)

Melanization is a potent immune response used by arthropods. It involves the deposition of melanin on the surface of pathogens and is also involved in wound healing. Innate immune responses in the malaria vector Anopheles gambiae are initiated by the recognition of pathogens by pattern recognition receptors (PRRs) that bind to pathogen associated molecular patterns (PAMPs) and trigger the activation of serine protease cascades that, among others, are involved in converting prophenoloxidase (PPO) into active phenoloxidase (PO) that is involved in melanization. The main proteins involved in these cascades are constituted predominantly of clip-domain serine proteases family (CLIPs). Previous studies have shown that A. gambiae rarely melanize Plasmodium parasites but they do melanize bacteria. However, the contribution of melanization to antibacterial defense remains controversial. A previous study have shown that melanization in Anopheles gambiae is not required for resistance and tolerance of mosquitoes to infections with E. coli and S. aureus bacteria, which are model bacteria and not common mosquito pathogens. Thus the need to further characterize this response in Anopheles gambiae against a broader spectrum of species is required. Here, we investigated the role of melanization in antibacterial defense to Streptococcus iniae, a Gram-positive fish pathogen, as a model bacterium. We show that melanization plays an important role in the defense against Streptococcus iniae bacteria. Western blot analysis revealed that CLIPA8, a key regulator of melanization, is cleaved in the hemolymph of mosquitoes infected with

Streptococcus iniae. Moreover, comparing the dynamics of CLIPA8 cleavage between the Gram-negative E. coli and the Gram-positive S. iniae shows that the later triggers more cleavage of CLIPA8 protein. S. iniae triggered also a consistently higher hemolymph PO activity than E. coli, implying enhanced activation of melanization. Strikingly, CLIPA8kd mosquitoes showed significantly more compromised survival following S. iniae infection compared to LacZ kd, while E. coli or S. aureus infected mosquitoes showed a similar survival pattern to LacZkd controls. Interestingly, CLIPA8 kd mosquitoes contained less S. iniae DNA compared to LacZ kd controls and that at several days post-infection. This indicates that CLIPA8 kd mosquitoes are more resistant but less tolerant to S. iniae infections than controls. The results obtained suggest that melanization affects bacterial tolerance and resistance in a species-dependent manner. Therefore, to obtain a deeper in sight into the contribution of melanization to antibacterial defense it is important to use a broad panel of bacterial species.

Effect of Connexin 43 Loss on Polarity and Initiation of Tumorigenic Pathways in the Phenotypically Normal Breast Epithelium

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Recent evidence suggests a regulatory role for Connexin (Cx) 43, a gap junction (GJ) protein, in apical polarity establishment that is a key property of epithelial tissues and is disrupted early on during tumorigenesis. We have previously demonstrated a Cx43 context-dependent tumor-suppressive role mediated partially by a GJ complex assembly that sequesters Cx43-associated proteins β-, α-catenin and ZO-1 proteins at the cell membrane of breast epithelial tumor cell lines and contributes to lumen formation and maintenance in non-neoplastic breast epithelial cells. However, the mechanism that governs Cx43 role in regulating tumor suppression is not fully elucidated. In this study, HMT-3522 S1 non-neoplastic breast epithelial cells were used to decipher the mechanism through which Cx43 contributes to the homeostasis of the normal mammary epithelium. For this purpose, Cx43 was stably silenced in S1 cells using Cx43-specific shRNA along with a nonspecific (NSS) shRNA as control. S1 cells were cultured in three-dimensional (3D) conditions that permit the formation of physiologically relevant epithelial glandular structures (acini). A significant rise in the proliferation rate of S1 cells was noted in response to Cx43 silencing, as reflected by an increase in the size of S1 acini. Enhanced proliferation was accompanied by improper acinar morphogenesis and loss of the ability of S1 cells to form monolayered acini. Moreover; preliminary data from invasion assays revealed that the loss of Cx43 gives the capability for S1 cells to invade, through a layer of diluted Matrigel, to a higher extent than the control and T4-2 cells, the tumorigenic counterparts of S1 cells. These changes, in addition to the disruption of apical polarity in acini and mislocalization of both ZO-1, an apical polarity marker, and β-catenin, a protein involved in the control of epithelial to mesenchymal transition (EMT), indicate a shift in the phenotype into one that enables neoplastic development. Furthermore, Cx43 silencing altered the apico-lateral localization in S1 acini of the protein Scrib, a key regulator of apical polarity and a tumor suppressor recently reported to be involved in the control of EMT in murine lens epithelium and in the regulation of murine mammary gland progenitor activity. We propose that Cx43 tumor-suppressive role may be mediated through an impact on pathways involved in EMT.

Molecular Phylogeny and Cytogenetic Characterization of Iris genus in the East Mediterranean Region

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Iris genus is one of the largest in Iridaceae family, it includes 6 subgenera, 8 sections (Mathew, 1989) and more than 300 species (De Munk and Schipper, 1993).The range of the genus extends to all of the continents of the Northern Hemisphere. The large variety of natural habitats and adaptive traits makes the phylogenetic relationships and evolutionary history of the genus Iris worth investigating. Furthermore, the Eastern Mediterranean region is considered as the center of diversification of many groups including Iris and especially its Oncocyclus section. Most classifications of Iris are based on morpho-anatomical features, ecological features, and cytogenetic analysis (Wu and Cutler 1985; Rodionenko 1987; Doronkin 1987, 1990; Mathew 1989). Almost no discrete phenotypic groups exist within the Oncocyclus species of the southern Levant except for variation in the floral colours. Most of the suggested diagnostic characters proved unreliable in that they varied continuously across populations (Sapir, 2002). Given this taxonomic confusion, along with the high variation observed in natural populations and transitional populations frequently encountered in the field, molecular studies are required in order to resolve these classification problems. In this study, we conducted genome size evaluation on all Lebanese irises (14 taxa), and 19 Oncocyclus species of the East Mediterranean Region. Cytogenetic investigations (chromosome number, karyotype, heterochromatin and rDNA patterns using FISH) were made on 11 of the Lebanese irises. On the other hand, internal transcribed spacers of 18-26S nuclear ribosomal DNA, and two plastid markers chloroplast matK gene and trnL intron sequences were analyzed on different Iris sections: 22 species and subspecies of Iris from Lebanon and neighbor countries: Armenia, Jordan, Syria, Turkey, Palestine, belonging to different Iris. Phylogenetic relationships among them were reconstructed based on the data using maximum likelihood and Bayesian inference methods. Our data are also compared to published sequences available and a global phylogenetic tree is reconstructed. A special emphasis on endemic

taxa allows the determination of their discrete taxonomy and helps take concrete measures to save the species. These studies contribute to the understanding of the phylogenetic relationships of the studied species, in particular those of the Oncocyclus section.

The Leading Risk Factors of Cardiovascular Diseases in Tripoli

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Background: Cardiovascular disease (CVD) is a collective term used to describe diseases of the heart and blood vessels. It has become a major health burden that occupies fifty percent of deaths worldwide. There are four types of cardiovascular diseases which are Coronary Heart Disease, Stroke, Peripheral Arterial Disease and Aortic Disease. The Coronary Heart Disease which is based on the oxygen-rich blood not reaching the heart due to an accumulation of fatty material (atheroma) and the obstruction of blood vessels,causing serious chest pain and eventually leading to heart attacks. The Stroke which is when the blood supply is not reaching the brain, therefore leading to the damage of brain cells. This problem will then affect the face, arms and speech. The peripheral Arterial Disease, which is about a blockage in the arteries that supply blood to the limbs (usually your legs) and leads to cramps,dull pain or sensation of heaviness in the legs. Finally is the Aortic Disease, in which the aorta is the largest blood vessel in the body that carries blood from heart to the rest of the body. When affected by a disease, the aorta can split or dilate (aneurysm) and in either case, the rupture causes fatal results, causing pain in the chest, abdomen and back. Aortic Diseases risk factors include high blood pressure, atherosclerosis and smoking. Most of the Middle Eastern countries have a high prevalence of CVD. In Lebanon, the mortality rate due to CVD reaches 60% in subjects 50 years and older. Several factors are related to CVD. They can be divided into two categories. The first category consists of risk factors that can't be modified: advancing age, genetic predisposition, gender, ethnicity. The second category includes risk factors that can be modified and prevented through behavioral changes: tobacco smoking, unhealthy eating habits, stress, sedentary lifestyle and biomedical factors such as presence of hypertension, diabetes, cholesterol and triglyceride levels. This shows that if taking action wasn't accounted and observed there will be a huge increase in the presence of CVD in Lebanon and it will have fatal consequences on all ages in our societies. Objective: The objective of this project was to evaluate the risk factors leading to CVD and to see how healthy and unhealthy lifestyle habits affect cardiovascular health of people within Tripoli and its surrounding. Methods: The research was conducted at the Lebanese Heart Hospital in Tripoli. One hundred patients with cardiovascular disease were randomly chosen and included in the study. They were both females and males, aged more than twenty-five years. Patients aged less than eighteen years, and patients living outside Tripoli and its suburbs were excluded. A literature search was conducted in order to highlight the list of risk factors that can be a major key leading to CVD. A questionnaire asking about each of these risk factors and about the eating habits through food frequency was prepared and filled by the respondents. Excel was used for data entry, data analysis (using chi-square and hypothesis testing) and for visual data presentation through graph and tables. Results: Our results showed a different aspect of information about the healthy and non healthy habit characteristics of each patient studied compared to typical internet results. To begin, no significant difference in gender was detected ($p= 0.42$) which means that males and females in our population have equal risk of developing cardiovascular disease in contrary to the results of other studies showing that males suffer more from CVD. The age group of 55 years of age had the highest patients suffering from CVD. This shows that the older a person gets, the more prone they will be to having CVD. More than half of the patients had family history of CVD ($p=0.02$). This shows that the patients in our study relatively had a high prevalence of family members with the same heart conditions and confirm the results of other studies proving that patients having a family history of cardiovascular disease are at higher risk of developing CVD compared to those with no family history. More than half of the patients were overweight, and 19% were overweight, showing a huge relationship between overweight/ obesity and cardiovascular diseases. More than half of the patients were sedentary and unable to perform physical activity ($p=0.001$), which also relates to cardio vascular risk factors. Our data showed that smoking was not shown to be significantly related to CVD in contrast to other studies where smoking is a very crucial risk factor of cardiovascular disease leading to fat building up in the arteries . The number of CVD patients who smoked were less than half of the population, however the ones that smoked, smoked excessively betweeen one to three packets per day. A large majority, were more than half of the patients suffered from cholesterol, diabetes and hypertension. Their food intake was also not suitable for the risk they stood in. They didn't eat sufficient fruits and vegetables, as recommended. They ate a lot of fried and unhealthy foods, with a high intake of butter and margerine as well as fries. Their fish intake was also insuffient yet their poultry consumption was moderately consumed as skinless. They didn't eat much meat or carbohydrates, however they ate too much white bread rather than going for whole meal breads and carbohydrates. Most of the patients didn't have a healthy diet and had lack of knowledge about the right eating habits. Conclusion: The results of this project showed that patients had accumulating factors that had caused cardiovascular diseases throughout their lifetime which was due to the high percentage of patients that smoke, are stressed, eat unhealthy, have cholesterol, diabetes, hypertension and live a sedentary life style. These health issues need to be further explored all within Lebanon and the Middle East and intervention must take place in order to decrease the immense number of people living with CVD risk factors and CVD itself.

Heme Oxygenase 1 Plays a Role in the Pathophysiology of ß-Thalassemia

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Thalassemias are a heterogeneous group of red blood cell disorders ranging from a clinically severe phenotype requiring life-saving transfusions (thalassemia major) to a relatively moderate symptomatic disorder, sometimes requiring transfusions (thalassemia intermedia). Thalassemia minor, the least severe

form of the disorder, is characterized by minimal to mild symptoms. While thalassemia minor and intermedia are vastly more prevalent than thalassemia major, the latter is often fatal when not treated. Though considered a major cause of morbidity and mortality worldwide, there is still no universally available cure for this severe form of thalassemia. A reason for this is at least in part due to the lack of full understanding of pathophsyiology of thalassemia. The underlying cause of pathology in thalassemia is the premature apoptotic destruction of erythroblasts causing ineffective erythropoeisis. Normally, the assembly of adult hemoglobin (consisting of a tetramer of two a- and two ß-globin chains) features a very tight coordination of a- and ß-globin chain synthesis. However, in ß-thalassemia, ß-globin synthesis is decelerated causing a-globin accumulation; while in a-thalassemia the opposite scenario occurs. Unpaired globin chains that accumulate in thalassemic erythroblasts are bound to heme. In addition, in ß-thalassemia an erythroid specific protease destroys excess a-globin chains, likely leading to the generation of a pool of "free" heme in erythroblasts. "Free" heme is toxic, but this toxicity will likely be augmented, if heme oxygenase 1 (HO-1) can release iron from heme. To date, virtually no information about the expression of HO-1 in erythroblasts has been produced; however, we have recently provided unequivocal evidence that this enzyme is present in several model erythroid cells1. Based on this novel and important finding, we hypothesize that in ß-thalassemic erythroblasts HO-1 mediated release of iron from heme is the major culprit responsible for cellular damage. To test this hypothesis we exploited the mouse model of ß-thalassemia, th3/th3. Thus far, our data indicates that HO-1 expression is increased in liver, spleen and kidney of ß-thalassemic mice compared to wild type mice. Importantly, we observed that Epo-mediated erythroid differentiation of fetal liver (FL) cells isolated from ß-thalassemic fetuses, display increased levels of HO-1 as well asdecreased phosphorylated eiF2-a. These results indicate that ß-thalassemic erythroblasts have inappropriately high levels of unbound heme that is continuously degraded by HO-1. Further research is needed to determine whether HO-1 liberated iron is responsible for the damage of ß-thalassemic erythroblasts. 1Garcia Santos D, Schranzhofer M, Bogo Chies JA, Ponka P. Heme Oxygenase 1 plays an unexpected role during erythroid differentiation. Blood 123 (14): 2269-77, 2014.

Evaluation of microbial contamination in Lebanese schools

Lubna Malaeb and Hoda Youssef (Beirut Arab University, Lebanon); Zakia Olama (University, Egypt)

A comparative study of indoor contamination in three private and three official schools in Lebanon-Aley was conducted during the academic year 2013-2014. Sampling was performed, in each school, from the air, desk-surfaces of classes and water taps of bathrooms. The samples were examined for microbial contamination and the colony-forming units (CFU) for each site were enumerated. Eighty morphologically different bacterial isolates were obtained, among which Gram-negative bacteria (52.5 %) were encountered slightly more than Gram-positive bacteria (47.5 %). These isolates were tested for their susceptibility to six commonly used biocides in indoor decontamination; Ajax®, Clorox®, Ethanol 70 %, Dettol®, Easy® and CAMEO®, by well diffusion test. The highest frequency of resistance amongst the eighty bacterial isolates was detected against Easy® (93.75 %), while the lowest frequency was detected against Clorox® (46.25 %). Moreover, the susceptibility of the biocides was in the order Clorox® > Dettol® > Ajax® > CAMOE® > Ethanol > Easy®. Seven bacterial isolates, which showed reduced susceptibility to three or more biocides were selected, identified and the minimum inhibitory concentration and the minimum bactericidal concentration of the six tested biocides were evaluated. Isolate 51 (E. coli) was the most less susceptible strain to biocides among the seven selected isolates, the results of the time kill assay revealed that the time needed to kill this isolate by Dettol® was 8 min., while other biocides took longer time to kill the cells. In addition, the loss of resistance of E. coli against the six biocides was recorded after plasmid curing, which proved the plasmid-mediated resistance. As a conclusion, the emergence of resistance to biocides creates a challenge to school infection control and environmental decontamination protocols and can have a serious impact on human health as well as economic consequences; therefore, the provision of knowledge on hygienic methods followed by their continued use at the schools, is essential.

Roles of RhoA, RhoC and RhoG in secretion of VEGF by astrocytoma cells and Angiogenesis in Vascular Endothelial Cells

Amira Fakih and Mirvat El-Sibai El-Sibai (Lebanese American University, Lebanon)

Astrocytoma is the major malignant intracranial neoplasm and highly characterized by neovascularization. Angiogenesis is a complicated process in which development of microvasculature start to form requiring endothelial cells responsiveness to external signals. Several proteins modulate endothelial cell motility and morphology in angiogenesis. Rho proteins are key regulators of angiogenesis modulating a diversity of cellular processes including vascular permeability, extracellular matrix remodeling, migration, proliferation, morphogenesis and survival. The activity of RhoGTPases family can be modulated in response to growth factor stimuli such as vascular epidermal growth factor (VEGF) and platelet derived growth factor (PDGF). This project studies the roles of RhoGTPases specifically RhoA, RhoC and RhoG in SF-268 astrocytoma cell secretion of VEGF and the resulting angiogenesis in ECV vascular endothelial cells. We aim to dissect the pathway leading to VEGF secretion in SF-268 cells, including the roles of PI3K and other regulators of RhoGTPases. When we inhibited or knocked down these various proteins (RhoA, RhoC, Rac1, Cdc42, ROCK1 and ROCK2) we saw an effect on VEGF secretion as well as MMP-2 and MMP-9 in astrocytoma cells. In addition we knocked down several proteins and saw their effect on angiogenesis in ECV cells through capillary sprouting assay. The complex three dimensional networks of new blood vessel formation will be studied by co-culturing SF-268 and ECV cells, followed by a series of protein knockdowns and growth factors stimulation then capillary sprout formation assay. In conclusion,

this study will elucidate the cross-talk between astrocytoma cells and vascular endothelial cells and the pathways responsible for angiogenesis formation.

Antimicrobial activity of Clove oil and Malvae palviflora against dental caries causing microorganisms

Sana Hadid and Mohammad H. El-Dakdouki (Beirut Arab University, Lebanon); Roula S. Abiad (Faculty of Dentistry, Beirut Arab University, Lebanon)

Background: Dental caries is a widely spread and prevalent disease. Dental caries cause serious problems in the oral cavity and elicit inflammations especially if left untreated. It is associated with various pathogenic microorganisms, including Streptococcus mutans, Candida albicans. Streptococcus mutans is the principle etiological agent of dental caries because they can produce high levels of dental caries-causing lactic acid and extracellular polysaccharide. Candida albicans is a causative organism for candidiasis. Bacterial plaque or biofilm formation is caused by lactic bacteria such as Lactobacillus fermentum and Staphylococcus aureus. Lactobacillus fermentum is associated with the progression of the lesion of dental caries, tooth enamel breakdown, and potential discoloration of the tooth surface. Dental plaque is known to be the primary cause of dental caries and other oral infections. It exists not only on the tooth surface but also under the gums. It can be defined as a diverse community of microorganisms in the form of a biofilm where the microorganisms bind tightly to one another in addition to the solid tooth surface, by means of an extracellular matrix consisting of polymers of both host and microbial origin. Aim: The main goal of this study is to evaluate the antimicrobial efficacy of extracts of two plants, namely Syzygium aromaticum and Malvae parviflora, against dental caries causing microorganisms. In addition, the ability of these extracts to prevent the formation of biofilms will be evaluated. Materials and methods: Ethanolic and aqueous extracts of Syzygium aromaticum and Malvae parviflora, in addition to the extraction of eugenol from Syzygium aromaticum were prepared. Agar well diffusion method was used to screen the antimicrobial effect for each plant extract against S. mutans, C. albicans, S. aeurus and L. fermentum. Minimal inhibitory concentration (MIC), minimal bactericidal concentration (MBC), and minimum fungicidal concentration (MFC) for each effective extract were determined by using the serial broth dilution method against tested microorganisms. The ability of the extract to exert lethal effect on microbial growth as a function of time was evaluated by generating time-kill curves. In addition, the potential of each plant extract on preventing biofilm formation was assessed. Results: Clove oil (eugenol), ethanolic extracts of Syzygium aromaticum, and ethanolic extract of the stem of Malvae parviflora exhibited the strongest antimicrobial effect against tested microorganisms, with inhibition zone diameters ranging from 15 mm to 40 mm. The MIC, the MBC of all active extracts were determined against tested microorganisms. The majority of extracts displayed an MIC index (MIC/MBC or MIC/MFC) equals to 1 indicating that the extracts demonstrated direct bactericidal and fungicidal effects. L. fermentum and S. mutans was found to be the most potent in biofilm formation. Most extracts were able to disrupt biofilm formation with eugenol being the most effective. Conclusion: Not only the extracts of Clove oil and Malvae palviflora demonstrated significant antimicrobial activity against normal and pathogenic dental caries-causing microorganisms, but also prevented biofilm formation. The promising data reported in this study sets the basis for advanced studies to evaluate the efficacy of these "safe" extracts in humans.

Evaluating the Antibacterial Effects of Different Parts of Rubus hedycarpus Against Drug Resistant Bacterial Strains

Omar Assafiri, Ghada Khawaja and Mohammad H. El-Dakdouki (Beirut Arab University, Lebanon)

Background: Given the continuous emergence of virulent multidrug resistant (MDR) strains of microorganisms, the scientific world has turned attention into identifying new sources for antimicrobial compounds. Medicinal plants, being the compelling wellsprings of both conventional and current pharmaceuticals, constitute an important source for protective, preventive, and curative medicine. It had been reported that Rubus family has numerous diverse medicinal utilizations. For example, the matured Greeks and Romans used Rubus for hindering stomachaches and stopping richness fluxes of common fluids. The Indians used the leaves and bark of genus Rubus to treat astringent diuretic activity. The Chinese used raspberry (Rubus) to prevent impotence, reduce sore lower back, improve seeing or indistinct vision, and prevent uterine, cervical, and colon cancer. In Australia, local people used raspberry leaves as an accepted drug for curing the diarrhea. Rubus hedycarpus is widespread across Lebanon at different altitudes. To the best of our knowledge, no studies have been reported describing the antimicrobial effects of the different parts of the plant. Aim of the study: The goal of this study is to evaluate the antibacterial efficacy of methanolic and aqueous extracts of different parts of Rubus hedycarpus against two Gram -positive (Streptococcus pneumonia and Staphylococcus aureus) and two Gram-negative bacteria (E. coli and Klebsiella pneumonia). The plants were collected from different altitudes (sea level, 480 m, and 1426 m) to investigate the effect of the climate on the bioactive constituents of the plants. Materials and Methods: Rubus hedycarpus plants were collected from three different altitudes in northern Lebanon, namely Tripoli (sea level), Bayno Akkar (480 m), and Kammouaa (1426 m). Leaves and stems from each plant were separated, dried, grinded, and extracted by methanol or distilled water under reflux conditions. After cooling to room temperature, the mixture was filtered, and the filtrate was concentrated on a Rotary Evaporator apparatus under reduced pressure. In addition, the juice extract was collected from the fruit of the plants by squeezing and concentration under vacuum. The resistance of the test microorganisms to various commercial antibiotics was assessed using the disc diffusion method. Sterile disks soaked with the antibiotic were placed on the agar seeded with the bacterial microorganism. Following incubation for 24 h at a temperature of 37ºC, the plates were examined and the diameters of the inhibition zones were measured to the

nearest millimeter. The antimicrobial activity of the plant extracts was screened using the well diffusion assay. In brief, the test extracts were placed in wells created in agar freshly seeded with the bacterial microorganism, and allowed to diffuse. The plates were then incubated at 37oC for 24 h after which the diameters of the inhibition zones were measured to the nearest millimeter. Plant extracts that showed significant antibacterial activity were chosen for further assessment. The potency of the active extracts was assessed by measuring minimal inhibitory concentration (MIC) using the broth dilution method, determining minimal bactericidal concentration (MBC), and calculating the MIC index (MIC/MBC) to confirm any direct bactericidal effect. In addition, time-kill curves were generated to determine the time needed to exert lethal effect on the microorganisms. Finally, the bactericidal capabilities of the extracts were demonstrated by collecting TEM images of the microorganisms treated by the extracts at the corresponding MIC. Results: The plants extracts showed various antibacterial activity against the test microorganisms. While all extracts (stems, leaves, and juice) demonstrated superb antibacterial activity against staphylococcus aureus, only the juice extract was active against E.coli. No antibacterial effect was obtained when all extracts were tested against Klebsiella pneumonia and Streptococcus pneumonia. In addition, no difference in the biological outcome was observed for plants collected from different altitudes. The potency of the bioactive extracts was assessed by measuring minimal inhibitory concentration (MIC) and the minimal bactericidal concentration (MBC). MIC index (MIC/MBC) equals to 1 was determined for all bioactive extracts indicating that the extracts exerted direct bactericidal effect against staphylococcus aureus and E. coli. Data collected from time-kill curves indicated that the active extracts needed 11-20 h to induce 100% killing of the microorganisms at the respective MIC. The bactericidal capabilities of the extracts were further confirmed by collecting TEM images of the microorganisms treated by the active extracts at the corresponding MIC. These images revealed irreversible cell wall damage, leakage of cytoplasm, vacuolization, and the presence of cellular debris. Conclusion: This promising data suggests that Rubus hedercarpus represents a viable source of bioactive molecules to combat multidrug resistant pathogens, and calls for more studies to decipher the chemical structure and mechanism of action of the active ingredients.

Characterization and genotoxicity of airborne particles in Northern Lebanon

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Air pollution particulate matter (PM) is a mixture of chemical and biological elements that is a complex toxicological concern. This toxicity occurs primarily by fine and ultrafine particles due to their physical and chemical characteristics. Northern Lebanon is affected by several sources of pollution: cement factories and quarries, industrial synthesis of phosphate fertilizer, transport section, and human activities. However, knowledge about air pollutants and their impact on health remains very patchy in the region, and physiological mechanisms showing the carcinogenicity of PM remains unclear. The aim of this project is to study genotoxicity mechanisms involved in the carcinogenicity of fine (PM2.5-0.3) and ultrafine (PM0.3) particles collected in North Lebanon. After sampling of atmospheric particles, physicochemical analyses were performed and several parameters were studied in order to identify potential biomarkers of exposure to atmospheric particulate matter and effects associated with early events in carcinogenesis (cytotoxic, genotoxic and epigenetic effects). Samples were collected on two sites, either under industrial influence (Zakroun) or in a regional background site (Kaftoun). Sampling of particles was done using a high volume air sampler Staplex type QIFT model (68m3/h) and a Staplex® Model 235 cascade impactor type. The inorganic composition of the sampled particles was determined by both Inductively Coupled Plasma-Mass Spectrometry (ICP MS) and Atomic Emission Spectroscopy (ICP-AES). The genotoxic potential of the samples was assessed by performing Ames test, a reverse mutation assay for the bacterial mutagenicity done on Salmonella typhimurium TA98, and the SOS chromotest, a quantitative bacterial colorimetric assay for DNA damage measurement on Escherichia coli. The ICP-AES showed the presence of metallic markers of combustion such as nickel and vanadium. This analysis also confirmed that particles contained tracers of transport and industrial sectors such as calcium, copper, zinc, sulfur, chromium and lead. Using the Ames test, the industrial sample showed a mutagenic activity while the background sample didn't show any mutagenicity. Mutagenicity Ratios (MR) were calculated and significance was evaluated by Chi-squared analysis. The industrial sample showed a significant mutagenicity starting at a dose of 100µg/well with a MR equal to 8. A dose-dependent effect was shown between the concentration of the tested samples and the mutagenicity ratio calculated for each sample. The SOS chromotest showed the high genotoxicity of the industrial sample with a high induction factor (IF), while it confirmed the non-genotoxicity of the background sample. A sample was considered as genotoxic or SOS repair inducer if its IF is equal or higher than 1.5. The industrial sample (at different concentrations ranging from 1 µg/mL to 2000 µg/mL) showed a high genotoxicity with an IF between 1.5 and 3.8.

Effect of Methotrexate and Carboplatin on Plasma Membrane Phospholipid Content and Motility of MCF7 Cells

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We examine in this study the effect of two antitumor drugs Metothrexate (MTX) and Carboplatin (CPt) on the phospholipid content of plasma membrane of breast cancer cell MCF7. MTX is a folate analog that inhibit dihydrofolate reductase. CPt is a platinum-containing antineoplastic drug that is an analog of cisplatin. It binds with DNA to form intrastrand crosslinks and adducts that cause changes in the conformation of the DNA and affect DNA replication. IC50 for both of these drugs were determined. Proteins concentration and extracted plasma membrane lipids were quantified from control and treated cells. Effect of the two drugs on cell motility was determined. MTX induced 50% cell death at a range of concentration from 50 to 100 ?M. No further decrease in viability was seen above this concentration even at 1 mM. Cpt induced 50% cell death at 5 ?M. It also showed a range concentration that gives a 50% cell death after 24 hrs of incubation. The plasma phospholipid content of MCF7 were extracted using Blye and Dyer, seperated by HPLC using a C18 reverse-phase column, and compared in presence and absence of the two drugs. The ability of the two drug to affect cell movement was studied using a motility assay. Images of cells moving were collected over a period of 2 hours. Our results show that both drugs decreased the amount of phospholipids and lead to doubling in the protein concentration in the plasma membrane. After membrane lipids separation, comparison of carboplatin treated and control cells showed no change in their separation patterns. However, methotrexate showed a single change in the lipid eluted at 4.36 min. Cell motility decreased 13.3% and 17.4% with carboplatin and methotrexate respectively.

Chemical composition and antimicrobial activity of leaves, stems and fruits of Lebanese Laurus nobilis

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Laurus nobilis belonging to the Lauraceae family is an aromatic plant native to the Mediterranean region. It is a symbol of peace and immortality, hence the origin of the laurel wreath. In Lebanon, it can be found along the coast as well as in the mountains. Its leaves, traditionally known for having digestive and antiseptic properties, are used mainly in cooking, especially to flavour poultry and meat. In this study, the essential oils (EOs) of leaves, stems and fruits of Laurus nobilis from Lebanon were chemically characterized and tested against several microorganisms in order to evaluate their antimicrobial activity. Materials and Methods: The essential oils were isolated from the aerial parts by hydrodistillation using a Clevenger-type apparatus according to the European Pharmacopoeia. They were analyzed by GC and GC/MS and their minimal inhibitory concentrations (MICs) were determined against a Gram-positive and a Gram-negative bacterium, a yeast, and five dermatophytes. Results and discussion: The EOs of leaves and stems had eucalyptol as the most abundant compound with relative proportions of 32.4% and 20.2% respectively, while trans-?-ocimene (17.26%) was the major component of the fruits EO. Leaves and stems EOs had in common equal proportions of linalool (13.3%) and terpinen-4-ol (17.7%) and slightly different proportions of ?-terpinyl acetate (13 and 11% respectively) and methyl eugenol (12 and 14% respectively). ?-Pinene was equally abundant in both leaves and fruits EOs (4%). Spathulenol (4%) and ?-elemene (10.4%) were present in stems and fruits EOs, respectively. Pseudomonas aeruginosa and Staphylococcus aureus were resistant to the three EOs (MICs > 512 µg/ml), while all of them showed significant activity against the tested dermatophytes. The fruits EO was the most potent with MICs of 64 (Trichophyton rubrum), 64 (T. mentagrophytes), 32 (T. Soudanense), 16 (T. violaceum) and 32 (T. tonsurans) µg/ml. Stems and fruits EOs had moderate activity against Candida albicans (MIC = 512 µg/ml). Conclusions: Laurus nobilis EOs exhibited interesting antifungal potential. However further investigations are needed to elucidate the origin of activity and understand why the fruits EO was the most active.

P2_EDU: Poster Session 2- Education

Room: USJ Hall CSH

Chairs: Nizar Hariri (Saint Joseph University & Association Libanaise Pour l'Economie Sociale, Lebanon), Marie Therese Saliba (Lebanese University, Lebanon)

La formation continue à l'usage des TIC des enseignants de français au Liban

Ghina El Abboud (Univrsity of Limoges, France)

cette communication est issue de mes recherches qui portent sur l'intégration des TIC dans les pratiques professionnelles des enseignants de français. afin de mener ce travail, je me suis basée sur un cadre théorique multidisciplinaire, j'ai mené un travail de terrain en adoptant une méthode de recherche mixte.

"Governance and Business Models in the Higher Education Ecosystem: A Theoretical Presentation"

Jocelyne Jreij (University of Balamand & Balamand Secondary School, Lebanon); Antoine Melki (University of Balamand, Lebanon)

This is a literature review on the concepts of governance, business model, their connection and their effect on the university as a higher education ecosystem. The paper starts by a review of the prevalent definitions for governance as a general concept being originated in corporate context differentiating, in specific, between the European model and the USA/UK model as expressed in up-to-date literature. A general definition is deduced. Also the definition of business model is visited to highlight the concept and list the main components and characteristics. The focus is on the university as a higher education ecosystem: The major governance models in higher education institutions are outlined as ideal types and the way they are found in reality. Also an overview of a business model approach in higher education institutions is presented. The paper concludes by an analysis to answer the following questions: What comes first, the business model or the governance strategy? How can high education institutions incorporate governance and business model? Does a harmonization between business model and governance always lead to a better administration in higher education institutions?

Lebanese Guidelines for Early Childhood Care

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Over the past few years, child care has gained increasing attention in the field of research, since it represents a key factor in shaping our society. In particular, children's safety and protection (in all their forms) play an important role in their development on many different levels, especially those related to health, hygiene and security. It is worth noting that safety, as referred to earlier, entails more than just a safe environment and setting; it extends to the constant supervision and awareness of the caregivers, as well as the existence of clear standards, procedures and guidelines to be followed by these caregivers. They ought to be provided with the necessary knowledge, in order for them to acquire the skills that would enable them to know what to do in case of an emergency and to know how to reach the parents when necessary. For this end, existing and future local licensing standards, developed and stipulated by the Ministry of Health, must be followed and respected by all nurseries across the country. In the following, we present the work performed in the context of a project technically supervised by the Mother and Child Unit (MCU) at the Ministry of Public Health (MoPH) with the technical support of Beyond Association and funded by the MoSAIC Program (which is itself funded by the Italian Development Cooperation and is implemented by the Lebanese Ministry for Social Affairs); this project, reinforced by a panel of domain experts, is mainly aimed at developing guidelines for early childcare institutions in Lebanon that assure child safety, care and protection, promoting the health and safety minimum standards in nurseries, all the while providing the necessary protection for both nursery personnel and children. Hereafter, the article depicts the various phases of the aforementioned project, namely the literature review conduct, the studies and assessment performed during the analysis period, along with the results and the conclusions eventually deduced. During the first phase, the idea behind the project, its background and the literature review that was carried out were all presented to the Task Force meeting of the MoSAIC program. International guidelines from several countries (Canada, United States of America, United Kingdom, etc…) were studied and scrutinized, then comparatively analyzed as a reference for the local guidelines devised. As a second phase, 235 MoPH Nurseries were taken as a sample, along with 23 randomly selected MoSA (Ministry of Social Affairs) Nurseries. The nurseries that were responsive were checked against a list of criteria and scored accordingly. Furthermore, a qualitative analysis was performed, where 15 Nurseries were randomly selected from five areas: Mount Lebanon, Beirut, North, South and Bekaa (3 Nurseries/ area); and 96 mothers joined the discussions held. Based on the results of both the quantitative and qualitative analyses, the national guideline toolkit was developed. Those results along with toolkit and the analyses will all be presented in details in the article at hand.

The Effect of Classroom Environment on Scientific Student Learning

Lina Alameh (Modern University for Business and Science, Lebanon)

The nature of the Classroom Learning Environment and psycho-social interactions can make a difference in how the students learn and achieve their goals. If the student feels uncomfortable of the classroom conditions, then they will have less concentration on the lesson and so they get a little information only, from the teacher, and thus, affecting their grades especially when they are studying scientific courses. Students succeed in environments where they feel safe, nurtured and respected. All students, even those who have learning difficulties and extraordinary personal challenges can do well when they are physically comfortable, mentally motivated and emotionally supported. Teachers want to achieve a comfortable class room environment in order to facilitate the explaining and helping students to understand directly. Teaching is often perceived as an easy job, one of high insignificance because it seems to be nothing more than the passing of information from a text to a group of people, usually youngsters. Simple by definition as that, teaching in reality is one of the most difficult functions, very demanding in nature, and one that requires a lot of skills and a high degree of proficiency in various disciplines such as leadership, management, psychology, sociology, in addition of course, to communication and the mastery of the curriculum in order to create a good classroom environment(Ann Arbor Public Schools, 2004) and especially when it is involved with scientific studies where the material is intangible. Classroom management, the major challenge any teacher will face, is a process of managing the teacher's resources, the class resources, the human relations in the class and at the same time, achieving the desired level

of performance and productivity(Hannah, 2013). Traditionally, teachers enjoyed a lot of power in their classrooms. This was the product of the old authoritarian system in which teachers operated. Such an environment, although highly disciplined, was often the cause which led many students to drop out of school, or as in most cases, prevented students from assimilating information in a productive manner. The traditional or classical model defines several functions for the teacher as a classroom manager. These functions exist in several layers, relating to the physical environment, the emotional environment, planning and scheduling, and finally keeping records(Allen and Valette, 1977). On the scientific level, one of the tasks every teacher had to involve in was to manage the physical attributes of his or her classroom. Elements such as the bulletin boards, the blackboard, the seating of students, and other physical elements of the classroom had to be managed in an efficient way such that they would be available to the teacher whenever needed, and their availability will be practical and will not lead to the wasting of time(Adelman and Taylor, 1997). At the emotional level, teachers were supposed to create and sustain a certain emotional atmosphere which would facilitate the learning process among students. Accordingly, the teacher was expected to release the emotional tension in the classroom, to assert him- or herself in order to create confidence in the teacher as a leader, and to prevent any kind of obstruction or interruption that would have a negative impact on the classroom management. Teachers were also supposed to clearly pinpoint their expectations so that students would be stimulated in order to meet these expectations and not fall behind. Traditional teachers, as classroom managers, were also responsible for setting the tempo or pace of the classroom so as to make sure that the curriculum's objectives would be achieved on time. Planning and scheduling, typical functions of any manager, were also among the functions that teachers had to maintain and conduct in the course of managing their classrooms. Both functions were carried by the teacher with support from the subject coordinator. The aim of planning and scheduling was to maintain the teacher's preparedness so as to prevent the loss of time and to maintain an effective educational and managerial function inside the classroom. Finally, among the significant managerial functions which the teacher conducted in his or her classroom was the keeping and maintenance of student records. This function did not only assert the teachers authority, but it also helped create data on the attendance, performance, and development of the students, to be used by the teacher and the administration. According to Wilen et al.,(2004), part of building a supportive climate for learning involves teachers sharing their expectations concerning learning of content, achievement, and social behavior with their students. Educational research supports creating an atmosphere of mutual respect and support in the classroom, where students feel safe in expressing concerns or asking questions, and where tolerance and a sense of common identity and community are promoted(Eick, Meadows, and Balkcom, 2005). The goal of using groups was to encourage students to help and rely on one another to complete a scientific experiement, and to learn to work with people who may be different from them. Beyond promoting tolerance and respect, the teacher also wanted to create a classroom environment that enhanced social relationships, student motivation, and engagement in productive work. According to Perkins(1993), "Thinking routines act as a major enculturation force by communicating expectations for thinking as well as providing students the tools they need to engage in that thinking. Thinking routines help students answer the questions they have: How are ideas discussed and explored within this class? How are ideas, thinking, and learning managed and documented here? How do we find out new things and come to know in this class?"

The Impact of Game Assessment on Enhancing Scientific Student's Performance

Lobna Bou Diab (Modern University of Business and Science, Lebanon)

The purpose of this research is to examine the importance of game-assessment and its positive effect on the learning process and the deep understanding of students in scientific studies. The reason of choosing this kind of assessment is to prove its value and encourage using it in each and every school and especially in scientific courses. Teachers, students, parents and administrators have diverse thoughts concerning assessment strategies(Dietel, Herman, and Knuth, 1991). There are two ways to collect data about student learning; either by using the authentic assessment or the traditional one. Students develop creativity, critical thinking and problem solving abilities when teachers emphasize on their interests and needs using real life activities and various teaching strategies. There are various types of learners(visual, auditory, and kinesthetic learners) that teachers should consider and cater their needs when planning and assessing. As a result, traditional assessment(which is generally called testing) should be transformed to authentic assessment for better learning progress/process(Dietel, Herman, and Knuth, 1991) and especially in scientific studies where using creative assessment technologies can make the student understand more. Due to the negative influence of the traditional assessment on curriculum and instruction, a variety of researchers and scholars have studied the disadvantages of it and ways to overcome them using authentic assessment. One example of authentic assessments is game-assessment in which students play a game and have fun without even knowing that they are being evaluated. Game-assessment has many advantages that facilitate grading and evaluating students' performance for teachers, parents and students in addition to some limitations. So is it worth to change? Scientific student learning was only examined by testing in traditional schools(Dikli, 2003). Previously, teachers used tests, which are strict and standardized, to measure students' points of strengths, points of improvements, and how much they have learned.(Edutopia Team, 2008; Baillie, ND) Then communities depended on the total number of points earned by students in those tests to evaluate the worth of their academic achievements.(Edutopia Team, 2008). According to Bailey(1998), traditional assessments are indirect and inauthentic. It may be helpful or essential in cases of national standards. Bers and Mittle(1994) enclose diverse styles of questions(MCQ, fill-ins, matching, essays, and sentence completions, etc.) that can be adopted and implemented quickly(Bers & Mittler, 1994). Traditional assessment is the most common way because it provides valuable information about the students learning but it is not the only method or the excellent technique to assess students. There are several disadvantages of traditional assessment since it's not applicable nowadays due to the demands

of 21st century that is having critical thinkers, problem solvers, decision makers, and inquiry lifelong learners. The Literacy and Numeracy Secretariat(2010) believe that such assessment is unsuccessful in considering students' progress which in return will decrease the levels of their improvement(Franklin, 2002). That means, tests border what can be measured; teachers assess what students do and not what they can do.(Bers & Mittler, 1994; Franklin, 2002). Law and Eckes(1995) indicated that most standardized tests evaluate only the lower-order thinking skills of the students. Likewise, Smaldino et al.(2000) declared that traditional assessment highlighted on student's capacity of memorization and remembering. They can't easily evaluate students' critical thinking skills, problem solving skills, and other capabilities.(Franklin, 2002). In the multiple-choice questions, specifically, there is a degree of guessing that of course lowers the validity of testing.(Bers & Mittler, 1994). Bailey(1998) also stated that in this kind of assessment there is no feedback given to students. Furthermore, it is only used as a summative evaluation not as a formative one; schools may even teach just for the exam. Bers and Mittler,(1994) and Law and Eckes(1995) emphasized on the same problem and declared that traditional assessment is single-occasion tests; that is, they assess what students can do at a specific time. What is more, tests are set to large groups of students thus they are not personalized and cannot be modified to meet the needs of every student(multiple intelligences, different learning styles, etc.)(Bers & Mittler, 1994). Alternative assessments, such as authentic ones, aim to relate assessment to the real-world experience of the learners. The task needs to be meaningful in order to be authentic. Simonson et al.(2000) and Winking(1997) also points out that alternative assessments require higher order thinking skills so that students can work out real-life related problems. In addition to that, the connotation of "knowing" has changed from recalling and repeating information to finding it, evaluating it and using it at the right time and in the right situations(Institute by play, 2015). Education, in the beginning of the 20th century, highlights on the achievement of critical skills and data(reading, writing, calculation...). Many experts think that success in the 21st century relies on education that cares for higher-order skills(ability to think, solve complex problems or interact critically through language and media)(Institute by play, 2015). Skills such as problem solving, communication, collaboration, and creativity, as well as personal attributes are very significant and have been marked as "21st century skills".(Casner-Lotto & Barrington, 2006; Fadel, 2011). These skills aren't considered in high-stakes tests; however, they are essential since companies are searching for staffs that have those skills and the capability to work in teams with coworkers(Edutopia Team, 2008). Thus, there is a necessity to reconsider the methods used to assess students' performance to make sure that they will graduate with qualification to meet the demands of the 21st century workplace. Alternative assessment methods suggest innovative ways of communicating what values most about superior education; they can encourage and inspire students to discover themselves and the world around them.(Lombardi, 2008). Nowadays, there is a rising interest in and examination of the utilization of games to evaluate 21st century skills(Shaffer et al., 2009; Shute, 2011). Research suggests that assessment forms students' perceptions of learning in advanced education(Ramsden, 1992) and that students have to identify assessment methods in order to be effective learners(Elwood & Klenowski, 2002). Students need to identify the methods to assist improvement and development leaded by unambiguous, realistic, and precise feedback; in addition to knowing the standards by which they will be judged. Without worth feedback on past performance, there are no roots to correct misconceptions or develop understanding(Lombardi, 2008). One goal of assessment is to find out whether educational programs are adding to students' intellectual development and interest in the subject matter or not.(Palomba & Banta, 1999) Piaget(1965) claimed that the method in playing games could make children recognize the surrounding they exist in and build their global imagination. Based on this point of view, many started to appreciate that people could reach individual growth and successful learning during game playing. Smilansky(1968) and Kafai(1996) also argued that games could assist students to build their personal thoughts and knowledge while achieving objectives. They are proposed to create complex problem that players know through independent sighting. They are intended to carry just-in-time learning and to use information to help players understand how they are performing, what they want to work on and where to go next.(Institute by play, 2015). Goddard et al.(2001) argued that games provide compound settings in which content, skills and attitudes have a vital function during playing. It provides ongoing practice through which students may get better accuracy and better recalling.(Driskell et al., 1992; Brophy & Good, 1986). Squire(2002) declared that games had educational potential from both cognitive and social positions. Games sustain, emphasize and speed up the learning process, and maintain higher-order cognitive growth.(Green & Bavelier, 2003; Klabbers, 2003). Coyne(2003) claimed that students collect data needed, apply it and engage in the learning process. Walliser(1998) said that games stimulated critical thinking, information gathering and sharing and collective problem solving. Mutual trust and communication skills had effects on the interactions(Stanulis & Russell 2000). When a student(or an adult for that matter) plays a game, he/she exercises his/her mind by putting himself/herself into a simulation of real-life situations. When a game is played, real-life-like decisions are made, solutions analyzed and problems solved(Denis & Jouvelot 2005). Students can experience learning by doing. But the main reasons for this increasing interest are the average success, the motivation of players and their deep engagement while playing(Hlodan 2008). Games have the power of engaging people in fun ways, providing interaction, offering opportunities for problem solving, and other essentials that gave the users structure and motivation while promoting involvement and creativity(Journal of Educational Technology, 2007). Many studies focused on presenting the advantages of using or better adopting game-based learning for supporting motivation in learning and for improving skills and competences(Dondi & Moretti, 2007). Games are vital when used as an assessment tool for various reasons. First, they permit students to experience real-life situations and assess the application of knowledge and skills. Second, games are attracting and inspiring which makes them more valid(Schmit & Ryan, 1992; Sundre & Wise, 2003). This type of assessment sheds lights on the growth and performance of the student. That is to say, if a learner was unsuccessful in performing a given task at a particular time, he/she still has the chance to express his/her ability at a different time and different situation(Dikli, 2003). Since alternative

assessment is developed in situations and over time, the teacher has an opportunity to measure the strengths and weaknesses of students in a variety of areas and circumstances(Law and Eckes, 1995). This means looking at the student's results rather than grades can allow instructors to get further insights regarding students' knowledge and skills (Niguidila, 1993). Authentic assessments let learners communicate their knowledge of the material in their own way using various intelligences.(Brualdi, 1996). Reeves(2000) believed that the importance of performance assessment is the capability of students in relating his/her knowledge and skills to real life simulations. Interested students will do faster and learn more in educational settings. Additionally, past studies stated that playing games improve intellectual and cognitive development unlike the traditional settings.(Pange, 2003; Perry & Ballou, 1997)

Communicative Approach: A Helpful Tool in Terminological Research Projects

Stephany Saad (Université Saint-Esprit de Kaslik, Lebanon)

A review of the literature has always been an essential part of every academic research project because it is a careful examination of the body of literature pointing toward the answer to the research question. The communicative approach addresses language specialists, terminologists and all those who are interested in any aspect of Terminology. It covers carefully the relation between linguistics, communication studies, documentation, methodology, especially with regard to specialized language, etc. It is designed for people specialized in the fields of terminology standardization or communication, technical writer, translators and terminologists. It is the outcome of teamwork between experienced experts at the Translation Bureau and other organizations. This tutorial offers the basic principles of terminology research and includes a glossary of the terms used in terminology, a wide bibliography and a list of essential related websites. With the communicative approach, many points can be studied starting with terminology and specialized communication in order to get a closer look at the special languages and the differences between general language and special language as well as the variation in special languages. For instance, we might be able to answer the following question: Is "sports terminology" a special language? In this axes the role of terminology in special language texts and documents can be found out. Communicative approach tackles terms as systematic units, in which we have the designation, concepts, the term-concept relationship and function; thus, linguists can be able to search for relevant terms and relate them to their concepts and cancel other terms who are not related to the main concept, create new designation that are more accurate to the concept. The communicative approach helps study the materials used in terminology such as references materials and specific materials for terminographic work as well as the support materials and the working methods in addition to the systematic searches all of which are helpful in finalizing every terminological job when forming a specific glossary of designated terms. Different segments of the communicative terminology can be used fruitfully in every research project in order to decide whether a specific field of terminology can be defined as a special language; know the difference between general language and special language(thus the importance of special language); analyze the related terms and expressions extracted; use the working methods fruitfully in the thesis to get the result(a specified lexicon). In addition to the above mentioned, abiding by the communicative approach will help the researcher study the term extraction and terminology extraction tools which are a major part in a terminological thesis; so the candidate will be able to examine term research vs vocabulary research and have an overview at the knowledge organization and subject-field classification as well as extraction of knowledge from specialized sources. This pivots is the basis of the thesis because it allows us to extract all related terms from different articles and texts. Moving to the selection and evaluation of documentation is a crucial step in which the researcher will study concepts and concept relationship as well as term creation and terminological relationship, the methodology for creating terminology record, how to find and compile terms, how to create records and corpus search tools and terminology standards. With these tools we can document our work and create specific records for the glossary. Therefore, communicative approach can be an easy access to the keys of terminology. Accordingly candidates will be able to: - Extract related terms from the corpus - Analyze the articles of the corpus - Select the terms needed and evaluate them - Create a list of terms (glossary) - Create new terms (neologism) With the communicative approach, we will have an overview of terminology in order to know what terminology is and what are its purposes and benefits along with studying the analysis of terms as well as content analysis of written information. In conclusion, the researcher's job will become easier in finding terms, compiling them, extracting others, creating some and forming a designated and specific glossary as well as having a right analysis based on communicative approach; thus a successful thesis project.

