جامعة الإمارات العربية المتحدة
United Arab Emirates University

UAEU College of Graduate Studies

PROFILES OF DOCTORATE DISSERTATIONS

2014-2015
Academic Year


AIR VALVE


جامعة الإمارات العربية المتحدة

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PREFACE

The "Profiles of Doctorate Dissertations" is prepared by the College of Graduate Studies in the Division of Research and Graduate Studies at the United Arab Emirates University (UAEU). The purpose of this publication is to highlight the research accomplishments of UAEU's Doctorate students who have successfully defended their dissertations and graduated from their program.

This 2014-2015 inaugural issue features the second class of graduates of the Doctor of Philosophy (Ph.D.) program. The profiles of twenty (20) PhD graduates are featured in this issue, and are ordered chronologically based on the dissertation defense date. Each profile includes a brief introductory information of the student, an abstract of the student's dissertation, a brief statement on the research relevance and potential impact, a list of the main publications resulted from the research, and the student's career aspirations. The information included in these profiles was provided by the students or their faculty advisors.

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MUSTAFA TALEB ARDAH

Department of Biochemistry
College of Medicine and Health Sciences

Dissertation

Title *Screening For Novel Inhibitors of Alpha-Synuclein Seeded Nucleation-Dependent Aggregation and Toxicity as a Potential Therapeutic Strategy For Parkinson's Disease*

Faculty Advisor Prof. Omar El-Agnaf

Defense Date 11 December 2014

Abstract

α-Synuclein aggregation is the key pathogenic event in several important neurological disorders including Parkinson's Disease, dementia with Lewy bodies and multiple system atrophy, giving rise to a distinct group of neurodegenerative diseases known as synucleinopathies. Although the molecular basis of α-syn toxicity has not been precisely elucidated, recent studies indicate that α-syn toxicity is mediated by a nu-cleation-dependent aggregation process. To elucidate the structural basis of α-synuclein mediated toxici-ty, we developed various methods to prepare different α-synuclein species of a defined size and mor-phology distribution, and we investigated their toxicity in different human dopaminergic cell lines. We observed that crude α-synuclein oligomers preparations, containing both monomeric and heterogeneous mixtures of α-synuclein oligomers, were the most toxic species. The toxicity of α-synuclein aggregates was directly linked to the presence of the monomeric α-synuclein, and strongly dependent on its ability in seeded nucleation-dependent aggregation converting into amyloid fibrils. Therefore any effort to identify compounds that could inhibit or even reverse the aggregation process should assess the effect of the potential inhibitors on the seeded aggregation of α-synuclein, among others. We screened thirty Chinese herbal medicinal compounds for their effect on α-synuclein aggregation, seeded polymerization and tox-icity by employing biophysical, biochemical and cell-culture-based techniques. Among the screened com-pounds, only ginsenoside Rb1, salvianolic acid B, dihydromyricetin and gallic acid were shown to be strong inhibitors of α-syn fibrillation, seeded aggregation and toxicity. Our results showed that gallic acid, ginsenoside Rb1 and salvianolic acid B inhibit α-synuclein fibrillation by binding and stabilizing the struc-ture of the soluble, non-toxic oligomers, which are devoid of ß-sheet content. In contrast, dihydromyrice-tin was found to be able to bind to both oligomeric and monomeric species of α-synuclein. In the case of gallic acid, the inhibition of α-synuclein fibrillation is related to the compound's hydroxyl moieties whose number and position on the phenyl ring were proven to be significant for the process of inhibition, as indicated by the structure activity relationship data obtained from fourteen structurally similar benzoic acid derivatives. Overall, the compounds identified herein may represent the starting point for designing new molecules that could be utilized as drugs for the treatment of Parkinson's Disease and related disor-ders.