Basketball Terminology: toward a Standardization Committee

Stephany Saad (Université Saint-Esprit de Kaslik, Lebanon)

There has been widespread concern that a growing gap exists in reporting sports articles and specifically when it comes to translation. Actually, translators do not always and necessarily have the sports background allowing them to translate specific articles. Therefore, in sports, journalists tend to write themselves articles in different languages, instead of getting back to a translator, even if sometimes they have to deliver a questioned outcome from the point of view of syntax and terminology. The problem lies in reporting the same event using different terms and expressions, which raises a question mark about the accuracy of delivering sports messages and information to Arabic speakers. In fact, being a translator and basketball reporter, gave me the opportunity to have a closer look over the field; we found a lack in finding a unique basketball lexicon or a unified terminological list in Arabic to be used by journalists, reporters, commentators, translators, writers and even coaches, referees, players and fans who tend to use different terms referring to the same concept. Thus, a unified basketball glossary can help everyone that talks about basketball(either professionally or non-professionally) use accurate basketball terms. Why Basketball? Basketball is the world's second most popular team sport, with 450 million players worldwide, and fans in the USA and China rating it as favorite sport.(See www.fiba.com,

FIBA departments, FIBA Media & Marketing). In Lebanon, basketball has a huge fan base, making it the most popular sport. Actually, since the late 90's, basketball has become the number one sport in Lebanon especially after Riyadi and Sagesse(Lebanese teams) reached the final stages of the Asian Championship for clubs. Sagesse won the finals in 1998 against Liaoning from China and got to participate in the McDonald's World Championships for teams. Since then our National Team kept improving and was able to qualify to the World Championships in Indianapolis(U.S) in 2002. If we take a closer look at the whole Asian continent, basketball is the most popular in Philippines followed by Lebanon, China and Taiwan. In the Arab world basketball is not in its best days; leagues in many countries is regressing or facing problems such as in Syria due to the war, Aleppo Championship and Damascus International Championship were cancelled. In Jordan the basketball situation is not reassuring, the league and its results were miserable in 2014 and the federation couldn't settle the crisis despite the workshops and projects that were launched. FIBA banned Kuwait(in 2010) and Lebanon(in 2013) from international representation because of internal conflicts. Even Arab Clubs Championships is regressed recently and haven't been played for long time because of the political situation in the area. On the other hand, basketball in Tunisia is witnessing a great era and Tunisian fans are waiting a successful basketball season ahead. Moreover, it is important to mention Egypt and UAE qualifications to the world cup in 2014 knowing that the UAE is always hosting friendly international tournaments such as Dubai(for the 26th time) and Abu Dhabi tournaments. Furthermore, women's basketball is surprisingly gaining in popularity in KSA with public restrictions on female movement and activity and this is happening with the help of some U.S. trained coaches For these reasons, there has been an urgent need for mitigation of the problem by filling the gap and trying to form a unified list of basketball terms based on the Standardization. In English, standardization has both meanings and is the accepted term for referring to both the correction of a sociolinguistic situation and the choosing of a specific term as a reference form Standardization perspective is a must in order to argue in favor of the adoption of a standardization committee in the FLB(Fédération Libanaise de Basketball) known as the governing body for Basketball in Lebanon under a special committee. A similar standardization committee doesn't exist in the FLB; therefore, such a project can be considered as a step forward in the attempt of convincing the FLB to adopt such a committee; thus, moving the terminological sports standards forward. To that effect and from the viewpoint of standardization, we will try to establish a virtual committee designed to take care of the terminology package, updating basketball terms, keeping journalists posted with updates, managing regulations and updating media, marketing and communication departments in the FLB. The members of this committee have to work closely with similar committees in federation branches worldwide to keep record of all updated terms and expressions. FLB is surely a part of FIBA. We would like to mention that the 'Fédération Internationale de Basketball'(FIBA) is the world governing body for the sport of basketball. Having a standardization committee for Arabic terms would make the job of publishing and including the new rules easier and more effective because this committee would update the rules, terms and concepts and make sure to transmit them properly to all concerned people including translators and journalists, not only players and referees.

P2_eng1_energy_power: Poster Session 2- Engineering I

Room: USJ Hall CSH

Chairs: Aziz M. Barbar (American University of Science and Technology, Lebanon), Rony Darazi (Antonine University, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

A design of clothes dryer using the heat recovered from HVAC systems

Mohamad Ramadan (Lebanes International University, Lebanon); Mahmoud Khaled (Lebanese International University, Lebanon); Hussein Jbara and Abdel El bast (Lebanes International University, Lebanon)

As energy conservation became one of the most essential issues in the world in relation with the increase of the cost of un-renewable energy, heat recovery systems in its different types were born to provide one of the promising solutions to such kind of problem. It can be applied in many domains where heat is lost and dissipated to the environment, especially in Heating, Ventilating, and Air Conditioning HVAC which became a need in any building to maintain a suitable environment for living, tending in work or for some industrial and healthy reason. And after searching for the most underrated and unused way for heat recovery from HVAC systems, the drying room idea was born so the coefficient of performance for the refrigeration cycle increases and the rejected heat is used to decrease the time that clothes take to dry. The aim of the project is to benefit from the heat lost from the condenser of the split unit air conditioner in drying clothes without decreasing the efficiency of the air conditioner. A drying chamber will be connected to the condensing unit of the air conditioner by means of a duct, in which rejected air will flow to the drying chamber.

Selection and Classification of Heat Exchangers for Energy applications

Mohamad Ramadan (Lebanes International University, Lebanon); Mahmoud Khaled and Mostafa Gad El Rab (Lebanese International University, Lebanon); Bilal Haidar and Loris Doumanian (Lebanes International University, Lebanon)

Heat exchangers domain is very wide covering every project involved fully or partially in heat transfer or generation, heat exchangers exist in huge number types depending on the specified application required. Due to this spread, the reviews on heat exchangers are very useful. Passing through the existing art, the most common classification is classification according to construction features. In this work a procedure for selecting heat exchanger based on construction features is proposed.

Conception et commande d'un convertisseur électronique de puissance pour la génération électrique à partir de cellules photovoltaïques

Fadia Sebaaly (Saint-Joseph University, Lebanon); Hani Vahedi (Ecole de Technologie Superieure, Canada); Hadi Y. Kanaan (Saint-Joseph University, Lebanon); Nazih Moubayed (Lebanese University, Lebanon); Kamal Al-Haddad (Ecole de technologie supérieure, Canada)

L'objectif principal du travail présenté est d'améliorer la qualité de l'énergie électrique produite par un système de generation photovoltaïque pour répondre aux normes internationales exigées pour les systèmes raccordés directement au réseau. Trouver une solution optimale pour le système au niveau de la topologie (choix de l'algorithme MPPT le plus convenable, la possibilité de l'élimination ou non de l'élévateur de tension…..) ou de la commande (nouvelle commande en courant et en tension, nouvelle technique de modulation…..) est le défi majeur dans ce projet. Dans cette perspective, une commande du courant basée sur la technique par mode de glissement a été conçue pour contrôler le courant de ligne généré au réseau par le système. Des résultats de simulation et expérimentaux vérifient les bonnes performances de cette technique de commande.

A new series z-source sparse matrix converter applied to a PMSG-based wind conversion system

Catherine Nasr El-Khoury and Hadi Y. Kanaan (Saint-Joseph University, Lebanon); Imad Mougharbel (Lebanese University, Lebanon)

The objective of this paper is the study of a matrix converter topology that can be applied in a wind conversion system while meeting the improvement requirements of reduced number of semiconductor switches, increased voltage gain, and bidirectional power flow capability. The VSMC is adopted since it has 15 unidirectional power switches and can still operate in both power flow directions. The proposed converter is implemented using the series Z-source concept to increase the voltage gain. The proposed converter has been implemented numerically using the SimPower Library of Matlab/Simulink, and the obtained results show that the series Z-source VSMC presents better performances compared to conventional Z-source matrix topologies in terms of output current THD and reduced constraints. The proposed converter is then integrated and tested in a wind conversion system where the bi-directionality of power converter presents a major advantage in the overall system efficiency.

Design of a Matlab GUI to study the behavior of PV cells

Elie Sayah (Lebanese International University, Lebanon); Mahboub Bteich (LIU, Lebanon); Mohamad Arnaout (LIU & Electrical Engineer, Lebanon); Ali H Assi and Hassan Bazzi (Lebanese International University, Lebanon)

This paper considers the well-known model of a PV solar cell shown in figure 1. The model is developed using basic circuit equations including the effects of solar radiation. This effect added in real time operation simultaneously. The implementation of the model is established using MATLAB®/GUI interface. Different parameters affecting the series and shunt resistances will be investigated including the material used in the fabrication of the solar cell and the contacts with interconnections between adjacent cells and conducting the current from the cells to the load.

A new approach of Automatic detection and analysis of Body Language in real-time

Inass Ayoub Salloum, Youssef Bou Issa and Taline Boyajian (Universite Antonine, Lebanon)

Kinesics is the study of body language. It provides a base to detect and analyze all postures and gestures of a person in order to reveal his psychological probable state. The objective of our work is to study the possibilities to automatically generate the probable psychological state from detecting body postures and gestures by analyzing images in real time. Our Solution is divided into three parts: 1. Posture, gesture and movements detection 2. Automatic psychological analysis 3. Generation of the probable psychological states

Automated Building for Car Parking

Ahmad Haddad, Rabih Saj and Ahmad Al Issa (Lebanese International University, Lebanon)

The main purpose of this thesis is to design an automated building for car parking. The proposed system must be a simple design, provide maximum space and must be time efficient in order to reduce traffic and parking time for users. The idea is to combine a building structure with an automated parking system controlled by an efficient programmable device. The building will be occupied with lights and LCD displays to inform the user about the number of available places and to assist him in positioning his car. Fingerprint technology will be used for user identification during car parking or delivering. Acoustic sensors will be

used for positioning cars elevators. The proposed design concept will be implemented into a functional prototype.

Wind Energy Conversion System: Introduction of advanced technological concepts

Ali Hammoud (Lebanese International University- Beirut, Lebanon); Mohammad Mokdad and Abbass Nahle (Lebanese International University, Lebanon); Rodrigue Elias (LIU, Lebanon); Marc Anthony Mannah (Lebanese International University, Lebanon)

As a result of the increasing environmental concern, more and more electricity is generated from renewable sources. Wind power is one of the most reliable sources that allow meeting the national energy demand. The performance and efficiency of any wind energy conversion system (WECS) depends upon the characteristics and the components of its power system. This paper deals with the modeling and simulation of a typical WECS proven to be efficient through literature. Creative and advanced technological concepts are implemented on the WECS and their benefit and added value are discussed and evaluated

A Three-Phase DC-DC Converter for High Current Fuel-Cell Applications

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

In this paper, a two-stage DC-DC converter for high current applications is studied. The converter consists of two three-phase full-bridge inverters connected through three AC coupled inductors. A switching-functions based model of the converter is first established, and then a control scheme is designed for both inverters in order to ensure a high power factor at the AC stage, and a regulated voltage at the DC load. The performance of the proposed control system is verified through numerical simulations. First, an ideal DC source is considered in order to test the performance of the control system, then a Proton Exchange Membrane Fuel Cell (PEMFC) is applied as the DC source in order to highlight the usefulness of this converter in such applications.

A Three-Phase Four-Leg Shunt Active Power Filter for Power Quality Improvement

Hadi Y. Kanaan (Saint-Joseph University, Lebanon)

Current harmonics caused by nonlinear loads yield major power quality related problems in the utility. Such harmonics are commonly reduced by employing static compensators known as Active Power Filters (APF). APF topologies are of various types, depending on technical and economical requirements; and their performance is intimately related to the applied control algorithm. In this paper, new constant-frequency control schemes are proposed for a shunt three-phase four-leg APF. The APF is used to compensate the current distortion and the reactive power created by a typical industrial load. The elaboration of the control law is based on a state-space averaged model of the converter, computed in the (d,q,0) synchronous frame. All control schemes consist of multi-loops controllers that ensure voltage regulation at the DC side of the filter, and current wave shaping at the AC side. The control systems are implemented numerically using the Matlab/Simulink tool. The performance of the proposed control approaches is finally discussed through the obtained simulation results.

Allocating resources in WirelessHART for Real Time applications

Gilbert Habib (Faculty of Sciences II- Lebanese University, France)

The industrial control system consists of actuators, sensors, controllers and monitoring systems. Some research focuses on how to replace the communication between those entities from wired to wireless communication taking into consideration the industrial constraints. Using wireless communication within these systems offers many advantages such as reducing the wiring cost, as well as facilitating the commissioning, the configurability, and the mobility of the control devices. Moreover, plant operation by human operator is more efficient thank to wireless mobile hand devices performing data analysis. The WirelessHart is an extension of the HART communication protocol. It is designed to fulfill the wireless industrial requirements. It is simple to use, self-organizing, flexible, reliable and secure. A WirelessHART network supports various network topologies, such as the star and mesh. It is composed of four main elements: 1) Gateway: it connects the controller to the wireless network. 2) Network Manager: it is connected to the gateway and it automatically builds the wireless network and manages its operations (access the medium, routing…). 3) Field devices: it is a sensor node or an actuator, and it is usually connected to process or to plant equipment. 4) Security Manager: it manages the security encryption keys (join, open a session…). 5) Handheld: it is used for configuring and monitoring field devices. It uses the same physical layer as Zigbee (2.4 GHz). At the MAC layer, WirelessHart employs the TDMA technology to enable the communication between two devices. The network layer uses source routing and graph routing to ensure a reliable communication. The application layer is a layer based on HART commands protocol. These commands are used by the different entities in the network to join, write/ read data…. For security issues, WirelessHART uses advanced encryption standard (AES) with 128 bit block Ciphers similar to Zigbee standard The main requirements for communications in industrial systems are scalability, backwards compatibility, reliability, security, and power consumption Our work focuses on studying a way to allocate the resources in the network manager in order to improve the performance of the network.

AUTOBAR: Automated Drink Maker using Mobile Application

Michel J Owayjan, Mohammad Eido, Bilal Khatib, Samer Kiwan and Karim Timani (American University of Science & Technology, Lebanon)

Bartending processes are not efficient in crowded bars. Waiting time for drinks span up to 15 minutes on crowded nights or even more, and bartenders often demonstrate favoritism toward high profile customers. Inefficient ordering and distribution in crowded bars lead to customer's annoyance and dissatisfaction with the bartenders' services. In addition, bar managers often face the problem of bartenders offering drinks in an unorganized manner from the stock, which leads to losses in the profit. The main goal of this project is to build an Automated Drink Maker machine that receives the order to make a drink from the customer using a menu located on the phone, and mixes the drink using nine different pumps connected to a microcontroller. The user has the ability to choose from predefined drink list, or to create his special drink. The project also includes a database which stores all of the orders that have been processed for each table number. Even though other devices exist in the market for mixing drinks, the idea of introducing a device controlled by a mobile application is relatively new, and offers a technological experience for the user. The project increases the efficiency, accuracy, and reliability of drink ordering, preparation and delivery. It offers an independent reliable standalone device that executes the process at a feasible price.

Parking Management System Using Mobile Application

Michel J Owayjan, Bahaa Sleem, Elio Saad and Amer Maroun (American University of Science & Technology, Lebanon)

Car parking may be considered a problem, especially in the big cities. Unorganized parking systems are time wasting and cause traffic jams. When a customer visits a mall or a centre it may take him/her a long time to locate free areas. Later on, after spending a couple of hours in the mall or centre, it may be a difficult task to relocate the parked car. Moreover more time is needed to pay for parking fees because of the long waiting queues. Accordingly, there is a need to create and design a parking management system using mobile application. This application solves the aforementioned problems, by helping the user to locate free parking areas, locate the place of the parked car, and manage the parking fees. Using a custom made sensor, based on the TCRT5000 phototransistor with infrared transmitter, the system is capable of determining the presence/absence of a car in the lot. The sensor status is sent to a database using the Arduino Mega 2560 microcontroller and a W5100Arduino Ethernet shield. The mobile application is capable of receiving and sending data from and to the database using the JSON (JavaScript Object Notation) format. The developed mobile application runs on android smart phones; it is developed using the Eclipse software. Using the mobile application, the customer is capable of locating free parking lots. The client is only capable of using this application if he/she is present in the mall. Moreover, as soon as the client enters the mall, a timer starts calculating the time spent, and according to a specified time interval, the client is notified of the parking fee withdrawn from his/her account. Finally the whole system has been implemented and tested; the results met the theoretical study: the mobile application is able to interact with the sensors, enabling the capability of locating free parking lots and determining the place where a client has parked his/her car. Moreover parking fees are withdrawn from the customer's account after every time interval spent at the mall. The resulting system solves the problems mentioned above and organizes the parking process.

Entraînement d'un mélangeur à rotors engrenants

Nour Chamaa and Lara Ghosn (Université Saint Joseph, Lebanon); Flavia Khatounian (Université Saint Joseph de Beyrouth, Lebanon)

De nos jours, le caoutchouc se retrouve dans de multiples applications de la vie courante telles que l'industrie, la médecine, le sport, les pneumatiques, etc. Sa fabrication nécessite cependant un processus minutieux, basé sur un mélangeur à rotors engrenants. Les différentes étapes du cycle de fonctionnement sont définies par un cahier des charges sur une période de 300s. La mise en œuvre de ce cycle de fonctionnement se fait à l'aide d'un mélangeur entraîné par une machine asynchrone triphasée à cage d'écureuil, asservie par commande vectorielle indirecte et orientation du flux rotorique. Les correcteurs mis en œuvre pour la régulation du flux, de la vitesse et du couple de la machine sont des correcteurs Proportionnels Intégrales (PI). Les résultats de simulation obtenus sous Matlab-Simulink, dans des conditions idéales de fonctionnement permettent de valider le simulateur et la commande mise en place. La prise en compte de tous les éléments introduisant des imperfections dans un une commande de ce type est en cours d'étude afin de rendre les résultats actuels plus rigoureux.

Valorisation des déchets solides pour la production d'électricité au Liban

Chantal Maatouk (Saint Joseph University, Lebanon); Nour Zgheib (Saint Joseph University- Faculty of Engineering, Lebanon); Mounir Jibbawi (Saint Joseph University, Lebanon)

Le secteur électrique est confronté aujourd'hui à deux grands problèmes: l'un d'ordre technique et l'autre d'ordre financier. Du point de vue technique, au niveau de la consommation, il y a un grand écart entre la demande nationale, dont les besoins sont de 2 300 à 2 400 mégawats, et l'offre qui est d'environ 1 600 mégawats. La production d'électricité au Liban est donc loin de suffire aux besoins du pays et de sa population. Les coupures fréquentes de courant ont ainsi conduit les ménages à recourir à des générateurs privés pour assurer un approvisionnement continu en électricité ; leur entrainant des coûts supplémentaires. De telles déficiences se chiffrent en milliards de dollars de pertes annuelles pour l'économie libanaise. D'un point de vue financier, l'électricité, qui est subventionnée par l'état, est un

gouffre pour le pays étant donné qu'elle constitue son troisième plus grand poste de dépenses après le service de la dette et les salaires. En effet, le déficit chronique de l'EDL, coûtent aujourd'hui au pays des millions de dollars par jour. D'autre part, le Liban produit plus de 1.5 millions de tonnes de déchets solides chaque année ; la plupart sont enterrés dans des décharges sauvages. Faute d'une gestion intégrée des déchets à l'échelle de l'ensemble du territoire, la situation atteint un point de non-retour, une catastrophe sanitaire et environnementale qui s'aggrave au cours des années. La gestion des déchets solides est un élément fondamental du développement durable d'un pays. Une solution double consistera donc en la valorisation des déchets solides, aussi appelés biomasse, pour la production de l'électricité.

Procédé de traitement de produits biologiques (EPPIP) en vue de la modification de leur contenu lipidique et texture; mise en œuvre d'un tel procédé et reconstitution par des méthodes préservant l'apparence et les qualités organoleptiques des graines

Joelle Nader, Charbel Afif and Nicolas Louka (Saint Joseph University, Lebanon)

Les graines et fruits oléagineux se distinguent par une teneur élevée en lipides (autour de 50%) limitant ainsi leur consommation sous forme de produit snack. Pour ce, afin de répondre aux besoins du consommateur qui cherche une alimentation équilibrée et moins riche en matières grasses, les producteurs ont recours au processus de délipidation de ces produits. Or depuis plusieurs décennies, l'extraction huileuse a toujours été réalisée en utilisant différentes techniques d'extraction, par voie mécanique ou chimique. Toutefois, ces techniques étaient souvent associées à plusieurs inconvénients qui limitent leur large application dans l'industrie alimentaire. La plupart de ces techniques déforment les graines d'une manière irréversible, et altèrent leurs propriétés organoleptiques et leur composition chimique et sont souvent polluantes, trop coûteuses et inefficientes. D'où vient le principal objectif de notre étude: concevoir un nouveau procédé de délipidation qui préserve les caractéristiques physicochimiques des graines (les arachides à titre d'exemple), tout en respectant l'environnement et présentant une méthode efficiente extrapolable au niveau industriel. Dans notre étude, nous avons adopté la délipidation par pressage mécanique sans l'usage d'aucun additif ou solvant chimique. Or selon la littérature, l'extraction de quantités considérables d'huiles nécessite l'utilisation d'une pression allant jusqu'à 25MPa ce qui induit une détérioration irréversible dans la structure de la graine. Afin de remédier à cette problématique, une succession de prétraitements ainsi qu'une modification du procédé de pressage suivi par une opération de reconstitution ont été mises en œuvre et optimisées résultant en un produit snack torréfié à faible teneur calorique, préservant la forme des graines et conservant ses qualités organoleptiques. Une pré-torréfaction suivie d'un épluchage et une hydratation par trempage ont favorisé respectivement le développement de la saveur et couleur caractéristiques des arachides et l'augmentation de leur résistance à la déformation irréversible. Le traitement par pressage a été effectué moyennant une presse hydraulique avec une pression ne dépassant pas les 10MPa. A ce niveau, deux brevets d'invention ont été déposés et accordés (LB-10492 ; N. Louka & J. Nader, 2014 et LB-10493 ; N. Louka et al. 2014) permettant l'extraction de la matière grasse par pressage des graines ou de produits oléagineux, avec un taux d'extraction allant jusqu'à 85%, sans que la déformation des graines soit irréversible. Dans le but de limiter la déformation, le produit destiné au pressage a été réparti entre des couches de matériaux, nommés Matériaux Spécifiques de Séparations (MSS) de qualité alimentaire formés de matières déformables remplissant les interstices entre les particules dudit produit. Par la suite, les graines d'arachides délipidées et partiellement déformées ont subi une étape de reconstitution par un nouveau procédé de texturation baptisé IVDV (Intensification de la Vaporisation par Détente vers le Vide) où le produit subit un traitement en créneau sous haute pression/haute température (une pression de 12 bars est atteinte en moins d'une seconde) suivi par une détente très rapide vers le vide (>10bar/ 50ms). L'IVDV permet de corriger la déformation subie lors du pressage ce qui permet à la graine de reprendre sa forme initiale avant pressage. Le couplage de l'IVDV avec l'EPPIP (Extraction par Pressage Préservant l'Intégrité du Produit) nous a permis de réaliser des extractions avec des rendements allant jusqu'à plus que 85%, pour des durées de traitement relativement faibles (3-4 minutes) et des pressions inférieures à 10MPa (nettement plus faibles que les pressions pratiquées dans les études et inventions antérieures). Le produit résultant présente un taux de déformation irréversible inférieur à 1% et une acceptabilité par le consommateur très élevée (plus de 90% de satisfaction). De plus, contrairement aux procédés existants, l'extraction par EPPIP combinée à la reconstitution par IVDV et à la torréfaction améliore considérablement l'aspect des graines, le taux d'expansion, la dureté, la croustillance, la stabilité oxydative (indice de peroxyde, durée de vie…), etc. D'autre part, les analyses nutritives effectuées sur le produit issu de cette méthode montrent une augmentation considérable de la teneur en protéines et en fibres respectivement (42% ; 16%) par rapport au produit témoin non traité (22 ; 8.21). De plus, ce procédé a permis de réduire sensiblement le temps de la torréfaction en le divisant par un facteur allant jusqu'à 10. Ce procédé innovant est actuellement en cours d'extrapolation à une échelle industrielle avec une possibilité d'application sur d'autres types de graines et de noix.

Modeling of Speed Bump Power Generator

Mohamad Ramadan (Lebanes International University, Lebanon); Mahmoud Khaled (Lebanese International University, Lebanon)

Electricity is a form of energy, it is the flow of electrical power. Electricity is one of the most widely used forms of energy which is a secondary energy source. Electrical energy can be generated from many primary sources like coal, natural gases, nuclear power and other natural sources. But the use of these non-renewable primary sources results in atmospheric and environmental pollution in addition to the current global economic uncertainties and the fluctuation of energy prices. The pollution problem leads to some undesirable phenomena represented by global warming, greenhouse effect, climate change

and acid rain. All these factors are forcing countries and organizations to research and develop more efficient green energy generation methods. Since the focus now is shifting more and more towards the renewable and natural sources of energy, which are essentially non-polluting, an alternative approaches for generating electrical power were developed. One of these methods are using speed breakers [1-2] as power generation units. The number of vehicles passing over speed breakers in roads is increasing day by day. In addition, a great amount of energy is wasted at the speed breakers through the dissipation of heat and also through friction. There is great possibility of utilizing this energy in generating power by using the speed breaker as a power generation unit. Some of the kinetic energy of these vehicles can be converted into rotational motion throw the speed bump unit and this is the main concept of this paper. This rotational motion is used to generate electricity by using electric generator. The generated power can be used for the lamps, near the speed breakers, or it can be stored in batteries. A mathematical modeling of the speed breaker power generator is presented. The aim of this modeling is to determine a relation between the vehicle motion and the speed breaker motion. The kinetic energy of moving vehicles can be converted into electrical energy by using several speed breaker power generation mechanisms. In this study, six mechanisms have been introduced(Rack and pinion mechanism, Roller mechanism, Crank shaft mechanism, Magnetic mechanism, Pressure lever mechanism, Pneumatic mechanism). This paper explains clearly the mechanisms, working principle, main parts, advantages and disadvantages for different speed breaker power generation units. The modeling of the speed bump is divided into two parts. The first part is performed to model the kinematic performance of the system by discovering the relation between the motion of the vehicle and the motion of the speed breaker. Graphical method is used to find this relation to the standard top flat speed breaker geometry and the standard parabolic speed breaker geometry. In both cases, rack and pinion power generation mechanism is used. This modeling shows the governing equations for the displacement, velocity and acceleration of the speed breaker with respect to the motion of the vehicle. The second part of the modeling aims to calculate all the specification required for lighting the specific number of lamps during the night. The street length is assumed and the distance between two lamps are taken as standard. Then the number of the lamps for the road is estimated, accordingly, the number of speed breakers is calculated. The top flat speed breaker power generator system is considered for this study. Each speed breaker power generator system consists of two parts, one is electrical and another is mechanical. In this study all the specifications related to the electrical and mechanical systems are determined. The calculations will start from the electrical system to specify all the electrical component characteristics(dynamo, battery and inverter). Then all the mechanical system requirements(gear arrangement, flywheel) are specified.

P2_eng2_CCE: Poster Session 2- Engineering II

Room: USJ Hall CSH

Chairs: Aziz M. Barbar (American University of Science and Technology, Lebanon), Rony Darazi (Antonine University, Lebanon), Khaled H. Khalil (Universite Libanaise & Faculte de Genie, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

Resource Management in Future Opportunistic Networks

Joyce Obeid (Holy Spirit University of Kaslik, Lebanon)

Opportunistic network is mainly based on two sub networks: The Mobile Ad-Hoc Network (MANET) and the Delay Tolerant Network (DTN). Opportunistic networks are designed to allow communication between nodes that do not rely on pre-installed infrastructure. Wireless sparse nodes can communicate only if they are in the same transmitting range over high-speed interfaces such as Bluetooth and WI-FI [1]. These nodes form a dynamic network where the connectivity is intermittently most of the time. In such networks, there are no fixed or stable paths that connect a source to a destination due to the mobility of the nodes [2]. Each node will determine which, when and where each packet must be forwarded in order to bring it closer to the final recipient. Thus, in similar networks, nodes use store-carry-and-forward paradigm to deliver messages. Hence, routing strategies and resource management become a critical problem to face since traditional forwarding protocols fail in such networks. In addition, opportunistic networks are susceptible to high buffer consumptions and traffic congestions. This is due to the unpredictable opportunity to find the next neighbor node to transmit the stored data and the undefined period that the users' bundles may be stored in the intermediate nodes' buffers [3]. To overcome these challenges, many routing and buffering algorithms have been manipulated. Most of these algorithms yield to significant results in this field but few of them introduce a quality of service (QoS) deployment to improve buffer management quality. That's why in this paper, we aim to solve buffer problems by introducing priority factor into opportunistic networks. Our main challenge is to design an effective method in which the overall delivery probability and the average latency are optimized without increasing the overhead ratio. The new buffer management mechanism is based on three major policies: messages transfer policy, scheduling policy, and drop policy. In this context, the nodes storage will be retained to the messages with a higher priority and then to the messages with a lower priority. A node will transmit messages to its neighbor only if the transmitted packets meet specific criterion or are unlikely to cause crowding in the next node's buffer. In addition, in certain contact duration, nodes may not be able to forward their entire messages stored in the buffer. Thus, significant messages must be transmitted first. Three sorting parameters are used to order the queue in the nodes' buffers: message priority,

remaining lifetime and its size. Finally, two different drop policies are used to specify which messages should be removed first to decrease the crowding in the nodes' buffers and prevent the buffers from being full. Opportunistic Networking Environment (ONE) simulator is used to implement and evaluate the proposed algorithm. In this context, to compare and analyze our results, the main routing protocols were simulated and compared using the ONE simulator considering different performance evaluating criteria. We have observed that our proposed buffer management approach is able to meet our challenges for the opportunistic networks, particularly the delivery probability and the average latency. In addition, our algorithm has fulfilled the main concept it was developed to complete especially the improvement of the buffer management quality.

Caractérisation des matériaux magnétiques opérant à hautes fréquences

Adnan Al-Rifai (Université Antonine, Lebanon); Taline Boyajian (Universite Antonine, Lebanon)

Les matériaux magnétiques font une partie essentielle des composants hyperfréquences passifs non-réciproques tel que les isolateurs et les circulateurs. Dans le but d'améliorer l'effet de l'isolation, plusieurs contributions effectuées visent à modéliser de nouveaux matériaux magnétiques comme les composites et les méta-matériaux, mais leur caractérisation reste un objectif non-banal. Ce travail présente une méthode de caractérisation des couches minces d'états d'aimantation quelconque dans une bande de fréquence large. L'idée est de faire converger les paramètres S issus du modèle analytique (problème direct) d'une ligne coplanaire chargée par le matériau, vers les paramètres S simulés en changeant itérativement quelque termes afin d'obtenir leurs optimums (problème inverse) qui seront les résultats de la caractérisation.

Miniaturized SIW Leaky Wave Antenna using Slow-Wave effect

Mohamad Khalil (Lebanese University & University of Tehran, Lebanon); Mahmoud Kamarei (University of Tehran, Iran); J. Jomaah and Hussam Ayad (Lebanese University, Lebanon)

Substrate Integrated Waveguide (SIW) is a very promising technique in that we can make use of the advantages of both waveguides and planar transmission lines (1). As a waveguide, we can get such advantages as low loss, high Q factor, high power capability and small radiation. And as a planar transmission line, we can fabricate it with Printed circuit Board (PCB) technique which is a relatively low cost. This technique is becoming a new means of signal transmission, has been the basis for the design of many circuit components. Components such as power dividers, resonator cavities, and filters, also patch antennas and Leaky Wave Antennas are being redesigned now using SIW. The concept of planar Leaky Wave Antennas (LWAs) due to their multiple advantages like narrow and high directive beams, inherently simple feeding network, and reduced unit cell length, make us interested on this kind of structures. The low profile and easy manufacturing make them ideally suited for modern communication systems since they give high-quality performance at low cost (1). This type of antennas is on study these last year's using SIW technique, and was analyzed by (2) and then the scanning angle and gain is optimized by (3; 4) good results were obtained. The criticism that has been raised about these new components is that they possess a relatively large footprint. Research works published have in particular focused on the development of miniaturized components using Quarter Mode SIW, high permittivity, multi-layer components, and Folded SIW technique (6; 7; 8). In (4) they focused on the miniaturization of the LWA antenna using the Half Mode Substrate Integrated Waveguide technique (HMSIW). Here in this paper we minimize the LWA using a new technique, by inserting the vias inside the SIW-LWA, first introduced by (7) in order to realize a compact narrow wall coupler, and recently used by (8) in order to show the potential of this technique to reduce the transversal and longitudinal size of the SIW transmission lines. Thus using this technique we design a new miniaturized LWA, we inspect the influence of internal vias on the lateral size reduction, also on the characteristics of the LWA (Gain, radiation efficiency, scanning angle). The new structure Figure (1) is called Slow Wave - Substrate Integrated Waveguide - Leaky Wave Antenna (SW-SIW-LWA), since inserting the vias induce the SW effect. After designing the antenna and simulating with HFSS a reduction of 30% of the transverse side of the antenna is attained as we can see from S-parameters showed Figure (3-4) while maintaining an acceptable gain between 7 and 14dB, Figure (5) and Table (I). Other parameters like the radiation efficiency, Gain, directivity, and radiation pattern are analyzed. Finally a Comparison of our miniaturization technique with Half-Mode Substrate Integrated Waveguide (HMSIW) technique realized in recent articles is done Table (I), shows that SW-SIW-LWA technique could be a good candidate for SIW miniaturization.

Cross-layer Framework for Green Communication

Samara Masri (Holy Spirit University of Kaslik-USEK, Lebanon)

Recently, the interest of telecom operators and internet service providers (ISP's) in energy efficiency for wireless networks have remarkably increased; it became a high-priority goal. The boost in energy prices, the continuous increase of the users' numbers, the pervasion of wideband access and the diffusion of services offered, have motivated this interest. With this significant development, an increase in the power requirements, related with the large number of servers and data centers that exist now, occurred in parallel. In response to this increase, a lot of projects were founded to establish how energy savings may be acquired in future wireless networks. The challenge is the necessity to accomplish this decrease without the need to compromise on the Quality of Service (QoS) and the network performance. Different organizations, workshops and conferences have been set up and several worthy papers and projects have been published in order to address this issue. In this paper, we will discuss the motivations to move toward green communications and create energy-efficient networks as well as green networking solutions

for wired networks which are categorized under four different classes namely resource consolidation, virtualization, selective connectedness, and proportional computing. Then, since we are more interested in wireless communications, the most important techniques used to reduce the power consumed by the base station are also explained; Cell switch ON/OFF and cooperation between Base Stations (BS's), Cell zooming, Heterogeneous Networks (HetNet's), Relay techniques and Multiple Inputs Multiple Outputs (MIMO) techniques. After an overview of all the greening techniques of wired and wireless networks and as the paper is restricted to cross-layer framework for green communication we will restrict to the cross-layer optimization techniques. An efficient Orthogonal Frequency Division Multiple Access (OFDMA) resource allocation in Long Term Evolution (LTE) advanced based on cross-layer optimization between Physical (PHY) and Medium Access Control (MAC) layers, is proposed, considering the data rate, service differentiation, channel state information (CSI) and the total power consumption. Cross-layer methodologies take advantage from connections between diverse layers and can enhance energy effectiveness as well as flexibility to service, traffic and environment progress. The MAC layer will provide the physical layer with all the information required to assure an efficient service differentiation which is an important issue that should be exploited in the energy saving context. Usually, the classification of services is done in response to their restrictions and demands. Two main classes exist that are non-real-time services and real-time services. Users with real time services will have more priority to be allocated and served. Before explaining the resource allocation based on cross-layer scheme, an overview of LTE-Advanced is presented as well as OFDMA and (Single Carrier FDMA) SC-FDMA used in LTE-Advanced downlink and uplink respectively. Finally, a new algorithm based on Rate Adaptive (RA) algorithm, is introduced to achieve better energy efficient resource allocation based on cross-layer approach between the two lowest layers. The purpose from the new algorithm is to increase the capacity of the system as much as possible while trying to decrease the total transmitted power. Hence, increasing the energy efficiency since it's the capacity to total power ratio. The service differentiation is highly considered; the users are differentiated according to their classes and their services according to their data rates. Providing fairness between the two types of users is not our concern. What we care about is to allocate subcarriers in an optimal way to satisfy the users having highest QoS requirements. The algorithm starts by computing the weight of users and differentiating them between Hard-QoS and Soft QoS users. Each user among the Hard-QoS users is characterized by a parameter alpha indicating the level of QoS requirements and by the channel quality of the respective user in each subcarrier that increases with the Signal to Interference and Noise Ratio (SINR) and alpha. The channel parameter is computed for all users in each subcarrier and the user having the highest channel quality parameter will be assigned to the respective subcarrier and its own power parameter will be set to 1 and 0 for all the other users so only one user will have power in this subcarrier. The rate of each user in each subcarrier is computed then compared to the rate initially required to see if the user is satisfied or he needs more subcarriers. In the latter case, alpha will be slightly increased in order to increase the channel parameter. This step will be repeated until all hard QoS users are satisfied. It would be great if we insert a parameter measuring the average level of satisfaction for each user in a way that the resource allocation for hard QoS users will not depend only on the data rate constraint. For instance, even if the acquired data rate is less than the required data rate and the user is more or less satisfied, there will be no need for extra resource allocation. So the power will be further reduced. After all hard-QoS users are allocated and satisfied, the algorithm checks if there are any available subcarriers for soft-QoS users. If yes, they are allocated using the same procedure used for hard-QoS users' allocation, but in this case the data rate constraint doesn't exist. Once the subcarrier allocation is done, the power of each user in each subcarrier is calculated. The power assigned to hard-QoS users depends on alpha and the channel quality as well while the power assigned to soft-QoS users depends only on the channel quality. The power increases with alpha and the channel quality. The total sum of the assigned power must be less than the imposed total power. If the sum exceeds the total power, alpha should be decreased. The algorithm repeats itself until the power constraint is achieved. Lastly, the ultimate goal of this paper is to achieve an efficient reduction of the energy consumption in the base station, by using cross-layer framework approach, in order to create an energy efficient network, while maintaining a good QoS for high priority users.

objective quality assessment of tone mapped images

Jad Melhem (USEK, Lebanon)

Mapping the HDR images to LDR images, may reduce the quality of the obtained images. To measure this quality many metrics may be applied to the obtained image. The most popular one are the SSIM, NSS and TMQI. However, my paper shows an example where objective metrics fail to represent the reality.

Mood and Emotion Detection in Call Centers

Sandra Kerbage (Holy Spirit University of Kaslik, Lebanon)

Speech recognition is an interesting and emerging field, in particular emotion detection from audio speech which succeeded in crossing the cultural and linguistic boundaries. Such systems can be used for many purposes and involve too many languages and cultures, but this paper proposes an emotion recognition system for a call center based on Arabic language. Therefore, a database of segmented Arabic calls is collected making sure it includes diverse samples regarding the age, genders and accents. To get rid of undesired signal components, reduce background noise and put up with equipment imperfections, audio speech is pre-processed prior to acoustic features extraction. By optionally applying a feature selection algorithm, the important features which describe best the input are kept, whereas irrelevant attributes are rejected allowing for complexity reduction. Finally, the database feature vectors are fed to a machine learning algorithm, multi-layer perceptron neural network in this case, prior for classification and validation. Because no absolute agreement or general rules are dictated on how to choose the system's characteristics, a total methodology is presented and tested regarding how to build the database, what

number or type of features to choose, whether a feature selection algorithm is necessary or not, and which neural network architecture fits the requirements the most. Pre-processing and feature extraction are conducted using Praat, and data mining processes using WEKA. Note that the validation step is achieved using a cross validation process based on training and testing sets, and additional tests using validation unseen data. Two emotions theories are explored: dimensional theories to detect two emotional states: stressed-not stressed, and the categorical theories to recognize three discrete emotions: happiness, anger and neutral. In the latter case, a parallel system is proposed and tested. It should be mentioned that the outcomes in this thesis are dependent from the database size and content in addition to the number of validation data sets. Despite the data number constraints, promising results are obtained but more tests are recommended with a larger amount of data.

Data over FM/AM Radio Tranceiver

Hussein Hijazi (Grenoble-INP, GIPSA-Lab, France); Ali Chamas Al Ghouwayel (Lebanese International University, Lebanon)

Data FM/AM radio transceiver is an innovative software application approach to advanced communication world. This project designs a digital radio transceiver that permits secure wireless transmission of data documents between PCs using a USB FM/AM radio transceiver. Today's communication depends on the usage of cell phones, Bluetooth, and the internet; these techniques had facilitated the communication. However, each has its limitation even in the case of all problem solver "The Internet"; it is not everywhere accessible. Moreover, it is not for free. However, our project proposes a cheaper gadget for the means of wireless communication which is based upon a USB FM/AM radio transceiver.

Hybrid EMS-Near ML Algorithm for Non-Binary LDPC Codes

Ali Chamas Al Ghouwayel (Lebanese International University, Lebanon); Hussein Hijazi (Grenoble-INP, GIPSA-Lab, France); Ahmad Issa and Mohammed Dahwi (LIU, Lebanon)

This paper investigates the decoding of rate Non-Binary LDPC codes using a Hybrid algorithm based on the Maximum-Likelihood (ML) principle and Extended-Min Sum (EMS) algorithm. The iterative decoding approach based on the well known EMS algorithm, considered as the most efficient decoding algorithm to decode NB-LDPC codes, executes the decoding process in an iterative way where at least eight iterations are run to achieve good performance in terms of Frame Error Rate (FER). The proposed EMS-Near ML algorithm is based on the execution of only one iteration of the EMS algorithm and then run the Near ML search where the number of candidates is highly reduced using a technique privileging the most reliable and nearest codewords.

End to End Quality of Service Support between LTE and WiMAX in 4G Heterogeneous Networks

Alice Rizk (USEK, Lebanon)

The advanced version of the current 3G network is the Fourth Generation (4G) network known as the Next Generation Wireless Network (NGWN) or also as the Heterogeneous Wireless Access Network (HWAN). The word "Heterogeneous" introduced diverse wireless access networks technologies such as GSM, UMTS, WLAN, WiMAX, LTE and other networks. The main challenge reside in integrating these technologies together. Several technologies, at least two, will certainly be involved at any time when any end to end communication occurs. Mapping between these technologies is the key solution for ensuring an end to end quality of service (QoS) support and thus a seamless connection and communication between end users. Mapping is based on the different QoS parameters and/or classes and/or attributes and/or categories of the networks. On a general level, a QoS parameter of one network is mapped to a QoS parameter of the other network. An in deep mapping will certainly involve QoS attributes. This project presents a mapping QoS methodology of one of the most widely used type of hybrid networks: WiMAX-LTE. Each has distinct characteristics: WiMAX is known by its big coverage area, its good QoS with seamless mobility and high data rates while LTE is known by its high downlink and uplink rates as well as its low latency value. In order to combine their characteristics and reduce their individual problems, interworking between WiMAX network and LTE network is based on mapping their QoS parameters and attributes. Several levels of mapping may be elaborated based on whether only parameters are taken into considerations or parameters and attributes together. The interworking joins the two networks via a gateway called "interworking gateway" which responsibility is to map the QoS parameters/attributes based on the elaborated mapping tables. The interworking architecture as well as the interworking mechanisms in both ways, from WiMAX user(s) to LTE user(s) and from LTE user(s) to WiMAX user(s), are illustrated and explained. Performance metrics such as the throughput, the packet loss, the jitter and the delay are considered without mapping and after mapping is performed. Mapping goal is to improve the end to end QoS by increasing the throughput metric, lowering the packet loss, the jitter and the delay metrics.

Smart Walker

Roger Achkar, Gaby H Abou Haidar, Hussein Allam, Richard Maalouf, Batoul Msheik and Moussa Abdulrahim (American University of Science and Technology, Lebanon)

The conventional methods that the blind and elderly apply on an everyday basis are summarized by the use of the old-fashioned cane when on the move and require the help of others with major and even minor day-to-day activities. This limits the blind's and elderly's capability of being independent while executing daily activities. This project is the suggested solution for these issues. It is an application

that wirelessly receives valuable information or through the Internet using the open-source easy to use platform Android. The implemented sensors provide real-time analog signal information that indicates the directions where objects are, and medical information about the user. The data is converted and received by the pre-programmed Arduino board, where it is converted into digital and serial signals and transmitted by a router to be read by the Android application installed on the phone. Hence, real-time values are guaranteed. Moreover, this system provides an emergency button which can be used an emergency arises. The results found are promising and support the notion that this project can increase the effectiveness of technology present to facilitate the lives of those who need assistance. This project creates opportunities to develop more user-friendly-aid systems in the future, depending on the vast expansion of smart phone applications. This project provides additional advantages that can benefit other fields in engineering and technology, contingent upon the needs present. Limitations experienced are dependent on the quality of resources present. Despite what has been encountered, the project proved to be a learning process and a true implementation of how communication using programming and control can benefit the engineering community.

Joint Utilization of Personal Devices for Enhanced Mobile Video Streaming

Sanaa Sharafeddine (Lebanese American University, Lebanon); Karim Jahed (Lebanese Americen University, Lebanon); Nabil Makarem (Lebanese American University, Lebanon)

Current mobile devices are capable of providing connectivity anytime anywhere while supporting multitude of services and applications . Users place high expectations on the amount and level of services to be provided by their devices. Mobile devices, however, despite all efforts, are constrained in their computational, communications, display, and storage resources. In a typical household or office environment, it is common that one possesses multiple connected devices such as smartphone, tablet, laptop, desktop, and even IP-based television. In this work, we develop, implement, and test a flexible framework for the formation and operation of personal area networks composed of multiple IP-based devices placed within a given geographical area. This includes the development of network formation procedures in addition to intelligent resource sharing strategies among the devices in order to stream multimedia video content to one of the devices with higher effective download bit rate and, thus, better end-user quality of experience; this is achieved by grouping the communications interfaces of different devices to form some kind of a super-link connectivity that supports personal content delivery with enhanced quality of service.

Modeling and Control of a Fuel Cell operated Asynchronous Machine

Ahmad Haddad, Perla Assaf, Khaled Safsouf and Bashir Omarie (Lebanese International University, Lebanon)

The main purpose of this research project is to couple the fuel cell system to an asynchronous machine for use in automotive applications. The integration of fuel cells in electric cars in place of batteries aims to improve their performance in terms of torque and speed. In this project, the PEM fuel cell type is used due to its high power density, suitable temperature (around 80°C) and clean products (water vapor). This project is divided into three stages: the first stage consists on building a control-oriented mathematical model of the asynchronous machine, the fuel cell system (stack and auxiliaries) and the electric power converters (converter and inverter). The second stage consists of simulation and response analysis of the different models. In the third stage, drivers are used for the control of the asynchronous machine's speed and torque. The proposed control strategy aims to ensure a maximum torque while maintaining the fuel cell at high efficiency.

Toward a better and much efficient Wind Energy Conversion System

Jalal Chamas, Zeina Boucher, Khaled A. Chahine and Marc Anthony Mannah (Lebanese International University, Lebanon)

This paper focuses on the modeling and analysis of the wind energy conversion system. A detailed study is carried out over the different wind turbine generators, power electronic converters and control techniques used in wind systems. First, a preliminary architecture is chosen, modeled and simulated. Different simulations are produced next, using various generators and controlling techniques in order to define the best possible architecture.

P2_FEA1_env: Poster Session 2- Food security, Environment, Agriculture I

Room: USJ Hall CSH

Chairs: Maher Abboud (Unité Environnement Génomique Fonctionnelle et Etudes Mathématiques, UEGFEM, FS-USJ, Lebanon), Claude Daou (Lebanese University, Lebanon), Wehbeh Farah (Université Saint Joseph, Lebanon)

Flora Biodiversity in Hermon Mountain: Substantial Endemism

Safaa Baydoun (Beirut Arab University, Lebanon); Nelly Arnold (Université Saint Esprit, Lebanon); Helena Dalleh and Ousama Halablab (Beirut Arab University, Lebanon); M Sayah (Lebanese University, Lebanon); Lamis Chalak (The Lebanese University, Lebanon)

This work is a continuation of our investigation on the flora biodiversity of the Lebanese side of Hermon Mountain, one of the Important Plant Areas(IPAs) in Lebanon. It presents a second inventory list of species and a first assessment of the endemism rate according to the National Flora of Lebanon and Syria, and Euro/Med checklist. Major factors threatening the mountain flora was also evaluated. To date, the plants identified reached a total of 230 species distributed over 48 plant families. Compositae(35 spp.), Labiatae(25 spp.) and Rosaceae(19 spp.) formed the major shares. The endemicity rate was around 10.7% confirming the importance of the mountain in terms of flora biodiversity. Clearing vegetation and woodlands for agriculture, urbanization and overgrazing caused by human expanding footprint were recorded as the main threats of the Mount flora. These findings incite to consider Hermon Mountain among the priority areas for conservation measures

Applied Lagrangian Methods for the tracking of pollutants in the Eastern Mediterranean Basin

Milad Fakhri (National Center for Marine Sciences-CNRSL, Lebanon); Pierre-Marie Poulain (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Italy); Laurent Mortier (Locean Institute of Pierre et Marie Curie University, France); Julien Brajard (LOCEAN Institute of Pierre et Marie Curie University, France); Leila Issa (Lebanese American University, Lebanon); Dany Merhej (CNAM, Lebanon); Gaby Khalaf (National Council for Scientific Research Lebanon, Lebanon)

The anthropogenic pressures render the Lebanese sea to be the final destination of multiple sources of pollution leading to the dispersion and spread of dangerous contaminants all along its coastal and pelagic waters. Currents in combination with other hydrodynamic factors play the major role in conveying any hazardous substances from a source point to any other coastal or pelagic one. The lack of available national data on deep and surface circulation and the difficulty in predicting the trajectory of any patch of contamination(oil spills or other pollutants) discharges in the sea enhanced the National Center for Marine Sciences-CNRSL, to participate in a Joint Mediterranean Regional Programme ENVI-MED through a research project entitled "Altifloat". This project aims to develop oceanic operational products for the support of marine research and monitoring off the coast of Lebanon, increase the understanding of the circulation of the Eastern Mediterranean from the large basin scale to the small eddy scale, increase the ability to predict the behavior and motion of surface contaminants, create a network of academic researchers, and implement and assimilate algorithm for the reconstruction of surface velocity fields by combining altimetry and Lagrangian data. The project's actions fall within the potential targets of CANA project in studying the physical characteristics of seawater and the surface Eastern Mediterranean currents. The kick-off meeting of the project was held in Jounieh-Lebanon on April 23 2013. In the Summer of 2013, the National Center for Marine Sciences-CNRSL received from the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale(OGS), Italy, 6 MetOcean Iridium drifters(SVP) and this group of drifters was followed by another group of 6 in the spring of 2014 send by LOCEAN institute of "Pierre et Marie Curie University", France. In compliance with project's action plan, 3 drifters were deployed seasonally at the following months August 2013, December 2013, April 2014 and August 2014 in the off-shore water of Tyre - South Lebanon at distances of 8, 10 and 12 NM respectively. These drifters were supposed to follow the surface current at 15 m depth. The platform of the Lebanese scientific vessel CANA-CNRS R/V, was used for the deployment of the drifters. Some of the 12 drifters stranded on some locations of the Lebanese coasts (travelled for a distance between 100 and 200 Km), others stayed longer in water and stranded at some Syrian coasts(travelled for a distance between 400 and 450 Km), while a 3rd group stayed for much longer time and stranded away in Iskenderun Bay of Turkey or at its south western coast(travelled for a distance between 600 and 1700 Km). The trajectories drawn by the iridium drifters may help in defining the trends of surface currents generated by the prevailing winds in the Eastern Mediterranean Sea and may be translated into Lagragienne models to predict the destiny of any potential contamination. Early in 2013, a German Argo float stranded offshore the coast of Beirut. This float was recovered by the Lebanese army and handled to the American University of Beirut, department of Fishery. Then through Altifloat project, the German decided to give the float to the Lebanese CNRS through the National Center for Marine Sciences in order re-deploy it offshore the Lebanese coast. During the Launching of Altifloat project in Beirut, the float was tested and calibrated. It was deployed at the same time with the first group of Iridium drifters on the 27th of August 2013 at 12 NM off-shore the southern coast of Lebanon(offshore of Tyre). The Argo float executed several profiles(53 profiles) and stayed functioning for 9 months by drifting at 300 m depth in the Eastern Mediterranean Sea till it sank permanently because of battery failure in front of the Eastern coast of Cyprus. The routes followed by the Argo float at 300 m depth contributed in studying the central Eastern Mediterranean currents while the executed profiles monitored the evolution of water temperature and salinity down the water column. In order to study the local surface currents in specific marine zones of the Lebanese coast and their direct impact on the dispersion of any kind of contaminants, a mutual cooperation between the National Center for Marine Sciences-CNRSL and the Superior Institute of Applied and Economic Science(CNAM-Lebanon) allowed the creation of a prototype locally manufactured low cost drifter whose aim is the collection in real time surface water information(water temperature, geographical positions and lately additional

parameters such as conductivity). The prototype transmits the collected information in real time(≈5 minutes),to a local server where they are saved for ulterior analysis. The server allows the access to these data through the web page. The drifter is made up of 2 parts: electronic and mechanic. It is equipped with a global navigation module through satellites, a GSM communication module, a temperature probe and a 12 V photovoltaic-alimented battery. This first prototype of drifter has accomplished successfully its launching test. Its trajectory and the temporal and spatial water temperature evolution were followed for a whole day through the created web page till it stranded in the evening at the western coast of Beirut.

Methodological assessment of sustainable management solution of Infectious healthcare waste in Lebanon

Olivia Maamari (Saint Joseph University, Lebanon); Cedric Brandam (Université de Toulouse, France); Roger Lteif (Université Saint-Joseph, Lebanon); Dominique Salameh (Faculté des Sciences, Université Saint-Joseph, Lebanon)

Potentially infectious health care waste(PIHCW) constitutes more than 83% of hazardous health care waste(HHCW). Until 2003, this waste was one of the major problems encountered in Lebanese health care institutions, and its mismanagement was threatening public health and environment. Since 2003, in collaboration with Saint Joseph University, the NGO arcenciel started to implement a national solution through the instauration of a network for collection and treatment of infectious healthcare waste by autoclaving sterilization technique. Lebanon has a total of 163 hospitals(i.e 15,342 beds) spread throughout the country of which 135(82.82%) fall under the private sector i.e. 12,648 beds(82.44%); and 28(17.18%) under the public sector i.e. 2,550 beds(16.62%). Today, arcenciel is treating the major part of Infectious healthcare waste produced daily. The aim of this paper is to present the methodological management analysis "Industrial Sustainability Indicators". This method was used to assess the total quality and sustainability of the one of its kind network in Lebanon. This method showed that the best solution for healthcare waste disposal in Lebanon is a semi-centralized system. That solution as proved by methodological analysis is the most profitable for the service provider as well as the hospitals on one side; it is the most accurate solution for traceability and quality control on the other side. The semi centralized solution and the technique chosen are proved to be the best environmental solution. Finally, performance indicators calculated through this work, can be extended to other waste management sustainable solutions in Lebanon.

TRANSEMED: Transport Emissions and Mitigation in the Middle East - A focus on Beirut

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In the context of global climate change and growing urbanization, the East Mediterranean Basin (EMB) is a highly sensitive environment under considerable anthropogenic and environmental pressures. The increase and accumulation of anthropogenic emissions of gaseous and particulate pollutants from surrounding urban areas, and on-road transport emissions in particular, are suspected to be one of the key compounding factors of those environmental impacts (Waked & Afif, 2012). The TRANSEMED initiative aims at assessing the state of atmospheric anthropogenic pollution at local urban and global EMB scales covering short and long-term time frames. In order to achieve these aims, anthropogenic emissions should be studied, as they constitute a crucial scientific step which is often neglected. Therefore, the first step is the evaluation of the regional anthropogenic emission inventories with a focus on the road transport sector which is considered as the dominant anthropogenic source in the region (Kanakidou et al., 2011; Waked & Afif, 2012).. Pollutants under investigation include gases (the major greenhouse gas: CO2), and other pollutants like carbon monoxide (CO), sulfur dioxide (SO2), ozone precursors (NOx and speciated VOCs)) and particles (PM2.5, PM10, BC, OC). These pollutants are well recognized for their atmospheric impacts and are the ones which will be considered for the emission inventories. Thus, TRANSEMED relies on intensive in-situ observations in representative urban areas of the East Mediterranean in order to take into account the spatial and temporal heterogeneity of emissions composition. The targeted areas are: Beirut (Lebanon, Middle East), Istanbul (Turkey, Eurasia) and Cairo (Egypt, North Africa). So far, three ambient intensive field campaigns have been implemented in Beirut (summer 2011 and winter 2012) and in Istanbul (summer 2014). The highest amount of progress in this initiative lies in the far part of the EMB; specifically in Beirut, as part of the work was undertaken during the ECOCEM project. A highly resolved emissions inventory was implemented with grids of 5km x 5km for Lebanon and 1km x 1km for a domain that encompasses but only limited to Greater Beirut area (Waked et al., 2012). Results show that the dominant source of CO, NOx, and VOC is road transport, whereas the dominant source of PM2.5, PM10, and SO2 are industries and power plants. Moreover, source apportionment of PM2.5 and NMHC were conducted using the tracer based approach (Waked et al., 2013, 2014) and the positive matrix factorization (Salameh et al., submitted), respectively. For PM2.5, in summer, biogenic precursors such as monoterpenes and sesquiterpenes were the major source of OC due to intensive solar radiation and high ambient temperatures that promote biogenic VOC emissions and photo-oxidation reactions, while in winter, biomass burning was the major source of organic aerosols

because of the intensive use of wood burning for heating. NMHC loadings were governed mainly by emissions and atmospheric dynamics with little contribution of photochemistry and long range transport. On the other hand, the TRANSEM-Beirut (TRANSport & Emissions - Beirut) tunnel experiment was conducted in Salim Slam Tunnel in Beirut in July 2014 to derive EF for the Lebanese fleet and the chemical speciation of pollutants. Measured pollutants inside and outside the tunnel encompassed CO, NOx, PM2.5, speciated VOCs, CO2, nanometric PM distribution and size. Some preliminary results of this experiment will soon be presented. A very detailed and unique multipollutant database was generated in a city of the Middle East, Beirut with a focus on the organic carbon. These data cansupport source apportionment studies and will be used to evaluate the high resolution emission inventory that was recently built at the national level and at the scale of Beirut, as well as regional emission inventories. Source apportionment by means of modeling using the CTM Polyphemus/Polair 3D is at its final stages to complete the source-receptor modeling approach and for the definition of relevant emission strategies in this highly polluted region of the world.

Preliminary insights into the air quality of Zouk Mikael area

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Urban Cities on the Lebanese coastline are becoming more and more congested as population is moving from rural areas to urban ones for professional purposes and from the capital Beirut to the surrounding cities as real estate costs are more affordable. This fact increases the pressure on the road transport among other sectors. In Lebanon, Waked and coworkers (2012) determined that the dominant sector for CO, NOx, and VOC emissions is road transport concentrated mainly on the coastline, whereas industries and power plants play an important role in particulate matter and sulfur dioxide emissions. Zouk Mikael is a densely populated area in the North suburbs of Beirut - Keserwan - lying on the coastline through which the main highway linking North Lebanon to Beirut passes with more than 150,000 vehicles per day (Waked et al., 2012, Waked & Afif, 2012). Another main source of pollution in the area is the "Electricité Du Liban" main power plant which produces around 600 MW, supplemented by another 200 MW from a power barge. Additional sources of air pollutants include the different small industries located in the area, internal traffic, and power generators. Therefore, a stepwise study is being conducted and aims at 1) assessing air quality in the Zouk Mikael area through measurements and 2) apportioning the different pollutants to their respective sources through modeling. The first step of the project consisted of conducting atmospheric gas measurements using passive samplers (Radiello, Fondazione Salvatore Maugeri) situated in five different sites in Zouk: Notre Dame University - Louaize, Zouk Mosbeh; Club Animation Sportive, Zouk Mikael; Collège Saint Joseph, Antoura; Collège des Apôtres, Jounieh; and the Lebanese Army Officers' Club, Jounieh. The implementation of the sampling sites relied on the criteria of the "Agence De l'Environnement et de la Matrise de l'Energie (2002)" and the EU directive 2008/50/EC (European Union, 2008). The sampling period began in May 2013and involved the measurement NO2 and volatile organic compounds (VOCs) concentrations () over periods of 2 and 4 weeks, respectively. NO2 samplers were analyzed through the derivatization of nitrite with sulfanilamide/ N(-(1-naphtyl)ethylendiamine) dihydrochloride which forms a purple azo-dye measured with a UV-Vis-spectrophotometer (Afif et al., 2009, Radiello, 2006). As for VOCs, compounds were first extracted with CS2 after the addition of an internal standard, followed by analysis of the solution for the different VOCs (i.e. benzene, toluene, xylene, etc.) using gas chromatography (Radiello, 2006). Preliminary results show high concentrations of NO2 and variable concentrations of VOCs. Detailed results will be presented in the conference with a comprehensive analysis.

A simple ensemble modeling to assess air quality in Lebanon

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Lebanon, a Middle-Eastern country located on the Mediterranean basin, has been experiencing high pollution episodes because of a growing population, especially in urban areas, the absence of efficient public transport, and highly favorable climatic conditions for photochemical processes. Until recently, there was no air quality monitoring network. Therefore, measurement studies were led by scarce efforts from private institutions to identify local anthropogenic sources with high emissions and assess their impact on surrounding areas and population. Robust Environmental Impact Assessment studies, evaluating the impact of new infrastructures on air quality, were impossible as no background data existed for the area of interest. In 2012, Waked et al. (2012) put in place the first spatially allocated emission inventory for the Lebanese territory on a 5 km x 5 km grid; thus allowing the use of chemical transport models. Following the work of Waked et al. (2013) to model air pollution in Lebanon, this study was conducted to compare the performance of the Polyphemus/Polair3D CTM (Mallet et al. 2007) and the AMS/FARM CTM (Mircea et al. 2014) in this region, and generate spatially allocated baseline data for future air quality assessment projects. In this study, each model is run with its own set-up and input data (such as land use, meteorology, boundary and initial conditions, and biogenic emissions). The only common datum used by both are the anthropogenic emissions data based on Waked et al. (2012) emission inventory for the Lebanese territory combined with measured physical parameters, where available, for large power plants and main industrial facilities provided by the Lebanese Ministry of Environment (e.g., exit temperature, stack height, volumetric flow rate, stack internal diameter, and relative humidity). Both models were run with a spatial resolution of 5 km with MEGAN model for biogenic

emissions, boundary and initial conditions were adopted from MOZART-4 (gas)/MACC-IFS(aerosols) for AMS/FARM and MOZART-4/GEOS5 (gas and aerosols) for Polyphemus/Polair3D model. RAMS and WRF-ARW were used to model the meteorology for AMS/FARM and Polyphemus/Polair3D respectively. For the gas phase chemistry SAPRC99 was used in AMS/FARM and CB05 in Polyphemus/Polair3D. For aerosol physics and chemistry ISORROPIA and AERO3/SORGAM (Binkowski et al., 2013; Schell et al., 2001) were used in AMS/FARM whereas ISORROPIA and SIREAM/H2O (Couvidat et al., 2012) in Polyphemus/ Polair3D. In the absence of measurements, the assessment of the models output is done by computing the relative difference between both models and the mean bias. For ozone, the annual averages from both models are close, with a mean normalized bias error (MNBE) of -2.7% (using a threshold of 80 µg/m3), and the root mean square error (RMSE) over the whole domain is 25 µg/m3. However, slightly higher differences between models are observed above urban areas where anthropogenic emissions are high. For both models, hourly results showed a good representativeness of the diurnal cycle of ozone. For PM2.5, the annual MNBE and RMSE for the whole domain are 58% and 12.79 µg/m3 respectively. AMS showed higher concentrations than those of Polair3D near the domain boundaries. This difference may be related to the different boundary conditions used. Also, AMS showed lower concentrations of PM2.5 than Polair3D in urban areas where anthropogenic emissions are high. This difference may be attributed to differences in meteorology and in the chemical schemes. A one year simulation of the Lebanese air quality was done using two different CTM, for the year 2011. The only common data was the Lebanese anthropogenic emissions data. The results showed a good agreement between both models for O3 and PM2.5 where anthropogenic emissions are high. Further work should focus on updating the emission inventory, to simulate air quality for recent years, where observation data are available from the air quality monitoring network implemented late 2013. Furthermore, estimating anthropogenic emissions of neighboring countries is essential, as they cover more than a quarter of the studied domain.

BIODIVERSITY AND FISHERY RESOURCES IN LEBANESE SEAWATER (East Mediterranean)

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The Levantine Basin in the Eastern Mediterranean, including the Lebanese seawater is the most oligotrophic water body in the entire Mediterranean and thus the poorest in term of fisheries. However, despite the low productivity rate and the meager fishing activity, the biodiversity of marine flora and fauna remain very important. Fishery resources include not only the fish production in term of seafood catch, but also the basic primary productivity of organic substances as related to geochemical and physical and biological-ecological factors enhancing the trophic production through the food chain performed in the pelagic and benthic ecosystems. In this paper we tried to define and evaluate biotic and abiotic factors prevailing in the marine ecosystems and enhancing fishery resources leading to success of fisheries in Lebanese seawater. Abiotic factors constituting the basic level of the trophic pyramid in the sea, include the physical-chemical and geological factors governing the viability of living organisms in the seawater. The most important of those factors are: seawater temperature, salinity, dissolved nutrients, solar energy, sea surface and deep currents, the tide and geological factor regarding the structure and the nature of the sea bottom. The spatio-temporal and geographical variations of these factors affect the quality and quantity of marine resources production .The penetration of the light spectrum in the seawater is the most important factor for the photosynthesis. The light intensity penetrating in the sea decrease in intensity and in quality with the depth; the red and orange wavelengths are absorbed in the first ten meters, the violet, green and blue penetrate more deep. Biotic factors enhancing the primary productivity performed by photosynthetic activity through marine plant(Algae and Phanerogms) containing the activating chlorophyll pigment and under the effect of light energy. The photosynthesis occurs in the photic zone at uppermost layer of the sea level 0-50 m where algae and phanerogams are very abundant. The photosynthetic activity in absorbing the dissolved CO2 from the seawater produce the hydrocarbon and organic substances and liberating oxygen in assimilating dissolved mineral salts(nitrate, nitrite, ammonia, sulfate, silicate, etc..). The autotrophic phytoplankton (Diatoms, Dinoflagellates, Silicoflagellates) are the primary producers in the pelagic ecosystem. In our coastal and neritic seawater we recorded 175 diatoms and 250 dinophycea, from which 20% are introduced migrating species of Indo-pacific origin into the East Mediterranean through the Suez Canal; whereas the phytobenthos (Macroalgae, Angiosperms) are the primary producers in the benthic ecosystem. From those, we described 240 species in four classes: Cyaophyta, Chlorophyta , Phaeophyta and Rhodophya, and 6 species of Angiosperm Phanerogams, from which 10% are migrant introduced species. Marine plants are the basic organic producers situated at the base of the trophic pyramid. The second trophic level in the sea is formed with heterotrophic herbivorous animals which feed on algae and other plants. Most of those are hundreds of zooplanktonic species from several groups such as Copepods and other planktonic Crustacean, Tunicates , varied eggs and larvae, etc..; they live in the photic zone at the 100 m sea surface layer of, where plants are abundant . In the benthic environment hundreds of species from different groups are herbivorous(Crustaceans, Echinoderms, Mollusks, Fishes, etc.); they feed on benthic algae and plants. The 3rd trophic level is formed with 1rst carnivorous order, including hundreds of species from several marine groups such as: Fishes, Crustaceans, Mollusks, Echinoderms, etc... The other 4th and 5th carnivorous organisms standing at the top of the trophic level complete the trophic web in the sea. These carnivorous species include the big Fishes, Sharks, Cephalopods, in the pelagic system and Fishes, big Crustaceans, Mollusks, Echinoderms, etc..) . The food energy is transferred from basic trophic level to the highest level through the food web with an efficiency of about 10% and 90% of waste; this mean that in term of biomass production efficiency, 1000g of algae give 100g of herbivorous animals and the 100 herbivorous provide 10g of carnivorous of 1rst order and those give 1 g of carnivorous 2nd order and so on. When we pass from low carnivorous level to a higher level the food energy efficiency transferred decreases; this mean that higher animals expand more energy to catch

their food than the lower animals, so the trophic efficiency rate that is 10% at the lower herbivorous level became less from lower to higher carnivorous in the trophic pyramid. Most of seafood come from fisheries production, including all edible marine animals produced in the sea, caught or fished by human. They are formed in feeding on animals from pelagic or benthic environments auch as Fishes, Squids, Calmars, Octopus, Oysters, Mussels, other Bivalves, etc…The abundance and biomass of these edible organisms depends not only to the fishing efforts deployed through different techniques, but mainly to the primary productivity produced at the basic algal level followed by secondary production performed by herbivorous and followed by all other carnivorous trophic levels. In conclusion we confirm that the fisheries in our seawater depend on the abundance and quality of available marine resources , mainly flora and fauna . As the fisheries activity decrease as long as the overfishing is practiced , and because of the marine pollution and degradation of coastal ecosystem, the fishery resources decrease and fishing activity may collapse. So it is an imperative fact to proceed to protection of marine ecosystem and avoid or eliminate pollution reacing the marine environment in order to the conservation the marine biodiversity and thus fishery resources. Moreover, it is necessary to fill this gap in the meager fisheries , in developing marine aquaculture in Lebanon. So it is time now to start practicing marine aquaculture in establishing coastal marine fish farming in following the modern technology practiced in most the Mediterranean countries ; knowing that 30% of the fish production in the Mediterranean comes from aquaculture.

Assessment of carbamazepine degradation by fungus Trametes versicolor: kinetics and thermodynamics

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Carbamazepine (CBZ) is the antiepileptic medication mainly prescribed worldwide; it is as well, one of the most persistent pharmaceutically active compounds found in different aquatic ecosystems. This is principally the result of the resistance of this molecule to the activated sludge process (elimination yields inferior to 10%), conventionally used by wastewater treatment plants to achieve biological elimination of organic pollutants [1]. Generally, a poor biodegradability of a compound is essentially the result of some physical and chemical characteristics, such as its low solubility in water which reduces the chances of an efficient contact with the activated sludge microorganisms, its incapacity to cross the cellular membranes in order to be transformed by the intracellular enzymes, and its complex molecular structure leading to harder fixation on the active sites of enzymes. White-rot fungi (WRF) are eukaryotic beings known for their production of ligninolytic enzymes such as laccase and peroxidases which are extracellular, highly oxidative and little specific to lignin; therefore, WRF are high-profile candidates to perform the degradation of recalcitrant pollutants in water [2]. The purpose of this study was to assess at laboratory scale, the kinetics and thermodynamics of the elimination of CBZ in water using the WRF strain Trametes versicolor DSM 11 269. To do so, batch cultures were carried out at different temperatures ranging from 20 to 40°C, were stirred at 100 rpm for 21 days in a mineral medium of initial pH 7, containing CBZ at an initial concentration of 1 mg L-1 and inoculated with the same concentration of 50 mg L-1 (dry weight) of fungal biomass. The pH, the laccase enzymatic activity and the concentration of CBZ in the medium were monitored. The obtained kinetics was modeled using Haldane-like equation and thermodynamics ΔH, ΔS and ΔG were determined. The obtained results showed that the CBZ elimination yields can reach 80% under optimal temperature of 25°C and regulated pH conditions.

The first investigation on cactus species as a biomonitor: a case study of opuntia ficus-indica under atmospheric fallouts enriched with lead

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The impact of atmospheric deposition on trace elements diffusion into the others compartment of the biosphere (soil, water, plants, etc..) has been widely investigated (Folkeson, 1979; Jenkis, 1987). Metals are mostly identified in the atmosphere associated with organic or inorganic particles which present an aerodynamic diameter situated between 0.01 and 100 µm (Kabata-Pendias, 2010). These contaminated particles were found to present a severe damage for human health and the environment. Recently, studies involved in atmospheric pollution have been notably increased (Csavina et al., 2012). Such evolution has engaged research on trace elements accumulation after foliar absorption by several vegetables and plants. This study reports for the first time the potential of opuntia ficus-indica (Ofi) as a biomonitor of trace elements during atmospheric dust contamination. In order to reach our goal, a particular investigation on the origin of lead input in Ofi cladodes and roots was carried out by 2 distinct studies. The first one was based on the collection of cladodes, roots of Ofi as well as soil samples in the vicinity of three heavily polluted sites, i.e. Selaata fertilizer industry (Lebanon), the roadside of highway near Sayda (Lebanon), and tailings of a lead-zinc mine (Jebel Ressas in Tunisia). These collected samples were subsequently subjected to lead quantification and isotopic analysis by performing respectively an Atomic Absorption Spectroscopy (AAS), ICP-MS and TIMS measurements. On the other side, a parallel study was developed by testing the foliar and roots inputs after 4 months of exposure to synthesized fluorapatite particles enriched with lead. A quantitative analysis was also carried out by (AAS) as well as a Micro-X-ray fluorescence (µXRF) measurements that were employed to underline any possible foliar diffusion. Finally, a Scanning Electron Microscopy coupled with Energy Dispersive X-Ray Spectroscopy (SEM-EDXS) was used in the 2 studies to characterize the cladode surface and the deposited particles. The results show that Ofi is indeed a bioaccumulator of Pb mainly within cladodes. The lead isotopic composition changes according to the local Pb emission source; For the highway roadside, the Pb signature in the soil and the cactus (cladodes and roots) essentially identifies unleaded and leaded gasoline, whereas it refers

to a natural crustal source in Jebel Ressas mining site. In the industrial area, the isotopic composition in cactus cladodes shifts to more anthropogenic values than those found in roots and soil. These various isotopic signatures indicate that Ofi is a sensitive species to aerial pollution. The second study was in good accordance with our first observations. Indeed, the cladodes of Ofi were found much contaminated with lead after foliar exposition. The (μXRF) measurements showed a dispersion of fluorapatite particles retained on several zones of cladode surface and mostly in the trichome and stomata areas. Furthermore, an interesting foliar diffusion of lead concentration was detected in the first 0.3 mm of trichome layers. As for the microscopic observations, they revealed the distribution of deposited particles in some zones of cladodes surface in each of the two studies. Thereby, the possible identification of lead input coming from the atmosphere added to the important capacity of Ofi to accumulate atmospheric fallouts on the surface of its cladodes (cuticle, stomata, trichome) make this plant an adequate biomonitor. Further studies could be done to investigate the ability of Ofi to present a long term biomonitor by conserving previous source emissions of lead in its ancient cladodes. References: Csavina, J., Field, J., Taylor, M. P., Gao, S., Landázuri, A., Betterton, E. A., & Sáez, A. E. (2012). A review on the importance of metals and metalloids in atmospheric dust and aerosol from mining operations. Science of the Total Environnement, 433, 58-73. Folkeson, L. (1979). Interspecies calibration of heavy metal concentrations in nine mosses and lichens: applicability to deposition measurements. Water Air Soil Pollution, 11, 253. Jenkis, D. A. (1987). Trace elements in saxicolous lichens, in Pollutant Transport and Fate in Ecosystems, Coughtrey, P. J., Martin, M. H., and Unsworth, M. H., eds., Blackwell Sci., Oxford, 249. Kabata-Pendias, A. (2010). Trace elements in soils and plants.

CNRS-L role in Early Warning System for Natural Disasters

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Natural disasters such as floods, forest fires, landslides, droughts, earthquakes, tsunamis, and others occur frequently in most parts of our world. Disaster, precipitated by a natural hazard, can be defined as 'a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. Disasters are increasing in number and severity and international institutional frameworks to reduce disasters are being strengthened under United Nations oversight. Therefore, many activities are being carried out to improve different phases of Disaster Management (DM) such as preparedness, awareness, response, recovery and mitigation. Early Warning is obviously a central point within the whole chain, as proper warning systems that can collect and analyze data in real time as disasters occur, and when necessary, transmit early warnings to cause mitigation responses to lessen the disaster impact on lives and property. The system detects disasters in real time and determines the type, magnitude, speed, direction, and the expected geographic area to be impacted. A Disaster Risk Response Framework Plan has been recently put forward in Lebanon that established a Disaster Risk Reduction Unit under the Prime Minister's Office with coordination responsibilities in the prevention and preparedness phases of risk management. Taking this fact together with the stressing need for capacity building in disaster risk mapping and management, and to scientifically assist the DRM unit, the Lebanese National Council for Scientific Research (CNRS-L) has established (October 2014) a Sustainable Natural Resource management platform and early warning system (SuNaR) equipped with skilled experts, hardware and software, internet based satellite receiving station and associated infrastructure for the production and storage of geo-information in order to properly assist both emergency operations, implement proper prevention and preparedness actions, serving stakeholders and decision makers for disaster risk management. The CNRS's SuNaR early warning system platform is composed of an (a) Expertise Center, (b) a production center, and (c) an active stakeholder structure. The expertise center is composed of the scientific body of the CNRS and the Lebanese scientist in the domain that are working on developing research, tools and algorithms. The expertise center is connected with regional and international labs and scientific centers (NASA, CESIBIO, CIMA, etc...) and feeds the production center which in turn is comprised of an environmental database & automatic ingestion system, a processing system, and a dissemination system. The Active stakeholders is the portal upon which levels of data access will be given to stakeholders depending on their relation to SuNaR platform (people acting on the ground "Ministries, civil defense, Police" scientific expert, lab partner, end users, etc…). The dissemination structure will also host the crowdsourcing, post analysis, contingency plans. The SuNaR platform is currently focused on hydro-meteorology and wild fire risk forecast (i.e. Floods, drought, snow monitoring, forest fires, landslides) and shall expand in the future to other natural hazards. Though it is still in the early stages, the CNRS; in the recently established SuNaR early warning system platform, has laid the foundations to move from a general reactive approach, focusing on strengthening disaster response mechanisms, to proactive approaches through (i) establishing effective communication networks to integrate scientific research into practice; (iii) developing effective decision-making processes that incorporate local contexts by defining accountability and responsibility; (iii) acknowledging the importance of risk perception and trust for an effective reaction; and (iv) consideration of the differences among technocratic and participatory approaches in EWSs when applied in diverse contexts.

Evolution of Metallic Trace Elements in Contaminated River Sediments: Geochemical Variation along River Linear and Vertical Profile

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Metal pollution in riverine systems brings a serious threat that jeopardizes water and sediment quality, and hence river dwelling biota. Since metallic pollutants are persistent and thus can be transported for long distances via river flow, river management has become a great necessity. In this study, two sediment cores were collected upstream of two dams in the Orne River, France, in a vicinity greatly influenced by industrial activity during the last century. Then sediment cores were partitioned as a function of depth and characterized for physical features, such as particle size distribution and water content, mineralogical composition by XRD, SEM and TEM, elemental composition by XRF, ICP-MS and ICP-OES, including the elemental analysis of interstitial waters. The discrepancies between recently deposited sediment layers and underlying anthropogenically influenced ones are very much noticeable. Surface sediments (top 10 to 20 cm) are silty clay to silty, less consolidated and mainly constituted of expected minerals due to the geological background, while deeper layers are more clayey, consolidated, depleted of natural minerals, and enriched in metallic elements, mainly iron (~35%), and trace elements such as zinc and lead (thousands mg/Kg) in the form of sulphides (as seen by TEM).

study of the sexual maturity and sex inversion mechanism of Lithognathus mormyrus in the coastal water of Lattakia

Waad Sabour, Adib Saad and Ahlam Ali (Tishreen University, Syria)

This research has been carried out on(313) Lithognathus mormyrus caught from different marine areas of the Syrian coast (Lattakia- Gablah- And Albasset), during the period 20/9/2012- 16/9/2013 , using local fishing gears. The striped seabream sexually mature in Syrian coast at May , and lays eggs during June and July, where GSI reached the highest level(4.8%). The striped sea bream is a protandrous hermaphrodite, where there is a inversion sex from male to female,Sex inversion occurred mainly at lengths between 13.7 and 18.5 cm. This research is part of the project studying the biology reproductive of The striped sea bream Which includes the study of the dynamics of the maturity of the gonads(and per weight and morphologically and microscopically), and determine the period(or periods) reproduction, and at the stage of determining height sex inversion from male to femal.

Overview of the fossil batomorphs from the Cenomanian limestone of Lebanon

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Lebanon is worldly renown in Palaeontology for its numerous fossil fish outcrops that constitute a wonderful and unique Konservat-Lagerstätten for the Cenomanian period. The Cenomanian (circa 95 MA) was the most favorable period for trapping fossils of fish and many invertebrates in the sub-equatorial North-East of Gondwana. The climate was tropical, marked by the presence of coral reef in what is today the Mount Lebanon area. Occurrence of fossil fishes in Lebanon has been documented since 450 B.C. The preservation of these fossils is among the best in the world, and allows the fossilization of complete cartilaginous fishes, which elsewhere are mainly known from isolated teeth. This fact is scientifically of extreme importance as it permits access to anatomical details that are used to complete evolutionary studies through cladistics phylogenies. Since 1845, several scientific studies have been made on Lebanese material. New excavations on several outcrops yielded to the discovery of new material. We report herein a revision of the fossil batomorphs from the Cretaceous of Lebanon. The materials from Lebanon encompass a wide array of exquisitely preserved stem-batomorphs (Rhinobatidae, Cyclobatidae, Rajidae and Sclerorhynchidae). More than 50 specimens for the 17 describe species that belonging to 8 genera in 4 families have been studied. As a result, a re-description for some species is thus necessary as the original descriptions are based on fragmented materials which lacking several characters even sometime anatomical details for teeth.

First succession study of a cadaver entomofauna in Lebanon

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Forensic entomology studies insects in relation to court cases. It is probably the only accurate method of determining the Post Mortem Interval (PMI) when more than two days after death have passed. In order to investigate the entomofaunal colonization and pattern of decomposition of a pig's carrion, an entomological based experiment was carried out on an open field in Bedghan (Aley district, Mount Lebanon Governorate, Lebanon). Stages of decomposition and the insects that mark them were investigated. Diptera imagoes were the first to arrive to the corpse in the fresh stage and their larvae especially those of Chrysomya albiceps (Wiedemann, 1819) have dominated the active decay. Simultaneously and during the decay process, different fly and beetle species fed on the carcass until the stage of remains. Upon the sequence of their colonization, different taxa were collected. Three Calliphoridae species were recorded; Chrysomya albiceps, Lucilia sericata (Meigen, 1826), and Calliphora vomitoria (Linnaeus, 1758). Three Sarcophagidae species were identified for the first time in the fauna of Lebanon; Sarcophaga protuberans Pandellé, 1896, Sarcophaga africa (Wiedemann, 1824)and Sarcophaga carnaria (Linnaeus, 1758). Three Sarcophagidae subgenera belonging to the genus

Sarcophaga Meigen, 1826 were recognized; Liopygia Enderlein, 1928, Parasarcophaga Johnston and Tiegs, 1921 and Liosarcophaga Enderlein, 1928. Among beetles, Staphilinidae, Dinothenarus pubescens (De Geer, 1774), Creophilus maxillosus (Linnaeus, 1758) and Histeridae Saprinus maculatus (Rossi, 1792), Saprinus semipunctatus (Fabricius, 1792) were identified for the first time for the Lebanese entomofauna. Dermestes frishi Kugelann, 1792 among dermestids and Necrobia rufipes (De Geer, 1775) among clerids were observed especially during the post decay stage. Within Diptera, thermophilous predator Chrysomya albiceps was the dominant species and within Coleoptera, feeder on Diptera larvae Creophilus maxillosus was the major species. This is a first record for the entomofaunal succession on a cadaver in Lebanon; future work will better validate the results.

The Jezzinian, a Regional Stage recently implemented in the Lebanese Lower Cretaceous

Sibelle Maksoud and Bruno Granier (Université de Bretagne Occidentale, France); Dany Azar (Lebanese University, Lebanon); Raymond Geze (Universite Libanaise, Lebanon)

Since the publication by Dubertret (1963) of the volume of the "Lexique stratigraphique international" dedicated to "Liban, Syrie, Jordanie", "Falaise de Blanche", which merely a physiographic entity, was commonly treated as a genuine stratigraphic unit of the Lebanese Lower Cretaceous. However, it is a facies-driven formation, lacking a formal and unambiguous description and a type-section with a clear definition of its boundaries. In addition, due to the historical lack of ammonite finds, except for the Albian strata with the well-known Knemiceras sp. (with the first finds several tens of meters above the cliff sections studied), a direct calibration on the International Chronostratigraphic Chart was not feasible. In 2012, we initiated a full re-evaluation of "Falaise de Blanche", which led us to create a new "Regional Stage" that can equally be treated as an UBU (Unconformity Bounded Unit) or an Alloformation: the Jezzinian. The type-section is sited in Jezzine, 70 km south from Beirut. There each bounding unconformity, either the lower or the upper, corresponds to a transgressive surface (TS) merged with a sequence boundary (SB). We assume that basinward both surfaces unmerge and that the lowermost unconformity (the SB) gradually passes to a conformity without any hiatus left. Facies in the newly defined unit comprises not only the mud-dominated fabrics, formerly referred to "Falaise de Blanche", but also some grain-dominated fabrics, formerly referred to another facies-driven formation, supposedly older. We demonstrated that one facies may locally be missing or interfinger with the other, suggesting that these areas represent transitional zones between a shoal barrier and a protected lagoon behind it. This geometrical relationship is merely the signature of regular lateral changes in facies. In addition, the fossil assemblages which are very similar in both of these units, also plead for their grouping in a single unit. Actually we recently identified two lower order (sub-) sequences within Jezzinian interval. Our holostratigraphic approach, that is the integration of sedimentological data, sequence stratigraphic interpretation, macrofossils and microfossils, led us to: • correlate the Jezzinian with the Kharaibian of the Persian Gulf (South Tethys), • correlate the Jezzinian with the Urgonian sequences Ba5 - Bd1 (North Tethys), • ascribe it a latest Barremian - early Bedoulian age (equivalent at least to parts of the Giraudi - Oglanlensis ammonite zones), • estimate the duration of the upper hiatus to at least the duration of the Hawarian of the Persian Gulf (South Tethys) or the Urgonian sequences Bd2?-Bd3? (North Tethys), i.e., parts of the Oglanlensis - Deshayesi ammonite zones).