Research Relevance and Potential Impact

The accumulation of aggregated form of α-synuclein (α-syn) protein in the brain has been found to be the main characteristic of Parkinson's disease and related disorders. Recent studies indicate that α-syn toxicity is mediated by a nucleation-dependent ag-gregation process. Therefore any effort to identify compounds that could inhibit or even reverse the aggregation process should assess the effect of the potential inhibitors on the seeded aggregation of α-syn, among others. Considering that many potent anti-amyloidogenic agents have been isolated from Chinese herbal medicines (CHM), we screened thirty CHM compounds, for their effect on α-syn aggregation, seeded polymerization and toxicity by employing biophysical, biochemical and cell-culture-based techniques. Among the screened compounds, only ginsenoside Rb1, salvianolic acid B, dihydromycetin and gallic acid were shown to be strong inhibitors of α-syn fibrillation, seeded aggregation and toxicity. Our results showed that gallic acid, ginsenoside Rb1 and salvianolic acid B inhibit α-syn fibrillation by binding and stabilizing the structure of the soluble, non-toxic oligomers, which are devoid of ß-sheet content. In contrast, dihydromyricetin was found to be able to bind to both oligomeric and monomeric spe-cies of α-syn. In the case of gallic acid, the inhibition of α-syn fibrillation is related to the compound's hydroxyl moieties whose number and position on the phenyl ring were proven to be significant for the inhibition process, as indicated by the structure activity relationship data obtained from fourteen structurally similar benzoic acid derivatives. Overall, the compounds identified herein may represent the starting point for designing new molecules that could be utilized as drugs for the treatment of Parkin-son's disease and related disorders.

Relevant Publications

• **Ardah, M. T.**, Paleologou, K. E., Lv, G., Abul Khair, S. B., Kazim, A. S., Minhas, S. T., Al-Tel, T. H., Al-Hayani, A. A., Haque, M. E., Eliezer, D. and El-Agnaf, O. M. (2014) 'Structure activity relationship of phenolic acid inhibitors of α-synuclein fibril formation and toxicity', Front Aging Neurosci, 6, 197. IF 2.8

• **Ardah, M.T.**, Paleologou, K. E., Lv, G., Menon, S. A., Abul Khair, S. B., Lu J.H., Garabedian, B. S., Al-Hayani, A. A., Eliezer, D., Li, M. and El-Agnaf O. M.

• Ginsenoside Rb1 Inhibits Fibrillation and Toxicity of Alpha-Synuclein and Disaggregates Preformed Fibrils, Neurobiology of Disease. IF 5.2

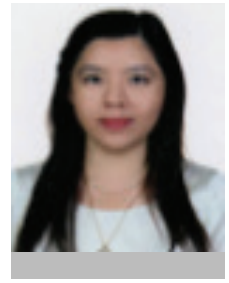
• Lu, J. H., **Ardah, M. T.**, Durairajan, S. S., Liu, L. F., Xie, L. X., Fong, W. F., Hasan, M. Y., Huang, J. D., El-Agnaf, O. M., and Li, M. (2011) Baicalein inhibits formation of α-synuclein oligomers within living cells and prevents Aß peptide fibrillation and oligomerisation. Chembiochem12, 615-624. IF: 5.614

Career Aspirations

After my graduation, I joined a post-doctoral research fellow in my current lab, to extend my PhD study in Neuroscience. Later I'm aspiring to attend an international group in Neurodegeneration disorders either in Canada or USA as a scientist to be my first step to have my own group in Neuroscience research.

ELIZABETH S. BUDILARTO

Department of Food Science
College of Food and Agriculture



Dissertation

Title *Studies on the Initial Stage of Lipid Oxidation in Bulk Oils*

Faculty Advisor Professor Afaf Kamal-Eldin

Defense Date 15 December 2014

Abstract

During the oxidation of bulk oils, oxidation products (i.e. peroxide values, conjugated dienes and thiobar-bituric acid reactive substances) are formed gradually and increased sharply at the end of the induction period. Tocopherols were consumed, some water was formed, and micelles increased in size during the induction period of vegetable oils oxidized in bulk. The evidence that the evolution of micellar size was in parallel with the end of induction period corroborates the recognition that micelles are the active site of oxidation. The interactions of □-tocopherol and three synergists: ascorbyl palmitate, phosphatidylcholine and L-lysine were studied in cod liver oil, to examine their effects on formation of thiobarbituric acid reac-tive substances. Second order polynomial models were found to satisfactorily represent the slope of changes of conjugated dienes, thiobarbituric acid reactive substances and □-tocopherol during the induc-tion period. The suggested optimized levels of the four additives to protect cod liver oil at 30°C based on the rate of thiobarbituric acid reactive substances formation and loss of □-tocopherol (day 0 to 4) are □-tocopherol (1200 µg/g), ascorbyl palmitate (100 µg/g), phosphatidylcholine at (9000 µg/g) and L-lysine (1000 µg/g). Higher level of □-tocopherol and ascorbyl palmitate did not give better protections to the oils or caused a loss in the antioxidant efficacy, compared to when the additives were added at lower levels. Phosphatidylcholine was effective at a wide range of high concentration while L-lysine improved the pro-tection at levels up to 4000 µg/g.