Effet de la date de récolte, des conditions climatiques et écologiques sur le rendement, la composition chimique et la bioactivité des huiles essentielles de l'Origanum syriacum, l'Origanum ehrenbergii et l'Origanum libanoticum

Raviella Zgheib (Université Saint Esprit de Kaslik, Lebanon); Naim Ouaini (Holy Spirit University of Kaslik, Lebanon); Marc Beyrouthy (Holy Spirit University - Kaslik, Lebanon)

Effet de la date de récolte, des conditions climatiques et écologiques sur le rendement, la composition chimique et la bioactivité des huiles essentielles de l'Origanum syriacum, l'Origanum ehrenbergii et l'Origanum libanoticum. Raviella Zgheib 1, Naim Ouaini 1, Marc El Beyrouthy 2. 1 Département "Chimie et Sciences de la Vie et de la Terre", Faculté des Sciences, Université Saint-Esprit de Kaslik, B.P. 446 Jounieh - Liban 2 Faculté des Sciences Agronomiques et Alimentaires, Université Saint-Esprit de Kaslik, B.P. 446 Jounieh - Liban raviella-zgheib@hotmail.com, naimouaini@usek.edu.lb, marcelbeyrouthy@usek.edu.lb Liban est l'un des pays méditerranéens qui ont une longue tradition médicale à base de plantes médicinales. La production des huiles essentielles HE à partir de ces plantes pourrait constituer une source économique pour ce pays. Le rôle fonctionnel des herbes, des épices et de leurs constituants est un sujet de recherche très intéressant pour l'étude. En réalité, les épices ne sont pas uniquement évaluées pour leurs propriétés d'assaisonnement, mais aussi elles sont appréciées pour l'efficacité bioactive de leurs HE. Ces dernières sont des substances odorantes volatiles et très actives contenues dans les végétaux et elles font l'objet d'étude pour leur éventuelle utilisation comme antioxydants, antimicrobiens, anti-inflammatoires et anticancéreux. L'origan (Origanum sp.), une plante vivace de la famille des Lamiacées, est un des éléments majeur de la flore en Méditerranée. Au Liban, l'origan est connu depuis l'histoire ancienne et fait partie du quotidien des libanais jouant un rôle socio-économique non négligeable. Connu sous le nom de Za'atar ou Zoubaa, l'origan a des usages multiples comme condiment alimentaire, aromatique et médicinal. Il est surtout utilisé dans la préparation de la fameuse pizza libanaise appelée "Manakish". Plusieurs espèces d'origan poussent à l'état sauvage au Liban dont l'Origanum ehrenbergii, et l'Origanum libanoticum qui sont des espèces endémiques du Liban, et, l'Origanum syriacum, endémique du Levantin. Depuis longtemps, nos ancêtres ont eu

l'habitude d'utiliser l'origan en médecine traditionnelle pour ses vertus thérapeutiques diverses comme agent stimulant, analgésique, antitussif, expectorant, sédatif, antiparasitique,… Pourtant, malgré que l'impact des habitudes naturelles sur la variation du rendement et de la composition a été reporté dans différentes études, les cultivateurs ignorent toujours que l'effet médicinal de l'origan est attribué à certains composants majeurs de leurs HE dont le rendement qualitatif et quantitatif dépend largement de plusieurs facteurs tels que le climat, la saison, le sol et la date de récolte. Dans ce contexte, le présent travail consiste à mettre au point l'effet de la date de récolte, de la région et de la méthode de séchage sur la composition chimique des HE de l'Origanum ehrenbergii, l'Origanum libanoticum et l'Origanum syriacum tout en évaluant leur rendement durant tous les mois des années 2013-2014. Ceci va permettre d'estimer les conditions optimales et la meilleure période de récolte pour lesquelles les HE de ces plantes auront un rendement satisfaisant ou une activité intéressante afin de pouvoir les utiliser à bon escient. A noter qu'aucune étude préalable a analysé la variation de la composition chimique des HE de ces espèces pendant tous les mois de l'année et durant tous les stades de développement végétatifs et ceci en fonction de différentes techniques de séchage. Des échantillons d'Origanum ehrenbergii, Origanum libanoticum et Origanum syriacum ont été collectés mensuellement à la main de différentes régions libanaises et de différentes altitudes et cela avant, pendant et après la période de pleine floraison des plantes donc durant différentes périodes de l'année. Les parties utilisées sont surtout les parties aériennes: feuilles vertes et sommités fleuries. Les plantes, fraîchement récoltées, ont été ensuite séchées suivant deux méthodes: le séchage traditionnel et la lyophilisation. L'extraction des HE, par hydrodistillation utilisant l'appareil Clevenger, étaient suivies par la détermination du profil chimique de nos extraits. La composition chimique des HE a été déterminée par chromatographie en phase gazeuse couplée à la spectrométrie de masse (CPG / MS). Plusieurs composants ont été identifiés pour chaque espèce et les composants majoritaires de l'Origanum syriacum et l'Origanum ehrenbergii sont: Thymol, Carvacrol, γ- Terpinène, p-Cymène. Cependant, l'Origanum libanoticum est riche en Thymol méthyl éther et β-Caryophyllène. La détermination de la date optimale de récolte augmenterait la capacité du producteur à contrôler le rendement de ses cultures et la qualité des HE qui constituent des critères très importants dans la commercialisation ultérieure du produit ou bien dans son utilisation dans la préparation d'ingrédients fonctionnels pour diverses applications industrielles. En effet, il a été observé que le rendement et la composition chimique des HE dépendent largement du climat, de la saison, des conditions géographiques, de la période de récolte et de la technique d'extraction. Pendant le stade de pleine floraison, la phase la plus productive, le rendement en HE atteint son apogée et les composants majoritaires sont dominants. L'importante bioactivité est due principalement à la richesse de ces essences en dérivés phénoliques (carvacrol et thymol) possédant une forte activité antimicrobienne. En effet, le thymol est le composé qui possède le plus large spectre d'activité antifongique et antibactérienne contre de nombreuses espèces, y compris Aspergillus sp., S. aureus et E. coli. Ceci montre que la flore libanaise peut constituer une réserve importante d'espèces végétales intéressantes, dont l'effet inhibiteur de leurs principes actifs sur le développement bactérien et fongique laisse entrevoir des perspectives d'application dans les domaines de l'industrie agroalimentaire et pharmaceutique. Face au problème soulevé depuis plusieurs années par la résistance des bactéries, l'usage des HE semble être la véritable alternative aux antibiotiques lors des infections et les meilleurs candidats fiables pour les relayer. Les composants mineurs favorisent avec les composants majeurs un effet synergétique qui joue un rôle déterminant sur le plan d'utilisation médicinale ou autre. Donc, une évaluation in vitro de l'activité antimicrobienne des HE de l'Origanum ehrenbergii, l'Origanum libanoticum et l'Origanum syriacum sur un ensemble de bactéries pathogènes pourra être un plan suivant de mon travail. Mots-clés: Huile essentielle ; Origanum syriacum ; Origanum ehrenbergii ; Origanum libanoticum ; composition chimique ; date de récolte ; GC-MS ; Clevenger ; rendement ; bioactivité.

Polymères à empreintes moléculaires pour la recapture de résidus de médicaments dans les eaux

Syntia Fayad (Orleans & ICOA, France)

La carbamazépine (CBZ) est le premier médicament antiépileptique approuvé en 1974 pour le traitement des troubles bipolaires. Sa surveillance dans l'eau est nécessaire compte tenu de l'impact de ce genre de substances sur l'écosystème vis-à-vis des organismes vivants. Dans ce contexte, un polymère à empreintes moléculaires (MIP) de la CBZ a été synthétisé afin d'extraire spécifiquement ce médicament de matrices aqueuses. Le MIP a été préparé en utilisant la CBZ, l'acide trifluorométhacrylique (TFMAA) et le dichlorométhane comme molécule empreinte, monomère fonctionnel et solvant de polymérisation, respectivement. Dans cette étude, la sélectivité du MIP vis-à-vis de la CBZ a été évaluée par extraction sur phase solide (SPE) d'un échantillon aqueux dopé par la CBZ. Cette démarche a nécessité la mise au point de différentes étapes de lavage afin de renforcer les interactions spécifiques de la CBZ par les empreintes et minimiser les interactions non spécifiques. Le passage à un échantillon d'eau minérale (matrice réelle) a requis la mise en place d'une étape de lavage supplémentaire afin de conserver la sélectivité du matériau mis au point. Avec le protocole optimisé, quel que soit le volume d'échantillon d'eau minérale extrait (1, 10, 20 ou 100 mL), à quantité de CBZ déposée constante (5µg), un excellent rendement d'extraction de la CBZ par le MIP de 100 % a été obtenu. En outre, la sélectivité et l'affinité du MIP vis-à-vis de molécules analogues à la CBZ a aussi été étudiée. Quatre antidépresseurs tricycliques (ATCs) fréquemment utilisés par l'Homme, la désipramine, l'imipramine, la trimipramine et la clomipramine ont été sélectionnés. Les extractions SPE faites sur des échantillons aqueux dopés en ATCs et en CBZ à 5 mg.L-1 ont montré la forte affinité des ATCs vis-à-vis de la matrice polymérique avec des recouvrements de 100 % à l'étape d'élution. Une chute à 64 % du recouvrement en CBZ a prouvé l'effet compétiteur des ATCs dans les interactions de la CBZ avec le MIP. Ce travail a montré l'intérêt de développer de nouveaux matériaux contribuant à améliorer l'efficacité des systèmes de surveillance des eaux. Ces derniers constituent une étape amont indispensable à l'amélioration de la qualité des eaux en

permettant de dresser un suivi représentatif de l'état des masses d'eau nécessaire à leur gestion. De plus, cette approche pourra être transposée dans les années à venir à d'autres polluants dangereux pour la faune, la flore et l'Homme.

Caractérisation de la pollution du sol d'une parcelle de la Bekaa (Liban): essai de phytoremédiation assistée par les champignons mycorhiziens

Imad El-Alam (Université Libanaise, Lebanon); Ramez Chahine and Hassane Makhlouf (Lebanese University, Lebanon); Anissa Lounès-Hadj Sahraoui (Université du Littoral Cote d'Opale, France); A Verdin (Université du Littoral Côte D'Opale, France); Joel Fontaine (Université du Littoral Cote d'Opale, France)

La plaine de la Bekaa est une zone agricole de premier plan. Elle englobe plusieurs industries, qui, en plus de l'agriculture intensive, des déchets domestiques et hospitaliers, contaminent les cours d'eau dont le plus important est le fleuve du Litani. Selon plusieurs études portant sur la qualité des eaux du Litani, le niveau de pollution par certains polluants inorganiques (métaux lourds) et organiques (dioxines, hydrocarbures, pesticides…) s'avère très alarmant (El-Fadel et al., 2003 ; Nehme et al., 2014). Les eaux du Litani, ainsi que celles de ses affluents, sont largement utilisées pour irriguer les champs des cultures provoquant ainsi la contamination des sols et des cultures. Ce transfert au sein de la chaîne alimentaire représente donc un risque d'exposition de l'homme à cette pollution qui pourrait être à l'origine d'une recrudescence du nombre de cas de cancer au sein de la population locale (Adib et Daniel, 2006). Parmi les méthodes existantes de traitement des sols, la phytoremédiation (utilisation des plantes et de leurs microbiotes associés, pour éliminer, contenir ou rendre moins toxiques les contaminants environnementaux) est plus conforme aux enjeux du développement durable que les techniques physico-chimiques, qui en dépit de leur rapidité, conduisent à l'altération des propriétés biologiques du sol et de sa biodiversité. La phytotoxicité et la faible biodisponibilité des polluants sont deux facteurs qui peuvent limiter l'efficacité de la phytoremédiation. Ainsi, l'apport d'amendements biologiques tels que l'ajout d'un inoculum à base de champignons mycorhiziens pourrait constituer une bonne solution pour améliorer la tolérance des plantes à la toxicité des polluants, mais également augmenter la biodisponibilité des polluants. Les champignons mycorhiziens sont présents dans la plupart des sols naturels et anthropique. Il est établi que plus de 90% des espèces végétales vivent en symbiose avec des champignons mycorhiziens à arbuscules (CMA) (Bonfante et Genre, 2010). En échange des substances carbonées fournies par la plante, ces champignons apportent une meilleure nutrition hydrique et minérale à la plante, améliorant ainsi à la fois sa croissance et sa tolérance aux stress biotiques et abiotiques, et notamment aux polluants. En outre, les CMA favorisent l'élimination des polluants en explorant un volume de sol beaucoup plus important (1000 fois plus par rapport à une racine seule), en modifiant les propriétés physico-chimiques de la rhizosphère ainsi que les communautés microbiennes associées dont celles à capacité dégradante. Nous recherchons, dans un premier temps, la caractérisation de la pollution des sols de la Bekaa Centrale et de leur viabilité microbienne. Dans un second temps, nous envisageons d'explorer la biodiversité végétale locale, sauvage et/ou cultivée, mycorhizées par des souches de CMA indigènes et/ou introduites, en vue de proposer une méthode biologique de traitement de ces sols (phytoremédiation assistée par les CMA).

Determination of manganese oxide phases dispersed on hydroxyapatite for total oxidation of toluene

Dayan Chlala (Lebanese University & University of Lille 1, France); Jean-Marc Giraudon (Université Lille 1, France); Jean-François Lamonier (University of Lille 1, France); Madona Labaki (Lebanese University, Lebanon)

The research of new catalytic materials requires available cheap and non-toxic components. Phyllomanganates such as birnessite, buserite and related phases are amongst the strongest known natural oxidants and Mn is an easily reducible/oxidable element. Hence such materials represent an efficient class of catalysts for total oxidation of volatile organic compounds. Among them well dispersed Ca manganese oxides have not been studied so far. A new and original synthetic pathway may involve hydroxyapatite, Ca10(PO4)6(OH)2 (HAP) which is a safe and non-toxic material. HAP can play both the role of a catalyst support and a Ca supplier agent to get Ca manganese oxide phases. Indeed HAP is recognized for its ability to easily exchange calcium ions exposed on the surface at site I (coordinated by 9 oxygen ions) and site II (coordinated by five oxygen ions and one hydroxyl group). A previous work reported on efficient Mn-HAP catalysts for direct imine formation by oxidative coupling of alcohols and amines but mainly focused on the acido-basic properties of the catalyst. Pioneering work in this field aiming to dope HAP with a Cu active phase has been very recently reported. The hypothesis of 5 possible sites for Cu location has been proposed on the features of HAP structure and experimental results. Additionally it was found that the Cu location and species can be adjusted owing to the method of preparation. In the present work, the wet impregnation has been adopted to disperse 10 Mn wt% species on HAP. The main challenging task is to be able to determine the location and nature of Mn species taking into account that HAP flexible structure offers a wide range of possible cationic as well as anionic substitutions. Keywords: manganese calcium oxide, hydroxyapatite, catalytic oxidation, VOC

Dynamiques des écosystèmes méditerranéens durant le passé

Jalal Tabel (Université de Montpellier, France); Carla Khater (Conseil National de la Recherche Scientifique, Lebanon); Rachid Cheddadi (Université de Montpellier, France)

Le bassin méditerranéen est le troisième «Hotspot» plus riche de la planète en termes de plantes endémiques et en biodiversité végétale. Les écosystèmes forestiers méditerranéens sont composés d'espèces endémiques et emblématiques telles que le cèdre et le sapin, dont les aires de répartitions ont variés sensiblement durant les 20 derniers millénaires, en relation avec les changements climatiques globaux et récemment par les différentes activités anthropiques. La région méditerranéenne est très sensible aux fluctuations climatiques. Une prochaine aridification est prévue dû à une diminution des précipitations et une augmentation de la température. Quelle va être le comportement de ces communautés végétales face aux changements climatiques actuelles, celles prévues dans le futur et quelles vont être les conséquences? Pour pouvoir évaluer les conséquences de tels changements dans le futur, il faut avoir une fenêtre dans le passé. Les études paléoécologiques sont pertinentes pour la reconstitution des changements passés de l'environnement (climat, végétation…) et des activités anthropiques ainsi que leurs impacts sur les écosystèmes, elles sont aussi les principales sources d'informations pour valider les comportements des modèles à long terme. Dans le but d'élargir nos connaissances sur la dynamique des écosystèmes méditerranéens et leurs relations avec les changements climatiques globaux depuis la dernière période glaciaire, des analyses multi proxy (palynologie, géochimie…) ont étés menées sur des séquences sédimentaires prélevées du Moyen Atlas, Maroc, pour reconstruire les dynamiques paysagères au cours de la dernière période glaciaire et l'Holocène. Les résultats de ces analyses montrent que les paysages ont été dominés par des steppes durant la dernier période glaciaire dû à un climat sec et aride. L'Holocène chaud et humide montre une dynamique de végétation qui débute par l'expansion des forêts de chênaies, et plus tard par l'expansion de cèdres. La dernière partie de l'Holocène montre que les paysages ont été fortement impactés par les différentes activités humaines. Donc, les paysages ont subi des changements majeurs des steppes à des forêts en réponse à l'augmentation de l'humidité. Le retard d'expansion de cèdre est probablement lié à un début d'holocène plus chaud et moins humide que l'actuel. C'est un LIA O-LiFE numéro de contribution OC-17-2015

P2_TECP1_Chimestry: Poster Session 2- Theoretical and Experimental Chemistry and Physics I

Room: USJ Hall CSH

Chairs: Natalie Estephan (Holy Spirit University of Kaslik, Lebanon), Chadi Nader (Lebanese University, Lebanon)

Characterization of depolymerized and non-depolymerized alginate extracted from Lebanese brown algae Sargassum vulgare and the synthesis of amidic-alginate derivatives

Nouha Sari Chmayssem (EDST UL, France); Samir Taha (Lebanese University, Lebanon); Hiba Mawlawi (Lebanese University- Health 3, Lebanon); Thierry Benvegnu (ENSCR, France)

Lebanon, with its Mediterranean coast, is a country deeply influenced by the sea, where it exists thousands of marine species, especially brown and green seaweeds unexploited until now. [1] Nowadays, the field of surfactants developed from a low-cost renewable biomass, in order to replace petrochemical products, is a concept that is gaining recognition in blue chemistry, biotechnology, cosmetics, pharmaceuticals and food industries due to their low toxicity, biodegradability, high efficiency and specific modes of action.[2] The aim of our study is to extract and characterize alginates (Fig. 1) from the brown algae Sargassum vulgare collected from Tripoli Al-Mina Lebanese coast, in order to synthesis hydrophobically modified amphiphilic alginates. In fact, the development of hydrophobically modified amphiphilic alginates find a lot of applications as stabilizers, binders and thickening or gelling agents in various areas including pharmaceutical applications. In aqueous solutions, they show specific properties mainly due to their ability to develop intra- and/or intermolecular hydrophobic associations. These associations lead to the formation of aggregated structures and/or three dimensional networks (gels) that show great potential for the entrapment of therapeutic active molecules. [3] The extraction method of alginates is based on successive acidic and basic treatment of S. vulgare. [4] The yield of extraction was 40% and a low content of proteins (< 0.62%) was detected with a molecular weight of 110200 g/mol. The sequence and the composition of uronate units in alginate sample have been obtained by FT-IR, 1H-NMR and 13C-NMR spectroscopy. [5] The viscosity problem was overcome by a controlled depolymerization of alginate sample. [6] NMR spectra is recorded at 80°C.[4] M/G ratio of alginate characterized by 1H-NMR was 0.82, the FM and FG were 0.45 and 0.55 respectively. Then, a controlled acid hydrolysis of our alginate sample was realized in order to obtain a fraction enriched with polymannuronate (PolyM) and another enriched with polyguluronate (PolyG) with a yield of 22% and 32% respectively. These two fractions were found to have close molecular weight about 7000 g/mol. [5] The antioxidant properties of the depolymerized and non-depolymerized alginate sample were evaluated by determining the scavenging ability of stable radical DPPH.. Clearly, the results demonstrated differences in scavenging efficacy of these fractions mainly depending on its G content. A high hydroxyl radical scavenging activity comparable with those of standard antioxidants was observed from the PolyG fraction (~92% at 2 mg/mL) that could be valuable in foods or pharmaceutical products as alternatives to synthetic antioxidants. The synthesis of amphiphilic alginate, polyG and polyM is performed in an aqueous

phase reaction. 1-octyl amine was covalently coupled to alginate and its fractions via amide functions using 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride (EDC-HCl) as a coupling reagent to provide octyl-grafted amphiphilic alginate-amide derivative.[3] The structure of these amphiphilic derivatives was confirmed by FT-IR and 1H-NMR spectroscopies.

Vapor pressure measurement of heavy hydrocarbons by dynamic saturation apparatus

Juliette Stephan (Université Libanaise & Faculty of Sciences, Lebanon); Joseph Saab (Université Saint-Esprit de Kaslik & Faculty of Sciences, Lebanon); Ilham Mokbel and Jacques Jose (Université Claude Bernard Lyon1, France); Hanane Ishak (USEK, Lebanon)

A petroleum fraction is a typical multi-component system wish is necessary to control the composition, the equilibrium temperature and pressure very carefully during the experimental procedure. The vapor pressure is a reliable thermophysical parameter used to estimate the enthalpy of vaporization valuable in engineering work [1] and it is a crucial parameter in meeting safety requirements in crude oil transportation[2]. Among oil industries, petroleum refineries have been identified as large emitters of pollutants especially the polycyclic aromatic hydrocarbons (PAH)[3]. Donaldson and al. [4] mentioned that understanding the physical processes which govern the distribution of a chemical species among environmental phases is critical to the prediction of the fate in the environment. Vapor pressure data for low molecular weight hydrocarbons are easily measured and many reliable sources are available; unfortunately, this is not the case for heavy hydrocarbons due to their experimental measurement challenges. In this work, we present the vapor pressure of heavy polycyclic aromatic hydrocarbons, HAP (vapor pressure < 1 Pa), Benzyl butyl phthalate (BBP) with a molecular weight of 312.36 gmol-1. We used the dynamic gas saturation method for the measurement in a temperature range between 353,15 and 448,15 K. results showed great conformity comparing to literature value with relative standard deviation of 0,6%. Our team is now interested in building up an online dynamic gas saturation apparatus coupling both sampling and analytical parts. Acknowledgments: the authors would like to thank the Innovation project- Lebanese university for their financial support.

High density barium titanate nanoceramics derived from mechanical activation and Spark plasma sintering

Tawfik Al Naboulsi (Lebanease University, Lebanon); Raymond Hajj and Mirvat Zakhour (Lebanese University, Lebanon); Madona Boulos (Universite Libanaise, Lebanon); Pascal Dufour and Sophie Guillemet-Fritsch (Universite Paul Sabatier, France)

The electronic development is based on the miniaturization of devices while preserving or increasing their performance. The interest of recent research is finding new performed materials or improving existing like barium titanate. We report here an unsophisticated elaboration process leading to very interesting properties Barium Titanate (BaTiO3, BT). BT powder was synthesized by a solid-state reaction via ball milling of BaCO3-TiO2 mixture followed by a calcination. Thermo-gravimetric analysis revealed a totally decomposition of BaCO3 at 900oC. The calcinated powders were characterized by X-Ray diffraction (XRD), Raman spectroscopy, BET analysis, and field emission guns scanning electron microscope (SEM-FEG). XRD showed the cubic structure of powders while Raman spectroscopy revealed the presence of a minor tetragonal structure. The final powders were sintered for 3 minutes by spark plasma sintering. The temperature dependence of relative permittivity showed a shift of Curie temperature to a lower value (386 K). These ceramics exhibit stable colossal dielectric permittivity (3.5 x105) and low losses (0.07) at room temperature for a wide range of frequency.

Synthesis and characterization of new coupling derivatives between closo-decahydrodecaborate and polyoxometalate for biological activities

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The "POMs-borates" project aims to develop a new class of anti-tumor inorganic chemical compounds by chemical combination between two type of clusters "Hydroborates" and "polyoxometallates. Hydroborates clusters are anionic compounds of boron and hydrogen. They are remarkably stable compounds thermally and chemically in neutral aqueous medium, acidic or basic. The chemistry of these compounds is very rich and possible substitutions on these clusters can be done which helps to strengthen the most interesting properties. The closo-decahydrodecaborate anion and its derivatives [LB10H9]n- have several potential applications depending on the nature of L group; It has been used as extractants of radioactive cations, as medicinal drugs in Boron Neutron Capture Therapy BNCT technique, as electrolytes in lithium-ion batteries and applicable for hydrogen storage. Polyoxometalates POMs are considered as molecular oxides, they correspond to assembly of MO6 fragments (M = Mo or W in most cases) around an anion which can be a silicate or a phosphate, for example. POMs have various properties and applications in all fields especially in medicine. But there is need to improve the structure of POMs by other chemicals that should not be toxic and does not affect their biological activity. But these chemicals are unstable, toxic and limited. Hydroborates show promising results to substitute these obligations. The project is directed towards functionalization of closo-decaborates using polyoxometalates that could create a synergy between these different types of clusters and optimize their properties. As part of this project, the focus will be on the

chemical synthesis and on the analysis of their anti-tumor biological activity. Different approaches were tried to functionalize directly decaborate with polyoxometalates but these attempts were unsuccessful, therefore the solution will be in the use of a link spacer. Currently the project aims to investigate the preparation of two different links, a triol link and a silicon link that can be added to boron cage and then study their reactivity on the POM cluster

Catalyseurs d'hydrogénation à base de Rh(0) colloïdal dispersé sur des supports acides mésoporeux hexagonaux et mésocellulaires

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Dotées d'une importante porosité en 3D et de larges ouvertures, les mousses mésocellulaires (MCF) siliciques sont potentiellement des supports de catalyseurs plus adaptés que les silices mésoporeuses à structure hexagonale de type SBA-15. De tels matériaux permettent en effet d'envisager des transformations catalytiques pour des substrats réputés volumineux tout en facilitant les circulations de réactifs et produits.

Hydrogen generation from the hydrolysis of Mg-based materials for PEM Fuel Cell

Toufic Tayeh, Abdel Salam Awad, Eliane Asmar, Mirvat Zakhour and Michel Nakhl (Lebanese University, Lebanon); Jean-Louis Bobet (University Bordeaux 1, France)

Researchers are starting to pay more attention on Mg-based materials hydrolysis to produce hydrogen for fuel cell. Pure hydrogen can be obtained by reacting Mg with water through the reaction: $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$ $\Delta Hr = -354$ kJ.mol−1 Most of the previous studies were focused on the enhancement of this reaction by using acid, salt, ultrasounds and mechanical treatment of Mg or Mg-additives. In the present study metal oxides has been used as additives. Two metal oxides (Nb_2O_5 and V_2O_5) were co-milled with Mg and the hydrolysis reaction was studied using NaCl solution (3.5 Wt.%). The mixture was milled in a stainless steel vial under 10 bar of H_2 for different times (1, 3 and 5h) with 30 min of continuous milling followed by a break for 2 min. The ball to powder weight ratio was 17:1 corresponding to 8g of powder and 34 stainless steel balls and the rotation speed was 250 rpm. The reaction rate depends on the nature of oxides. The best kinetics were found for big particles in spite of small ones. It is assumed to come from: (i) The presence of fractures and crackings which is clear in the case of Mg/oxide ball milled for 1h. A complete hydrolysis reaction was found for mixtures milled for 1h with better kinetics than the ones milled for longer time; in addition Mg/Nb_2O_5 (particle size ~ 100 - 150 µm) mixture ball milled for 1h releases the theoretical hydrogen yield in a shorter time than the Mg/V_2O_5. (ii) The presence of hydride, formed during the ball milling, which decreases Mg particles size leading to a higher conversion of Mg into its hydride, induces a delay of the hydrolysis reaction. To investigate the feasibility of on board hydrogen production from hydrolysis of Mg/MgH_2 alloy to power a PEMFC, a single cell was connected directly to the hydrogen production reactor containing 50 mg of Mg-H (about 90 mL of H_2). The polarization curve of a single PEM was measured using a potentiostat (AUTOLAB PGSTAT302N). The cell exhibit a stable value of approximately 0.52 V for roughly 35 min at 0.15 A corresponding to a efficiency of 11 %.

Etude de la faisabilité de la séparation de polymères de type protéines en macro LC(HPLC très faible débit micro colonne) LC-MS/MS

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La protéomique consiste à étudier l'ensemble des protéines d'une cellule, d'un tissu ou d'un liquide biologique. Depuis peu la chromatographie liquide couplée à la spectrométrie de masse ou la spectrométrie de masse en tandem est devenue une méthode de choix pour l'étude des protéines en milieu complexe. Notre étude est basée sur l'optimisation des paramètres de la LC-MS/MS pour pouvoir détecter le plus grand nombre de protéines présent dans des milieux complexes. La spectrométrie de masse consiste à identifier des molécules en fonction de la mesure précise de leur masse. Dans notre étude on réalise une étude digestion enzymatique, il faut d'abord digérer les protéines de l'échantillon à étudier grâce à une enzyme(la trypsine) afin d'obtenir des fragments protéiques(ou « peptides ») de taille différents qui sont solubles en solution injectée ensuite en LC-MS/MS. Les masses de chaque peptide et de leurs fragments sont ensuite déterminées en comparant les données expérimentales aux données déjà existantes dans des banques. L'objectif à terme était d'identifier précisément les peptides contenus dans un échantillon complexe dans notre cas formé de cellulases et albumine. Les échantillons étudiés en protéomique peuvent être de différente nature et représenter un protéome entier(organisme, cellule), un sous-protéome(organite, compartiment sub-cellulaire, phosphoprotéome) ou encore un complexe protéique, mais ils sont toujours constitués de protéines en mélange(Bodzon-Kulakowska et al., 2007) L'enzyme la plus couramment utilisée dans la digestion des protéines est la trypsine. C'est une protéase stable qui clive les protéines en peptides de manière très spécifique du côté C-terminal des résidus lysine et arginine. L'albumine et quatre protéines appartenant au groupe des cellulases ont été étudiés, l'endoglucanase 1, endoglucanase 2, exoglucanase 1, exoglucanase 2. Les échantillons de protéines à analyser sont introduits dans l'appareil HPLC-MSMS de Thermo Scientific ™. La LC-MS/MS est composée d'un système d'Ultra Chromatographie liquide à très haute performance(UPLC) qui est couplé avec un spectromètre de masse(MS) en tandem. Cet appareil est composé de quatre modules: le passeur d'échantillon, la pompe, la colonne et la MS. Suite à la digestion enzymatique d'une solution mère constituée de cellulases et d'albumine de concentration 1mg.ml-1, une solution contenant 119 peptides

a été obtenue ensuite traité. On a appliqué une digestion enzymatique sur différents concentrations différentes allant de 5µg.ml-1 à 50µg.ml-1, ces solutions ont ensuite été analysées par LC-MS/MS. L'identification d'un peptide a été réalisé en cherchant dans l'ensemble du chromatogramme, les pics dont le spectre de masse comportait les massifs isotopiques correspondant au peptide chargé 2, 3 et 4 fois. Un pic chromatographique a ainsi pu être attribué à un peptide dès lors que 2(ou +) massifs isotopiques du peptide charge 2, 3 ou 4 fois, étaient trouvés dans le spectre de masse du pic chromatographique. Le temps de rétention de chaque peptide a ainsi été déterminé. L'aire sous le pic a également été relevée. De plus, avant de confirmer l'identification du peptide 'dit père' celui-ci a été fragmenté. Les m/z des ions fils obtenus ont été répertoriées et comparées aux m/z théoriques selon la base de données « protein prospector ». Afin de pouvoir vérifier que les peptides trouvés sont les bons on a fragmentes les ions pères et on a obtenue des ions fils. Tous les ions issus de l'ionisation par ESI seront fragmentés de nouveaux pour obtenir les ions fils. On cherche les ions fils de chaque ion père pour s'assurer que c'est le bon. Pour l'albumine On remarque que les peptides contenant au moins 10 acides aminés ont une réponse assez intense, néanmoins on remarque que ce sont essentiellement les peptides contenant 5 à 7 acides aminés qui répondent le mieux. On remarque qu'à 5 µg.ml-1 les peptides ont une réponse très faible. Pour la cellulase seuls quelques peptides ont été trouvés, ceci est dû à la faible concentration de chaque protéine dans le flacon standard. Seuls 8 peptides parmi 16 de l'endoglucanase 1 répondent. Seuls 8 peptides parmi 14 l'endoglucanase 2 répondent. Seuls 13 peptides parmi les 21 de l'exoglucanase 1 répondent. Seuls 10 peptides parmi les 19 de l'exoglucanase 2 répondent. Les aires des peptides à 5 µg.ml-1 sont presque négligeables, là encore elles sont trop faibles pour être correctement déterminées. Lors de la mise en place de la méthode, il est recommandé de contrôler le domine de linéarité de la courbe de calibrage, ce contrôle doit être effectué sur une gamme de concentration importante. Pour cela on a effectué trois gammes étalons, la première constituée de 0 à 10 µg.ml-1, la deuxième de 30 à 40 et la troisième de 40 à 50 µg.ml-1 avec un saut de 2 µg.ml-1 entre chaque point, chaque point de gamme a été réalisé 3 fois . La LC-MS/MS est la technique appropriée pour la quantification des peptides surtout dans notre cas celui de l'étude des peptides issues de la digestion enzymatique par la trypsine de l'albumine et la cellulase. Dans le cadre de notre projet nous avons étudié la faisabilité de la séparation de 129 peptides différents via cette technique. Plusieurs paramètres ont été modifiés tout le long de notre analyse, en particulier les paramètres d'ionisation du Q-Exactive.

Etude des réactions entre la monochloramine et les molécules organiques modèles(acides aminés)

Simon Hayek (Université Saint-Esprit de Kaslik, Lebanon); Hervé Gallard and Florence Berne (Université de Poitiers, France); Naim Ouaini (Holy Spirit University of Kaslik, Lebanon); Virginie Simon (Université de Poitiers, France)

La monochloramine soit connue pour être un désinfectant moins efficace que le chlore, dans certains cas, la monochloramine est utilisée à la fois pour la désinfection primaire et secondaire. Cependant, les réactions entre le chlore et les matières organiques naturelles(MON) présentes dans les eaux conduisent à la formation de nombreux sous-produits de désinfection(SPD). Les autorités sanitaires ont fixé des concentrations maximales à ne pas dépasser pour certains SPD comme les trihalométhanes. La monochloramine pure(NH_2Cl) est un liquide incolore et instable, produite par ajout de chlore à une solution contenant de l'ammoniaque, par ajout d'ammoniaque à une solution contenant du chlore résiduel libre($HOC1 + NH_3 \leftrightarrow H_2O + NH_2C1$)(Cimetiere et al., 2009; Fayyad and Al-Sheikh, 2001). L'eau ultra-pure(EUP) utilisée pour la préparation de toutes les solutions est produite par un système Millipore Synergy 185 muni d'une cartouche Sim Pack 1. Il fournit une eau de résistivité 18,2 MΩ.cm, de teneur en carbone organique total inférieure ou égale à 0,1 mg.L-1. Les solutions de monochloramine(≈ 2 mM) sont préparées au maximum quelques heures avant utilisation, en ajoutant lentement et sous agitation rapide, le chlore libre dans une solution de chlorure d'ammonium. La solution de HOCl mère est préparée à partir d'une solution commerciale de chlore et le pH est ajusté vers 8,0-8,5 avec de l'acide chlorhydrique HCl. Les spectres d'absorption UV-Visible(entre 200 et 350 nm) et les mesures d'absorbance ont été réalisés à l'aide d'un spectrophotomètre à simple faisceau Safas UV-mc2 connecté à un ordinateur. La cinétique par dégénérescence d'ordre a été utilisée afin d'étudier la réactivité d'acides aminés vis-à-vis de la monochloramine. Les concentrations de la monochloramine et des acides aminés étaient respectivement 2 mM et 40 mM. Différents débits allants de 0,2 à 40 ml/min ont été appliqués dans le but de déterminer les valeurs des constantes cinétiques des acides aminés en question. L'absorbance de nos mélanges correspond à l'absorbance de NH_2Cl et du N-chloroamino acide formé (NClAA) d'où: $[NH_2Cl]=(A(\lambda 1)\ x\varepsilon'2 - A(\lambda 2)\ x\ \varepsilon'1)/(L(\varepsilon 1\ x\ \varepsilon'2 - \varepsilon 2\ x\ \varepsilon'1\ ))$ Cette formule permet ainsi de déterminer la concentration en monochloramine restante pour chaque débit pour différents temps de réaction et de calculer ainsi les constantes cinétiques de réaction entre la monochloramine et les acides aminés grâce à la formule de vitesse suivante, selon l'hypothèse d'une réaction d'ordre global 2, ordre 1 en chacun des réactifs. $-d\ [NH_2Cl]/dt= k\ [NH_2Cl]\ [AA].$; avec k= constante cinétique apparente d'ordre 2. En intégrant, on arrive à la relation suivante: $ln([NH_2Cl]/\ [NH_2Cl]0)= -k\ [AA]\ t$ En présence d'un excès d'acide aminé la concentration en acide aminé est constante tout au long de la réaction [AA]= [AA]0 et la vitesse suit une loi de pseudo ordre 1: $ln([NH_2Cl]/\ [NH_2Cl]0)= -kobs\ .\ t$ avec $kobs= [AA]0\ .\ k$; et [AA]0: concentration initiale en acide aminé et k: constante cinétique de pseudo ordre 1. Le tracé du $ln([NH_2Cl]/\ [NH_2Cl]\ 0)$ en fonction du temps permet alors d'obtenir kobs qui n'est autre que la pente de la droite. La constante k est obtenue à partir de k et [AA]0. La réactivité des acides aminés avec la monochloramine diffère d'un acide aminé à un autre. La structure chimique ainsi que les groupements fonctionnels jouent un rôle essentiel dans le déroulement de la réaction. Ainsi les constantes cinétiques apparentes d'ordre 2 à pH 8 varient de 0,35 M-1.s-1(alanine) à 1,06 M-1.s-1(histidine). Les acides aminés neutres présentent les plus faibles constantes cinétiques (< 0,5 M-1.s-1) à l'exception de la glycine(0,60 M-1.s-1), qui a une réactivité comparable à celle de l'acide glutamique(0,62 M-1.s-1). Les spectres des mélanges de monochloramine et

d'acide aminé ont été déterminés toutes les heures pendant 12 heures afin d'étudier la stabilité des sous-produits. Ce mélange a été également analysé par la méthode à la DPD et I3-. Les N-chloroamino acide sont instables avec le temps et la diminution de leur absorbance dès les premières heures de réaction et les résultats des dosages à la DPD et I3- sont le témoin de cette instabilité.

Oxidative degradation of pentachlorophenol by permanganate for ISCO application

Roger Matta (Université USEK, Lebanon)

Potassium permanganate(KMnO4) has been an effective technology for the in situ oxidation of many organic compounds including chlorinated alkanes and alkenes, but it has rarely been applied for oxidizing aromatic organochlorines. This study confirmed the ability of permanganate to oxidize an aromatic chlorinated compound, pentachlorophenol(PCP), in an efficient manner at neutral pH. The rate of the reaction between KMnO4 and PCP was calculated. The results indicated that the reaction between PCP and permanganate is relatively fast with a second order rate K"= 110 M-1.s-1. Besides the kinetic aspect, the authors identified the main reaction by-products, and proposed a possible reaction mechanism scheme. The general pathway shows the formation of chlorinated intermediates, and ultimately, the complete mineralization to chloride, water and CO2 confirmed by TOC and chloride measurement in solution. Flowthrough column experiments, consisting of flushing a PCP contaminated sandy or natural soil with oxidant, showed the good ability of permanganate to eliminate the pollutant. After 24 h of treatment 77% and 56% of PCP abatement were obtained for sandy and natural soil respectively. These findings show high potential of permanganate for the in situ remediation of aromatic organochlorine contaminated soils.

13:00 - 14:00

LUN 2: Lunch

Room: USJ

14:00 - 14:45

SP4: Séance plénière 4

Collège et école doctoraux
Prof. Christelle Goutaudier, Université de Lyon (France)

Room: USJ Salle Polyvalente E5

Chairs: Jarjoura Hardane (Université Saint Joseph, Lebanon), Lydia Khabbaz (Université Saint Joseph, Lebanon)

14:45 - 16:15

BIO13_Medicale: Biological, Medical, Pharmaceutical, Health Sciences XIII

Room: USJ CSM Amphi B

Chairs: Hayat Azouri (Saint Joseph University, Lebanon), Fouad Dabboussi (Lebanese University, Lebanon)

The synthetic retinoid ST1926 as a novel therapeutic agent in rhabdomyosarcoma

Hussein Basma (American University of Beirut, Lebanon); Raya Saab (AUBMC, Lebanon)

Purpose: Rhabdomyosarcoma (RMS) is the most frequent soft tissue sarcoma in children. Despite multiple attempts at intensifying chemotherapeutic approaches to treatment, minimal improvements in survival have been made for patients with recurrent or advanced stage disease. Retinoic acid is a differentiation

agent that has shown some anti-tumor efficacy in RMS cells in vitro, however the effects are of low magnitude. E-3-(4o-Hydroxyl-3o-adamantylbiphenyl-4-yl) acrylic acid (ST1926) is a novel orally available compound belonging to the class of synthetic atypical retinoids. Experimental Design: In vitro and in vivo models of RMS were used in order to explore the effects of ST1926 cell cycle and DNA damage response. Results: We found that, in vitro, ST1926 reduced RMS cell viability in all tested alveolar (ARMS) and embryonal (ERMS) rhabdomyosarcoma cell lines, at readily achievable in vivo concentrations. ST1926 induced an early DNA damage response, which led to an S-phase cell cycle arrest and a reduction in protein levels of the cell cycle kinase Cdk1, irrespective of TP53 mutational status. Interestingly, in ARMS cell lines, ST1926 resulted in a decrease in levels of PAX3-FOXO1 fusion oncoprotein, and this suppression occurred at a translational level. In vivo, ST1926 was effective in inhibiting growth of ARMS and ERMS xenografts, and induced a prominent DNA damage response. Conclusion: We conclude that ST1926 has preclinical efficacy against RMS, and should be further investigated in this disease in clinical trials.

Contribution of copy number variants (CNVs) to congenital, unexplained intellectual and developmental disabilities in Lebanese patients

Nancy Choucair and Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Pierre Cacciagli (Faculté de Médecine de la Timone, France); Cecile Mignon-Ravix (Faculté de Médecine de la Timone, Lebanon); Sandra Corbani (unité de Génetique Médicale, USJ, Lebanon); Nabiha Salem (Université Saint Joseph, Lebanon); Nadine Jalkh (Unité de Génétique Médicale, USJ, Lebanon); Sandra Sabbagh (Université Saint Joseph, Lebanon); Ali Fawaz (Lebanese University, Lebanon); Tony Ibrahim (Université Saint Joseph, Lebanon); Laurent Villard (Faculté de Médecine de la Timone, Lebanon); Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

Chromosomal microarray analysis (CMA) is currently the most widely adopted clinical test for patients with unexplained intellectual disability (ID), developmental delay (DD), and congenital anomalies. Its use has revealed the capacity to detect copy number variants (CNVs), as well as regions of homozygosity, that, based on their distribution on chromosomes, indicate uniparental disomy or parental consanguinity that is suggestive of an increased probability of recessive disease. We screened 149 Lebanese probands with ID/DD and 99 healthy controls using the Affymetrix Cyto 2.7M and SNP6.0 arrays. We report all identified CNVs, which we divided into groups. Pathogenic CNVs were identified in 12.1% of the patients. We review the genotype/phenotype correlation in a patient with a 1q44 microdeletion and refine the minimal critical regions responsible for the 10q26 and 16q monosomy syndromes. Several likely causative CNVs were also detected, including new homozygous microdeletions (9p23p24.1, 10q25.2, and 8p23.1) in 3 patients born to consanguineous parents, involving potential candidate genes. However, the clinical interpretation of several other CNVs remains uncertain, including a microdeletion affecting ATRNL1. This CNV of unknown significance was inherited from the patient's unaffected-mother; therefore, additional ethnically matched controls must be screened to obtain enough evidence for classification of this CNV.

Report of Novel Mutations in KIAA1840 and DDHD2 in two consanguineous Lebanese Families presenting Hereditary Spastic Paraplegias with thin corpus callosum

Nadine Jalkh (Unité de Génétique Médicale, USJ, Lebanon); Jean-Louis Serre (Université de Versailles-Saint Quentin en Yvelines, Lebanon); Valérie Delague (Faculté de Médecine de la Timone, Lebanon); Jean-Pierre Desvignes (Faculté de Médecine de la Timone, France); Christel Depienne (Université Pierre et Marie Curie, Lebanon); Cécile Cazeneuve (Hospital Pitié-Salpêtrière, France); Eliane Chouery and Andre Megarbane (Saint Joseph University, Lebanon)

Hereditary spastic paraplegias (SPGs) represent a large group of inherited neurological disorders characterized by progressive lower limbs spasticity. They are clinically and genetically heterogeneous with more than 56 different genes/loci associated so far and involving all types of inheritance mode. Pure and complex phenotypes with additional neurological signs are also observed. Our objective was to perform clinical and genetic studies in two consanguineous Lebanese families affected with complex autosomal recessive SPG (AR-SPG) using whole-genome screening technologies. In the first family, linkage analysis was performed using 382 microsatellite markers, while in the second family, linkage analysis was undertaken using Affymetrix GeneChip Human Mapping 250K Nsp arrays. In the first family, a 32.8-Mb candidate region at chromosome 15q14q22.31 containing the candidate gene KIAA1840 was identified. Fluorescent sequencing and MLPA analysis revealed a deletion and an insertion involving exon 27 (c.4635+127_4744-494indel12) indicating a SPG11 type. In the second family, a 34.33-Mb candidate region at chromosome 8p21.3q12.1 was detected. Exome sequencing was then conducted and a novel deletion c.156delT (p.S52Sfs*59) was identified in DDHD2 introducing a premature termination codon revealing therefore a SPG54 type. Two consanguineous Lebanese families with complex AR-SPG were associated to SPG11 and SPG54, illustrating how whole genome technologies can be used to render a molecular diagnosis in clinically and genetically heterogeneous diseases.

Evaluation des Troubles du Langage dans le contexte plurilingue libanais: Utilisation des scores du « Questionnaire pour Parents d'Enfants Bilingues » (QPEB) comme prédicteurs diagnostiques des Troubles du Langage

Edith El Kouba and Camille Messarra (Université Saint Joseph, Lebanon)

Dans les contextes plurilingues, l'évaluation orthophonique des troubles spécifiques du langage (TSL) constitue une question de santé publique du fait de l'existence de similarités entre le développement langagier typique des enfants bilingues (bi-DT) et celui des enfants présentant un trouble spécifique du langage. Plusieurs études mettent en évidence l'utilité et la validité des questionnaires parentaux comme outils complémentaires à l'évaluation du langage de l'enfant bilingue. Au Liban, pays plurilingue, le « Questionnaire pour Parents d'Enfants Bilingues » (QPEB) (COST ISO804) a été préliminairement validé et prouvé fiable pour distinguer un enfant bi-DT d'un enfant bilingue TSL. Deux indices de score ont été attribués au QPEB, permettant de recueillir des données quantitatives auprès des parents. La présente étude cherche à confirmer la cohérence du QPEB auprès d'une population bilingue élargie et à voir s'il permet de distinguer, à travers les indices de score, les enfants DT des enfants ayant un trouble langagier (TL). Le protocole de l'étude, constitué de la batterie Évaluation du Langage Oral Libanais (ELO-L) et du QPEB, a été administré à 118 enfants âgés entre 39 mois et 7 ans 9 mois et leurs parents. L'analyse des résultats a montré que les réponses des parents au QPEB sont cohérentes dans l'ensemble et certaines variables du questionnaire se sont avérées corrélées aux z-scores de l'ELO-L. De même, des corrélations significatives ont été observées entre les indices de scores du QPEB, ses variables et les résultats de l'ELO-L. L'analyse des données révèle également des différences significatives entre les indices de score des enfants bi-DT et les enfants bilingues présentant un trouble du langage (bi-TL), deux groupes repartis d'après l'ELO-L. Les indices de score, notamment l'indice d'absence de risque, se sont avérés prédictifs du TL et complémentaires aux épreuves standardisées qui, dans certains cas, ne sont pas suffisantes pour dresser le profil des compétences linguistiques de l'enfant. Ceci permet de confirmer la valeur prédictive du QPEB dans la discrimination des enfants bi-DT des bi-TL, à travers ses indices de score. Le QPEB se révèle donc comme un outil quantitatif à valeur diagnostique et, surtout, complémentaire à l'évaluation clinique sur le terrain libanais.

Etude de validation de l'échelle d'Evaluation des Comportements Autistiques (ECA-R) en langue arabe, au Liban

Edith El Kouba, Camille Messarra and Sami Richa (Université Saint Joseph, Lebanon); Sylvie Roux and Catherine Barthélémy (Université Francois Rabelais de tours, France)

L'évaluation clinique dans les Troubles du Spectre Autistique (TSA) repose en grande partie sur l'observation à partir d'échelles, telles que l'ECA-R. Cet outil fournit une évaluation de la sévérité des comportements dans les différents domaines développementaux déficients tels que la communication, les interactions sociales et les intérêts. Elle permet également d'étudier leurs variations au cours du temps ; ainsi, l'identification des améliorations induites par les thérapeutiques et rééducations devient alors possible. En l'absence d'outils, standardisés au Liban ciblant à la fois, la sévérité des comportements autistiques, la mesure de l'évolution des sujets avec TSA et celle de l'efficacité des soins qui leur sont fournis, la validation en arabe de l'ECA-R répond à un besoin urgent. Cette étude a pour objectif d'étudier la fiabilité et la validité de l'ECA-R pour l'évaluation des enfants et jeunes adolescents au Liban. Méthode: Une traduction en arabe de l'ECA-R a été effectuée par des traducteurs et des cliniciens experts; par la suite, sa passation a eu lieu auprès de 100 sujets présentant des TSA, diagnostiqués selon les critères du DSMIV-TR et âgés de 35 à 153 mois (DS: 28.0) et dont le niveau intellectuel varie d'un retard moyen (QD entre 49 et 35) à une absence de retard (QD> = 70). La sévérité de l'autisme mesurée par la CARS 1 (Shopler et al. 1980), les scores variant de 20- 58.5 (M= 39.1; DS= 8.8). Les cotations de l'ECA-R ont été effectuées par des cotateurs formés préalablement à l'ECA-R, au sein de séquences filmées, en situations individuelles et en situations naturelles de groupe. Résultats: les résultats montrent que la version arabe de l'ECA-R est valide sur la population libanaise. La mesure de la fidélité inter-cotateurs s'est avérée excellente. La validité en interne de l'échelle a permis d'identifier 2 facteurs pour décrire la sévérité des comportements autistiques reliés au déficit des interactions sociales et de la communication, ainsi qu'aux particularités comportementales et sensorielles avec une cohérence interne de 0.91 et 0.92 respectivement pour les items du Facteur 1, en groupe (F1g) et en individuel (F1i). La validité externe de l'échelle mesurée par les corrélations avec les scores à la CARS et à l'âge réel mettent en évidence que les F1g et F1i sont principalement expliqués par la sévérité de l'autisme et non par le degré de déficience intellectuelle. Conclusion: l'ECA-R en arabe est donc un outil pratique et applicable par l'ensemble des membres de l'équipe soignante pour l'évaluation des enfants avec TSA au Liban et dans les pays arabes avoisinants. Elle permettra également des perspectives de recherches futures dans l'autisme, basées sur des outils de mesures fiables et accrédités à l'échelle internationale.

L'évaluation orthophonique au Liban: ELO-L (adaptation de l'ELO)

Edith El Kouba (Université Saint Joseph, Lebanon); Rasha Zebib (Université François-Rabelais de Tours, Lebanon); Guillemette Henry and Camille Messarra (Université Saint Joseph, Lebanon)

L'ELO-L est la première batterie standardisée et étalonnée pour l'évaluation du langage oral de l'enfant libanais. Elle répond à un besoin urgent exprimé par les orthophonistes libanais qui sont, jusqu'à présent, démunis de tout information psychométrique spécifique à l'évaluation du langage. Cette batterie leur permettra ainsi de parfaire leur évaluation du langage oral en complétant leur bilan qualitatif par des

données psychométriques précises. L'ELO-L consiste en une adaptation de la batterie ELO (Khomsi, 2001) au Liban. Le projet de l'adaptation de l'ELO a été réalisé par l'équipe de recherche de L'ISO (USJ) en collaboration avec le professeur Abdelhamid Khomsi. Cinq épreuves évaluant le lexique en réception, le lexique en production, la compréhension d'énoncés, la production d'énoncés et la phonologie en expression ont été adaptées puis étalonnées auprès de 1540 enfants tout-venant. Les épreuves comportent une version destinée aux enfants âgés de 3 ans à 6 ans (1329 enfants classés par tranches de 6 mois) et une version plus longue destinée aux enfants âgés de 6 à 8 ans (211 enfants partagés en deux tranches d'un an). L'administration des différentes épreuves de l'ELO-L à un enfant permettra ainsi de situer ses performances langagières par rapport à celles des enfants du même âge mais aussi d'observer les caractéristiques de son profil langagier. L'équipe de recherche de l'ISO travaille actuellement sur la finalisation de la batterie ELO-L afin de la publier le plus rapidement possible.

BIO15_Biologie: Biological, Medical, Pharmaceutical, Health Sciences XV

Room: USJ CSM C3

Chairs: Ziad Daoud (University of Balamand, Faculty of Medicine & Centre Hospitalier du Nord Hospital, Lebanon), Nassim Fares (University of Saint Joseph, Lebanon)

Occurrence of Multi-Drug Resistant Gram Negative Bacilli in Nursing Home Residents of North Lebanon

Iman Dandachi, Elie Salem, Eid Azar and Claude Afif (University of Balamand, Lebanon); Salam Samad and Khalil Masri (Centre Hospitalier du Nord, Lebanon); Ziad Daoud (University of Balamand, Faculty of Medicine & Centre Hospitalier du Nord Hospital, Lebanon)

Objectives: Bacterial strains producing Extended Spectrum Beta Lactamase (ESBL) can cause severe infections with high morbidity, mortality and cost rates. Individuals can be fecal carriers of ESBL producing strains. Our aim was to investigate the carriage of ESBL producing Enterobacteriaceae among the elderly of 2 nursing homes located in the north of Lebanon. Methods: This study is a cross-sectional study detecting the prevalence of ESBL fecal Carriage and providing profile of the mechanisms of resistance in these carriers in two nursing homes in Tripoli (north Lebanon). Between December 2013 and April 2014, 5 fecal swabs samplings were performed for 68 elderly residents at regular intervals of 3 to 4 weeks. Fecal swabs were sub-cultured on VACC medium for the screening of resistant organisms. The phenotypic detection of ESBLs, AmpCs, MBLs, and KPCs production was performed using respectively plain Mueller Hinton plates (MHA) and agars impregnated with 5mM of EDTA, 10mg/mL of Phenyl Boronic Acid (PBA), and 250µg/mL Cloxacillin (embedded). In addition, temocillin discs were used for the presumptive detection of OXA enzymes. The disks were arranged in a manner where a keyhole effect could be observed for the detection of Extended Spectrum β-Lactamases (ESBLs). The genotypic detection of the Beta-Lactamases CTX-M, SHV, TEM, and Oxa was done using a multiplex PCR. Bacterial strains were identified using the API 20E system and medical records for each elderly were reviewed at regular basis during the study period. Results: Over the 4 months period, 75% of the patients were at least one time carriers. A total of 197 strains were isolated; of these, 89% were E.coli, 5% were Klebsiella spp. and 6% were Citrobacter spp. The phenotypic tests show that 91% of them were ESBL producers, 4% were AmpC producers, 3% were co-producers of ESBL and AmpC and 1.5% were carbapenemases producers (all 3 strains were resistant to temocillin ans not affected by PBA, EDTA, or cloxacillin, suggesting therefore an Oxa 48 production). The multiplex PCR performed on a representative sample of the ESBL producers showed that bla-Oxa was found in 4 isolates (22.2%), bla-CTX in 15 (83.3%), bla-TEM in 15 (83.3%), and bla-SHV in 2 (11.1%). Fifty percent of these isolates showed the coexistence of CTX-M and TEM, and 22.2 % showed the co-existence of 3 or 4 genes of resistance. Conclusion: The high prevalence of MDR-Enterobacteriacea carriage detected in our study and the emergence of carbapenem resistance is alarming. Efficient infection control measures are urgently needed in these settings to limit the spread of the resistant strains.

Molecular study of ERCC6 and ERCC8 in Lebanese patients with Cockayne Syndrome

Alain Chebly (Saint Joseph University, Lebanon); Sandra Corbani (unité de Génetique Médicale, USJ, Lebanon); Eliane Chouery and Andre Megarbane (Saint Joseph University, Lebanon)

Cockayne Syndrome (CS) is a rare autosomal recessive genetic disorder belonging to the family of premature aging syndromes that affects 2.7 in 1 million newborns. It is a multisystem disorder characterized by growth failure, dwarfism, microcephaly, intellectual disability, senile face, photosensitivity and sensory impairment. This rare disease is linked to mutations in one of these two genes: ERCC6 (Excision-Repair Cross-Complementing 6) also known as CSA gene and ERCC8 (Excision-Repair Cross-Complementing 8) also known as CSB gene. These genes encode proteins involved in the transcription-coupled DNA repair pathway. Clinically, CS is divided into three subtypes: the classical form or CS type I, the severe form or CS type II and the mild form or CS type III. Three patients with CS were

referred to the Medical Genetics Unit of Saint Joseph University (USJ). Among them, two patients present a classical form while the third one presents a severe form. A molecular study of both genes implicated in this disease was undertaken. Fluorescent sequencing revealed the presence of three mutations, at homozygous state, in each family. Two mutations c.843+1G>C and c.966C>A (p.Y322X) in ERCC8 and one mutation c.2008C> T (p.R670W) in ERCC6. The c.843+1G>C was never described before while p.Y322X was found in patients with Lebanese origins. The clinical diagnosis was confirmed by molecular analysis in the three studied families. Thus these three families can now benefit from a genetic counseling to recognize the status of healthy people. Affected people can benefit in the future from a more targeted treatment.

10q26.1 Microdeletion: Redefining the Critical Regions for Microcephaly and Genital Anomalies

Nancy Choucair and Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Ali Fawaz (Lebanese University, Lebanon); Eliane Chouery and Andre Megarbane (Saint Joseph University, Lebanon)

Distal 10q deletion syndrome is a well characterized chromosomal disorder consisting of neurodevelopmental impairment, facial dysmorphism, cardiac malformations, genital and urinary tract defects as well as digital anomalies. Patients with interstitial deletions involving band 10q26.1 present a phenotype similar to the ones with the distal 10q deletion syndrome, which led to the definition of a causal 600 kb smallest region of overlap (SRO). In this report, we describe a male patient with an interstitial 4.5 Mb deletion involving exclusively the 10q26.1 segment. He had growth and psychomotor retardation, microcephaly, flat feet, micropenis, and cryptorchidism. The patient's deleted region does not overlap the 10q SRO. We reviewed the clinical phenotype of patients with similar deletions and suggest the presence of two new SROs, one associated with microcephaly, growth and psychomotor retardation, and the other associated to genital anomalies. Interestingly, we narrowed those regions to segments encompassing five and two genes respectively. FGFR2, NSMCE4A, and ATE1 were suggested as candidates for facial dysmorphism, growth cessation, and heart defects respectively. WDR11 was linked to idiopathic hypogonadotropic hypogonadism and Kallmann syndrome. Its haploinsufficiency could play a crucial role in the genital anomalies of these patients.

Cytogenetic and molecular findings in a patient with myeloproliferative neoplasm

Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Rima Korban (unité de Génetique Médicale, USJ, Lebanon); Tony Yammine (Unité de Génétique Médicale, USJ, Lebanon); Alain Chebly (Saint Joseph University, Lebanon); Nadine Jalkh (Unité de Génétique Médicale, USJ, Lebanon); Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

Myeloproliferative neoplasms (MPN) result from accumulation of cells which escape from normal hematopoiesis in bone marrow and peripheral blood. They can be explained by Knudson two-hit hypothesis of tumorigenesis. First, loss of heterozygosity (LOH) occur within a cell, LOH being commonly caused by a deletion of the appropriate genomic region in one chromosome but it may be also due to other mechanisms such as mitotic non-disjunction or mitotic recombination leading to acquired uniparental disomy of a chromosome or a part of it. In a second time, acquired somatic mutations arise and lead to activation of oncogenes or inactivation of tumor suppressor genes leading to tumor. In MPN, JAK2 V617F acquired mutation is present in the majority of patients. A male patient was referred with a suspicion of Chronic Myeloid Leukemia or Polycythemia Vera for having elevated hemoglobin level and hematocrit and increased white blood cell count. Bone marrow karyotype with R-banding revealed 9 normal metaphases, and a hypodiploid clone between 40 and 45 chromosomes where Y chromosome was missing in 20% of the cells and monosomy 18 and 20 was detected in 12%. AS-qPCR performed on bone marrow DNA revealed JAK2 V617F mutation with an allele burden of 73.11%. SNP array study on bone marrow using Affymetrix CytoScan HD microarray platform revealed a LOH of 35.67Mb on chromosome 9p (.arr[hg19] 9p24.3p13.3(192,128-35,864,274)hmz) suggesting a partial acquired uniparental disomy. Hypodiploidy detected by conventional karyotype was not seen since mosaics fewer than 20% are not detected by this technique. Although SNP Array has the potential to uncover additional submicroscopic genomic imbalances, the current findings show that conventional karyotyping together with SNP array and mutation detection should be combined for a better diagnosis and prognosis.

Cytogenetic study of 108 Lebanese CLL patients

Alain Chebly (Saint Joseph University, Lebanon); Tony Yammine (Unité de Génétique Médicale, USJ, Lebanon); Rima Korban (unité de Génetique Médicale, USJ, Lebanon); Andre Megarbane (Saint Joseph University, Lebanon)

Chronic Lymphocytic Leukemia (CLL), the most common adult leukemia, is a hyperplasia starting from bone marrow and leading to a monoclonal proliferation of mature lymphocytes. Its clinical course is extremely heterogeneous, with some patients living for decades while others have a rapidly aggressive disease. Diagnosis and prognosis of CLL generally requires different laboratory measures including a chromosomal study. Chromosomal abnormalities in CLL are detected in 30% to 50% of patients when using conventional techniques and up to 80% when adding the Fluorescence in Situ Hybridization technique (FISH). They are important for the clinical management of the patients; trisomy 12, 11q-, and 17p- are considered as poor prognostic markers while patients with a normal karyotype or 13q

abnormalities had better survival. Between 2002 and 2014, 108 CLL patients were referred to the Medical Genetics Unit of Saint Joseph University. A classic cytogenetic (R-banding) study was performed for all of them. Chromosomal abnormalities were found in 60 samples corresponding to 55.5% of patients which is consistent with the literature. 6.5% of patients had a trisomy 12, 4.6% 13q-, 2.7% 11q-, 2.7% 17p-, 1.8% 6q-, and 20% of patients had more than one chromosome abnormality. Indeed, complex karyotypes were observed in addition to other frequent chromosome breakpoints such as 14q and 18q. The results and the clinical data of these patients allowed us to make a comparison with the international data. Future studies of CLL using molecular biologic techniques will continue to refine our understanding of the biology and clinical behavior of this disease and identify novel targets for treatment.

Molecular study of RMRP gene (CHH syndrome) in a cohort of 13 patients from different origins

Sandra Corbani (unité de Génetique Médicale, USJ, Lebanon); Eliane Chouery and Andre Megarbane (Saint Joseph University, Lebanon)

Cartilage-hair hypoplasia (CHH), a recessively inherited developmental disorder, is characterized by short-limbed dwarfism, cone shaped epiphyses, metaphyseal flaring and irregularities, light colored hair of abnormally small caliber, immunological defects and other hematologic anomalies. CHH was originally described in the Old Order Amish in the United States and subsequently found to be unusually frequent among Finns. The incidence among the Amish was calculated as 1 in 1340 implicating a carrier frequency as high as 1:19. Cases have been described in numerous other populations; however, there is no precise measure of its worldwide incidence. CHH is due to mutations in the RNA component of RNase MRP (RMRP, ribonuclease mitochondrial RNA processing). RMRP is an untranslated gene with only 267 nucleotides, encoding an RNA subunit of an RNase-MRP complex that is involved in multiple cellular and mitochondrial functions. Nowadays, a total of 104 mutations have been reported in a variety of ethnic groups. Thirteen patients with the clinical and radiological diagnosis of CHH were referred to our laboratory for molecular confirmation or exclusion of the diagnosis, based on RMRP mutation screening. Fluorescent direct sequencing of RMRP gene was performed and identified the causal mutations in 6 patients showing the genetic and clinical heterogeneity of this disease. Four were compound heterozygous and 2 were homozygous. Five mutations detected here, had not been reported previously: g. +9C>T, g.265C>T, g.247G>A, g.232G>A and g.-9insTGAAGCTG. All identified variations segregate with the phenotype in the families. In this ethnically heterogeneous population, it will be from great interest to compare the clinical features to previous reports.

ENG9_MEC: Engineering IX

Room: USJ CSH 206

Chair: Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

Green Composites: Mechanical Properties

Sara Jebaii (Lebanese International University, Lebanon); Mohamad S Hammoud (Lebanese International University (LIU), Lebanon); Ali Hallal (Lebanese International University, Lebanon); Ali Alshaer (Lebanes International University, Lebanon)

In the present study, the main objective is to investigate the potential replacement of the glass fiber reinforced polymer (GFRP) by the natural fiber reinforced polymers (NFRP) - known as green composites. A large literature review study is done where the mechanical properties of a large set of natural fibers are collected. An analytical modeling is adopted to evaluate the 3D elastic properties and ultimate strengths based on a multi-scale homogenization method. Tsai-Wu and Christensen failure criteria and a damaged stiffness model are used to predict the failure of composites. Flax fiber reinforced polymer has shown better mechanical properties with a double specific modulus and better specific strength compared to the GFRP.

Proper Generalized Decomposition method to study the viscoelastic behaviour of polymer

Mohamad S Hammoud (Lebanese International University (LIU), Lebanon); Mouhamad Hammoud (Lebanese International University, Lebanon); Marianne Beringhier and Jean-Claude Grandidier (Institut P', Département Physique et Mécanique des Matériaux, France); Ali Alshaer (Lebanes International University, Lebanon)

In this work, the Proper Generalized Decomposition (PGD) method is used to simulate the cyclic loading of a polymer specimen. The viscoelastic behavior of the polymer is described by a Generalized Maxwell model which makes use of a relaxation times distribution. From a numerical point of view, a global model and several local models had to be solved. Within the PGD framework, the globalization of the local models is here investigated and consists in solving entirely all the problems (equilibrium equation and internal variables evolution) with the PGD method. As different times are considered, we here discuss

the possibility to decrease the computation time by using adapted time discretizations. For this purpose, the link between the cycle time, the relaxation time and the time step is analyzed through different simulations according to the number of relaxation times and the relaxation times distribution.

Novel Design of Delta Winglet Pair for Heat Transfer Enhancement

Mohammad Oneissi (LUNAM University & Lebanese International University, Lebanon); Charbel Habchi (Lebanese International University, Lebanon); Serge Russeil (Mines Douai, France); Daniel Bougeard (Ecole des mines de Douai, France); Thierry Lemenand (University of Angers, France)

The benefits of more efficient use of energy are well known and include reduced investments in energy infrastructure, increased competitiveness and improved consumer welfare. Efficiency gains can also deliver environmental benefits by reducing greenhouse gas emissions and local air pollution. Heat transfer is a naturally occurring phenomenon that can be greatly enhanced with the use of vortex generators (VG) (Habchi et al., 2012). In the present study three-dimensional numerical simulations of various vortex generators are performed to scrutinize heat transfer enhancement in parallel plate-fin heat exchanger. The shear-stress transport (SST) k-w model is adopted to model the flow turbulence. Empty channel simulations are validated with empirical correlations. Delta Winglet Pair (DWP) is then introduced and simulations are carried on for a configuration previously published by Tiggelbeck et al. (1992). Our numerical results are favourably compared with their experimental data, which demonstrates the validity of the present numerical model. Based on the Delta Winglet Pair case, which is chosen as the reference VG configuration in the present study, a new innovative VG configuration, named IPWP (Inclined Projected Winglet Pair, illustrated on Figure 1-a, is examined. Superior performance makes VG type more efficient. Compared to other trivial VG geometries over a wide range of Reynolds numbers: 2300<Re<30 000. Indeed the results of the simulations show that this intensified configuration lead to the same heat transfer as the reference case, but with less pressure drop penalty due to its special design. To investigate further heat transfer enhancement possibilities, the IPWP Vortex Generator configuration is combined with protrusions which are also inserted on the bottom wall downstream the VG. This compound enhancement method was recently proved to be effective in vortex generator-type multifunctional heat exchangers, cf. Habchi et al. (2012). Protrusions are thus implemented with the IPWP at different locations (Figure 1). The analysis of the local performance is conducted by means of the stream wise distribution of Nusselt number and friction coefficient, as well as the vorticity of the longitudinal vortical structures generated. This enables to highlight the different mechanisms involved in the convective heat transfer intensification. Finally, it is found that all the innovative IPWP configurations proposed in the present study bestow a better global performance than the DWP reference case, as shown in Figure 2, which represents the Thermal Enhancement Factor (TEF). The results obtained give clear idea of how these new configurations can enhance the heat transfer in parallel-plates heat exchanger with a decrease in pressure drop. The IPWP-PRO1-S is the same configuration as IPWP-PRO1 with more spacing introduced in the downstream direction.

Heat Transfer Enhancement in Channel Flow downstream a Rectangular Winglet Pair Vortex Generator

Assadour Khanjian (LUNAM University & Lebanese International University, Lebanon); Charbel Habchi (Lebanese International University, Lebanon); Serge Russeil (Mines Douai, France); Daniel Bougeard (Ecole des mines de Douai, France); Thierry Lemenand (University of Angers, France)

Heat transfer enhancement is essential for many engineering applications such as heat exchangers, electronic equipment, high temperature gas turbines or nuclear power plants. Among all methods existing for heat transfer enhancement, some are based on the idea of generating a secondary flow that is added to the main flow to intensify the fluid exchange between hot and cold regions in the system. One of these methods involves the use of vortex generators (VG). This study presents numerical computation results on laminar convection heat transfer in a rectangular channel equipped with a rectangular winglet pair vortex generators (RWPVG) located on the bottom wall of the channel. Different values of roll angle β in the range [20°-90°] are considered, while maintaining a constant angle of attack (α=30°) for all the cases. The influence of the Reynolds number is also studied for values 456 and 911. Both local and global analysis of the performances are carried out using parameters such the Nusselt number and the friction coefficient. In addition, the position and strength of the vortices being created in the duct are studied, highlighting their effect on the heat transfer rates. Based on the analysis of the flow structure and of the air temperature distribution, a pair of counter rotating vortices is found to be generated downstream from the Vortex Generators (VG) due to the pressure gradient between high momentum fluid in the flow core and low momentum fluid in the VG vicinity. For high values of roll angle (close to β=90°), the generated vortices get wider along the longitudinal direction compared with low values (i.e. β=20°). In Figure 1, the streamwise variation of the area-weighted average of the helicity is studied. It is observed that the helicity increases just after the flow encounters the VG where the vortices are first formed. The helicity peak for β=90° is about 6 folds higher than that for β=20° meaning higher energetic vortices. Moreover, increasing the mean flow velocity, i.e. the Reynolds number, leads to increase the helicity. The streamwise variation of the dimensionless location of the main vortex is also studied. It is observed that for Re=456, the dimensionless Y position of the main vortex starts at low position and increases along the duct until it reaches a maximum value of around 0.5 representing the middle of the duct for the highest value of angle β. Whereas for the case of higher Reynolds numbers, dimensionless location of the main vortex is increased at the tail of the VG and maintains its location with a slight increase along the longitudinal

direction of the duct. The streamwise variation of the average Nusselt number is studied using the average heat flux for bottom and top wall. For both Reynolds numbers, similar profiles are obtained. Starting from the position of the VG the Nusselt number value starts to increase due to the heat transfer enhancement until it reaches its maximum at the tail of the VG and then it drops to the minimum. For all the cases the values are above than that of the empty duct. The streamwise variation of the friction factor is also studied. For both Reynolds numbers the profile of the curve is similar: it starts to drop along the length of the duct until it reaches the leading edge of the VG. At that location a gradual increase appears reaching its maximum value at the tail of the VG, after which the curve continues to drop making an asymptote with the empty channel curve. In order to study the influence of the roll angle β of the VG on the heat transfer enhancement, global values of the Nusselt number and friction factor are discussed, as well as the enhancement factor which values are plotted versus β on Figure 2. For Re=456, it is shown that the enhancement factor increases with the increase of the roll angle β, reaching its maximum value of 1.13 at β=90°. On the other hand for the case of Re=911 the profile of the enhancement factor curve starts to increase with the roll angle β until it reaches a maximum value of 1.09 at β=70°. Then it can be considered that for Re=911 the optimum roll angle which lead to the best enhancement is 70° and not the highest angle, while for Re=456 the optimum value of β is the highest angle 90°.

Influence of the root-soil mechanical interactions on the variability of root architecture

Mahmoud Fakih (Montpellier University & LMGC, Cirad, France)

The phenotypic variability of root architecture is only partially explained by the genotype and the environment. It has been advanced that much of this variability is related to the developmental instability of meristems, a consequence of stochasticity at the cellular level. In this work, we investigate the effect of soil disorder at the particle scale on root variability by means of a numerical model based on Discrete Element Method (DEM). The architecture of the root system growing in a granular medium is influenced by the mechanical feedback between the roots and the surrounding grains. The simulations allow us to characterize the reorganization of the grains under the action of a growing root system, and the effect of resulting forces acting on the root development (elongation rate, branching...). These interactions will be quantified using methods and tools provided by the physics of granular media. The root system is modelled using chains of connected spheroline elements. At beginning, a first element is fixed at the top surface of the granular packing. Starting from the bottom end of this element, a new element is introduced and a growth rate is applied until a characteristic length is reached. A new element is then added and the process is iteratively repeated. We performed a parametric study in which we vary the different parameters that control the root growth (elongation rate, elastic modulus, bending moment between root elements...) and different parameters pertaining to the granular soil. Finally, simulation results will be compared with experimental data provided by a genotypic platform (CIRAD Rhizoscope) allowing roots growing in ballotini

Medical Jet Nebulizers: Innovative design towards effective nebulization

Georges Matar (USEK-Kaslik, Lebanon); Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

Many features can be added to the nebulizers existing in the market, while some of them should become mandatory in terms of regulations and standards related to safety, pollution and economy; especially because it is a class III medical device. This paper involves first a theoretical study of the existing medical jet nebulizers in terms of design and limitations, presents different points of strength from the oldest to the newest and the most developed ones; then as a synthesis, a design of an improved medical jet nebulizer is proposed in the aim of delivering effectively an amount of medication to a patient's lung; The project proposes parameterization and conceptuation of the electro-pneumatic control system, by combining the advantages and points of strength of its predecessors and overcoming the weaknesses. Consequently, the design of a portable, economical, ergonomic and safe nebulizer with high percentage of improvement in medication consumption consist the main objective of such thesis.

Wind-waves hybrid system concept for power generation

Wassim Chehade and Dory Chamoun (Lebanese University, Lebanon); Charbel Bou-Mosleh (Notre Dame University, Lebanon); Pierre Rahme (Lebanese University, Lebanon)

The renewable energy is nowadays in growing interest for the developing countries. Wind and wave are in particular two important sources that produce clean energy. In Lebanon, the use of wind energy is increasing whereas wave energy is not developed yet. When the velocity of wind at water surface increases, the wave velocity increases as well. The aim of this work is to design a hybrid system in which power is generated from both renewable wind and waves sources. A classical horizontal axis wind turbine is used in this project. A new concept of a mechanical system is presented for wave converter power. This concept is based on converting the wave motion to electrical power. The longitudinal and transverse motion of the wave is considered in this concept. Finally, the wind horizontal axis and the presented wave converter are combined to form one hybrid power generation system.

ENG10_CCE: Engineering X

Room: USJ CSH 208

Chairs: Aziz M. Barbar (American University of Science and Technology, Lebanon), Wassim Raphael (Université Saint Joseph, Lebanon)

Structure Tensor Field Quality Assessment

Wajih Sleiman (USEK, Lebanon); Adib Akl (Holy-Spirit University of Kaslik, Lebanon)

The structure tensor of an image is defined as the covariance matrix of the first partial derivatives of this image, and computed from previously estimated gradient fields [1]. It is a scientific tool used to give information about the local orientation and degree of anisotropy of spatial processes, and therefore to identify the directional peculiarities of those processes [2, 3]. In several applications, a comparison between distinctive tensors is needed [4]. Due to its non-scalar nature, it is a challenging task to focus/ create a tensor-space metric that assesses the closeness between tensors or tensor fields. In this study, we go for assessing the effectiveness of tensor-space metrics and their devotion in catching dissimilarities between tensor fields. More precisely, we focus on four existing tensor-space metrics; the Euclidean Distance (ED), the Shape-Orientation (SO), the Frobenius Norm (FN) and the Log-Euclidean metric (LE) [4-6]. We start by implementing and evaluating those metrics in order to investigate and analyze their behavior on different tensor fields. Based on this analysis a novel adaptive tensor-space metric is proposed. Figure 1 illustrates the behavior of the previously listed tensor-space metrics with respect to the standard deviation of the noise added to the tensor field (left), and with respect to the rotation angle used to disturb the tensor field by changing its tensors orientations(right). It can be clearly seen that; the Euclidean Distance, the Frobenius Norm and the Log-Euclidean distance are more sensitive to noise than the Shape-Orientation metric, which is logic since this latter depends on the tensor orientation and coherence while all the other metrics depend on the tensor components (the gradient fields) [5]. On the contrary, the Shape-Orientation metric is more accurate to the tensors orientation variation than the three other metrics. Note that the frequent variations of the Shape-Orientation curve in Figure 1 (right) is due to the fact that the orientation angle of the structure tensor is periodic, with a fundamental period of π. Inspired by these obtained results, the new proposed metric is based on the weighted fusion of the Euclidian Distance and the Shape-Orientation measure. The weight is then a parameter which varies with respect to the noise extent and structure tensor orientations variation. The proposed metric is tested on different image samples with different Gaussian noise variances and different distortion angles. The preliminary results obtained using the proposed metric are promising in terms of metric sensitivity to both noise and tensor orientation variations.

Extended Near ML Algorithm for Decoding Non-Binary LDPC Codes

Ali Chamas Al Ghouwayel (Lebanese International University, Lebanon); Hussein Hijazi (Grenoble-INP, GIPSA-Lab, France); Hamoud Younes (LIU, Lebanon)

In this paper, we investigate the decoding of short and Moderate Non-Binary (NB)-LDPC codes of rate 1/2 using a non-iterative approach based on the Maximum-Likelihood (ML) principle. The traditional decoding algorithms used to decode the NB-LDPC codes are by nature iterative where the Variables Nodes (VN) and Check Nodes (CN) exchange data iteratively during, at least, eight iterations which imposes a long decoding time to achieve good performance. In this paper we propose a decoding algorithm based on the Maximum Likelihood (ML) search named Near ML approach to be applied on short and moderate code lengths where the number of tested words considered as potential codewords is highly reduced.

Texture Analysis using Structure Layer and Orientation

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In image processing, it is hard to give a universal definition for textures because everyone tries to understand its concept in terms of his center of interest. A texture is defined as a construction of nearly complex elements, a structure created by the equipment of a textile, the joint of the molecule of a body or substance or the tactile region characteristics and presentation of something [1]. Texture analysis is an essential task in image processing and a useful area of study in many application domains such as machine vision, computer graphics, remote sensed imagery, texture mapping, biomedical data analysis, texture synthesis and seismic data processing [2-5]. Most of the existing texture analysis techniques yield to significant results in different applications but fail in others, especially when dealing with complex heterogeneous samples as it is the case in seismic texture analysis for example. In this study, we focus on texture analysis by structure layer modeling. The structure layer is represented by the structure tensor field which carries information about the local orientation and the degree of anisotropy of the texture [5, 6]. The structure tensor can be represented in 2D by an ellipse having a shape factor (also called coherence or confidence indicator) and a principle orientation. The shape factor determines the geometry variation in the image while the orientation factor is an angle ranging between -π/2 and π/2 and determines the orientation variation in the image. Tensor components are obtained using an averaging window - usually Gaussian - having a standard deviation σ known as the structure tensor size and used for gradient field smoothing. The structure tensor size has to be adequately chosen in order to faithfully analyze the texture structures. The choice of σ is crucial to get relevant local image analysis; a high value of σ entails a smoother structure tensor field and a less local orientation estimation but a better noise robustness. On the contrary, a low σ ensures an accurate local analysis but with a high sensitivity to noise [7]. Naturally, it should be on the scale of the largest observed texel (texture element), otherwise the structure may be lost. That's why came our idea of developing an algorithm that adaptively detects the optimal value of σ and therefore the optimal structure tensor size that leads to satisfying structure

layer representation. The first stage of the proposed algorithm consists in determining the position of the different texels present in the texture. Therefore, an object detection algorithm is essential. The blobs detection and analysis algorithm [8] is used. The method deals with binary images where the texture patterns are represented by 1s (white) and the background by 0s (black) using thresholding techniques. Then a filling process is applied to shrink noise and artifacts. Afterwards, the center of each pattern is determined and the maximum distance between each texel center and the underlying texel's contour is computed in order to capture the largest texel size, which is equivalent to the Gaussian averaging window size. Finally, the corresponding σ is deduced and used for the structure tensor field calculation. Figure 1 presents a simulation result obtained on a texture taken from Brodatz database [9]. A Gaussian noise is added to the texture sample and the proposed algorithm results in a standard deviation of 3.24. The first row shows (from left to right), the original texture sample, the noisy texture and the orientation and coherence of its structure tensor field calculated using the standard deviation obtained by the proposed method. The second and third rows show (from left to right) the orientation and coherence images of the structure tensor fields calculated on the noisy texture using σ = 0.5, 1.5, 2.5, 3.5 and 4.5, respectively. It can be clearly seen from Figure 1 that a very low standard deviation (0.5) leads to noisy orientation and coherence images showing distorted patterns. A standard deviation of 1.5 results in better quality images. However, the averaging window seems not large enough to capture the sample patterns. On the other hand, a very high standard deviation (4.5) gives a non-local analysis highlighted by the obtained over-smoothed tensor field. On the contrary, σ = 3.24 obtained by the proposed algorithm, leads to noise free images that are almost similar to those obtained with σ = 2.5 and σ = 3.5, where the sample variation of orientations is well captured. Therefore, the proposed algorithm succeeds in computing a tensor field which locally represents the structure of the texture sample with a high robustness to noise.

Transform your PC along with an analog Walkie-Talkie into a Digital Wireless Modem

Mohamad Hijazi, Sami Abbass and Samir Omar (Lebanese International University, Lebanon)

We present in this paper an innovative idea for a software application approach to the advanced communication world. We mainly show how to transform your PC along with an analog wireless transceiver "Walkie-Talkie" into a digital wireless modem that permits secure wireless transmission of chats and files between PCs. In fact, today's communication depends on the usage of mobile phones, Bluetooth, WiFi, etc. These techniques have facilitated the communication between people. However, each one of these systems has its limitation. For instance, the access to mobile networks is not possible through every corner in the rural and urban areas. There are many zones where the coverage is either weak or not available at all. Furthermore, even if the coverage exists, sometimes and due to the high demand on the data network, only the second generation "2G" network is accessible, where the voice service is mainly offered with a very limited data service. On the other hand, we should keep in mind that these services are not offered for free. They cost the subscriber a fortune. As for the WiFi and the Bluetooth, it is well known that they offer coverage for only short ranges; hundreds of meters for the first and tens of meters for the latter. Hence, they don't satisfy the user's requirements. As we have mentioned above, our proposed idea shed light on a more useful gadget for the means of wireless communication which is "Walkie-Talkie". A Walkie-Talkie with a built-in microphone and headphone jacks together with a PC would approve the wireless communication not only for chatting but also for sending files using digital modulation. The maximum range of our proposed application depends on the maximum transmitted power of the chosen Walkie-Talkie. It extends from several kilometers (5 Watt) up to tens of kilometers (50 Watt). In the sequel, we will give a quick glance about the internal structure of the proposed digital modem. Actually, the binary data inside the PC which may represent the chat or any kind of files resides there would be first compressed to remove any redundant bits (source coding), and then it would be encrypted to provide confidentiality and security. We encrypt the data using the widespread AES algorithm which is considered nowadays one of the most secure algorithms. Up to this level we have not provided yet a protection against errors, hence the data will pass through a channel encoder (Convolutional encoder) to provide the capability at the receiver to detect and correct binary errors. Finally, a header and footer are included at the beginning and at the end of the binary stream respectively before the latter is passed through a digital modulator. We use here the Differential Phase Shift Keying (DPSK) where the data rate is 1200 symbols per second. This baseband digitally modulated signal is then frequency translated into a carrier which lies in the middle of the audio band of the chosen Walkie-Talkie. In our case, we have chosen a carrier of 900 Hz which has been revealed by our measurements and tests as the middle of the audio band of the Walkie-Talkie that we have used namely, "ICOM V8". At this stage, the binary data has been transformed into an analog signal with bandwidth of almost 1200 Hz and a center frequency of 900 Hz. This signal is sent out of the PC through the line out of its sound card into the mic-in of the Walkie-Talkie. Simultaneously, the push and talk button of the Walkie-Talkie is pressed and the signal will be transmitted into the receiver. It is worthy to note that since the Walkie-Talkie is utilizing, by default, the Frequency Modulation (FM) for voice communication, hence upon using the DPSK we have now a double modulation (DBPSK & FM). At the receiver side, the reverse of the whole process that takes place at the transmitter will occur. Hence, the signal is first received by the Walkie-Talkie to be FM demodulated, and then it will be sent through its headphone-out into the line-in of the PC. Inside the PC and after the signal has been captured by its sound card, it will be DBPSK demodulated, and then it would run through a channel decoder (Convolutional decoder) to correct as much error as it could. Hence after, the obtained binary stream is decrypted and then the sent file/chat is extracted using the header and the footer as guides to the beginning and end of the useful binary stream. It should be noted that we have designed, verified and implemented this whole system along with a user friendly Graphical User Interface (GUI) using MATLAB. To sum up, our proposed digital wireless modem takes the advantage of time, cost and availability of a

"Walkie-Talkie" and PC to permit a wireless transmission of chats and files between PCs. The emphasis is that the proposed idea constitutes a practical way to make use of the common on the shelf items to provide a wireless, reliable, free and on the top of that a secure data communication. As for the future enhancement of this digital modem, we are investigating the possibility of augmenting the data rate by using higher digital modulation techniques (QPSK, 16 QAM) and to provide the capability of live audio chats, not only text chats as it is the case now.

On Positioning Techniques in LTE Cellular Systems

Khaled Al Haj Ismaiil (Autonomous University of Barcelona, Lebanon); Jose Vicario (Universitat Autònoma de Barcelona, Spain); Antoni Morell (Universitat Autonoma de Barcelona (UAB), Spain); Michel Nahas (Lebanese International University (LIU), Lebanon)

Positioning is the process of determining the geographical location of a device, such as tablet computer, a PDA, a navigation or tracking equipment or a mobile phone [1]. Upon establishing the geographical coordinates of a device, they can be mapped into a location such as building, a street or an object, and then transferred back to the requesting service. This phenomena of mapping and delivering the location information or a part of location services (LCS) for example, emergency services, weather services. Location based services can be used to optimize network performance and to enhance many services such as network management, self-learning, etc. Positioning QoS is generally defined in terms of confidence level, time it takes to retrieve a positioning result and the accuracy. The current trend shows that network operators and users are requesting for more reliable and accurate positioning, along with a reduced latency from trigger time to the time when a result is available upon the request, in addition to high accuracy for indoor and outdoor environments.

Theoretical and numerical study of an AMOOFDM IMDD transmission system using different SOA structures

Mohamad Hamze (Arts, Sciences & Technology University in Lebanon (AUL), Lebanon); Ali Hamie (Arts Sciences & Technology University in Lebanon (AUL), Lebanon); Ammar Sharaiha (ENIB, France); Jianming Tang (Bangor University, United Kingdom)

We present an Adaptively modulated optical orthogonal frequency division multiplexed (AMOOFDM) Intensity modulation and direct detection (IMDD) transmission system using different semiconductor optical amplifier (SOA) structures. The system is designed so as to perform a theoretical and numerical research on the potential of using AMOOFDM for future optical access networks that operate at high transmission capacity and for distances up to 100 Km. We have used three different SOA configurations, Quantum Dot SOA (QD-SOA), two electrode SOA (2E-SOA), and two cascaded SOAs in a counter-propagating configuration (TC-SOA-CC) as intensity modulators with the developed AMOOFDM IMDD system. We have developed a model for each SOA configuration, verified the models in static domain, and performed a study of the transmission system in terms of system capacity vs reach performance, optimum operating conditions, signal clipping effect, and fiber and SOA dispersion effects. The results obtained demonstrate the potential of using these three SOA structures for future IMDD systems incorporating AMOOFDM for next generation optical access networks.

Enhancement of radiation efficiency of ring-shaped slotted rectangular waveguide antennas

Ali Harmouch and Hassan Haddad (Lebanese University, Lebanon); Mustapha Ziade (Lebanese University & Branch 1, Lebanon); Yvona Yammine (Notre Dame University, Lebanon); Ahmad El sayed Ahmad (Doctoral School, Lebanese University, France); Larissa Abou Assaf (Notre Dame University, Lebanon); Rabih Barake (Doctoral School, Lebanese University, Lebanon)

Currently, the wireless internet communication field witnesses an extensive evolution related to antennas and their design. In all these new applications, a compromise between high power handling ability, high gain and reliability of mechanical features exists. But until now, is there an antenna that provided all needed specifications? In previous researches, RSSWA (ring shaped slotted waveguide antennas) was designed and introduced. Studies were prepared to distribute the slots and define their number, position and shape in order to have optimal results. Although this antenna gave a good outcomes, and was proved to be suitable for wireless internet distributing system, military radar applications and even oil drilling devices; but still its pattern presented many off peaks. Inspired by reflector and horn antenna concepts and mechanism, and after studying the effect of a reflector on the radiation pattern, we will implement an iron reflector on the RSSWA in this project. This employment will serve to reduce the off peaks for improving the pattern, and thus increasing the gain. So, this project introduces an optimized form of the ring shaped slotted waveguide antenna. As a beginning, the project will describe in details the design of the RSSWA, the distribution, the number and the dimension of the slots. The dimensions of the slots determine the bandwidth, thus choosing convenient ones is a critical task. The second task will be adding the iron reflectors such that the off peaks are reduced. The purpose of this optimization is obtaining a perfect circular polarization and an omnidirectional radiation pattern, in addition to a good directivity. Adding the reflectors is not that easy task. Our study should not only consider the reduction of the peaks, but also it should consider the effect of the iron reflector on the performance of the antenna, in such a way

that the number of side lobes should not increase. In addition, one of the main features of the antenna is its compact size and light weight which should not be affected. During our research, many simulations will be made using the CST software; we will test the reflector on different positions to be able to choose the one that will give us the most optimized version of the RSSWA.

MCS3_computer: Mathematics and Computer Sciences III

Room: USJ CSH 306

Chairs: Dany Mezher (Saint Joseph University, Lebanon), Ahmad M. Shahin (Lebanese University, Lebanon)

Privacy-Enhanced Disassociation of Set-Valued Data

Sara Barakat (Antonine University, Lebanon)

Shopping logs collected by Lebanese e-commerce websites (e.g., Makhsoom, MarkaVIP, GoSawa, etc.) are sample datasets which if released properly can be highly beneficial (e.g., aggregate analysis, advertisement and data mining) to further the growth of their providers. These datasets, consisting of a set of records where each of which associates an individual with his/her set of distinct items, should adhere to strict privacy constraints before their release. In this work, we intend to provide a novel safety constraint to cope with the minimality attack in disassociation. Our safety constraint should ensure that the disassociation of datasets, which keeps items intact, is a suitable technique that has an acceptable trade-off between utility and privacy.

A Novel Perceptron Architecture for Simulating Object Construction

Hussein Chible, Alaa Almissttaf, Rami Tawil and Ali Jaber (Lebanese University, Lebanon)

Pattern recognition modeling and designing is one of the main challenges for researchers. In this paper, we propose a novel architecture for the preceptor depending on the biological fact "information is coded within firing rate". The main idea is that the architecture is based on neurons' APs(Action Potentials) that are transmitted in structures that represent the stimuli patterns, and the response of connected neuron through their synapses is highly proportional to the nature of these structures.

Software product lines evolution for valuable reusability

Eddy Ghabach (Université Saint-Esprit de Kaslik & Université Nice Sophia Antipolis – i3s, Lebanon); Franjieh El Khoury (Université Saint-Esprit de Kaslik & Université Lyon1, Lebanon); Mireille Blay-Fornarino (Université Nice Sophia Antipolis– i3s, France); Badih Baz (Université Saint-Esprit de Kaslik, Lebanon)

Nowadays, adopting software product line(SPL) development approach became a successful strategic decision in software development since the rapid time to market necessity is guaranteed by SPLs due to assets reusability. However, the expansion of the market segment implies a boost of user requirements that must be satisfied by quickly developing new products. Thus, an agile evolution of SPLs became a necessity. The general purpose of a SPL is the automated construction of a new product based on the reusability of existing features. A feature is a characteristic defined by the domain experts that abstracts a set of software-related resources called assets. A feature model(FM) represents all the products of the SPL. To generate a new product, a user selects a set of features via a process called configuration by respecting the constraints defined in the FM. Despite that SPLs permit reusability, generating a new product that uses features that refers to different products is not supported by a classic FM. In other words, if two products P_1 and P_2 leaded respectively to the injection of the features F_1 and F_2 in the FM, the latter does not support the generation of a new product P_3 that uses both F_1 and F_2 since they refer to different products. However, in our desired approach we want to design evolved FMs that make the previous operation feasible. In addition, to benefit from a valuable reusability, we are interested to focus on the fact that a product can be constructed from a subset of the SPLs' features - regardless of referring to one or many products, or from a set of features that some of them are not part of the SPL. Thus, we must identify the features that are not part of the SPL once requested, connect them if required to the existing features that we still need from the SPL and integrate them in the SPL to be able to use them later. In other hand, we must guarantee an agile evolution of the SPL, thus our desired approach must adopt mechanisms that automate as much as possible the software development process, minimize its overhead and simplify its complexity. Many research papers concentrated on SPLs engineering, variability management, FMs configuration and organizational SPL development challenges, but few of them focused of the evolution of SPLs. However, after the successful adoption of SPL as a software development approach, evolving an SPL became a necessity for a sustainable development. On the SPL domain engineering side, we define an information system as a set of interconnected assets corresponding to some well-defined features. Each information system is identified by a unique version. Thus, an information systems product line can be defined as a set of features belonging to a specified domain, where this set consists of the union of the features defined or used by all the information system versions. In other words, our global FM is the union of the features of the produced versions. Thus, the set of features or a subset of it consists of a configuration. We classified the configurations into two

categories: predefined configurations where an existing version fulfills the required configuration and non-predefined configurations where a configuration refers to a set or subset of features that are not strictly fulfilled by an existing version - thus a new version should be produced. Based on best practices of the domain experts, developing and evolving SPLs requires to involve the client in the different phases of this process. We defined our perspective as follows: once a client arrives with new requirements, we navigate through the line feature model and respectively through the configuration knowledge engine, and we select all existing features that fulfill the client requirements. In case all the requirements are covered, we generate the product and deliver it to the client, either using an existing version that was produced using the same features or by creating a new version by assembling a set of existing features. In other case, where a subset of the requirements is not covered, we determine the features that should be added if any or modified and respectively we determine the assets to be added, modified or deleted, before creating a partial version of the desired product. We mean by partial version, a version that contains the assets related to the features selected that already exist in our line, in addition if possible to a skeleton of the assets related to the new/updates feature-related assets. Afterwards, we validate the extra requirement with the client based on the partial version, before updating the partial version by adding the new required assets. At this level, we must one side, create the new version requested by the client(v_i), and on other side, integrate the new artefacts in our product line(PL) in order to reuse them in future configurations. To develop our approach, we created multiple products concentrated on a set of domain-related features, and for each new production process we applied a different configuration category and we created our new product by selecting, adding, modifying and removing artefacts from the existing versions, and we tracked the different steps from the choice of the versions that we were based on to create the new version, the operations that we used on the features, activities and assets, and the trace of the steps that we did to execute each step. Thus, we defined some rules, constraints and operators to be used during the creation of a new product. Finally, to be able to adopt our approach we must provide an asset per version model to identify the assets related to each version, an asset per feature model to identify the assets related to each feature, a version to feature model to identify the features fulfilled by each version, an algorithm that automatically selected the minimum number of versions that provide the maximum of the requested features for a given configuration and an algorithm that automatically performs the selection of assets per feature and provides suggestions to product developer.