Research Relevance and Potential Impact

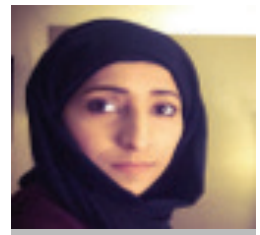
The oxidation of lipids is a very important reaction in foods and biological systems and its implications extend from rancidity in foods to atherosclerosis and other complications in the human body. Understanding the mechanism of lipid oxidation is important for the control and management of this reaction. For about half a decade, the explanation of the initiation, propagation, and termination of lipid oxidation reactions was based on the free radical mechanism. The research presented in this thesis focuses on the involvement of micelles in the catalysis of lipid oxidation and the explanation of the role of different chemical species on the reaction rate. This new understanding will open doors to tailoring of innovative antioxidant and synergistic strategies.

Relevant Publications

- Budilarto E. and Kamal-Eldin A. The Supramolecular Chemistry of Lipid Oxidation and Antioxidation in Bulk Oils. Accepted, European Journal of Lipid Science and Technology, 2015. DOI: 10.1002/ejlt.201400200.
- Budilarto E. and Kamal-Eldin A., Stabilization of cod liver oil with a quaternary combination of □-tocopherol and synergists: Method of assessment. Accepted, European Journal of Lipid Science and Technology, 2015. DOI: 10.1002/ejlt.201400637.
- Budilarto E. and Kamal-Eldin A., Water content and micelle size change during oxidation of sunflower and canola oils. Accepted, European Journal of Lipid Science and Technology, 2015. DOI: 10.1002/ejlt.201400632.

Career Aspirations

I would like to work in scientific based work or projects, either in the academics, a research institution or an industry. I would like to apply the knowledge that I have learned to do research, find solutions and create safer healthier food products.



MARYAM SULAIMAN MOHAMMED AL SAADI

Department of Biology
College of Sciences

Dissertation

Title *THE EXPRESSION PATTERN OF DEATH ASSOCIATED PROTEIN KINASE 1 (DAPK1) IN NORMAL DORSAL ROOT GANGLION NEURONS AND FOLLOWING PERIPHERAL NERVE INJURY*

Faculty Advisor Dr. Rasheed Al Hammadi

Defense Date 12 January 2015

Abstract

Death-associated protein kinase1 (DAPK1) is a calcium/calmodulin (Ca2+/CaM) regulated ser-ine/threonine kinase. Increasing body of evidence supports the significance of DAPK1 protein in cancer and CNS diseases. The role of DAPK1 in peripheral nerve regeneration and neuropathic pain remains com-pletely unexplored. We aimed to investigate DAPK1 expression pattern along with key pro- and anti-apoptotic cell signaling molecules (p53, Bax, AKT, ERK5, P38) and to verify the possibilities of DAPK1-NMDA NR2B relationship in dorsal root ganglion neurons (DRG) at 2 hours, 7 days and 14 days following sciatic nerve injury. ATF3 was used as neuronal injury marker. Using gene expression analysis and im-munohistochemistry assessed the effects of nerve injury. The results showed that DAPK1 mRNA was ex-pressed and translated to functional protein in normal DRG neurons. Soon after sciatic nerve injury (2 hours), DAPK1 was significantly ($p<0.05$, 2.2 fold) up-regulated in the injured L4 and L5 DRG compared with contralateral uninjured side. However, 7 days after axotomy a profound decrease was observed in DAPK1 level, with further reduction that reached its minimum level at 14 days postoperatively. In addition, at 7 days after injury, most of DAPK1 positive injured neurons were ATF3 positive, while after 14 days this correlation was not observed as DAPK1 immunoreactivity decreased in injured ATF3 positive neurons. Interestingly, DAPK1, p53 and Bax exhibited almost same expression pattern in axotomized lumbar DRG. The results also revealed that sciatic nerve injury had no effects on the gene expression of ERK5, P38 and AKT at all studied time points. Moreover, NMDA NR2B mRNA expression increased at 7 days and contin-ued to up-regulate significantly until 14 days postoperatively ($p<0.05$, 3.6 fold). In a contrast, our immu-nofluorescence results showed a decrease in its protein level in DRG neurons during this time period; however, a strong positive NMDA NR2B immunoreactivety appeared in the satellite cells that surround injured large-sized neurons in L4 and L5 DRG neurons. In addition, immunofluorescence double labeling revealed that DAPK1 and NMDA NR2B are co-localized in normal and injured DRG neurons. In conclusion, the down-regulations of DAPK1 following sciatic nerve injury along with other vital pro-apoptotic players promoting neuronal survival might shed light on the mechanisms of peripheral nerve regeneration. We also suggest that NMDA might modulate neuropathic pain through satellite cell but not neurons 7 and 14 days after PNS injury.