Computational Analysis of the Gibbs-Wilbraham Effect As an Inverse Problem

Nassar Haidar and Mounir Abou Yassine (AUL, Lebanon)

We report on the numerics of solvability and solution of the inverse problem of Fourier series representations of discontinuous 2L- periodic signals in the real BV(-L,L) space.

Interface transport scheme of a two phase flow by the method of characteristics

Mireille Wazen (University of Saint-Joseph & LJLL - Pierre & Marie Curie University, Lebanon); Frederic Hecht (University Pierre and Marie Curie -LJLL, France); Toni Sayah (Université Saint-Joseph, Lebanon)

In this paper, we study an interface transport scheme for a two-phase flow of an incompressible viscous immiscible fluid. The problem is discretized by the characteristics method in time and finite elements in space. In this work, the interface is captured by the Level-Set function using appropriate boundary conditions for the problem of filling a tank. New natural boundary conditions for the transport equation are proposed and algorithms for computing the solution are presented. Finally, numerical experiments show and validate the effectiveness of the proposed scheme.

Two dimensional Ginzburg-Landau model with variable magnetic field

Kamel Attar (Lebanese University, Lebanon)

We consider the Ginzburg-Landau functional of superconductivity with an applied magnetic field in a two dimensional domain. We study the case when the applied magnetic field varies smoothly and is allowed to vanish non-degenerately along a curve. We describe the concentration of the energy and we show that the energy minimizers have vortices when the strength of the applied magnetic field $H(\kappa)$ varies between two characteristic scales, and the Ginzburg-Landau parameter κ tends to infinity.

EDU2: Science and Mathematics Education II

Room: USJ CSM Amphi A

Chairs: Fadi El Hage (Universite Saint Joseph (USJ), Lebanon), Marie Therese Saliba (Lebanese University, Lebanon)

Enseigner le français langue étrangère à des adolescents libanais issus de milieux socioculturels non-francophones, Démarche socioconstructiviste

Romacia Chamaa (USJ fsedu, Lebanon)

Cette thèse de doctorat est une recherche-action en didactique du français langue étrangère. Un cadre théorique socioconstructiviste et énonciativiste sert de fondement à un scénario pédagogique à distance de trois mois, destiné à des lycéens libanais d'une école privée francophone qui suit le programme

libanais. Le forum de discussion via Moodle y occupe une place importante. L'expérimentation du scénario permet de montrer que la réflexion métalinguistique, la réflexion interculturelle et l'analyse contrastive de textes dans les langues arabe (maternelle) et française (étrangère) de façon collaborative font évoluer les compétences linguistiques et discursives d'apprenants issus de milieux socioculturels non-francophones.

Les enjeux pour les enseignants de l'introduction du numérique à la Faculté des Sciences de L'Université Libanaise (Liban)

Joyce Rouhana (Université Saint-Esprit de Kaslik, Lebanon); Norma Zakaria (USEK, Lebanon); Jacques Wallet (Université de Rouen, France)

Notre communication portera sur la synthèse des réponses des enseignants-chercheurs et des responsables de l'Université Libanaise - Faculté des Sciences à une enquête sur leurs usages présents et envisagés des Technologies de l'Information et de la Communication pour l'Enseignement (TICE). Dans cette enquête en cours, au-delà des considérations pédagogiques, émergent des considérations identitaires liées à la fonction enseignante. Décréter pédagogiquement la mutation d'une posture de l'enseignant dispensateur de savoir à celle de l'enseignant accompagnateur des apprentissages est relativement simple, accompagner techniquement par la conception d'une cellule pédagogique universitaire numérique, responsable du développement des dispositifs de formation des enseignants-chercheurs libanais sur la pédagogie universitaire en utilisant les TICE est certes plus compliqué, mais nous faisons l'hypothèse que la crainte de la concurrence, la crainte d'être comparé ou remplacé par des contenus en ligne est l'obstacle principal au changement. Le contexte libanais caractérisé à la fois par une concurrence entre universités et par un protectionnisme national (les diplômes en ligne ne sont toujours pas reconnus au Liban) constitue une étude de cas atypique. Dans cette communication, nous essayons de présenter les enjeux de l'usage (présent et envisagé) des TICE par les enseignants-chercheurs scientifiques libanais et leurs attitudes (découragement, résistance, motivation…) et celles des décideurs envers leur utilisation à la Faculté des Sciences suite aux résultats (qui figureront dans la version définitive) de notre enquête en cours. En outre, nous cherchons à repérer les changements qu'implique (et/ou qu'impliquera) l'intégration des TICE dans les pratiques professionnelles des enseignants-chercheurs libanais à la Faculté des Sciences au niveau du rôle de l'enseignant-chercheur, au niveau des techniques d'enseignement/apprentissage adoptées, au niveau de la relation enseignant/étudiant, au niveau de l'accès aux ressources (en ligne), au niveau de la communication (formelle/informelle) enseignant/étudiant… et aussi au niveau des conduites institutionnelles envers ces technologies (qui ne reconnaissent pas les diplômes en ligne au Liban). De plus, nous essayerons d'identifier et d'analyser les obstacles « potentiels » vis-à-vis du changement (l'introduction du numérique) à la Faculté des Sciences sur le plan humain (crainte(s) des enseignants-chercheurs d'être remplacé par les technologies, formation des enseignants, etc.), sur le plan technique (matériels et équipements, informaticiens etc.) et sur le plan administratif (décrets ministériels, stratégies institutionnelles, organisation, etc.). Ainsi, dans cette enquête en cours, nous cherchons à comprendre les considérations identitaires liées à la fonction enseignante dans un contexte libanais « exceptionnel ». La réflexion sur notre problématique s'inscrit dans une recherche qualitative établie sur l'entretien semi-directif, sur le questionnaire et sur l'observation, des enseignants-chercheurs ainsi que des responsables administratifs à l'Université Libanaise en nous basant sur le cas de la Faculté des Sciences II.

L'USF: A la recherche continue de l'innovation dans l'enseignement

Josiane Abi Khattar (Université Sainte Famille USF, Lebanon)

À l'université, les pratiques d'enseignement se sont développées dans les siècles derniers en prenant appui sur deux modalités principales de communication: la communication orale et la communication écrite. La notion de technologie de l'information et de la communication ne remonte pas au numérique. Le passage de l'oral à l'écrit, de l'écrit à l'imprimé, puis de l'imprimé à l'audiovisuel ont constitué des changements technologiques importants dans l'histoire de nos cultures.Le langage numérique est désormais la « langue maternelle » des étudiants d'aujourd'hui lorsque, pour les enseignants formés dans une autre époque, l'acquérir nécessiterait de nombreux efforts. On constate que tout le monde "innove" désormais, ou plus exactement tout le monde se doit d'innover car le savoir change: Il était rare, il devient surabondant ; il était figé, il devient dynamique ; il était imprimé, il devient électronique ; L'accès au savoir devient interactif. Il évolue rapidement, en même temps que les disciplines. Chacun peut être en même temps producteur et consommateur de savoir. Associée à l'idée de progrès, de créativité, l'innovation est aussi génératrice de tension, de changements. Ce besoin de changement est suscité, au niveau des étudiants, par une insatisfaction ressentie, des difficultés rencontrées au quotidien. Au niveau institutionnel l'innovation représente aussi une réponse, souvent engendrée dans l'urgence, à l'insatisfaction de l'étudiant à l'égard du système éducatif, à un décalage entre la demande d'éducation, de formation et les besoins. Les enseignants devraient s'adapter à ces publics d'étudiants habitués à avoir des réponses rapides ou obtenir très vite des informations. Consciente de l'importance des TIC dans l'enseignement et dans la qualité du savoir, l'Université Sainte Famille - Batroun, a évalué le degré de l'utilisation des technologies de l'information et de la communication par ses enseignants. Pour répondre à la question, nous avons adressé un questionnaire à 100 enseignants exerçant dans différentes spécialisations. Ce questionnaire comprend des questions ouvertes, fermées et à choix multiple et divisée en trois parties: Informations personnelles, usage des TIC innovants dans l'enseignement, obstacles qui entravent l'intégration de ces technologies en classe. Le but ultime de cette recherche vise à optimiser l'emploi des ressources éducatives technologiques, investir les TIC en tant que voies de l'avenir pour parer autant que possible aux difficultés d'enseignement et d'apprentissage, intégrer et encourager les technologies dans la réalité universitaire. Les questions auxquelles nous avons tenté de répondre sont: - Quelle est le degré de l'utilisation des TIC par nos enseignants ? - Quel est l'impact de l'utilisation

des TIC sur l'enseignement? - Quels sont les obstacles qui entravent l'utilisation des TIC? Nous avons identifié que: - La plupart des enquêtés n'utilisent pas quotidiennement les TIC. - Les enseignants sont conscients de l'utilité des TIC dans l'enseignement. - Les enseignants n'utilisent pas les TIC pour diverses causes: manque de temps(33%), manque de formation(22%) Insuffisance de formation(35%) ; produits non utiles ne contribuent point à l'évolution des savoirs universitaires enseignés(10%). - Une minorité a réalisé différents produits, des sites web, des scénarios pédagogiques, d'exercices interactifs(5%). - Notre enseignant n'est qu'un simple utilisateur de l'Internet(95%). - Les enseignants ont une volonté pour surmonter les difficultés d'enseignement et d'apprentissage d'où la nécessité de valoriser la capacité d'innovation de nos enseignants(90%). Ces conclusions contribuent à la formulation des recommandations suivantes qui ont pour but d'améliorer et d'encourager les enseignants à intégrer les différents produits technologies dans les pratiques d'enseignement pour diminuer le taux d'échec et redonner du sens à ses concepts: - Améliorer et certifier la formation des enseignants aux TIC. - Favoriser des approches novatrices pour l'éducation et le développement professionnel des enseignants. - Fournir aux leaders du secteur éducatif les outils pour mettre en œuvre et gérer les changements. - Créé un réseau des enseignants innovants pour partager leurs expériences. - Innover Le statut des enseignants. Pour l'USF, réussir l'innovation est une question axiologique, d'adhésion à des valeurs qui doivent être partagées entre tous ses acteurs.

Calculus Students and Infinity: Perceptions and Misconceptions

Hiba S. Othman and Ziad Abou Haidar (American University of Science and Technology, Lebanon)

Infinity has been a debatable subject throughout history. Infinity may be seen as a mathematical idea that causes various obstacles to students due to the duality of its meaning, as an object and as a process. This study aims to examine calculus students' understanding of infinity. Firstly, this study aims to examine the perceptions of calculus students regarding the concept of infinity. In particular, the two aspects of the concept- as a process or as an object - are examined through the definition and participants' responses. Secondly, misconceptions that participants have during the comparison of infinite sets or numbers with infinite decimals will be discussed. Finally, the impact of different representations in the comparison of infinite sets will be investigated. Our study involved 50 students in an Advanced Calculus class. Data was collected through a questionnaire that was comprised of 4 tasks that aimed to identify perceptions of calculus students related to the concept of infinity. Results showed that the majority of students comprehend infinity as an unlimited process. Moreover, results showed that students mainly conceive infinity as a mathematical idea with limited applications to daily life. Furthermore, it could be seen that different representations of sets such as schematic drawing, vertical representations, horizontal, and verbal representations led to different answers. The present study identified misconceptions that students have related to the concept of infinity. This could help teachers later on devise ways to overcome these misconceptions. Recommendations include introducing applications of infinity in real life, and explaining infinity through its two aspects: the object and the process, and distinguishing each of the aspects by examples.

The Role of an Interactive Website in Providing a Catalyst for Learning Calculus at University: An APOS Theory Approach

Hiba S. Othman (American University of Science and Technology, Lebanon); Nina Hayfa (Lebanese University, Lebanon)

Calculus demonstrates the beauty of math and the agony of math education. Teaching calculus at university level has been known to be one of the toughest tasks that professors will undertake. As such, we selected to investigate in our study the effect of an interactive website, www.mymathlab.com, on the learning of university Calculus. The learning approach evaluated here is likely to be the first of its kind in the Lebanese University Context and possibly beyond. The aim of our research was to identify if the use of such a website will be found to be of high utility and constitute a catalyst for learning because it benefited students and enhanced performance in calculus courses at university. The Action-Process-Object-Schema (APOS) theoretical framework was used. Our study followed a quasi-experimental design of 2 groups: the experimental group (treatment group with www.mymathlab.com) and the control group (non-treatment group). Four sections of calculus were selected, and 3 instructors were chosen, 2 of them each teaching two sections (experimental and control). The third instructor was teaching on a remote campus in the traditional way. The concept of action in this study for the experimental group is an externally enabled conversion, through the interactive website, of concrete mathematical knowledge based on definite prior algorithms. Gradually, as the students reflected more on these actions and used them through the website, they converted them into a process. At this point, the students moved away from a step by step approach into using their understanding to digest the mathematical processes acquired and to formalize them into objects and mathematical tools. These objects, then, became a target for further manipulation, thus bringing the students onto a more abstract level. The entire process of transforming concrete objects to obtain more abstract new objects formed a schema. Through this cyclic process, the students' schema continually expanded, and the manipulated objects became more and more abstract. The knowledge acquired grew increasingly formalized. After experiencing such a learning process, students did not have to build a new schema when processing similar problems: the original schema was sufficient. The control group on the other hand experienced a traditional learning approach. Chi Square tests as well as an ANOVA study were used to compare student's academic results in the different calculus sections. The statistics obtained showed that this website significantly increased student achievement on calculus courses. A correlation analysis followed to show the effect of using the website on students' calculus grades. The regression model yielded a strong significance.

University Instructors' Perceptions of Technology Integrated in Mathematics Classes: A TPACK Approach

Hiba S. Othman and Youssef Hassoun (American University of Science and Technology, Lebanon); Nina Hayfa (Lebanese University, Lebanon)

The role of information and communication technology is seen as a support and an enhancement of the ability of the instructors to solve mathematical problems. Most importantly, it changed the way the instructors see the problems and how they devise ways of teaching mathematical problem solving using technology in order to offer new and powerful learning environments for future generations. University educators are in continuous search for ways to enhance student learning of mathematical concepts and to facilitate instructors' instructions of such concepts. With the emerging rise of technology in the 21st century, it was imperative to study the impact of technology on math education at university level. The aim of this study is to understand how technology is used in classroom environments, which beliefs instructors hold towards teaching and learning with technology, how technology could support learners, and the teacher know-how needed to integrate technology into the curriculum. The theoretical framework used is the Technological Pedagogical Content Knowledge (TPACK), built on Shulman's idea of PCK. This framework attempts to capture some of the essential qualities of knowledge required by instructors for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge. At the heart of the TPACK framework, is the complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between all three components. A teacher capable of negotiating these relationships represents a form of expertise different from and greater than, the knowledge of a disciplinary expert (a mathematician), a technology expert (a computer scientist) and a pedagogical expert (an experienced educator). A sample of 75 university mathematics instructors was selected. A survey of 25 questions was conducted. Correlation analysis was performed to monitor the effect of instructors' technological, pedagogical and content knowledge on their technology use. This was followed by a regression study to determine the type, strength, and significance of the relation. Results showed that instructors who use technology believed that the use of technology in the classroom leads to increased student achievement and helps overcome student gaps. However, more than half of the instructors only use computers for administrative functions. One reason that faculty are not using technology resources is lack of knowledge. In addition, a lack of confidence in one's ability to use technology and a corresponding lack of commitment to using it can add to a teacher's reluctance to integrate technology into the classroom experience. Many faculty members lack the technological proficiency needed to take advantage of these new technologies, making them unable to bring these technologies into the classroom. Future recommendations include the need for teacher technology training. Action plans for departments of mathematics at universities all over Lebanon should include ongoing one-on-one mentoring and follow-up support available to address instructors' daily challenges, alleviating the fear of the unknown while increasing knowledge, proficiency, and efficacy. As well, further research needs to look specifically at the integration of technology into the curriculum. Faculty members need to learn not only how to use technology at a basic level but also how to integrate that technology into their curricula.

The Effect of the Language of Instruction on the Math and Science Achievement of Lebanese Students

Nadine Adnan Dandashly (American University of Science and Technology, Lebanon)

A relation between language and science and math achievement has been recognized by a number of academics(Stubbs, 1976; Secada, 1991; Huang & Normandia, 2008). When low proficiency of language exists, students face many challenges in achieving well in math and science(Tan, 2011; Capps & Pickreign, 1993). The choice of the language of instruction has shown an effect on the students' performance in math and science (Alvarez, 1991; Saade, 1982; Za'rour & Nashif, 1977; Gorgorio & Planas, 2001). Receiving instruction in the students' first language has benefits. When proficiency in both languages was achieved, higher performance in math/science was shown(Bankston & Zhou, 1995; Cummins & Gulutsan, 1974; Hakuta & Diaz, 1985, Lambert, 1990; Swain & Lampkin, 1982; Mouw & Xie, 1999).This study is designed to examine whether the language of instruction(L1 or L2) of math and science at the elementary level has an effect on the science and math achievement of Lebanese students, with specific focus on higher cognitive levels of thinking. This study examined the extent of which the science and math achievement of Lebanese students is influenced by the language of instruction at the elementary level. It specifically studied whether students studying in Arabic at the elementary level achieve better results in questions requiring higher cognitive levels of thinking than students studying in the second language. In this study the First Language(L1) is defined as the language first learned by the individual, his/her primary and home language, which is Arabic. The Second Language(L2) is defined as the language that students learn in addition to the language they learn as children. Higher order thinking involves interpreting, analyzing, and manipulating information. The study aimed at allowing educators to seek new teaching strategies which would reinforce the relation between the language and science /math instruction and benefit from their interdependence to increase the academic achievement. It also intends to consider alternative models of bilingual education in order to enhance students' understanding of math and science concepts and also increase high achievements in solving problems which involve higher cognitive levels of thinking skills in L1 and L2. The research design included in this study was quantitative and comparative where the results of achievement tests of two groups of Lebanese students were analyzed and compared. A sample

of six schools was selected from three regions of Lebanon: Beirut, Saida, and Nabatieh. All schools were private and mixed gender schools that worked to fulfill the requirements of the Lebanese Curriculum. The text books used in these schools were Lebanese National text books covering the learning outcomes stated by the ministry of education. Several criteria were used to check the common characteristics of the schools chosen in each region. A paired sampling of groups of schools was done. All selected students were born in Lebanon with Lebanese parents, used the Lebanese dialect in communicating with their family members and peers, and were those who had been living in Lebanon for more than five years. The total sample was 526 students: The overall number of students in the group of L1 schools: 219 students. The number of the students in the group of L2 schools: 307 students. The instrument used was achievement tests which were administered to grade five and eleven students of every school. A short questionnaire was completed by all students before the exam. The achievement tests were designed then administered in the six schools to grades 5 and 11 students on different dates between the end of April 2013 and the beginning of May 2013. Six achievement tests administered in different schools: the English science achievement test for Grade 5(T1), the English math achievement test for Grade 5 (T2), the Arabic version of the science achievement test for Grade 5(T1'), the Arabic version of the math achievement test for Grade 5(T2'), the English science achievement test for Grade 11(T3), the English math achievement test for Grade 11(T4). The designed achievement tests measured three different cognitive levels of thinking. In conclusion, students studying in their first language at the elementary level achieved higher in math and science at the elementary and the secondary levels than students who studied in the second language at the elementary level. L1 students achieved higher than L2 students in the science and math achievement test. An alignment between these results and the review of literature of several reviews existed. Students learning in Arabic achieved better than students learning in English in the exercises requiring high cognitive levels of thinking. The results of grades five and eleven math and science achievement tests align with the review of the literature(Lee, 2005; Lynch, Chipman, & Pachaury, 1985a). Using the first language should be considered as the language of math and science instructions at the elementary level. Learning math and science in L1 and L2 in order to achieve the objectives of the Lebanese curriculum is recommended. Language programs through which the proficiency of the first language(before starting to learn in L2) is achieved are suggested. Transition to learning in L2 should occur after the students achieve the language of proficiency in L1. Interdisciplinary programs of English and math/science are also recommended. On the ministerial level, new math and science books are recommended to be chosen by the education department in Lebanon.

Etude de l'évolution des représentations sur le métier d'enseignant des étudiants en sciences de l'éducation à l'Université Saint-Esprit de Kaslik

Odile Saab (USEK- USJ-UL, Lebanon); Hind Alouf (USEK, Lebanon)

De nos jours, le métier d'enseignant a considérablement évolué. Des compétences professionnelles visant l'amélioration de la qualité et l'équité de l'enseignement ont été identifiées et préconisées par de nombreux systèmes éducatifs notamment au Canada et en France (Martinet, Raymond & Gautheir, 2001). Actuellement, la finalité de l'éducation est de conférer à l'écolier la capacité d'accéder à l'information, de la comprendre, de l'interpréter et de développer des compétences personnelles et sociales lui permettant d'utiliser cette information dans sa vie quotidienne. La formation des enseignants est devenu par conséquent, un facteur clé pour le développement cognitif et psychosociale des élèves à l'école (Jourdan, Vaisse, Bertin, & Fiard, 2003). Elle permet aux enseignants de situer leur rôle en éducation et de l'intégrer plus aisément dans leur programme de classe. Dans cette perspective, enseigner au Primaire demande que l'éducateur maîtrise parallèlement aux connaissances disciplinaires, des connaissances sur les méthodes actives d'enseignement, sur les principes de l'interdisciplinarité, sur la psychologie cognitive, sur la psychologie comportementale, et une culture générale. L'enseignant doit également être capable de planifier correctement ses cours, de concevoir et d'animer toutes sortes d'activités d'apprentissage (Perrenoud, 2004). De même, il doit prendre en considération les conceptions initiales de ses élèves, leurs acquis, leurs intérêts, leurs conditions de vie à l'école ainsi que leur environnement familial et social, afin de mieux cibler leurs besoins en éducation et d'augmenter l'efficacité de son intervention (Berthet & Paradas, 2006). Des entretiens avec les enseignants du département des Sciences de l'Education de l'Université Saint-Esprit de Kaslik, ont permis de constater que les étudiantes trouvent certaines difficultés à construire des compétences nécessaires au métier d'enseignant du Primaire et une identité professionnelle. Nous émettons l'hypothèse que ces difficultés sont en grande partie dues à certaines représentations erronées du métier d'enseignant construites tout au long de leur expérience scolaire. De plus, ces étudiants ont des parcours scolaires forts différents et se caractérisent par des profils de compétences variables selon l'option du bac détenu et les établissements scolaires qu'ils ont fréquentés. A noter que certains d'entre eux avaient déjà commencé des études universitaires et y ont connu un échec et espèrent, en s'inscrivant en licence en sciences de l'éducation, rencontrer un type d'enseignement moins exigent. Nous pensons que ces facteurs constituent de sérieux obstacles à la réussite académique des étudiants et aussi dans le métier d'enseignant. Par ailleurs, nous supposons que la formation fournie à l'université est capable d'induire des changements positifs sur ces représentations et de favoriser l'acquisition des compétences professionnelles du métier d'enseignant. Dans ce travail de recherche, nous proposons d'abord, d'étudier les représentations des étudiants, futurs éducateurs, sur le métier d'enseignant et de mesurer par la suite l'effet de la formation proposée par la faculté sur ces représentations. Notre souci étant le développement de la qualité de notre enseignement et celui de l'enseignement du Primaire au Liban. Méthodologie Nous adoptons, dans cette recherche, une approche méthodologique mixte qui combine une étude qualitative et une autre quantitative afin d'appréhender la réalité au maximum. En effet, pour analyser l'évolution des représentations des étudiants en éducation sur le métier d'éducateur, nous réaliserons en un premier temps, une enquête par questionnaires destinés à tous les étudiants du département et nous comparons les réponses des étudiants des 3 premières

années avec celles des étudiants en Diplôme d'enseignement et en Master. Deux focus groupes avec des étudiants stagiaires seront effectués en un second temps, ils permettront d'approfondir les résultats sur les effets de la formation inculquée dans la faculté sur les représentations des étudiants. 1- Le questionnaire Le questionnaire comporte des questions fermées, semi-fermées ou ouvertes centrées autour de: - l'expérience scolaire, la motivation dans le choix des études, - les représentations sur les compétences professionnelles des éducateurs du Primaire, - les représentations sur la communication avec élèves, les parents, les collègues et les responsables (coordinateurs et préfets). 2- Le guide d'entretien du focus groupe Le guide d'entretien comportera des questions autour des compétences professionnelles du métier de l'enseignant du Primaire tels qu'ils sont définis dans le B.O. français n°30 du 25 juillet 2013, ainsi que des questions sur l'évolution des représentations de 1re année et sur les origines de cette évolution afin d'avoir une idée sur le profil des enseignants de demain que nous formons. Conclusion Actuellement, l'école vise la formation de citoyens autonomes et responsables, en mesure de comprendre l'enjeu de l'avenir et de conduire leur vie en conséquence. L'enseignement des éducateurs devrait, par conséquent, avoir pour objectifs l'intégration des savoirs, des savoir-faire, des savoir-être et des savoir-agir chez l'apprenant, dépendamment de son niveau scolaire et de ses capacités intellectuelles. D'où l'importance de former des enseignants « professionnels ». Bibliographie Berthet, C., & Paradas, C. (2006). Prévention de conduites addictives-Guide d'intervention en milieu scolaire. Jourdan, D., Vaisse, J., Bertin, F., & Fiard, J. (2003). L'éducation à la santé en formation initiale. revue EPS 1, (111). Martinet, M. A., & Raymond, D. et Gauthier, C.(2001). La formation à l'enseignement. Les orientations. Les compétences professionnelles. Québec: Ministère de l'éducation, Direction de la formation et de la titularisation du personnel scolaire. Perrenoud, P. (2004). Évaluer des compétences. L'éducateur, 8-11.

BIO14_Phamra: Biological, Medical, Pharmaceutical, Health Sciences XIV

Room: USJ CSM C9

Chairs: Ramez Chahine (Lebanese University, Lebanon), Latife Karam (Université Saint Joseph, Lebanon)

Novel insights into the role of interleukin-23 in nickel-induced allergic contact dermatitis

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Allergic contact dermatitis (ACD) is a common skin disease that is caused by type IV delayed-type hypersensitivity responses to chemicals that come into contact with the skin. It has a high prevalence in Europe (15 to 20%). Among the 3000 known sensitizers, nickel is the most involved in ACD reactions. IL-12p70 (composed of IL-12p40 and IL-12p35) and IL-23 (composed of IL-12p40 and IL-23p19) are two cytokines involved in inflammation and adaptive immunity, from the IL-12 cytokine family and produced by dendritic cells. They are also involved in the amplification of ACD and play a major role in the generation of allergen-specific T cell responses. In this study, we address the question whether the sensitizer nickel sulfate (NiSO4) can induce the secretion of IL-12p70 and IL-23 in human monocyte-derived dendritic cells (Mo-DC). In our model, NiSO4 induced human Mo-DC maturation and enhanced the expression of cell surface markers (CD86, CD83). We found that IL-12p40 and IL-23 were produced by human Mo-DC in response to NiSO4 stimulation. We also showed that NiSO4 induced an early expression of il-23p19 mRNA and il-12p40 mRNA but mRNA levels of il-12p35 weren't modified. Furthermore, we showed that NiSO4 required the presence of IFN-γ to induce il-12p35 mRNA expression. By contrast, this association induced a decrease in il-23p19 mRNA expression. On the other hand, we found that p38MAPK and NF-KB were involved in the expression of the two subunits of IL-23 and in the production of IL-23 and IL-12p40 induced by NiSO4. Finally, our results contribute to the understanding of the mechanisms of nickel-induced ACD and describe a novel effect of nickel on IL-12 cytokine family in human Mo-DC.

Evaluation of Antibiotic Prescription in Hospitalized Lebanese Childrens

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Introduction: Antibiotic (ATB) prescription is facing the problem of misuse and overuse leading to antimicrobial resistance and mortality. This issue is of major concern in developed and developing countries; however, data on infections and prescription of antibiotics in Pediatrics are lacking, particularly in Lebanon. Objective: Our aim is to evaluate the adequacy of antibiotic prescription in children hospitalized for any infection at pediatric floor in Lebanese hospital setting. Methods: A 6 months

retrospective pilot study was conducted on 269 inpatient aged 14 years or less, hospitalized in two teaching medical centers between November 2013 and April 2014 and treated by at least one ATB. Data collection was performed using a standardized form, filled out based on hospitals' records. The conformity of practices has been evaluated according to the ANSM (Agence Nationale de Securité du Médicament et de Produits de Santé) and the IDSA (Infectious Diseases Society of America) guidelines, by considering the following criteria: choice, indication, dose, association, route of administration and duration of antibiotics used. Results: Among the 269 collected cases, an empirical antibiotic was prescribed in 92.2 % of infections encountered during this period. The overall nonconformity was 66.2% for IDSA and 69.1% for ANSM , which matches the published literature. The results showed an increase in nonconformity to IDSA guidelines with empirical ATBS (p=0.001); this was similarly noticed with ANSM guidelines (p=0.026). We also found that nonconformity to IDSA was higher when residents were the prescribers (p=0.028), but not according to ANSM (p=0.814). The percentage of nonconformity was higher with public insurance versus private one (p=0.038). The multivariate analysis of IDSA adherence showed that the more prescribers were involved, the less likely to report nonconformity (ORa = 0.410; 95 % CI = [0.178-0.949]), whereas prescribing empirical ATBs was a high predictor of non-conformity (ORa =12.282; 95 % CI = [2.355-64.068]), in addition to a hospital stay of more than 5 days (ORa = 2.139; 95 % CI = [1.14-4.013]). Conclusion: These results highlight the urgency of controlling antibiotic prescription in pediatric medical settings. Additional studies will further clarify the full picture of ATBs use in Lebanon.

Evaluation of Antibiotic Prescription in Lebanese Elderly Hospitalized Patients

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Introduction: The burden of antimicrobial resistance worldwide is extensive and is likely to grow. One of the main causes is excessive prescription of antibiotics (ATB) which is likely to be high but is poorly described in Lebanon especially in primary care. Objective: The aim of this observational study was to describe and evaluate the adequacy of antibiotic prescription patterns among elderly patients admitted for any infection at the internal medicine floor in Lebanese hospital setting. Methods: A 6 months retrospective cohort pilot study was conducted on Lebanese inpatients aged 55 years or more, treated by at least one ATB and hospitalized from November 2013- April 2014 in Internal Medicine ward at Rafic Hariri Univresity Hopsital (RHUH) at Beirut. A Neutropenic and dialyzed patients were excluded. Data collection was performed using a standardized form, filled out based on hospitals' records. The conformity of practices has been evaluated according to the ANSM (Agence Nationale de Securité du Médicament et de Produits de Santé) and the IDSA (Infectious Diseases Society of America) guidelines, by considering the following criteria: choice, indication, dose, association, route of administration and duration of antibiotics used. Results: Among the 119 inpatients screened during the study period 63.1% infections were confirmed and empirical antibiotic was prescribed in 58% of infections encountered during this period. Most frequent diagnoses were: community acquired pneumonia (27%), urinary tract infection (17.6%) and diabetic foot infection (8.8%). Most commonly prescribed antibiotics were: Piperacillin-tazobactam (48.7%) and imipenem-cilastatin (37%) with extensive empirical antibiotics (58.8%). The overall nonconformity was 35.8% for IDSA and 31.8% for ANSM, which matches the published literature. The results showed an increase in nonconformity to IDSA guidelines with empirical (p=0.031) and documented (p=0.022) ATBS treatment, but not for ANSM guidelines (p=0.093 and 0.082 respectively). We also found that nonconformity to IDSA was higher with the number of ATBs (p=0.001), the number of infections (p=0.001) and use of Amikacin (p=0.035) and ceftriaxone (p=0.031). This was similarly noticed for ANSM guidelines (p=0.001 for the number of infections, p=0.001 and p=0.041 respectively for Amikacin and ceftriaxone use) in addition to the number of ATBs modifications (p=0.032). Multivariate analysis of IDSA conformity showed that carrying radiopulmonary test (ORa=16.713, p=0.022; 95%CI=1.504-85.745), having a community acquired pneumonia (ORa=2.282, p=0.008; 95%CI=0.882-5.903) prescribing empirical (ORa =1.657; 95%CI=2.355-64.068) were a higher predictors of nonconformity; Similarly, the hospital stay more than 5 days was also associated to increase in non-conformity (ORa=1.045, p=0.005; 95%CI=1.013-1.079) and (ORa=1.030,p=0.003; 95%CI=1.003-1.058) respectively for IDSA and ANSM respectively. Conclusion: The study demonstrates that potentially inappropriate prescribing is occurring in the adult population and the high rate of broad-spectrum antimicrobial agents associated with vast use of empirical formula is a major concern. This behavior is ending in non compliance to treatment guidelines. So there is a need for official and standardized guidelines that homogenize antibiotic prescribing among hospitals.

The Neurosteroid Derivative Caprospinol Crosses the Blood Brain Barrier; Analysis by Liquid Chromatography and Tandem Mass Spectrometry

Georges Rammouz (McGill University, Lebanon)

Alzheimer's disease (AD) is most common form of dementia in elderly which is estimated to affect 60 millions people in the world by 2050. A hallmark of the disease is an abnormal accumulation of amyloid peptide (Ab) in the patients' brain with the formation of the non-fibrillar highly neurotoxic oligomers Amyloid Derived Diffusible Ligands (ADDLs), and plaque formation. We recently published that the 22R-hydroxycholesterol derivative caprospinol, a heterospirostenol naturally occurring in plant of Asteraceae family, binds to Ab, preventing 1/ the accumulation of the peptide in the neuron mitochondria and 2/ the formation of ADDLs, both contributing to the neuroprotective effect on neurons in culture. We also showed in vivo on an AD rat model that caprospinol treatment reduced amyloid deposits and neurodegeneration

in the hippocampus and improves cognitive performance on Morris watermaze task. With this first set of experiments, we provide the direct evidence that caprospinol crosses the blood brain barrier. Male Long Evans rats received caprospinol through an osmotic pump place inside the peritoneal cavity at 5 mg/kg/day for 2 weeks (total amount = 24.5 mg) and brains were removed for caprospinol measurement one week after the pump infusion stopped. The presence of caprospinol in the brain extracts was characterized by electrospray quadrupole ion trap mass spectrometry in positive mode. The full ESI-MS scan and the ESI-MS/MS spectrum of the caprospinol standard and of all the rat brain extracts showed the same molecular peaks (m/z=1115, m/z=1047, m/z=1015, m/z=995). Quantification using high performance liquid chromatography revealed that 4.13±1.46 mg of caprospinol was still present in the rat forebrain one week after the end of the perfusion which represented 17.33±5.96% of the total amount injected over 2 weeks. These findings show that caprospinol crosses the blood brain barrier and accumulates in the brain during chronic treatment.

Improved Plasma Cholesterol Efflux Capacity from Human Macrophages in Patients with Hyperalphalipoproteinemia

Petra El Khoury (Universite Saint Joseph, Lebanon); Marianne Abi Fadel (Université Saint Joseph, Lebanon)

Objectives: Genetic CETP or HL deficiency are associated with a marked increase in HDL-C levels, however the athero-protective effect of this phenotype, in particular the ability of HDL particles to remove cholesterol from human macrophages, remains to be determined. Methods: Patients carrying molecular defect in either CETP (n= 6) or LIPC (n=2) gene, causing a striking increase in HDL-C levels (>100mg/dl) were recruited. We measured the capacity of total plasma as well as of isolated HDL particles to mediate cholesterol efflux from human THP1 macrophages and from specific cellular models over expressing ABCA1, SR-BI or ABCG1. Results: A prominent increase in HDL-C levels (+134%) was observed in all patients carrying CETP or LIPC deficiency when compared to normolipidemic controls. This increment was localized in the peak of large HDL2 particles as shown in the lipoprotein profile of HALP patients. The quantitative increase in HDL2 particles (1.7 fold) lead to a specific enhancement of SR-BI mediated cholesterol efflux of plasma from HALP patients (+18% and +40% in CETP and in LIPC deficient patients respectively as compared to controls; $p<0.0001$). A major increment in the intrinsic capacity of HDL3 particles to stimulate cholesterol efflux through ABCA1 pathway was observed in HALP patients (+47% and +56% in CETP and in LIPC deficient patients respectively as compared to controls; $p<0.001$). In consequence, an increase in the capacity of plasma to stimulate cholesterol efflux from human THP-1 macrophages was observed in HALP subjects when compared to controls (+24% and +38% in CETP and LIPC deficient patients respectively; $p<0.001$). A structural analysis of the functional HDL particles from HALP patients revealed an increase in their relative Apo-E content which is potentially related to the observed increase in plasma cholesterol efflux capacity. Conclusion: HDL particles isolated from HALP patients carrying molecular defect within either CETP or LIPC gene are efficient to stimulate cholesterol efflux from human macrophages. We conclude that the observed increase in cardiovascular disease in HALP patients reported in some studies is not related to the generation of dysfunctional HDL.

Evaluation des prescriptions en Médecine Interne: Elaboration d'un score prédictif de l'erreur visible

Mayssam Bou zeid (Lebanese University, Lebanon); Mohammad Yassine (Université Libanaise, Lebanon); Akram Farhat (Lebanese University, Lebanon); Sanaa Awada (Faculty of Pharmacy, Lebanese University, Lebanon); Samar Rachidi, Salam El zein, Wafaa El Bawab, Pascale Salameh and Amal El Hajj (Université Libanaise, Lebanon)

Introduction: L'iatrogénie médicamenteuse représente un problème majeur de santé publique, mais longtemps ignoré. De nombreuses études menées dans des pays différents du monde entier, ont montré que la majorité des erreurs survenaient au cours de la prescription. Objectif: L'objectif de l'étude est d'évaluer les prescriptions médicamenteuses dans le service de médecine interne en milieu hospitalier libanais et élaborer un outil prédictif de l'erreur visible définie comme toute iatrogénie médicamenteuse évitable se traduisant chez le patient par un signe détectable au niveau clinique. Méthode: Une étude rétrospective a été menée en service de Médecine Interne d'un hôpital universitaire à Beyrouth entre Avril et Juin 2014. Elle a été conduite sur 126 patients hospitalisés entre 1er Novembre et le 15 Mai 2014, quelque soient leurs motifs d'admission. La collecte des données a été réalisée à l'aide d'une fiche de recueil en langue française. Des analyses bivariée et multivariée ont été réalisées. Une analyse factorielle a été retenue afin de construire le score pilote. Résultats: Parmi les 126 hospitalisés, 54 (42.6 %) ont montré une erreur au niveau clinique. En analyse bivariée, plusieurs variables ont montré une association significative avec l'apparition d'une erreur visible au niveau clinique: l'âge avancé ($p=0.03$), le bas niveau culturel ($p=0.001$), l'hypertension artérielle ($p=0.022$), la dyslipidémie ($p=0.019$), l'insuffisance rénale ($p=0.006$), le diabète mellitus ($p=0.001$), le syndrome coronarien aigu ($p=0.006$), le nombre élevé de médicaments ($p<0.001$), le nombre élevé d'erreurs ($p<0.001$), la présence de contre indication ($p=0.018$), l'altération des signes vitaux ($p<0.001$) et le degré du médecin traitant du patient qu'il soit un spécialiste, un résident ou un interne ($p<0.001$). La présence de tout type d'erreur de prescription (non-conformité aux référentiels, interaction, monitorage non suivi, surdosage, sous dosage, effet indésirable, voie/administration inappropriée) était significativement associée à l'apparition d'une erreur visible. Afin de déterminer les facteurs prédictifs de l'erreur visible, une régression logistique a été menée. Les patients soumis à une erreur de surdosage avaient à peu près 24 fois plus de risque de développer une erreur visible (ORa=24.405; $p=0.004$). L'augmentation du nombre des erreurs de prescription et

de médicaments au cours de l'hospitalisation était significativement accompagnée d'un risque augmenté d'apparition d'une erreur visible (ORa=1.656; p<0.001; ORa=1.245; p=0.002 respectivement). En plus, un outil prédictif de l'erreur visible a été construit. Sept items ont été retenus. Pour des valeurs du score ?50.5 points, cet outil prédit à 79.40 % des valeurs négatives et à 80 % des valeurs positives pour des valeurs du score > 60.5 points. Conclusion: Au cours de cette étude, un outil pilote prédictif de l'erreur visible chez les patients hospitalisés a été construit. Il pourrait être utile une fois appliqué au cours des premiers jours de l'hospitalisation afin de prévenir par la suite toute erreur visible. La valeur clinique de cet outil nécessite toujours une confirmation par des études futures et prospectives.

15:30 - 17:30

TR5: Table Ronde 5

Technologies de la lumière et applications aux quotidien
Intervenants : Azzedine Boudrioua, Joseph Fadous, Naji Waked, Serge Fermandjian, Youssef El Hage

Room: USJ Salle Polyvalente E5
Chairs: Marie Abboud (Saint Joseph University, Lebanon), Guy Le Brun (Université de Bretagne Occidentale, France)

16:15 - 16:30

CB5: Pause-Café

16:30 - 18:00

BIO16_Medicale: Biological, Medical, Pharmaceutical, Health Sciences XVI

Room: USJ CSM Amphi B
Chairs: Marianne Abi Fadel (Université Saint Joseph, Lebanon), Walid Abou HAmad (Holy Spirit University of Kaslik, Lebanon)

Novel mutation in forkhead box G1 (FOXG1) gene in a Lebanese patient with Rett syndrome

Sandra Corbani (unité de Génetique Médicale, USJ, Lebanon); Alain Chebly, Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

Rett syndrome (RTT), an X linked dominant neurodevelopment disorder, represents one of the most frequent intellectual disability (ID) genetic disease in girls. It is characterized by the progressive loss of intellectual functioning, fine and gross motor skills and communicative abilities, deceleration of head growth, and the development of stereotypic hand movements, occurring after a period of normal development. 95-97% of patients with typical RTT and 50-70% of atypical cases present alterations in MECP2 gene. Recent studies showed that mutations in CDKL5 and FOXG1 genes are involved in atypical RTT phenotype. In fact, 1.5% of females with severe ID, autistic features, epilepsy and agenesis of the corpus callosum present mutations in FOXG1. The latter encodes a transcription factor acting primarily as transcriptional repressor through DNA binding in the embryonic telencephalon. In this study, we describe the molecular analysis of FOXG1, by Sanger sequencing, in a cohort of 31 Lebanese female RTT patients with no MECP2 mutation. We have identified a nonsense mutation, p.L325*(c.974T>A), in FOXG1 gene in a patient with congenital variant of RTT. This mutation results in premature stop codon. Since the mutation is located in JARID1B-interacting domain, the resultant mutation disrupts the secondary structure of the protein making it non-functional. This is the first study in Lebanon showing mutation in FOXG1 gene in RTT. CDKL5 and NTNG1 molecular analysis should be performed for the remaining patients in order to understand the mechanism behind their disease.

Molecular Study of FANCA gene responsible for Fanconi anemia in a Lebanese cohort

Tony Yammine (Unité de Génétique Médicale, USJ, Lebanon); Sandra Corbani (unité de Génetique Médicale, USJ, Lebanon); Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Alain Chebly (Saint Joseph University, Lebanon); Rima Korban (unité de Génetique Médicale, USJ, Lebanon); Eliane Chouery and Andre Megarbane (Saint Joseph University, Lebanon)

Fanconi anemia (FA) is a genetic disorder belonging to chromosomal instability syndromes characterized by an increased chromosomal breakage and sister chromatid exchange, pancytopenia, congenital malformations and a high predisposition to cancer. Sixteen genes are responsible for FA rising to different disease subtypes with an autosomal recessive mode of inheritance, except for FANCB, which is X-linked. The most frequent gene involved in the disease is FANCA. Six patients with FA were referred to the Medical Genetics Unit at USJ for molecular analysis. Sanger sequencing of FANCA detected three new mutations: p.P1164L (c.3491C>T), IVS27-2A> G and a deletion of three exons 6-8, in three patients at homozygous state. Bioinformatics studies were conducted in order to understand the effect of these mutations on the protein level. This is the first Lebanese molecular study of FA making genetic counseling possible to families' members with identified mutations. This study should be completed by the analysis of the remaining genes implicated in FA in order to identify the mutations in the remaining families.

Knock-out of the bradyzoite marker p18 in Toxoplasma gondii: insights towards a functional characterization during neurotoxoplasmosis

Nadim Tawil and Lea Maalouf (American University of Beirut, Lebanon); Sana El-Sayyed (Lebanese University, Lebanon); Raghida Abou Merhi (Lebanese University & Faculty of Sciences, Lebanon); Sébastien Beistero (Université de Montpellier II, France); Jean-Francois Dubremetz (Université de Montpellier II, Lebanon); Maryse Lebrun (Université de Montpellier II, France); Hiba El-Hajj (American University of Beirut, Lebanon)

Descriptive Statement: The dynamics of disease progression and development in case of Toxoplasmosis is an interplay between acute and chronic infection phases. The mechanisms of interconversion between these phases are poorly understood and the molecular players are yet to be identified. We investigated the involvement of a chronic-phase-specific surface marker p18. Background and Aims: Toxoplasma gondii is an apicomplexan protozoan parasite that infects all warm blooded animals including humans. T. gondii causes a severely morbid or fatal disease in fetus and immunocompromised patients. During its life cycle, T. gondii exhibits three morphologically infectious stages: tachyzoites, bradyzoites, and sporozoites. Tachyzoites are rapidly multiplying and responsible for the acute toxoplasmosis leading to tissue damage. Bradyzoites are slow-growing and responsible for the chronic neurotoxoplasmosis that often reactivates in immunocompromized patients. Lastly, sporozoites are the infective forms found in oocysts. The back and forth switch between tachyzoite and bradyzoite stages is a key modulator of the progression of toxoplasmosis between acute and chronic phases. However, this switch remains very poorly understood. We have investigated the role of the bradyzoite marker p18 in this frame for which the gene sequence is annotated on www.toxoDB.org. Methods: We have used the selection vector (P2854) containing the selectable marker cassette hypoxanthine-xanthine-guanine-phosphoribosyl-transferase (HXGPRT) and cloned the 5' and 3' flanking regions of p18. This vector was introduced by electroporation to the Pru Δku80 strain which favors its integration by double crossing over and homologous recombination. We have successfully generated and cloned the Pru Δku80Δp18 knock-out parasites and investigated their phenotype in vivo. Results: Deleting p18 led to the formation of more bradyzoite cysts in the brains of mice. However, these bradyzoites reactivated much later than the wild type strain. This result drove us to investigate the phenotype of the Pru Δku80Δp18 knock out during the acute phase of infection. We could clearly see a better survival rate of mice infected with the knock-out strain as compared to the wild type strain, furthermore, we have seen less parasites in all tested organs except in the brain where the amount of tachyzoites from both strains was similar. Conclusion: These results strongly suggest a role of p18 in the reactivation process and require further investigation on the immune profile of the knock-out parasites.