Research Relevance and Potential Impact

This study highlights the importance of biochemical and molecular characterization of peripheral nerve injury, as exemplified by mammalian sciatic nerve. DAPK is one of the key molecules that plays a temporally and spatially regulated role in the process of regeneration. The study demonstrates some of these potential roles.

Relevant Publications

- Alsaadi, M., Shehab, S., and Al Hammadi, R. (2014). The Expression Pattern of Death Associated Protein Kinase 1 (DAPK1) In Dorsal Root Ganglion Neurons Following Peripheral Nerve Injury. Society for Neuroscience (SFN) Conference 2014 (Abstract #2652).
- Alsaadi, M., Bajbouj, K., and Al Hammadi, R. (2013). DAPK Signal Transduction Pathways and Its Role In The Nervous System. European Journal of Biological and Life Sciences, 10:2.
- Alsaadi, M., Al Hammadi, R., Shehab, S. (2014). The Expression Pattern of Death Associated Protein Kinase 1 (DAPK1) in Normal Dorsal Root Ganglion Neurons and Following Peripheral Nerve Injury. Brain Research [Under Review]
- Alsaadi, M., Anwer, M., Al Hammadi, R., Shehab, S. (2015). Characterization of neurons expressing Death Associated Protein Kinase 1 (DAPK1) in normal L4 and L5 Dorsal Root Ganglion [Forthcoming].

Career Aspirations

I have finished my PhD program last January 2015 at UAEU, I find myself highly motivated and energetic worker with good scien-tific management skills and encourage to pursue an academic and research career in neurobiology and work in a dynamic work-place. I have aspirations of becoming the head of my own research lab at an academic or government institution. I would also like to mentor young students from underprivileged backgrounds and encourage their involvement towards scientific research. Nowa-days, I have some good options and I think I can achieve my goals there.

REHAM MAHMOUD MOH'D MILHEM

Department of Pathology
College of Medicine and Health Sciences

Dissertation

Title *ELUCIDATION OF THE CELLULAR AND MOLECULAR MECHANISMS OF MISSENSE MUTATIONS ASSOCIATED WITH FAMILIAL EXUDATIVE VITREORETINOPATHY AND CONGENITAL MYASTHEN-IC SYNDROME*

Faculty Advisor Prof. Bassam Ali

Defense Date 22 February 2015

Abstract The endoplasmic reticulum (ER), within eukaryotic cells, is a hub for protein folding and assembly. Mis-folded proteins and unassembled subunits of protein complexes are retained in the ER and degraded by a process termed endoplasmic reticulum associated degradation (ERAD). Frizzled class receptor 4 (FZD4) and muscle, skeletal, receptor tyrosine kinase (MuSK) are Wnt receptors. These proteins contain the cyste-ine-rich domain (Fz-CRD) required for dimerization in the ER. Mutations in FZD4 and MuSK genes are known to cause familial exudative vitreoretinopathy (FEVR, an autosomal dominant disease) and congeni-tal myasthenic syndrome (CMS, an autosomal recessive disease), respectively. It was hypothesized that missense mutations within Fz-CRD lead to misfolding of FZD4 and MuSK proteins and consequent ER-retention. Investigating the molecular mechanism of these mutations is important since misfolded protein and ER-targeted therapies are in development. Wild-type and mutants of FZD4 and MuSK were expressed at 37 °C in HeLa, COS-7, and HEK293 cells and their subcellular localizations were investigated by confocal microscopy imaging and glycosidase treatments. Abnormal trafficking was demonstrated in 10 of 21 stud-ied mutants; nine mutants were within Fz-CRD and one was distant from Fz-CRD. These ER-retained mu-tants were improperly N-glycosylated confirming ER-localization. They were tagged with polyubiquitin chains confirming targeting for proteasomal degradation. The half-lives of wild-type MuSK and P344R-MuSK were 90 and 37 min, respectively; the latter half-life improved on incubation with the proteasomal inhibitor MG132. The P344R-MuSK kinase mutant showed around 50% of its in vivo autophosphoryla-tion activity. Trafficking defects in three of the 10 mutants (M105T-FZD4, C204Y-FZD4, and P344R-MuSK) were rescued by expression at 27 °C and by chemical chaperones (2.5-7.5% glycerol, 0.1-1% dime-thyl sulfoxide, 10 μM thapsigargin, or 1 μM curcumin). Trafficking of wild-type FZD4 was not affected by co-expression with any of the nine ER-retained mutants, suggesting haploinsufficiency as the mechanism of disease. Thus, all nine studied Fz-CRD mutants of FEVR and CMS resulted in misfolded proteins. In contrast, only one of the 12 mutants outside Fz-CRD resulted in ER-retention. These findings demon-strate a common mechanism for diseases associated with Fz-CRD missense mutations. Disorders of Fz-CRD could be amenable to novel therapies that alleviate protein misfolding.

Research Relevance and Potential Impact

Reham Milhem's PhD research resulted in the elucidation of the cellular mechanisms underlying many mutations causing two ge-netic disorders, namely congenital myasthenic syndrome and familial exudative vitreoretinopathy. These findings are original and are likely to have impact on our understanding of the parthenogenesis of these incurable disorders and possibly help in develop-ing novel therapies for them. The results have been published in journals that are in the top 5-10% of their respective fields.

Relevant Publications

- Milhem RM, Al-Gazali L & Ali BR (2015) Improved plasma membrane expression of the trafficking defective P344R mutant of muscle, skeletal, receptor tyrosine kinase (MuSK) causing congenital myasthenic syndrome. The International Journal of Biochemistry and Cell Biology. 60:119-129.
- Milhem RM, Ben-Salem SM, Al-Gazali LI & Ali BR (2014) Identification of the cellular mechanisms that modulate trafficking of Frizzled Family Receptor 4 (FZD4) missense mutants associated with FEVR. Investigative Ophthalmology and Visual Science, 55:3423-3431.
- Ali BR, Ben-Rebeh I, John A, Akawi NA, Milhem RM, Al-Shehhi NA, Al-Ameri MM, Al-Shamisi SA & Al-Gazali L (2011) Endoplasmic Reticulum quality control is involved in the mechanism of endoglin-mediated hereditary haemorrhagic telangiectasia. PLoS ONE, 6(10): e26206.

Career Aspirations

I am currently working as a postdoctoral research fellow on an interdisciplinary project in the area of biochemistry and molecular cellular biology, identifying electrical signatures for biological molecules and cells. It aims to create novel approaches towards understanding science and disease. This experience will serve as a platform for transitioning into a translational research career in the biomedical field.

RKIA EL-KHARRAG
Department of Biology
College of Science

Dissertation

Title *Development of a Therapeutic Model of Early Liver Cancer Using Crocin-Coated Magnetite Nano-particles*