L'écriture de l'arabe chez des enfants bigraphes

Carla Matta Abizeid, Amira Tabsh Naib and Martine Mansour (Université Saint-Joseph, Lebanon); Jean-Michel Albaret (Université de Toulouse, UPS, France); Jean-Luc Velay (Aix-Marseille Université, France)

L'écriture est un véritable carrefour entre langage et motricité dans lequel trois composantes générales et relativement indépendantes peuvent être décrites: celle qui génère et organise les contenus à évoquer; celle qui effectue la mise en forme du texte; celle qui prend en charge la transcription graphique. Ces composantes ne sont pas sollicitées avec la même intensité dans la production d'écriture selon l'âge, la classe, la tâche ou encore la présence d'une pathologie. Nous nous intéressons à la troisième composante, celle du geste graphique et de ses difficultés connues sous le nom de dysgraphie de développement ou de Trouble de l'Apprentissage de la Graphomotricité (TAG; Albaret et al., 2013), qui est essentielle dans les premières années de la scolarité. Si cet apprentissage procédural et l'automatisation consécutive ne s'installent pas, l'enfant se trouve alors dans une situation de double tâche pouvant

interférer sur les activités de composition, soit l'écriture en tant que véhicule de la pensée. Un nombre conséquent d'enfants ne parvient pas à maitriser l'écriture manuscrite: ces enfants dysgraphiques voient leurs chances de réussite académique se réduire de façon dramatique. En France, les enfants ne sont confrontés qu'à un seul système graphique (monographie). Au Liban, les enfants se retrouvent en situation de bi- ou de pluri-linguisme, du fait de l'intrication de facteurs historiques, politiques, économiques et confessionnels. Dans ce contexte déjà fort complexe, la situation de bigraphisme est générale avec un apprentissage dès l'âge de 5 ans de deux systèmes d'écriture cursive. Tout n'est pas encore connu quant aux causes qui engendrent la dysgraphie chez les enfants monographes, mais les enfants libanais bigraphes constituent un modèle d'étude particulièrement intéressant de ce point de vue. En effet, on pourrait penser qu'un enfant qui rencontre des difficultés dans l'une des deux langues rencontrera des difficultés comparables dans l'autre. Mais il est possible que la même cause ne produise pas les mêmes effets sur les deux systèmes graphiques. D'un point de vue plus fondamental et à l'instar de ce que l'on sait de la dyslexie, la situation particulière dans laquelle se trouve le jeune enfant libanais remplit toutes les conditions pour étudier le rôle de la structure de l'écriture, notamment le lien entre graphème et lettre, sur l'apparition du trouble de l'apprentissage de l'écriture. Le fait qu'une même lettre puisse, selon son emplacement dans le mot, correspondre à plusieurs graphèmes, comme c'est le cas dans l'écriture arabe, pourrait constituer l'une de ces contraintes linguistiques. Nous nous proposons tout d'abord de préciser la nature des troubles de l'écriture chez l'enfant évoluant dans un contexte de bigraphisme. Pour cela, il est d'usage de distinguer l'évaluation de la trace laissée sur le papier, produit formel de l'écriture (Henderson, 1987; Rosenblum, Weiss & Parush, 2004) et l'évaluation du geste du scripteur, processus qui évolue au cours du temps. L'évaluation du produit s'effectue à l'aide de tests mesurant la qualité de l'écriture sur une série de critères. Le test le plus utilisé en langue française est le BHK (Charles et al., 2003). L'évaluation du mouvement graphique nécessite l'utilisation de tablettes digitales afin de recueillir une série d'indices temporels, spatiaux et cinématiques. L'objectif de ces deux études qui s'inscrivent dans le cadre de la recherche à l'Institut de psychomotricité est d'une part de préciser la nature des troubles de l'écriture chez l'enfant libanais âgé de 8 à 10 ans et, d'autre part, de comprendre les interactions entre les deux systèmes graphiques. Pour cela, seront comparés des enfants qui sont dans un contexte de bigraphisme différent, certains apprenant l'arabe et l'écriture latine cursive (francophones), d'autres l'arabe et l'écriture latine scripte (anglophones). L'évaluation de l'écriture est effectuée grâce à deux tests analytiques d'écriture rapide, le BHK et le STAKIA, étalonnés sur la population libanaise. Par ailleurs, une étude complémentaire est conduite sur tablette graphique digitale, afin d'analyser les indices cinématiques, spatiaux et temporels du mouvement graphique. Cette évaluation des facteurs morphocinétiques de l'écriture arabe chez les enfants bigraphes permettra de vérifier si l'écriture arabe est affectée différemment selon qu'elle soit accompagnée par l'écriture latine scripte ou cursive. Les résultats obtenus par les enfants aux deux tests d'évaluation mettent en évidence une forte corrélation entre les deux systèmes d'écriture arabe et français, et corroborent les analyses des indices spatiaux, temporels et cinématiques du mouvement graphique, mesurés par la tablette graphique digitale. De même l'analyse comparative entre l'écriture arabe et latine cursive et l'écriture arabe et latine scripte montre des différences significatives en ce qui concerne les indices temporels (le nombre et la durée des arrêts, des segments tracés, des levers…) et les indices cinématiques (la vitesse des parties tracées et des levers. Ces différences significatives sont en faveur des enfants qui écrivent en « cursive et arabe ». Il semble donc que l'apprentissage de l'écriture latine scripte, qui impose de nombreux levers et arrêts entre les lettres affecte plus nettement l'écriture arabe que l'apprentissage de l'écriture latine cursive. Ces résultats montrent que l'écriture arabe combinée à l'écriture cursive gagnera en fluidité probablement à cause des caractéristiques complexes communes à ces deux systèmes d'écritures.

Another rare case of a 9p complex rearrangement characterized by array-CGH

Joelle Abou-Ghoch (Unité de Génétique Médicale, USJ, Lebanon); Ghassan Hmaimess (Département de Pédiatrie, Université de Balamand, Lebanon); Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

Rearrangements involving the distal region of chromosome 9 have been often described. For instance, 9p partial duplication represents the fourth common trisomy after trisomy 21, 18 and 13, and 9p deletion, documented in more than 100 patients, is a recognizable syndrome including developmental and psychomotor delay, craniofacial dysmorphy and hypotonia. A 17 months old female patient with psychomotor delay, macrocephaly, curly hair, flared and flat nose and short neck, was referred to our laboratory with a suspicion of Van der Knaap disease. Array-CGH detected a 14Mb distal deletion with a 20.1Mb interstitial duplication of 9p (.arr[hg19] 9p24.3p22.3(203,861-14,206,835)x1,9p22.3p22.1(14,206,901-34,338,708)x3). Few cases have been reported with concomitant terminal deletion and duplication of 9p, all of them being inverted duplications, and sharing with the current patient developmental delay, short neck and nose abnormalities, but macrocephaly is the striking difference since all reported cases presented microcephaly or trigonocephaly. In most of the patients, the duplication 9p is a result of an abnormal chromosome segregation of a balanced translocation in one of the parents but in few cases it has been described as occurring de novo rearrangement. Further analysis for the parents and the patient must be completed to determine the origin and the nature of the aberration. The abnormalities found in current patient are compared to the typical features of duplication 9p and monosomy 9p to better understand the genotype-phenotype correlation in such patients.

Seven years' experience using AS-qPCR for JAK2 V617F mutation detection in MPN

Joelle Abou-Ghoch and Nadine Jalkh (Unité de Génétique Médicale, USJ, Lebanon); Andre Megarbane and Eliane Chouery (Saint Joseph University, Lebanon)

Myeloproliferative neoplasms (MPN) are defined by enhanced proliferation and survival of one or more myeloid lineage cells. They are classified into different subtypes: chronic myeloid leukemia (CML), polycythemia vera (PV), essential thrombo¬cythemia (ET), primary myelofibrosis (PMF), chronic neutrophilic (CNL), chronic eosinophilic (CEL), myelomonocytic (CMML), juvenile myelomonocytic (JMML) leukemias, hypereosinophilic syndrome (HES) and systemic mastocytosis (SM). MPN result from acquired fusion transcripts or somatic mutation; BCR ABL being the implicated fusion transcript in CML, and JAK2 V617F in 95% of PV, 50-70% in ET, 50% of MF. Between 2008 and 2014, JAK2 V617F mutation was studied on 409 DNA samples at the Medical Genetics Unit of USJ by allele specific quantitative PCR (AS-qPCR). Among 194 patients with a suspicion of NMP without further information, 1 DNA was degraded, 53 were positive for JAK2 V617F (27.46%). BCR-ABL test was performed in parallel for 46 RNA and was positive for 2 patients, suggesting consequently the diagnosis of CML; 2 RNAs were degraded. For 100 patients with thrombo¬cythemia, 48 were positive for JAK2 V617F (48%). 18 patients among 70 presenting polycythemia were positive (25.71%). For 6 patients with myelofibrosis, only1 was positive (16.66%). Concerning the 15 patients sent with a suspicion of CML, 5 were positive for BCR-ABL and 4 positive for JAK2 V617F mutation. Among 12 patients presenting myelodysplasia, 2 had JAK2 V617F mutation. 1 Budd-Chiari had JAK2V617F mutation. Regarding negative patients for JAK2 V617F mutation, 5 were referred for pancytopenia, 3 for thrombopenia, 1 for HES, 1 for leukopenia and 1 for previous chronic leukemia transformed to acute one. The difference of positive results with the literature is explained by the lack of clinical information. Moreover, a large number of patients are sent to rule out the JAK2 V617F mutation. A large panel of mutations of putative pathogenetic relevance in MPN must be analyzed and includes JAK2 exon 12 mutations in PV, MPL W515L/K and CALR mutations in PMF and ET, KIT D816V in SM, FIP1L1 PDGFRA in CEL SM, rearrangements of PDGFRB in CEL CMML and FGFR1 in stem cell leukemia lymphoma syndrome, and RAS/PTPN11/NF1 mutations in JMML. This increasing repertoire of mutant molecules with the allele burden is an excellent diagnostic marker for disease subtypes, phenotype, prognosis a nd follow-up. Qualitative and quantitative techniques are in progress to detect other changes for a better treatment monitoring.

BIO18_Biologie: Biological, Medical, Pharmaceutical, Health Sciences XVIII

Room: USJ CSM C3

Chairs: Nassim Fares (University of Saint Joseph, Lebanon), Richard G. Maroun (Université Saint Joseph de Beyrouth, Lebanon)

The association between ACE I/D polymorphism and the risk of Alzheimer's disease in Lebanon

Niveen Masri (Beirut Arab University, Lebanon); Fatima Saleh (BAU, Lebanon); Rajaa Fakhoury (Beirut Arab University, Lebanon)

Alzheimer's disease (AD) is a progressive neurodegenerative disease and the most common cause of dementia. AD is characterized by impairment in memory and other cognitive functions. The two pathological hallmarks of AD are the large extracellular plaques deposits of the β-amyloid peptides (Aβ) and the intra-neuronal fibrillary tangles of the microtubule binding protein tau. Aβ peptides are proteolytically derived from a type 1 integral protein termed amyloid precursor protein (APP) and are constantly anabolized and catabolized in the brain. The accumulation and aggregation of Aβ which is the primary cause of AD, induce an inflammatory response followed by neuritic injury, hyperphosphorylation of tau protein and formation of fibrillary tangles, leading ultimately to neuronal dysfunction and cell death. Genetic variations in genes involved in Aβ production (amyloid precursor protein, presenilins) and degradation (Apolipoprotein E, α-2-macroglobulin, insulin-degrading enzyme) are being evaluated and represent major risk factors for Alzheimer's disease (AD). Angiotensin converting enzyme (ACE) is a membrane-bound ectoenzyme that has been demonstrated to inhibit Aβ peptides aggregation and plaque formation in vitro. ACE gene has been extensively studied as a candidate gene for Alzheimer's disease (AD) since ACE was found to be significantly increased in AD patients in several previous studies. ACE is a dipeptidyl carboxypeptidase widely distributed in the body and is a very important component of the renin-angiotensin system (RAS). It catalyses the C-terminal dipeptide cleavage (His-Leu) from Angiotensin-I (Ang I) and generates the potent vasoconstrictor Angiotensin-II (Ang II). Ang II is pro-inflammatory and pro-oxidant, thus causing cellular toxicity and apoptosis. ACE gene is located on chromosome 17q23, and has an insertion and deletion polymorphism (I/D) of a 287 bp Alu repetitive sequence in intron 16. Therefore, ACE has three genotypes: DD, II homozygotes and ID heterozygotes. The association of ACE polymorphism with AD is still controversial. Some meta-analyses addressing the relationship between ACE I/D polymorphism and AD have shown that the D/ D genotype is associated with a reduced risk for AD and that both ID and II genotypes were associated with an increased AD risk,

thus making ACE I allele a risk factor for AD. However, in other studies ACE D allele was observed to increase the risk for dementia, whereas, I-allele had a small increased risk to develop AD. Furthermore, few studies found no evidence to support linkage between ACE I/D polymorphism and AD. This apparent discrepancy may be due to ethic differences. This study was performed to examine for the first time the association between ACE I/D polymorphism and the risk of Alzheimer's disease in Lebanese patients. Forty-five patients diagnosed as having Alzheimer's disease and forty-eight age-matched controls from Dar Al-Ajaza Al-Islamia Hospital in Beirut were recruited, relevant clinical data including age, medical history, smoking habits and blood chemistry tests were confidentially collected. A confidentiality letter was signed to safeguard the collected information. Patients and controls were tested for ACE I/D genotype by PCR. Results showed that the distribution of genotypes between Alzheimer's patients was: 28.9% DD, 53.3% ID and 17.8% II while the controls showed 35.4% DD, 64.6% ID and 0% II. According to our findings, the II genotype was significantly higher in Alzheimer's patients than in controls. Therefore, our study demonstrated the I/I genotype to be associated with an increased risk of AD in Lebanese population.

Pathophysiology of Morbus Niemann-Pick Type C1:

Mohammad Hassan Hodroj and Katia Maalouf (LAU, Lebanon); Anibh Daas (Hannover Medical School, Germany); Hassan Naim (Tiho-Hannover, Germany); Sandra Rizk (Lebanese American University, Lebanon)

Pathophysiology of Morbus Niemann-Pick Type C1: Membrane lipid abnormalities in cultured fibroblasts and lymphoblasts Mohammad Hassan Hodroj1, Katia Maalouf2, Anibh Das3, Hassan Y. Naim4, Sandra Rizk5 1,2,5Department of Natural Sciences, Lebanese American University, Beirut, Lebanon 3Department of Pediatrics, Hannover Medical School, Hannover, Germany 4Department of Physiological Chemistry, University of Veterinary Medicine Hannover, Hannover, Germany 1 mohammadhassan.hodroj@lau.edu, 2 katia.maalouf@lau.edu.lb, 3das.anibh@mh-hannover.de, 4 hassan.naim@tiho-hannover.de, 5 sandra.rizk@lau.edu.lb Introduction Morbus Niemann-Pick type C1 (NPC1) is a rare, usually fatal, autosomal-recessive, neurovisceral lysosomal storage disease (LSD). It results in a cellular cholesterol trafficking defect which in turn leads to the entrapment of cholesterol and glycosphingolipids inside lysosomes. The pathogenesis of clinical symptoms in NPC1 patients is not clear. One potential pathway suggests that the function and composition of biological membranes is disturbed, specifically in the ordered structure of a particular type of membranes, detergent-resistant membranes (DRMs) and /or lipid rafts, which are enriched in glycosphingolipids and cholesterol. This study investigates the effect of cholesterol and glycolipid storage on the composition and function of the plasma membrane in cultured skin fibroblasts and lymphoblasts with Morbus NPC1 in comparison with healthy individuals (WT cells). We focused on studying the following: abnormalities in the distribution of lipid raft-associated protein flotillin 2 in comparison to RhoA, the expression levels of cell surface protein dipeptidyl peptidase IV (DPPIV) in addition to proteome profiling of cultured lymphoblasts and fibroblasts from healthy and NPC1 patients. Materials and Methods Cultured lymphoblasts and fibroblasts were grown in Roswell Park Memorial Institute (RPMI-1640) Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum, 100 units/ml penicillin, and 100 µg/ml streptomycin at 37°C, 95% humidity, and 5% CO2. Lipid rafts from the cultured skin fibroblasts and lymphoblasts with Morbus NPC1 and from healthy individuals (WT cells), were analyzed by isolating TritonX-100 DRMs and separating them on a sucrose density gradient. To examine the membrane composition in NPC1 cells relative to normal lymphoblasts, cell surface protein isolation was performed by a biotin-avidin system based assay. The (biotin-avidin) isolated cell surface proteins were then quantified and immunoblotted with an antibody against DPPIV. Protein array studies were done on both NPC1 B-lymphocytes and fibroblasts in comparison with normal WT cells, using a human cells stress array kit (proteome profiler from R&D systems). Expression levels of HSP60, HSP70, COX-2, Cytochrome C, SIRT2, SOD2, and Thioredoxin-1 were studied. Results Lipid Rafts: When lipid rafts were analyzed on a sucrose density gradient, the distribution of flotillin2 appeared to be altered in the lymphoblasts and fibroblasts with NPC1 disease where they showed an accumulation in the bottom soluble fractions (8 &9) as opposed to the WT cells where flotillin2 appears floating in the upper fractions (1 to 4) of the gradient. To test whether the total expression levels of flotillin2 were changed in NPC1 cells, total proteins were isolated and a western blot with flotillin2 antibody was performed. No significant difference between WT and NPC1 cells was observed in the total flotillin2 expression levels. Cell Surface Protein Analysis: Quantifying the expression levels of the cell surface protein DPPIV revealed a significant 2-fold increase of this protein in the membranes of NPC1 cells relative to normal WT lymphoblasts. To verify these results using another method, FACS analysis was performed and the result was an apparent 2-fold accumulation of DPPIV on the surface of NPC1 compared to WT cells. The total expression level of DPPIV was examined in both WT and NPC1 cells. In both normal and diseased cells, the overall level of expression of DPPIV appears unchanged. Expression profile of cell stress proteins: The expression levels of cell stress related proteins were analyzed using a human cells stress array kit (proteome profiler from R&D systems) in both fibrobalsts and B-lymphoblasts of healthy and NPC1 type. This is essential for understanding the roles these molecules play in the cellular response to stress and the development of the disease states. The quantifiable bands that appeared on the array membrane s belonged for the proteins: HSP60, HSP70, COX-2, Cytochrome C, SIRT2, SOD2, Thioredoxin-1. The expression patterns of some of these proteins appeared different between the fibroblasts and B-lymphoblasts: a 2-fold drop in the expression of HSP70 was seen in NPC1 fibroblasts relative to healthy cells. Also, slight differences were observed in the expression of HSP60, COX-2, Cytochrome C, SIRT2, SOD2, and Thioredoxin-1. In NPC1 B-lymphoblasts, a slight increase in the expression of cytochrome C was observed relative to healthy cells. Discussion The distribution of flotillin2 is altered in the lymphoblasts and fibroblasts with NPC1 disease: accumulation of flotillin2 in the bottom soluble fractions (8 &9), while wild type cells revealed flotillin2 in the upper floating fractions (1 to 4). The expression level of the heat shock proteins HSP60 and HSP70

is reduced in NPC1 fibroblasts as compared to healthy cells. This suggests an increased degradation of NPC1 in the ER in accordance with the observation that HSP70 stabilizes NPC1 expression in HEK cells (Nakazone 2014). Finally, a reduced expression level of Cytochrome C in NPC1 fibroblasts signifies that the diseased cells are under oxidative stress concomitant with what was shown by Kennedy et al (2013). Conclusion The altered membrane composition of cellular membranes, particularly that of the lipid rafts as well as the different expression levels of the chaperone HSP70 and oxidative protein Cytochrome C are potential contributors to the pathology of NPC1. These results provide a promising basis for further understanding of pathophysiology of NPC1 disease, and they provide the hope for a potential diagnostic marker for patients with such disease.

Initial Results of the Pilot LEbanese GENetic Disorders (LEGEND) Project

Ghazi Tadmouri (Faculty of Public Health, Jinan University, Lebanon)

Perhaps the most important notion obtained from the publication of the human genome reference sequence in 2003 is the fact that the human genome contains 20,000-25,000 genes. Since then, global efforts have only succeeded in mapping approximately 13,000 genes of which 50% have known functions and only less than 500 have been associated with a genetic condition. This gap spurred the importance of studying approximately 1,650 inherited disorders that, so far remain genetically unexplored, in order to depict their underlying molecular etiologies and support global gene annotation efforts. A decade-long survey conducted at the Centre for Arab Genomic Studies indicates the presence of more than 1,250 genetic disorders in Arab populations with approximately 650 related-genes. Knowing the fact that 17% of hospital admissions in Lebanon are due to genetically predisposed disorders, it becomes an urgent need to shift focus from the tip of the iceberg and to explore the detailed characteristics of genetic disorders in the country. For this reason, we aim at establishing the LEbanese GENetic Disorders (LEGEND) Project as a long-term and multidisciplinary research program that will cover several aspects of genetic diseases in Lebanon, including: (a) mapping the regional distribution of genetic disorders, (b) studying the impact of consanguinity as a selective force, (c) depicting the molecular etiologies of genetic disorders, (d) analyzing the Lebanese variome, (e) establishing suitable database platforms, and (f) supporting families at-risk through proper genetic counseling methods. Hence, the current study represents a pilot project to explore the major characteristics of genetic disorders in Lebanese people including clinical, chromosomal, and genetic features. To achieve this aim, we have screened 2,200 studies that dealt with genetic disorders in Lebanese subjects. Out of these studies, we have encountered not less than 172 genetic disorders and 76 related genes. Several of these disorders are commonly found in the Lebanese population (e.g., sickle cell anemia, thalassemias, G6PD deficiency, Down syndrome, non-insulin dependent diabetes mellitus, achondroplasia, familial hypercholesterolemia, atrial septal defect, susceptibility to myocardial infarction, chronic obstructive pulmonary disease, and Takayasu arteritis). When compared to data from other Arab populations, 60 of the 172 disorders are exclusive to Lebanese people (e.g., branchiogenic-deafness syndrome, branchiooculofacial syndrome, autosomal recessive deafness types 13 and 14, dermodistortive urticaria, familial lifelong persistent fever, autosomal recessive and x-linked dominant types of hypophosphatemic rickets, Loeys-Dietz syndrome type 1A, Lebanese type of mannose 6-phosphate receptor recognition defect, autosomal recessive early-onset Parkinson disease type 7, and autosomal recessive spinocerebellar ataxia types 2 and 5). Some of these private disorders were described in a limited number of Lebanese subjects and have not been assigned proper names thus far. So, their names were based on the observed symptoms (e.g., atrial septal defect, secundum, with various cardiac and noncardiac defects; cutis verticis gyrata, retinitis pigmentosa, and sensorineural deafness; dislocated elbows, bowed tibias, scoliosis, deafness, cataract, microcephaly, and mental retardation). On the other hand, some of these private disorders were named according to the respective clinical geneticists who described them (e.g., Megarbane syndrome, Megarbane-Loiselet syndrome, Malouf syndrome, and Fadhil syndrome). According to the international classification of disease (ICD), nearly half of the genetic disorders in Lebanese people are due to congenital malformations and chromosomal abnormalities (44%). These are followed by endocrine, nutritional, and metabolic diseases (18%), diseases of the nervous system (6%), diseases of the circulatory system (5%), and diseases of the blood and the immune mechanism (3%). As in other Arab countries, Lebanon has a high overall rate of consanguinity (13-42%) including a large proportion of first cousin marriages (7-32%). This reproductive choice seems to have contributed to the preponderance of more autosomal recessive (66%) than autosomal dominant (23%) disorders in Lebanon similar to observed average values for all Arab countries (62% and 28%, respectively). The recent advance in techniques of genetic testing has enhanced the profile of many of genetic disorders in Lebanon and shed light on their molecular etiologies as well as their possible historical origins. Beta-thalassemia represents the most significant example of a disorder with comprehensive gene mutation data in Lebanon. The analysis of 814 chromosomes has indicated the presence of 20 beta-thalassemia mutations among the Lebanese. Of these mutations, only five comprise nearly 80% of all Lebanese beta-thalassemia alleles; the IVS-I-110 (c.93-21G>A; 37%), IVS-I-6 (c.92+6C>T; 14%), IVS-I-1 (c.92+1G>A; 13%), IVS-II-1 (c.315+1G>A; 8%), and Cd29 (c.90C>T; 8%). This mutation distribution indicates that beta-thalassemia in Lebanon has an Eastern Mediterranean origin with major influences from Asia Minor. On the contrary, the analysis of 100 Lebanese chromosomes with the sickle cell mutation indicates the presence of the Benin haplotype in 73% (usually associated with a severe phenotype) and the Arab/Indian haplotype in 10%. This observation pinpoints to an African origin of sickle cell disease in Lebanon. In contrast, data on the spectra of CFTR gene mutations in 73 chromosomes from Lebanon indicate the presence of 14 mutations responsible for the considerable clinical variability of cystic fibrosis. Among the CFTR mutations, the European [delta]F508 (c.1521_1523delCTT) is the most common (40%) indicating the introduction of the disease via a European stock. Apart from the beta-globin and CFTR genes, preliminary data are also available for mutations in 74 other genes analyzed in alleles of Lebanese ancestry. Despite the fact that many of those genes were assessed in limited numbers of chromosomes, they revealed striking spectra of heterogeneities with many rare and novel

mutations. The presence of this large array of mutations and the changes they cause at the level of the clinical outcomes could considerably complicate proper counseling for some disorders. Genetic counseling in Lebanon faces several obstacles including non-compliance, unawareness of the availability of molecular diagnostic methods, refusal of diagnostic methods, the availability of 51 (30%) disorders with unknown genetic determinants, a dearth of family physicians, the complete absence of genetic counselors, and the widespread genetic illiteracy at the levels of the general public and families at-risk. We do hope that progressing in the various aspects of the LEGEND Project would have favorable implications on genetic counseling, prenatal diagnosis, genotype-to-phenotype correlations, and appropriate management of patients with genetic disorders in Lebanon.

RAC1 expression and role in IL-1β production and oxidative stress generation in familial Mediterranean fever (FMF) patients

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Background and objectives. Familial Mediterranean fever (FMF) is a recessively inherited autoinflammatory disorder caused by mutations in the MEFV gene. The caspase-1 dependant cytokine, IL-1β, plays an important role in the pathogenesis of FMF. The RAC1 protein has been recently described as a potential actor involved in IL-1β secretion, raising thus the possibility of its involvement in the development of autoinflammatory diseases. The present study aims to investigate RAC1 expression and role in IL-1β production and oxidative stress generation in FMF patients. Materials and Methods. The study included 25 FMF patients, of whom 9 were studied during attack and remission and 25 healthy controls. The expression levels of RAC1 gene in patients and controls were obtained and analyzed by quantitative real-time PCR. Ex vivo spontaneous and LPS-induced production of IL-1β, IL-6 and markers of oxidative stress (MDA, catalase and glutathione system) were evaluated respectively in supernatants of patients' and controls' PBMC and PMN cultures, in the presence and absence of RAC1 inhibitor. Results. RAC1 gene was overexpressed in FMF patients in crises (2.78 ± 0.65) compared to those in remission (1.36 ± 0.14) or to controls (1.12 ± 0.06). Levels were 2-fold higher in patients homozygous for M694V than in patients heterozygous for M694V or carrying other genotypes. IL-1β levels were comparable in unstimulated and LPS-induced PBMC culture supernatants of FMF patients and controls, whereas IL-6 production was enhanced in LPS-induced PBMC culture of patients, compared to controls. However, inhibition of RAC1 protein resulted in a decrease in IL-1β levels, but not IL-6. LPS-stimulated PMNs produced higher levels of MDA in patients than in controls, but these levels were decreased in the presence of RAC1 inhibitor. The reduced catalase and GSH activities observed in unstimulated PMN culture supernatants of patients compared to controls were significantly increased in the presence of RAC1 inhibitor. Conclusion. Our results show the implication of RAC1 protein in the inflammatory process of FMF by enhancing the production of IL-1β, through caspase-1 activation, and generating oxidative stress, even during asymptomatic periods.

miRNA Expression Profile Analysis of Lebanese Breast Cancer Tissues

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Breast cancer (BC)is the most common type of cancer in Lebanese women with a higher percentage of young-aged patients than the West. microRNA (miRNA), small noncoding RNAs, regulate 60% of all protein-coding genes and play a vital role in cancer development. Since the etiology of BC initiation is not well-studied, we are interested in studying differentially expressed miRNA with potential tumor initiation function. We have recently shown that differential expression of certain miRNA in Lebanese BC tissues could be variable to what is reported in West. Hence, the objective of this study is to investigate the global miRNA profile in Lebanese BC tissues and to identify through in silico tools the relation of dysregulated miRNA to tumor initiation. miRNA profiling was performed using GeneChip miRNA 3.0 array after RNA extraction of formalin fixed paraffin embedded 47 tumor and 17 normal adjacent tissues from Lebanese BC patients. A total of 74 miRNA were significantly differentially expressed between tumor and normal adjacent breast tissues. Differentially expressed miRNA were validated using reverse transcription real time PCR. Using in silico tools such as Diana tools and ingenuity pathway analysis, most of dysregulated miRNA were found to be involved in cancer and p53 signaling pathway. More analysis of miRNA targets and their implication in BC initiation is still in progress. Lebanese BC patients have a set of dysregulated miRNA expression profile mostly implicated in cancer. A comparative study of miRNA profile to other populations will be discussed and further functional studies will be done on dysregulated miRNA to comprehend BC onset especially in young patients.

ENG11_MEC: Engineering XI

Room: USJ CSH 208

Chairs: Hadi Y. Kanaan (Saint-Joseph University, Lebanon), Sandy Rihana (Holy Spirit University of Kaslik, Lebanon)

Hot Stamping Process: Estimation of Heat Transfer Coefficients during Different Phases

Bakri Abdul Hay (LIU, Lebanon); Omar Melhem, Carole Challita, Chady Maatouk and Hasan Al Chami (Lebanese International University, Lebanon)

CO2-emission is one of the most hazardous environmental problems confronting humanity, since it is considered the largest contributor to greenhouse effects and climate change. The transportation sector contributes highly to CO2-emissions as a result of fuel combustion. Motor vehicles come out as a major component of CO2-emissions generating 20% of the man-made CO2-emissions, with passenger cars contributing about 12%. CO2-emissions are directly related to the amount of fuel consumption, so developing more economical engines and reducing the weight of the body-in-white will decrease the needed fuel consumption and therefore, less CO2-emissions will be generated. Thus, the growing effort to produce economical engines, reduce vehicle weight, and improve passive safety in the automotive industry has drastically increased the demand for ultra-high strength steel components. There are several production technologies for such components. The hot stamping technology or press hardening is the most successful in producing complex components with superior mechanical properties. Hot stamping is a quite novel technique which is increasingly used for structural automotive applications and intensive research is conducted to support this growing market. In the present work, the thermal and metallurgical aspects of a vehicle's B-pillar will be modeled by providing software simulation on Comsol® Multiphysics in addition to the estimation of heat transfer coefficients during different phases of the hot stamping process, namely: the Approach phase, the Forming phase, and the Quenching phase.

Design and Implementation of Supercritical/Transcritical CO2 Combined Cycle

Ibrahim El Houssein, Omar Melhem and Abdallah Al Sharif (Lebanese International University, Lebanon); Bakri Abdul Hay (LIU, Lebanon); Carole Challita (Lebanese International University, Lebanon)

Investigation of waste heat recovery methods and technologies has received lots of attention from researchers over the last two decades. Recently, interest in CO2 to be used as a working fluid in heat recovery systems and energy conversion from waste heat has increased. The current study aims at investigating the current status of a local factory power plant operating on the basis of a Brayton cycle and proposing a combined cycle for the purpose of improving the overall efficiency. The desired combined cycle should increase the efficiency and the net power output through the recovery of waste heat from the primary Brayton cycle to be used as a heat source for a secondary Rankine cycle using Supercritical CO2 as the working fluid.

Investigation into Sea-water Desalination Using the Freezing and Melting Technique

Amer Farhat (Rafik Hariri University, Lebanon)

Over the long term, water security stands out as one of the most serious issues facing the future of humankind. Freshwater is already approaching physical and economical scarcity in the face of an explosive increase in the demand for water. This increased demand is due to a growing world population, as well as improving economic conditions in many developing countries. Over the short term, things do not look good either. Water shortages are a reality in many countries, and the lack of access to clean water is widespread. This is all without mentioning climatic conditions that worsen the situation, such as global warming and drought. Desalination is one possible approach towards managing our water security problem. Because of the promise that this technology holds, a lot of desalination techniques were developed and adopted over the years. Reported here are the results of a preliminary investigation into sea-water desalination using the "freezing and melting" technique. A prototype was designed and built for this purpose. Chloride, sodium, TDS, hardness and pH were all examined in the resulting fresh-water. We also report here some improvements with regards to the energy consumption of the prototype: Precooling, insulation, and condenser cooling were all applied. The study carried out suggests that the freezing-melting technique greatly reduces salt and mineral contents of the sea-water samples that were treated. TDS content has dropped by 67% after the first cycle, and by up to 91% of the original levels after the second cycle. Moreover, the energy consumption decreased by 67% after applying thermodynamic improvements to the cycle. Based on these results, one can conclude that the freezing and melting technique is a promising desalination technique with a relatively low operational cost. Energy consumption can be further decreased by integrating the use of renewable energy sources.

Cooling Photovoltaic Panels Using Phase Change Materials

Ibrahim Houmani, Hussein Farhat, Wassim Salameh and Ali H Assi (Lebanese International University, Lebanon); Mohamad S Hammoud (Lebanese International University (LIU), Lebanon)

This paper investigates cooling PV panels using PCMs. In this work we present the related theoretical equations governing the heat absorption between the PV structure and the PCM. The suitable PCM can be determined through experimental characterization in terms of melting point and heat of fusion for PV cooling. Different graphs showing the PV panel characteristics will be given at constant irradiance with and without PCM, extracting its properties, and using the appropriate PCM that will be used for heat absorption to maintain the cell temperature within the operational working range.

Power from PVs Installed along the Lebanese High-ways

Karim Rammal and Hikmat Ghabris (Lebanese International University, Lebanon); Mohamad S Hammoud (Lebanese International University (LIU), Lebanon); Ali H Assi and Wassim Salameh (Lebanese International University, Lebanon)

The main idea in this research work is to generate power from PVs that can be installed in the middle of the Lebanese high-ways. The land in the middle of the high-ways is unexploited, and usually left empty. Using these areas to install PV panels will help reducing to almost zero the cost of land needed for the installation of PV systems. The other advantage of having the PV system along the Lebanese high-way is the possibility of storing the produced power directly in public grid (grid-connected-system). This way will save us the cost of batteries to store energy. Both, land and batteries are the most important factors raising the price of PV energy and limiting its use in Lebanon and anywhere in the world.

Modeling of 3D elastic properties and ultimate strengths for tri-axially braided composites

Ali Ismail, Mohamad Ismail and Ali Hallal (Lebanese International University, Lebanon); Mohamad S Hammoud (Lebanese International University (LIU), Lebanon); Mehdi Chouman (Lebanese International University, Lebanon)

In this work, a parametric study of mechanical properties for tri-axially braided composite is presented. The main parameters involved are: braided angle "θ", fiber volume fraction "Vf" and fiber type. An analytical modeling is adopted to evaluate the 3D elastic properties and ultimate strengths. That model is based on a multi-scale homogenization method, failure criteria and a damaged stiffness model. The main results that can be noticed are at θ around 50 degrees. For different types of fibers and Vf, the composite is almost in-plane isotropic and the in-plane Young's moduli and tensile strengths are invariable.

Building PV-operated Electric Tricycle

Saleh Alshoufi, Wissam AlMasri, Wafi Abou Rafeh and Wassim Salameh (Lebanese International University, Lebanon); Ali Shaito (Lebanese International University (LIU), Lebanon); Ali H Assi, Ali Badran, Ahmad Bizri and Mohammad Hallal (Lebanese International University, Lebanon); Rabih Rammal (LIU, Lebanon)

Considering the amazing amount of energy that is showered down upon earth every day from the sun, it's no wonder that a lot of researches and development are focused on improving human capabilities of capturing this source for electricity generation to power solar vehicles. This project consists of building a PV-operated electric tricycle. Starting from the chassis design, weight and materials, and ending with the electrical components to optimize the design in order to have the most efficient electric motor for the tricycle.

FEA5_FSEC: Food security, Environment, Agriculture V

Room: USJ CSH 305

Chairs: Marc Beyrouthy (Holy Spirit University - Kaslik, Lebanon), Dominique Salameh (Faculté des Sciences, Université Saint-Joseph, Lebanon)

Testing of Genetically Modified Organisms (GMOs) in Food Setting Up the Appropriate Sampling Strategy in the Lebanese Market and Optimizing the DNA Extraction Protocol

Rim Obeid (AUST, Lebanon); Narmeen Mallah and Gretta Abou-Sleymane (American University of Science and Technology, Lebanon)

Genetically Modified Organisms (GMOs) are organisms in which the genetic material has been altered by genetic recombination in order to express novel traits such as herbicide tolerance and insect resistance. Production of a genetically modified (GM) crop involves the integration of a DNA construct into the plant's genome. The construct is composed of a promoter, target gene, and terminator. More than

80 % of GMOs constructs have p35S promoter from Cauliflower Mosaic Virus and/or T-nos terminator from Agrobacterium tumefaciens. Therefore, these sequences are widely used in the routine screening of GMOs. Lebanon imports its agricultural commodities such as food and feed mainly from GMOs producing countries. Previous studies performed by our GMOs research group showed the presence of high quantities of GMOs in the soybean feed imports to Lebanon. Such results raise the possible presence of GMOs in imported food as well. Appropriate sampling strategies are essential for GMOs monitoring. Some sampling methods rely on defining the Acceptance Quality Limit (AQL). AQL determines the number of representative samples withdrawn from a homogenous lot and the number of nonconforming items to accept or reject that lot. Other sampling strategies provide guidelines for representative collection of samples in cases where AQL is not set by responsible authorities. In Lebanon, the AQL for GMOs testing has not been determined yet. In fact, Lebanon has ratified the Cartagena Protocol on Biosafety, an international treaty that controls GMOs trans-boundary movement. However, the protocol has not been implemented yet and the country is still in the process of developing GMOs regulatory measures. Therefore, the first aim of our project was to undergo a sampling strategy review in order to set up the most optimum one for the study. Another concern in GMOs analysis is the quality of extracted DNA which is critical to avoid any false negative results. DNA quality is highly affected by the samples' processing degree and food additives which cause DNA degradation and PCR inhibition, respectively. Hence, the second aim of our project was to optimize a cetyltrimethylammonium bromide (CTAB) based DNA extraction protocol developed by the European Union Reference Laboratory for Genetically Modified Food and Feed (EU-RL GMFF). Several institutions that deal with international standards and food safety provide literature review of sampling strategies for different products under different laws. Examples of such institutions are the International Standardization Organization (ISO), CODEX Alimentarius Commission (CAC), European Community (EC) and Food and Agricultural Organization (FAO). Our target was to adopt the most representative and cost-effective method, and to follow the technical recommendations advised by the previously mentioned institutions such as samples withdrawal, delivery, storage, and preparation. Accordingly, we adopted the FAO purposive theoretical sampling strategy. The DNA extraction protocol optimization took place at the level of organic phase separation and DNA precipitation. Optimization was carried out on products of different processing degrees namely: minimally, intermediately and highly processed food, of the three species mostly marketed as GM foods: maize, soybean and rice. The samples were prepared according to their matrix and components. For example, seed coats were removed, solid samples were grinded and liquid samples were centrifuged and extraction was performed on pellet. After extraction, DNA quantity and purity were assessed using spectrophotometric measurement. Then, the DNA fragmentation status was checked via agarose gel electrophoresis. Finally, DNA amplificability was tested by species specific gene amplification using PCR methods developed by the EU-RL GMFF. The targeted genes are Zein, Lectin and Sucrose-Phosphate Synthase in maize, soybean, and rice, respectively. As DNA in food is expected to be degraded, the targets' amplicon sizes were chosen to be below 300 bp. All experiments were carried out according to ISO 17025 recommendations. Through the adoption of the FAO purposive theoretical sampling strategy, we collected 72 maize, soybean and rice food products in total. Subsequently, the collected samples were subjected to the DNA extraction protocol of choice. Maize samples showed better results when the basic DNA extraction protocol was used. However, soybean and rice samples showed better extraction results when chloroform was modified to phenol: chloroform: isoamyl alcohol (PCI), in parallel to substituting the CTAB precipitation buffer with isopropanol. In addition to using the modified protocol, rice samples needed an extra step of adding α-amylase enzyme to degrade carbohydrates and prevent viscosity. The samples are currently being screened for GMOs by targeting the most frequently occurring GM sequences p35S and T-nos using conventional PCR protocols which are also developed by the EU-RL GMFF. The preliminary results obtained so far are very interesting. In fact, some samples which are labelled as "GMO free" showed positive GM results. In this study, we provided the stepping stone for establishing the first comprehensive GM foods assessment in the Lebanese market. Our findings are not applied to asses GMOs in maize, soybean and rice exclusively. In fact, current studies at our laboratories by the GMOs research team are extending the assessment to a wide range of plant-based products and many challenging highly processed samples such as infant formula. These studies will hopefully be the basis of the implementation of GMOs legislations and regulations in Lebanon.

Solubilité en phase aqueuse du 4-tert-octylphénol contaminant de l'emballage alimentaire. Prédiction du facteur de bioconcentration

Joseph Saab (Université Saint-Esprit de Kaslik & Faculty of Sciences, Lebanon); Hanane Ishak (USEK, Lebanon); Christelle Goutaudier (Lyon, France); Ilham Mokbel and Jacques Jose (Université Claude Bernard Lyon1, France)

La mondialisation économique croissante surtout au niveau des échangescommerciaux, que le Liban en fait partie, a induit l'alarme de surveillance sanitaire surtout vis-à-vis des substances chimiques qui entrent dans la composition d'une foultitude de produits de consommation courante. Afin d'évaluer les risques sanitaires de ces substances contaminants ainsi que le taux d'exposition, il faut déterminer les facteurs affectant leur processus de migration à partir du compartiment où elles séjournent[1]. Hauder et al. [2] ont montré que la migration des contaminants résiduels dans l'emballage (phase d'exposition humaine) est largement régie par leurs propriétés thermo-physiques telles que la solubilité aqueuse, le partage octanol/eau qui est fortement corréler au potentiel de bioaccumulation. Dans ce travail, nous présentons l'étude de solubilité en phase aqueuse et coefficient de partage octanol/eau aqueuse du 4-tert-octylphénol. Ce composé est utilisé comme surfactant et antioxydant des polymères des emballages alimentaires, est largement distribué dans l'environnement[3]. La détermination expérimentale du coefficient de partage octanol/eau du 4-t-OP a été réalisée par la méthode shake-flask à 298,15 K, la valeur moyenne obtenue est de 4,597 avec un coefficient de variation et un écart relatif par rapport à

la littérature inférieurs à 3%.Le facteur de bioconcentration prédit (BCF) est de l'ordre de 461,5, qui est largement supérieur à 100, reflétant un potentiel de bioaccumulation prononcé dans les tissus biotiques. La solubilité aqueuse dans l'intervalle 298,15-328,15 K est déterminée par la méthode dynamique de saturation dont son mode de fonctionnement a amorcé la cristallisation du 4-t-OP causant des obstructions du circuit dans les zones réfrigérées. Le problème est surmonté et les résultats issus sont reproductibles ayant un coefficient de variation inférieur à 5% et la comparaison de la solubilité à 293,15 K (X= 1,0866 10-6) avec celle de la littérature (X=1,09910-6) présente un écart relatif par rapport à la littérature de 1% consolidant ainsi nos valeurs expérimentales. Remerciement:les auteurs remercient le CNRSL-Conseil National de la Recherche Scientifique -

Capacity building and sustainable management of water resources in Lebanon

Talal Darwish and Ghaleb Faour (National Council for Scientific Research, Lebanon); Chadi Abdallah (National Council For Scientific Research, Lebanon); Amin Shaban (National Council for Scientific Research, Lebanon); Mohamad Mostafa Awad (National Council for Scientifc Research, Lebanon); Mouin Hamze (National Council for Scientific Research, Lebanon)

The increasing scarcity of fresh water problem is plaguing most countries of the Middle East and North Africa, and concurrent with the population growth and accelerating urbanization and increase pressure to divert water from agricultural use to domestic and industrial use. Fourteen countries have been classified in the Middle East and North Africa as a water deficit, with annual per capita of less than 500 m3 of renewable water supplies. And the Intergovernmental Panel on climate change, much of the region will witness a decline in the rainfall by more than 20% during the next century, in addition to a possible rise in the frequency and severity of droughts, declining aquifer recharge. Measurements of water location, availability and quality and their uses are essential to current and future safe decisions and management. However, both the high cost of data collection and analysis and the absence of data management systems and methods and protocols are interfering with sustainable management of water resources. With the recent advances achieved in the area of technology and remote sensing techniques, the collection of data on water became easier. These data can be converted easily to valuable information through maps and charts that allow water managers and stakeholders make better decisions about water resources management and planning. The program launched in 2012 by the World Bank and the Global Environment Facility was in line with national priorities for Lebanon, Jordan, Egypt, Morocco and Tunisia. The main focus of the project is to improve the sustainable management of water resources and water and food security through regional cooperation project for better management of water resources and capacity-building. Under the name CAPWATER, the WB/GEF project is implemented in Lebanon by the National Council for Scientific Research/Center for Remote Sensing. It contains six main lines dealing with water, drought, ET, crop mapping, yield prediction, floods and forest fires. The project is assessing the available hydrological and climatic datasets in the country in cooperation with the Ministry of Energy and Water and updating the national adaptation plan to climate change in water sector in cooperation with the Ministry of Environment. Both activities are undertaken in close cooperation with the stakeholders. With the technical support from NASA and CIMA Foundation, the project team is creating solid infrastructure for a geoportal which will secure the data storage, operation and web interaction with end users. One of the major project outputs is the creation of Sustainable Natural Resources Management Platform and Early Warning System (SUNAR), which was launched at Grand Serail on September 30, 2014. This platform run by the CNRS/CRF experts will be directly linked with the decision makers at different level and interacting with large public for the early warning allowing for the operational implementation of preventive measures and enhancement of national and local preparedness before and during catastrophic natural event like flood and forest fires. The platform will also contribute to the post event assessment of damage and will monitor the recovery and successful restoration of affected and degraded sites.