Faculty Advisor Prof. Amr Amin

Defense Date 21 April 2015

Abstract

Hepatocellular carcinoma is one of the most common health problems that is difficult to treat. As a result of the side effects frequently experienced with conventional cancer treatments, there has been a growing interest to develop controlled drug delivery system that can reduce the mortality rate of liver cancer pa-tients and un-harm healthy tissues. Magnetite nanoparticles are potentially important in hepatocellular carcinoma treatment, since they can be used as delivery system. Pure and coated magnetite nanoparticles were synthesized via modified co-precipitation method in air at low temperature. Various reaction param-eters and coating materials have been investigated and characterized. Among these parameters and coat-ing materials, 1.0 % of dextran was selected as an optimum coating for nanoparticles using a slow feeding rate for the Fe2+/Fe3+ reactants, maintaining the stirring and soaking temperatures at 60°C. After that dex-tran-coated magnetite nanoparticles were bound to crocin, a pharmacologically active component of saf-fron, via cross-linker. Crocin alone has shown anti-cancer activity in different in vitro and in vivo settings by several studies. The aim of this study was to synthesize dextran-coated magnetite nanoparticles con-taining crocin with a higher therapeutic index for hepatocellular carcinoma treatment. The nanoparticles with crocin were tested in vitro and in vivo for their anti-cancer effects as compared to free crocin. HepG2 cells treated with crocin-dextran-coated magnetite nanoparticles showed a decrease in cell proliferation compared to control (non-treated cells) or to those treated with free crocin or dextran-coated nanoparti-cles. The anti-cancer activity of crocin-dextran-coated nanoparticles was also evaluated in Balb/c mice. These mice were injected with carcinogenic agent, diethylnitrosamine. Histological examination revealed several precancerous changes. The immunohistochemical analysis using antibodies indication of cell pro-liferation (Ki-67), apoptosis (M30-Cytodeath and Bcl-2), inflammation (cyclooxygenase-2) and angiogen-esis (vascular endothelial growth factor), indicated that magnetite nanoparticles conjugated with dextran plus crocin does indeed improve its anti-tumorigenic activity over free crocin. These results provide the basis for designing new modalities for treatment of liver cancer which could hopefully reduce its high mortality rate.

Research Relevance and Potential Impact

Liver cancer is among the leading causes of cancer-related death at UAE and worldwide. As diagnosis and therapy continue to rep-resent major challenges, in this thesis we encapsulated a major bioactive principal (crocin) of the commonly used spice "saffron" in magnetite nanoparticles. Those crocin-loaded nanoparticles inhibited cell division of liver cells of cancer-induced mice and in human liver cancer cell line. They also unregulated cell death and reduced inflammation and angiogenesis more efficiently than crocin alone. Thus, our engineered crocin-nanoparticles is expected to have a potential clinical impact against liver cancer.

Relevant Publications

- Rkia El-kharrag, Amr Amin, Yaser Greish (2012). Low Temperature Synthesis of Monolithic Magnetite Nanoparticles. Journal of Ceramics International 38(1): 627-634.

- Rkia El-kharrag, Amr Amin, Yaser Greish (2011). Synthesis and Characterization of Mesoporous Sodium Dodecyl Sulfate-coated Magnetite Nanoparticles. Journal of Ceramic Science and Technology 2(4): 203-210.

Career Aspirations

My future goal is to continue in the academic research world and to utilize the knowledge and the skills that I obtained during my PhD study in the fields of liver cancer and nanotechnology research.

SALAH SUMAR AL ZADJALI

Department of Pharmacology
College of Medicine and Health Sciences

Dissertation

Title *Experimental Investigation on the Relationship between Lead Exposure, Thyroids and Systemic Toxicity in Health and Diabetes*

Faculty Advisor Dr. Abdu Adem

Defense Date 26 April 2015

Abstract Lead exposure can cause multiple systemic toxicities, particularly affecting the hematopoietic, nervous and renal systems. However, its effects on the thyroid functions are not well elucidated and the pub-lished studies are controversial. In addition, although there are several experimental thyroid models, each one of them has its own limitations. Accordingly, in this dissertation, we investigated the possible rela-tionship between lead exposure, thyroid functions and short-term systemic toxicity in two animal mod-els, namely normal (non-diabetic) and diabetic animals. We also investigated the possibility of develop-ing a hormonal thyroid model. In the non-daibetic model, Wistar rats were divided into five groups and treated for five days. The four treatment groups received 1, 25, 50, or 100 mg/ kg of lead acetate trihy-drate intraperitoneally (i.p.), respectively. The control group received i.p. injections of distilled water. As for the diabetic model, diabetes was induced with an i.p. injection of 60 mg/ kg streptozocin (STZ). Six weeks later, lead exposure experiments started. Here, four groups were studied i.e. a control; and 25, 50 and 100 mg/ kg lead acetate groups. In each model, the measured blood lead levels correlated very well with the administered doses of lead acetate. Treatment of the animals with lead acetate resulted in signif-icant weight loss in both models. Lead exposure caused a dose-related increase in thyroid stimulating hormone (TSH) in non-diabetic and diabetic animals. Although, thyroxine (T4) and triiodothyronine (T3) levels remained within normal range in non-diabetic animals, their levels were reduced in diabetic ani-mals. The highest dose of lead (100 mg/ kg) significantly increased white blood cell counts and caused a significant decrease in the number of platelets in non-diabetic animals. In addition, C-reactive protein levels increased significantly in response to lead exposure in this model. Moreover, there was a signifi-cant increase in lactate dehydrogenase (LDH), aspartate aminotransferase, total bilirubin, and urea levels; following lead exposure in non-diabetic animals. On the other hand, lead exposure in diabetic animals increased urea levels and caused a significant decrease in creatinine levels in plasma. While the concen-trations of malondialdehyde were not affected, glutathione stores were depleted in response to lead exposure in the diabetic animals.In the last stage, we tried to develop a new experimental thyroid model, based on the use of hormones. In this regard, animals were treated for five days with either thyrotropin-releasing hormone (TRH) or octreotide (OCT) to induce hyperthyroidism or hypothyroidism, respectively. Although there were no effects on T4 and T3 levels, TRH was effective in causing an increase in TSH levels. However, TRH also elevated LDH levels. The use of TRH did not cause any other side effects on the tested parameters, which included weight change, oxidative stress markers and renal and hepatic functions. In comparison, OCT failed to affect TSH, T4 and T3 levels, at the dose and treatment duration that we used. In conclusion, short-term lead exposure in healthy and diabetic animal models affected the functions of the anterior pituitary and thyroid glands, caused oxidative stress, liver and kidneys toxicity and induced systemic inflammation. In addition, we found that TRH has a potential to induce hyperthyroidism in experimental animals. Keywords: lead; rat; diabetes; thyroid; experimental model and systemic toxicity.