Hyssop, Hyssopus officinalis, a natural plant extract limiting aflatoxin production by Aspergillus flavus

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Amongst all of the food or feed-contaminating mycotoxins, aflatoxins, and mainly aflatoxin B1, emerge as the most toxic and dangerous, therefore the most preoccupying and intensively studied. Aflatoxins are produced by filamentous fungi belonging to the Aspergillus genus and more precisely to the Flavi section; Aspergillus flavus being the major producer in crops such as corn, peanuts, pistachios, cocoa, cottonseed and many others. Aflatoxin B1's damage has gone far beyond the economical losses and extended to be the major cause of serious health risks such as hepatocellular carcinoma, acute liver toxicity and other hepatic pathologies, immunosuppression and growth impairment in children. As a result, this aflatoxin arose to be the concern of many studies aiming its prevention either by fungal growth impairment or by contending its production in commodities destined for food or feed. Good farming methods are a key point to limit fungal growth. However, due to the major role of temperature and humidity in fungal growth and mycotoxins' production; this approach appears to be unable to completely avoid contamination, mainly due to the impossibility to control meteorological parameters. Furthermore, the use of fungicides has been globally restricted due to the growing awareness of their toxic effects. Consequently, the attention has been rather shifted towards more natural ways to thwart aflatoxin production especially since its degradation after production remains physically impossible and decontamination attempts are, to date, restricted to animal feed. These natural preventive defenses can consist on the use of natural

active molecules, extracted from plants or produced by certain micro-organisms, and that display the ability to inhibit aflatoxin production or fungal growth to a certain extent. Hence, the purpose of this study is to evoke a natural extract that is able to prevent aflatoxin's biosynthesis without interfering with fungal growth and thus preventing the occurrence of any other possible microbial hazard that might be hard to control. In this study, a screening of twenty Mediterranean plants known for their medicinal and antimicrobial properties was performed and several active extracts were retained for their anti-aflatoxinogenic ability such as anise, sage, cumin, corn silk, marjoram, basil, lemongrass, hyssop and fenugreek. Among these extracts, hyssop was selected for its ability to completely inhibit aflatoxin production without inflecting mycelium development. As a matter of fact, this herbaceous plant, endemic to the regions of Southern Europe and the Middle East and commonly used for medicinal and aromatic purposes, is a well known expectorant, antiseptic, digestive and hypotensive. Furthermore, we reveal that the aqueous extract of hyssop - Hyssopus officinalis is not only capable of inhibiting aflatoxin B1 production by Aspergillus flavus in a dose-dependent manner but that this inhibition is repeatedly consistent when tested with other A. flavus strains. Moreover, for a better understanding of this inhibitory mechanism, a molecular study of the expression of aflatoxins' biosynthesis gene cluster has been conducted. A set of primer pairs have been designed and tested for all of the 29 genes of the aflatoxin biosynthetic pathway and real-time PCR amplifications were performed to quantify gene expression when media was supplemented with hyssop's aqueous extract. Gene expression analysis revealed the repression of aflR and aflS, the two regulation genes belonging to this cluster, resulting in a severe decrease of expression of the rest of the aflatoxin biosynthesis genes. This molecular study has outlined the correlation between the restriction of aflatoxin production and the repression of the genes governing its enzymatic cascade, therefore suggesting that aflatoxin inhibition by hyssop's aqueous extract takes place at a transcriptomic level.

The disruption of patL, the patulin specific transcription factor affects Penicillium expansum virulence on apples

Joanna Tannous (Saint-Joseph University, Lebanon); Selma Snini (INRA, France); Rhoda EL Khoury (Saint-Joseph University, Lebanon); Yannick Lippi (INRA, France); Andre EL Khoury (Saint-Joseph University, Lebanon); Ali Atoui (CNRS, Lebanon); Roger Lteif (Université Saint-Joseph, Lebanon); Isabelle Oswald and Olivier Puel (INRA, France)

Patulin is a polyketide-derived mycotoxin produced by numerous filamentous fungi. Penicillium expansum is by far the most worrisome species. This fungus represents a significant economic problem for the fresh-fruit industry, causing up to 80 % of decay in stored fruits. The blue mold caused by P. expansum is often associated with patulin production that affects the apple products sanitary quality. Patulin is a toxic secondary metabolite that has been reported to cause intestinal disorders such as ulceration and bleeding. This polyketide mycotoxin is derived from the condensation of one acetate and three malonate units by a polyketide synthase (PKS); however the biochemical and genetic events in its biosynthesis are not entirely outlined. Only five out of fifteen genes were biochemically characterized and shown to be mainly involved in the first part of the patulin biosynthetic pathway. However the enzymatic functions of the rest of the genes remain unknown. A putative patulin cluster was described in a non-producing strain of Aspergillus clavatus NRRL1, a less economic relevant species. Furthermore, a nonfunctional "fossil" patulin cluster was also identified in non-producing species such as P. chrysogenum and P. digitatum. In the species of greatest concern P. expansum, the cluster is not yet sequenced. The present study consisted of the identification of the patulin cluster in P. expansum strain NRRL35695 and the assessment of patulin role in the apple infection process. For a start, primers specific to conserved regions were designed on the basis of some orthologous gene sequences alignments, to amplify and sequence large gene fragments. In the second phase, the intergenic regions were amplified in order to obtain genes islets. In the third step, the GeneWalking methodology was used to obtain the remaining gene sequences and link islets together. The characterized patulin gene cluster of P. expansum consists of 15 genes (PatA-PatO). The gene expression's study under patulin permissive and restrictive conditions showed a correlation between gene expression and patulin production. Putative binding sites for fungal transcription factors such as NRFA, AbaA, StrE, SltA, PacC and BrlA, were shown in the 5' regions of 14/15 genes. A BLAST analysis revealed that patL gene encodes for a protein that presents a high homology with AFLR, the specific regulatory factor of aflatoxins biosynthesis. The disruption of patL caused the inability to produce patulin with a harsh decrease of Pat genes expression. In the complemented ΔPatL:PatL strain, the ability to produce patulin is restored. Pathogenicity studies were performed on Golden Delicious apples indicated that the ΔpatL strain can infect apples but not in the same manner as the wild-type strain. Based on these results, we can conclude that patulin plays a significant role in the development of the blue mold decay on apples.

Characterization and traceability of matrices rich in triacylglycerols using an isotopomic approach

Noelle Merchak (University of Saint Joseph, Lebanon); Joseph Bejjani (Saint Joseph University of Beirut, Lebanon); Toufic Rizk (Université Saint Joseph, Lebanon); Serge Akoka, Gerald Remaud and Virginie Silvestre (University of Nantes, France)

Food security is a national and global concern that requires subjecting food products to stringent quality standards and ensuring their traceability from the field to the plate. Nowadays, fraud and adulteration have no limits. For this reason, verifying the origin of food products at risk must be ensured by reliable and standardized methods. Triacylglycerols are considered as quasi universal components of vegetable and

animal food matrices. Metabolomic and 13C isotopic profiling of these molecules afford very consistent origin tracers used for authentication issues and for metabolic studies at natural isotopic abundance. In this context, the creation of databases on food products, including olive oils, would provide us with a means of classification of products according to their geographical and botanical origins in order to protect both consumers and quality-conscious producers. The composition of fatty acids and other lipids in oil is highly dependent on its botanical origin as well as on the geo-climatic conditions of the corresponding terroir. This is also true for the isotopic content of the different molecule sites. Hence, the profile of fatty acids and their isotopic ratios varies according to several factors including variety, altitude, latitude, precipitation rate, and season. In order to determine whether olive oils may be classified according to these factors, an olive sampling program (232 samples) was conducted across the Lebanese territory and a targeted profiling of the extracted oils was performed using a 1H NMR metabolomics approach. A multivariate statistical analysis of the data thus obtained has revealed significant variations of different parameters within the oil matrix in function of the geographical origin of the oil (i.e., the altitude and latitude of the terroir), the olive morphology (i.e., the color, size, and shape), the harvest date, and the production year. Furthermore, geographical and botanical identification of oils has been discriminate among different oils samples using 13C NMR by applying the adiabatic INEPT sequence which allows an isotopomic approach: metabolomic profiling and carbon isotopic fingerprinting were performed at the same time with a sufficient precision reached 8 times faster than with the single-pulse 13C NMR experiment. 13C NMR affords additional information compared with the 1H NMR, in particular the position of the fatty acids on the glycerol moiety. Compared with the IRMS, 13C NMR gives positional isotopic ratios while IRMS is used for the stable isotopic ratios determination.

MCS4_math: Mathematics and Computer Sciences IV

Room: USJ CSH 306

Chairs: Dany Mezher (Saint Joseph University, Lebanon), Ahmad M. Shahin (Lebanese University, Lebanon)

Conformal Clifford Algebras and Image Viewpoints Orbit

Ghina El Mir (University of Balamand & Saint-Joseph University, Lebanon)

We propose a new model for image representation in computer vision. This is based on conformal Clifford algebras and their powerfulness to encode perspective distortions through the choice of basis of the Minkowski space.

A Triangle Analog To Pascal's Characterizing Primes

Issam Kaddoura (Lebanese International University, Lebanon)

A Triangle Analog to Pascal's characterizing primes Issam Kaddoura , Marwa Zeidan Lebanese International University School Of Art And Science A primality test is an algorithm for determining whether an input number is prime. Amongst other …elds of mathematics, it is used for cryptography. Unlike integer factorization, primality tests do not generally give prime factors, only stating whether the input number is prime or not.Factorization is thought to be a computationally di¢ cult problem, where as primality testing is comparatively easy (its running time is polynomial in the size of the input).The sequence of prime numbers and the binomial coefficients are two of the most ubiquitous objects in mathematics.A connection between them is given by a well-known characterization of the prime numbers: Consider the entries in the pth row of Pascal's triangle, without the initial and …nal entries. They are all divisible by p if and only if p is a prime. In this paper we construct an analog to pascal's triangle that characterizes primes with additional fascinating properties . We called this triangle Alkarkhi's triangle to the memory of Abu Bakr ibn Muhammad ibn al Husayn Al-Karkhi was a 10th-century mathematician and engineer who ‡ourished at Baghdad. Properties of Alkarkhi"s Triangle (1) Alkarkhi's Triangle characterizes primes In this section we present the amazing property of Alkarkhi"s Triangle to characterize primes Theorem 1: p is prime if and only if all the entires of the (p - 1)th row in Alkarkhi's Triangle are zero mod p Notice that all the enteries in (p-1)th row in bold divisible by the number p indicates the primality of p (2) Another property of Alkarkhi's Triangle to charecterize primality of a given number . Theorem 2: p is prime if and only if all the entires of the pth row not exceeding the diagonal are (1,-1,1,-1,1.....) mod p (4) Alkakhi's triangle rows sum for the nth row gives power of 2 (5) Alkakhi's Triangle rows alternating sign sums are calculated. (6) Alkarkhi's Triangle rising diagonals and Fibonacci numbers: we noticed that Fibonacci numbers are located in the rising diagonals of Alkarkhi's triangle.

Constructing Alyapunov Function To Study The Van Der Pol Equation

Issam Kaddoura (Lebanese International University, Lebanon)

There are many different types of Lyapunov theorems, but the key in all cases is to find a Lyapunov function and verify that it has the required properties. There is no universal method for constructing Lyapunov functions. One common approach to finding Lyapunov function is to decide on a parametrized Lyapunov function candidate, and then try to find the values of the parameters so that the required hypotheses hold.In this paper we can construct a Lyapunov function using the eigenvalues of the jacobian matrix of the system of differential equation of the Van der pol to study the equilibrium state as well the limit cycle .

An Interactive Workspace for helping Visually Impaired in Learing Linear Algebra

Bassam Almasri (BAU, Lebanon); Islam Elkabani (Beirut Arab University, Mathematics and Computer Science Department, Lebanon); Rached Zantout (Rafik Hariri University, Lebanon)

Linear algebra is one of the most important branches of mathematics, and it is part of many areas of science in general. Thus, it is required for students majoring not only in mathematics, but also in engineering, physics, economics, to name a few. For reasons related to the subject and the nature of vision disability, visually impaired students are more challenged in learning mathematics. Research has shown that performance of students in mathematical problem solving activities is heavily affected by factors like anxiety and lack of comprehensive understanding of the problem structure and components. Thus, it is no surprise that students who are visually impaired tend to under-perform in mathematics compared to their sighted peers, as the lack of fully accessible materials and the lack of mechanisms that allow them to compose the logical steps of a problem solving process exacerbates the level of anxiety and reduces the overall problem comprehension. An extensive literature has been developed to overcome barriers and problems associated to mathematical accessibility field. The literature has provided a plethora of approaches aimed at enhancing accessibility of mathematical expression. However, there have been relatively limited efforts to promote mathematics manipulation technologies for students with visual impairments. Around the world, many high schools provide linear algebra courses as essential parts of the mathematics curriculum. The number of high school students with visual impairment is significant. For example in the USA, according to the National Federation of the Blind(NFB) 1,061,600 visually impaired students were enrolled in high school diploma or a GED in 2011. In the other hand, the approaches that are devoted to support the processes of mathematical manipulation didn't provide a well support for helping the visually impaired in learning linear algebra. In this work, a novel framework, called MathPractice was designed in order to help students who are visually impaired manipulate mathematical content in a way that is convenient, accessible, and usable. The importance of this framework is in providing an opportunity for visually impaired students to practice their skills in some branches of mathematics that require special accessible techniques such as linear algebra. Moreover, this framework was designed to allow the students to practice their skills without the need of the sighted person help. These opportunities will be reflected positively on the visually impaired students psychologically and academically. The framework makes them more self confidence and motivates them to improve their mathematical skills. In addition to all of the above, MathPractice framework facilitate the communication between visually impaired student and his/her teacher by allowing him/her saves the solution that it can be read and graded by a sighted instructor. This kind of communication doesn't require a direct meeting. Using the MathPractice framework, the teacher can form a practice math sheet and send it to the visually impaired students who are in turn can access the sheet at any time, edit and perform the mathematical expression, and save the updated sheet so that it can be reviewed and graded by the instructor. Unlike other frameworks that were limited to facilitate manipulating mathematical algebraic content only, the new framework can be instantiated with different areas in mathematics. In this work, the new framework was instantiated with the domain of linear algebra. A set of system techniques were built in order to allow the visually impaired student navigates the linear algebra expressions, selects one of them, performs the operations, and saves the solution for further review and correction. The first step that was followed in order to determine such techniques was identifying which tasks required the student to use his/her sight. For that, the topics that are given in the first course linear algebra were determined. Each topic was then broken into several subtopics. Each sub topic was further broken into basic operations that in their turn are broken down into tasks. Tasks were then filtered based on whether or not they needed visual abilities. After that, the list of all tasks requiring visual abilities were analyzed to determine the visual abilities needed in linear algebra. After determining all visual abilities that were needed, one or more techniques were set to help the visually impaired students do these visual tasks. The techniques were implemented through an interactive workspace that was developed for this purpose. Using the available techniques such as Read-Matrix technique, the visually impaired students are able to navigate and select a linear algebra expression. They have also the ability to save the results of their manipulations. Saving the results will update the MathML file to include a MathML representation of the new results so that when the user reopens the file later on he/she will be able to navigate the results as well as edit them. In this manner, the students will be faster in solving mathematical problem with less chances of making mistakes. The hot access keys employed by the system to help the user manipulates a mathematical expression. Using the same hot access keys to invoke different system functions will reduce the amount of memorizing by the user. For example, the h button in the keyboard is devoted to invoke the help function that is used for finding out the current status or reviewing the list of available hot access keys. The arrow keys in turn help the user in navigating the names of existing files, the available expressions, the elements of an expression, and the entries of a matrix. Four experiments with different complexity of accessibility were conducted for evaluating the proposed workspace. The experimental evolution based on two main comparisons: comparison between the workspace and the conventional way, and comparison between the regular and learning modes of the workspace. The evaluation involved the effectiveness and the efficiency of the system. The results were analyzed using T-test. They showed that the proposed system and the learning mode of the system are respectively better in effectiveness than the conventional way and the regular mode of the system. They also showed that the proposed system in the experiments that are more complex in accessibility is better in efficiency than the conventional way. While the system in learning mode isn't better in efficiency than the system in regular mode.

Simon Torsion Theory

Simon Bechara (Lebanon, Lebanon)

The Torsion behaviour for Thin Wall Elements, is a Primary Degree Of Freedom that shall be properly calculated in any Structure to obtain Correct Result. It has been realized since the years 1940's by engineers that warping is an effect that cannot be ignored for Thin Wall Structural Members, such as Steel Open Profiles, used in Buildings and Bridges and specially Crane Beams. Engineers and Design Codes proposed different approximate methods to evaluate the warping effect for particular cases such as Crane Beams, using Finite Element Models, Solving the Differential equation provided by S Vlassov. The Finite Element Method will not provide a Theoretically accurate result since the Shell elements implemented in most used software does not consider the Shear Slide between elements. S Vlassov Equation as evaluated by Simon Bechara, is not aligned with the basics of the Strength of Material since it does not add the Shear Rotation to the Torsion Rotation, besides it is opposite to the Principles that an element with an Inertia equal to Zero does not show any movement and this is where the Error exists. The Simon Torsion Theory is changing the concept to an Opposite Understanding of how the Warping Effect shall be related to the Shear Effect. The result is showing that a higher rotation shall result from Torsion that is not considered is all previously mentioned methods. Finally Simon Torsion Theory Results in more safety to the structure that has not been considered preciously.

SOC 3: Social, Economic and Behavioral Sciences III

Room: USJ CSM Amphi A

Chairs: Christine Babikian (Université Saint Joseph, Lebanon), Christophe Varin (Université Saint Joseph, Lebanon)

Le Confessionnalisme Budgétaire et Fiscal

Georges El Haddad (Saint-Joseph University, Lebanon)

Comment se présente la charge confessionnelle dans le budget de l'Etat libanais et dans les lois fiscales et financières ? Et quels sont les privilèges financiers accordés aux communautés religieuses, leurs personnes morales et certaines des personnes physiques qui sont rattachées via les dépenses publiques et les exonérations fiscales ?

Les défaillances de l'Etat dans la production et la gestion de l'espace socioéconomique au Liban: la prééminence du quartier sur la métropole

Nizar Hariri (Saint Joseph University & Association Libanaise Pour l'Economie Sociale, Lebanon)

Nous proposons de montrer l'Etat libanais produit un «vide structural» dans lequel les agents privés de la gestion locale, dans leur insertion dans des réseaux transnationaux, assument le rôle de production et de régulation des ressources spatiales, le privé assurant par là-même la continuité du service public. La fragmentation de l'espace national au Liban montre que c'est à l'échelle du quartier que se joue désormais la gouvernance urbaine. En d'autres termes, l'Etat libanais est devenu lui-même un agent consommateur des ressources spatiales produites par les acteurs locaux et globaux, et non pas un agent régulateur ou producteur de l'espace économique. Dans le cas du Liban, on assiste à une réduction d'échelle qui va jusqu'au niveau du quartier, qui devient désormais l'échelle pertinente de l'analyse du développement géoéconomique, avec l'émergence de nouveaux acteurs privés qui, depuis la fin des années 1990, concurrencent l'Etat dans son offre des services publics et contestent ses monopoles naturels, notamment l'eau et l'électricité. Les politiques étatiques territoriales soulignent clairement le désengagement, voire la démission, des acteurs étatiques de leur rôle dans la régulation des ressources spatiales. Le rôle des acteurs publics dans la production socioéconomique de l'espace se renverse donc en devenant un processus de «libération de l'espace»: un Etat qui fait « du vide » en se retirant de son rôle traditionnel et en laissant la place à des acteurs situés à des échelles multiples. Le public ne produit donc pas l'espace mais « vide l'espace », en générant un vide patrimonial et en « laissant la place » aux agents privés de la gestion locale/globale.

L'émergence d'une norme de tolérance de la corruption au Liban

Sarah Hariri Haykal (Saint Joseph University, Lebanon)

De nature endémique, la corruption au Liban est une pratique généralisée et normalisée, à tel point qu'elle représente une partie intégrante des transactions quotidiennes des libanais. La banalisation des transactions corrompues se reflète dans la perception que les libanais en ont: un phénomène tellement ordinaire qu'on ne cherche plus à éradiquer. Cet article se propose d'analyser les déterminants de la corruption au Liban et d'identifier les facteurs qui expliquent son étendu. A cette fin, l'approche adoptée ne se contente pas d'investir le champ de la sphère étatique et des formes de « gouvernance », mais s'intéresse d'abord à la question de la perception de la corruption. Certes, le niveau de corruption dans la société libanaise est en rapport avec la mauvaise gouvernance, avec des institutions étatiques défaillantes ou avec une action collective souvent associée au multi-confessionnalisme et à la structure communautaire du pays. Mais nous pensons que la tolérance de la corruption par les individus eux-

mêmes est un facteur explicatif majeur, capable d'apporter un nouvel éclairage sur la généralisation de la corruption dans la société libanaise. Il semble donc indispensable d'intégrer des critères moraux, culturels et sociaux à toute analyse économique de la corruption. Afin d'appréhender le problème de la corruption au Liban, il convient de montrer que ce fléau demeure principalement un phénomène social, tributaire du système de valeurs en vigueur, en particulier des normes sociales et des pratiques culturelles qui tolèrent les pratiques corrompus. La prévalence de cette logique socioculturelle au sein de la société libanaise explique les raisons pour lesquelles la corruption est tolérée dans un contexte et non dans un autre, surtout quand les normes et les règles officielles divergent des normes en vigueur.

The Attractiveness of Family Owned Businesses From a Career Development Perspective: Perceptions of Fresh Graduates and Experienced Employees

Jamil Hammoud (Rafik Hariri University, Lebanon); Marwan Kotob (Rafic Hariri University, Lebanon)

Every year, thousands of Lebanese higher education graduates earn their degrees and become active job seekers. Yet finding fulfilling jobs which provide potential career growth and development is not an easy task. Meanwhile, experienced employees face a similar challenge as they seek career advancement opportunities. Within the context of a small economy run predominantly by family businesses, the latter offer the bulk of job opportunities available for both fresh graduates and experienced employees. Indeed, Family owned businesses are the most common forms of business in the world. They make up two-thirds of all companies in Europe and the Americas (Kennedy, 2013). Not only do they include sprawling corporations such as Wal-Mart, Samsung, Tata Group, and Porsche, but they account for more than 30% of all companies with sales in excess of $1 billion, according to the Boston Consulting Group's analysis (Kachaner et al, 2012). Moreover, They supply approximately half of the jobs in Europe and the Americas and account for nearly two-thirds of all the companies, according to a 2012 dated Ernst & Young and Family Business Network International report (E&Y and FBN-I, 2012). Yet, when initial decisions to consider a firm as a potential employer are based heavily on a person's general impressions about the organization, many people avoid working at such firms due to negative perceptions (Cable & Turban, 2003; Cable & Yu, 2006; Rynes, 1991). Moreover, a number of experienced employees of these firms apt out at one point of time or another. The combination of these two factors creates a problem for family owned business managers as they try to attract and retain nonfamily talents. And this problem grows, especially when attracting talent is critical not only for continuous competitive advantage, but also for the survival of any business (Taylor and Collins, 2000; Barney, 1991). Consequently, research and studies are needed, in order to pinpoint issues of concern, the resolution of which would contribute to an improved and more effective match between the career development interests of job seekers and the recruitment of skills considered by family owned business managers. It is out of this need of study that this research paper is undertaken. Accordingly, the objective of this paper is to explore the perceptions of fresh graduates and experienced employees vis-à-vis the attractiveness of family owned business from career development perspectives. Most suitable for this objective is the Expectancy Theory which was initially formulated as a motivation theory to explain why employees choose one behavior over another (Vroom, 1964). The methodology of research used to accomplish the objective stated above employs a research model deduced from an extensive survey of available literature, which stipulates that the attractiveness of family owned businesses is dependent on six main career development attributes pursued by job seekers. There are some differences in the attributes between fresh graduates and experienced employees. Therefore, the same model but with differing attributes was applied to two convenience samples, drawn from the employees of 10 family owned businesses across Lebanon. The first sample consisted of 100 fresh graduates, and the second included 140 experienced employees. Inferential statistical tools were used to tabulate, analyze and interpret the data collected, including correlation, hypothesis testing, analysis of variance and linear regression. The results of the research proved to be consistent with what had been previously revealed in similar research, regarding the career development attributes that affect job seekers perceive as important. Yet the data showed that fresh graduates expect low salaries and benefits from family owned businesses, which negatively impact the attractiveness of such firms. Meanwhile, experienced employees showed a concern for training opportunities which also negatively impacts their perception of family owned businesses. As a final outcome, this study points out the career development attributes important to job seekers in Lebanon. Family owned as well as incorporated businesses may benefit from this result by giving due attention to these attributes. Moreover, Family owned businesses may benefit by focusing their attention on how to reformulate their policies regarding salaries, benefits and training.

The Social and Economic Consequences of Syrian Refugees on Lebanon

Georges Masse (AUST, Lebanon)

Since the beginning of the Syrian crisis in 2011, millions of Syrians have fled their homeland to neighboring countries; according to the latest United Nations' report: Syrians are considered as the world's largest refugee population. The sudden influx of Syrian refugees into Lebanon has reached a level of crisis which the Lebanese government and institutions do not have the capabilities and solutions to handle. Comparing with other neighboring states with Syria such as Turkey and Jordan, Lebanon hosted the biggest number of Syrian refugees, with more than 1,1 million registered and nearly 300.000 waiting to be registered by the United Nations High Commission for refugees. Numbers shows that out of 3.6 million Syrian refugees, nearly 40% arrived to Lebanon. As a result, one third of the population living today in Lebanon is refugees. While Lebanon is neither a signatory to the UN Convention Relating to the Status of Refugees nor its 1967 Protocol, the Lebanese government maintains an "open border" policy whereby registered Syrian refugees can live and work in Lebanon. While other countries, and

starting from 2013, adopted restricted measures to stop the influx. Unlike other hosting states, Lebanon lacks a central effective stable state system, and its sensitive stability is the result of a fragile sectarian confessional balance. In parallel, the government is avoiding to adopt a policy of camps establishment due to the preexisting Palestinian refugees' question and its domestic complication on sectarian and confessional level. The open borders governmental policy had a significant social economic impact on Lebanon, including an impact on the labor market. For a country of four million citizens such reality is extremely alarming and transcending all red lines. The overwhelming majority of these refugees in Lebanon, approximately 86% of them, are concentrated in peripheral regions and some of the poorest areas of the country, where an elevated rate of poverty has always existed. Some of these areas became overpopulated. The result is the increasing number of poor people in Lebanon. The major and urgent question pertaining to this big problem is how a country like Lebanon with a public debt of around 57.7 billion dollars can deal with it. International contribution and funds to help the refugees, and until the end of 2014, reached 1.1 billion dollars, which is considered as 30% of what has been promised. Lebanon received barely 23% of these funds, though it hosts the biggest number of Syrian refugees. The aim of this paper is to shed light on the consequences of hosting this big number of refugees, knowing that these people have lost their homes and will not return to their country soon; they will reside here for many years to come. Lebanon, before the Syrian crisis, has been facing internal complications when all of a sudden, the number of people living within its borders increased to 30% in four years, the majority of whom are extremely poor and are dependent on humanitarian aids and donations. This situation is leading to more division and additional strain; according to the World Bank report, the cumulative losses of the Lebanese economy have reached 7.5 billion dollars due to the Syrian crisis, and that some 170.000 additional Lebanese are expected to plunge into poverty. Hence, raising the number of the poor to two thirds of the population since 2011, and doubling the number of the unemployed. Back to the early period of the Syrian crisis, refugees were met with considerable support and help, but after four years, the welcomed guests' existence became more and more problematic, leading to tensions and sometime to clashes due to the economic competition of the Syrian workers. Such hostility from local residents are attributed to the sensitivity that they have to the economic problem caused by the refugees, but the Syrian refugees unfairly benefit from humanitarian aid, while the poor local residents receive nothing: all what they face is unemployment due to the low-wage Syrian competition. On security level, some of these refugees were involved in terrorist activities; they have used some refugee camps as a shelter to hide and to attack the Lebanese army. We have witnessed this clearly in the incidents that took place in Arsal. Finally, we have to be realistic and understand that this is the beginning of a dangerous problem that is directly affecting all aspects of Lebanese life; nobody knows if it will stop here. What we are sure of is that it is apparent that the Syrian crisis is not close to end; the nearly 1.4 million Syrian refuges will stay in Lebanon for more and more years.

BIO17_Phamra: Biological, Medical, Pharmaceutical, Health Sciences XVII

Room: USJ CSM C9

Chairs: Ayman Assi (Faculté de Médecine, Université Saint-Joseph & Laboratoire de Biomécanique et d'Imagerie Médicale, Lebanon), George Hilal (Saint Joseph University, Lebanon)

Impacts of chronic exposure, during development, to Chlorpyrifos on respiration and diaphragm contractility in rats

Walaa Darwiche (Université de Picardie Jules Verne & Université Libanaise, Faculté des Sciences, France); Stéphane Delanaud, Véronique Bach and Jérôme Gay-Quéheillard (Université de Picardie Jules Verne, France); Hassan Khachfe (LIU, Lebanon); Wissam Joumaa (Université Libanaise, Faculté des Sciences, Lebanon); Wiam Ramadan (Lebanese International University & Lebanese University, Faculty of Sciences, Lebanon)

Chlorpyrifos (CPF) is one of the most widely used Organophosphoroud in agriculture. CPF can be detected as residues in food, drinking water as well as in the maternal and umbilical cord blood samples of pregnant women. CPF induces inhibition of acetylcholinesterase (AChE) that leads to increase acetylcholine (ACh) levels within synaptic clefts, hyper-stimulation of the cholinergic system, and decrease binding to muscarinic acetylcholine receptor (mAChR). Cholinergic stimulation ensures muscle contraction and plays a role in the regulation of respiratory pattern in the brainstem. The aim of our study is to determine the effects of the exposure to Chlorpyrifos at two doses: CPF1 (1 mg/kg/day) and CPF5 (5mg/kg/day), in utero and postnatal day 21 (PND21) and post natal day 60 (PND60), on the respiration and the contractility of the diaphragm, the main respiratory muscle. Exposed rats to CPF1 have lower body weight only at PND60. However, rats exposed to CPF5 group showed a decrease in body weight at birth, weaning and adult age. Concerning the respiratory parameters, only sleep apnea percentage was increased in exposed group (CPF1 and CPF5) compared to control. Twitch tension of diaphragm was significantly increased in CPF1 and CPF5 rats with an increase in the fatigability index in rats exposed only to CPF5 at both ages. Acetylcholinesterase activity showed no differences between control and exposed rats. In

order to determine the possible mechanism by which the contractile parameters of the diaphragm were changed, we studied if the expression of the different isoforms of myosin heavy chain were different. We observed no difference between exposed rats and controls. Furthermore, the expression of ryanodine receptor (RyR1), responsible of calcium release from the sarcoplasmic reticulum in skeletal muscles, was determined and showed no difference in exposed groups compared to controls. Additional investigations are needed in order to explain the changes observed in the contractile parameters of the diaphragm.

Rôle de la stimulation du cortex moteur dans la régénération nerveuse: Etude expérimentale chez le rat

Nicolas Nicolas (Saint-Joseph University, Lebanon); Sandra Kobaïter Maarrawi (Saint Joseph University of Beirut, Lebanon); Samuel Georges and Ghina Jardali (Université Saint Joseph, Lebanon); Elie Samaha (Hôtel-Dieu de France, Lebanon); Joseph Maarrawi (St Joseph University & Laboratory of Neurosciences, Lebanon)

Les lésions nerveuses, surtout d'origine traumatique, sont assez courantes en clinique humaine. Le traitement consiste en un rétablissement chirurgical de la continuité du nerf atteint, le plus souvent par suture et/ou greffe microchirurgicale(s). Les résultats sont limités par 2 facteurs principaux: le temps de récupération durant lequel le patient est privé de la fonction attribuée au nerf atteint, et le taux incomplet de succès de la réparation. D'où la nécessité de trouver des techniques complémentaires visant à accélérer la récupération et à augmenter le taux de succès de la réparation nerveuse. Ce projet expérimental vise ainsi à évaluer la régénération nerveuse périphérique, sur un modèle de section et de réparation microchirurgicale du nerf sciatique chez le rat, soumis soit à une stimulation corticale motrice soit nerveuse périphérique. 30 rats sont divisés en 3 groupes de 10 à 11 rats chacun selon le protocole de stimulation électrique: 1- le premier groupe sert comme groupe témoin avec une simple section nerveuse suivie de suture, sans stimulation, 2- le second groupe est soumis à une stimulation du cortex moteur pendant une heure en post-opératoire immédiat (SCM aigue), 3- le 3ème groupe à une stimulation du cortex moteur (SCM chronique) de façon chronique (une heure deux fois par semaine pour 2 semaines). Dans les 3 groupes, la dissection du nerf sciatique du rat est effectuée par incision latérale de la cuisse, suivie d'une section directe de la partie proximale du nerf avec suture microchirurgicale. Dans les groupes 2 et 3, une stimulation infralaminaire du cortex moteur est effectuée après craniotomie et placement de l'électrode directement sur la dure-mère en face du cortex moteur du membre inferieur controlatéral. L'évaluation de la régénération nerveuse se fait sur la base des paramètres électrophysiologiques: EMG (pic du potentiel d'action musculaire, et délai d'apparition de potentiel d'action musculaire), et fonctionnelles: Index sciatique fonctionnel, juste avant la manip (S0), puis à la 4ème (S4), 8ème (S8) et 12ème (S12) semaine. La récupération, basée sur les pics de potentiels et la latence de l'EMG montre une meilleure récupération dans les groupes SCM aigue et chronique par comparaison au groupe contrôle, plus visible avec le temps. Cette récupération s'avère plus significative statistiquement dans le groupe SCM aigue. En comparant les groupes de SCM aigue et chronique entre eux, il n'existe aucune différence statistiquement significative. Au dernier contrôle de 12 semaines, les pourcentages du pic de potentiel d'action ont atteint des valeurs de 46%, 86% et 93% pour les groupes sham, SCM aigue et SCM chronique respectivement. Les pourcentages du temps de latence ont atteint les valeurs 72%, 94% et 87% pour les groupes sham, SCM aigue et SCM chronique respectivement. Nos résultats montrent également que le ISF s'est amélioré dans les 3 groupes, mais avec une dynamique différente d'un groupe à l'autre. Ainsi, le groupe de SCM aigue est celui qui a manifesté le plus d'amélioration qui est significative statistiquement par rapport aux 2 autres groupes. Le groupe de SCM chronique montre une légère amélioration par rapport au groupe sham, surtout à S8 et S12, mais sans que cette différence atteint un degré de signification statistique. Une analyse par régression linéaire a été effectuée afin de détecter les facteurs qui ont influencé nos résultats de façon indépendante. Ainsi, les variables indépendantes analysées étaient le facteur type de stimulation (SM aigue, chronique et sham) et le facteur temps (S4, S8 et S12). 3 analyses ont été effectuées en prenant comme variable dépendante pour chacune respectivement: la latence à l'EMG, le pic de potentiel d'action à l'EMG et l'ISF. Ainsi dans les 2 premières analyses avec comme variable dépendante les données de l'EMG, le type de stimulation s'avère significatif ($p= 0.038$ et 0.007 respectivement), alors que le facteur temps n'est pas significatif. Dans la 3ème analyse avec comme variable dépendante le SFI, les 2 facteurs (type de stimulation et temps) sont significatifs ($p=0.0001$ et 0.017 respectivement). Les résultats histopathologiques sont en cours et n'ont pas pu être fini jusqu'à présent. En conclusion, la stimulation du cortex moteur semble induire une accélération et une meilleure récupération fonctionnelle après section-suture du nerf sciatique du rat, évaluée par un EMG et un index du nerf sciatique. Le mode de stimulation aigue semble donner de meilleurs résultats.

Neuro-modulatory differential effects of motor cortex stimulation on unit activity of the ventral posterior lateral thalamic nucleus in the cat

Sandra Kobaïter Maarrawi (Saint Joseph University of Beirut, Lebanon); Luis Garcia-Larrea (INSERM, France); Nayef Saadé (American University of Beirut, Lebanon); Elie Samaha (Hôtel-Dieu de France, Lebanon); Nabil Okais (Hôpital Hôtel-Dieu de France, Lebanon); Joseph Maarrawi (St Joseph University & Laboratory of Neurosciences, Lebanon)

Objective: Motor cortex stimulation (MCS) is a neurosurgical technique developed on empirical basis and is currently increasingly used as last solution to treat chronic refractory neuropathic pain in humans. However, the exact mechanisms of action of MCS remain incompletely elucidated at that time. A number of studies have suggested the involvement of somatosensory subcortical systems, in particular the thalamus, in humans using PET scan and in animals using electrophysiology on rat model. The aim

of the present work is a new attempt among other contemporary studies aiming to understand these mechanisms, therefore our main objective is to investigate the electrophysiological effects of epidural MCS on the activity of the thalamic ventral posterior lateral (VPL) nucleus, in a cat model whose thalamus is more similar to that of Humans than rodent's models. Methods: Based on our previous study, we created and validated a mini-invasive cat model of MCS with similar parameters as those applied in humans. 20 adult cats were included in this study. MCS was performed on epidural basis for 1, 3, 5 & 10 minutes on both forelimb and hindlimb cortical regions. The influence of MCS on the spontaneous and evoked activity of wide-dynamic range (WDR) units responding to noxious stimulation, as well as on non-nociceptive (NN) VPL cells, was tested using extracellular single-unit recordings. Firing rates and burst discharges were analysed for all conditions. Results: Our results indicate that all durations of MCS induced a differential modulation of the VPL cells spontaneous activity according to the nature of the cell, with significant inhibition of WDR cells, but enhancement of NN ones. No effect was noted on the activity evoked by innocuous peripheral stimuli. This might probably reflect a possible differential analgesic effect of MCS on spontaneous but not provoked pain. The observed effects were independent of the somatotopic relationship between the locus of MCS and the receptive field of the recorded cells. However, the bursting discharge of only WDR cells was somatotopically reduced by MCS, probably reflecting an independent mechanism of a selective induced inhibition of these cells. Conclusion: The present work has proven a neuro-modulatory differential effect of MCS on nociceptive and non-nociceptive cells in the thalamic VPL nucleus. That MCS-induced thalamic activity modulation may correspond to a first-line somatosensory control, with a dual effect, non-somatotopic on spontaneous activity of thalamic cells and somatotopic on the burst activity of only WDR cells which may play a role in neuropathic pain, and thus most probably participates to the complex analgesic MCS effects. These results can have future clinical application in patients suffering of refractory neuropathic pain in order to optimize MCS.

The Protective Effects of Selenium on Oxidative Stress Induced by Waterpipe (Narghile) Smoke in Lungs and Liver of Mice

Mohamad Charab (Beirut Arab University & Al-Iman Schools, Lebanon); Noura S. Abouzeinab and Mohamed Moustafa (Beirut Arab University, Lebanon)

Waterpipe (narghile) smoking with moassal type of tobacco is common in the Lebanese population and may result in health problems. This study investigated the effects of water pipe (narghile) smoking on oxidative stress in lungs and liver of mice and whether selenium administration exerts protection. A number of 24 mice were divided equally into four groups (i) The control group received no exposure or treatment; (ii) mice exposed to watepipe smoke for 15 minutes/day every other day for 4 times within 8 days; (iii) mice exposed to smoke and received intraperitoneal injection of 1.3 µg sodium selenite/ kg body weight 15 minutes before exposure to smoke and (iv) mice exposed to smoke and received intraperitoneal injection of 3.9 µg sodium selenite/kg body weight 15 minutes before exposure to smoke. The mice were sacrificed after 8 days of exposure and liver and lungs were harvested. MDA and NO levels were significantly higher in the liver and lungs, while the activities of SOD and GPx-1 decreased significantly in mice exposed to waterpipe smoke as compared to control group. The activity of CAT in lungs decreased significantly in the smoke exposed group at $P < 0.05$. Treating mice with 3.9 µg sodium selenite/kg body weight decreased MDA in lungs and liver and NO in lungs while increased significantly the activities of SOD, GPx-1 in both lungs and liver and the activity of CAT in lungs of mice at $P < 0.05$. Histological examinations confirmed these biochemical effects in smoke exposed mice and smoke exposed mice treated with selenium. In conclusion, waterpipe smoke resulted in increased lipid peroxides and decreased activities of antioxidant enzymes SOD, GPx-1 and catalase in the lungs and liver of mice. Treatment of mice with 3.9 µg sodium selenite/kg body weight 15 minutes before exposure to smoke restored the levels of these parameters.

Magneto-Fluorescent Iron Oxide Nanoparticles for Drug Delivery to Human Acute Myeloid Leukemia

Daniel Azar (Lebanese American University, Lebanon); Kheireddine El-Boubbou (King Saud bin Abdulaziz University for Health Sciences & King Abdulaziz Medical City, Saudi Arabia); Ralph Abi Habib (Lebanese American University, Lebanon)

Magneto-fluorescent nanoparticles have been recognized as an emerging class of materials that exhibit great potential in advanced biomedicine and drug delivery applications. Of the many available systems, these particles are considered promising drug-carriers due to their large surface areas, ease of synthesis, surface functionalities, imagability, low toxicity and high biocompatibility. However, synthesizing such uniform, colloidal, biocompatible, and water-dispersible particles that simultaneously exhibit large magnetization, high drug content and maximized fluorescence has been challenging. Herein, we report a simple approach to ensemble a novel chemotherapeutic formulation made of fluorescently-labeled PVPylated magnetic metal (iron) oxide nanoparticles (MONPs) loaded with the anticancer drug Doxorubicin (Dox). We then studied the delivery of these particles to leukemic cells. We first investigated the effects of Dox-loaded PVPylated MONPs on four human acute myeloid leukemia (AML) cell lines (HL-60, ML2, MonoMac1 and TF1-vRaf). We showed that the PVPylated MONPs are not toxic to the tested cell lines even up to 100 µg/mL, whereas three of the four cell lines tested were sensitive to Dox-loaded PVP-MONPs effectively killing the cells, with IC50 values ranging from 1.52 to 4.46 µM of doxorubicin content. Time-course measurements by flow cytometry of the uptake of fluorescently-labeled Dox-PVP-IONPs in ML2 and HL-60 at time-points ranging from 15 minutes to 72 hours have shown significant uptake at all time-points, with a detectable increase starting 24 h post treatment and increasing with time. Moreover, live imaging showed that Dox was delivered to the nucleus causing cell death in relatively short period of time. We anticipate that the observed cytotoxic effect from the Dox-loaded PVP-MONPs is dependent upon both

free drug released into the media once encountering the cell membrane, and uptake of the nanoparticles by cells, both enhancing the effectiveness of Dox released intracellularly. We are still characterizing the cellular mechanisms underlying the activity of these particles. To our knowledge, however, no reports on the use of magneto-fluorescent PVPylated MONPs to AML have been described. Importantly, the Dox-loaded PVPylated MONPs can potentially open new opportunities for in vivo AML therapeutic imaging and hyperthermia where they can serve as multi-photon and magnetic resonance dual-modal imaging probes.

Effect of Phenanthroline and Bipyridine Derivatives and their respective Ru(II) Metal Complexes on Human AML Cell Lines

Daniel Azar, Rony Khnayzer, Mirvat El-Sibai El-Sibai and Ralph Abi Habib (Lebanese American University, Lebanon)

Most currently approved therapies against acute myeloid leukemia (AML) have serious side-effects and limited potency, necessitating the development of alternative, more potent approaches that could specifically target cancerous cells. Promising results have been reported in the field of Metallomics, in which various cancers have been targeted by compounds formed of different ligands conjugated to a metal core, one of which being ruthenium. In this study, we sought to investigate the effects of bis-bidentate Ru(II) metal complexes, in which the ligands are phenanthroline- or bipyridine-derivatives, on a panel of nine human AML cell lines (HL-60, U937, ML1, ML2, MonoMac1, TF1-vRaf, TF1-vSrc, TF1-HaRas and KG1). Of the four different complexes tested {Ru-I: [Ru(II)(1,10-phenanthroline)2Cl2]; Ru-II: [Ru(II)(4,7-diphenyl-1,10-phenanthroline)2Cl2]; Ru-III: [Ru(II)(4,7-diphenyl-1,10-phenanthroline-disulfonate)2Na2]2+ and Ru-IV: [Ru(II)(2,2'-bipyridine)2Cl2]}, significant activity, on seven out of nine cell lines, was detected only with Ru-II (IC50 values ranging from 2.42 to 19.72 μM). Of the four free ligands tested (L-I, L-II, L-III and L-IV corresponding to Ru-I, Ru-II, Ru-III and Ru-IV, respectively), significant cytotoxic activity was detected in eight out of nine cell lines with L-I (IC50 values ranging from 2.64 to 4.55 μM) and in eight out of nine cell lines with L-II (IC50 values ranging from 0.12 to 1.58 μM). The activity of the free ligands L-I and L-II was at least one order of magnitude higher than that of the corresponding complexes. The activity of the metal complexes correlated with the structure of the ligands with modifications of phenanthroline (L-I) that make it more hydrophobic strongly increasing the activity of the free ligand itself (L-II), as well as that of the corresponding metal complex (Ru-II). The incorporation of a negatively-charged group (sulfonate) even to the more hydrophobic 4,7-diphenyl-1,10-phenanthroline, abolishes any activity in both the free ligand (L-III) and metal complex (Ru-III), suggesting that DNA intercalation is a possible mechanism of action of these compounds. No activity was detected with the ligand-free Ru(II) metal control {Ru-C: cis-[RuCl2(DMSO)4]}, indicating that the activity of these Ru(II) metal complexes is not due to the metal center alone, but to the metal coordinated to ligand. We are still investigating the role of other ligands when conjugated to a ruthenium core, as well as characterizing the cellular mechanisms underlying the activity of these compounds.

18:00 - 19:00

Cloture: Cloture

Room: Campus des Sciences Humaines, Amphithéâtre Pierre Y. Aboukhater; USJ CSM