Research Relevance and Potential Impact

In this thesis, Dr. Al-Zadjali conducted a research project to characterize the effects of lead exposure on a diabetic rat model. The three studies presented in this thesis provide new insights and contribute to a better understanding regarding the short-term toxicity of lead exposure and thyroid function in health and diabetes. Furthermore, a new experimental thyroid model based on the use of hormones has been reported. The significance of the research has far-reaching clinical implications. The findings will contribute significantly to the understanding of the health effects of lead among diabetic populations. The United States Native American population, for example, has a high prevalence of diabetes and also lead exposure so this research has global relevance.

Relevant Publications

- Lead exposure causes thyroid abnormalities in diabetic rats. Zadjali SA, Nemmar A, Fahim MA, Azimullah S, Subramanian D, Yasin J, Amir N, Hasan MY, Adem A. Int J Clin Exp Med. 2015 May 15;8(5):7160-7.

- Short-term effects of lead exposure on the thyroids and systemic toxicity in rats. Zadjali SA, Nemmar A, Fahim MA, Azimullah S, Subramanian D, Yasin J, Amir N, Hasan MY, Adem A Submitted.

Career Aspirations

N/A

RAY M-ESAM AL BARAZIE

Department of Biochemistry
College of Medicine and Health Sciences

Dissertation

Title *Mechanisms underlying control of anti-microbial immunity by acetylcholinesterase inhibitors.*

Faculty Advisor Dr. Maria J. Fernandez-Cabezudo

Defense Date 30 April 2015

Abstract

Inflammation is a crucial defense mechanism that protects the body from the devastating effects of invading pathogens. However, an unrestrained inflammatory reaction may result in systemic manifestations with dire consequences to the host. The extent of activation of the inflammatory response is tightly regulated through immunological and neural pathways. Previously, we demonstrated that cholinergic stimulation confers enhanced protection in experimental animals orally infected with a lethal dose of Salmonella typhymurium. In this study, we investigated the mechanism by which this enhanced protection takes place. We showed that cholinergic stimulation enhanced host survival following oral-route infection, which correlated with significantly reduced bacterial load in target organs, including livers and spleens. Enhanced protection was not due to increased gut motility or rapid bacterial clearance from the GI tract. Moreover, protection against bacterial infection was lost when the animals were infected systemically, suggesting that the acetylcholine-mediated protective effect was mostly confined to the gut mucosal tissue. In vivo imaging demonstrated more localized infection and delay in bacterial dissemination into systemic organs in mice pre-treated with acetylcholinesterase inhibitors. Morphological analysis of the small intestine (ileum) showed that acetylcholinesterase inhibition induced the degranulation of goblet cells and Paneth cells, two specialized secretory cells involved in innate immunity. Our findings demonstrate a crucial pathway between neural and immune systems that acts at the mucosal interface to protect the host against invading pathogens.

Keywords: cholinergic pathway, bacterial infection, innate immunity, intestinal mucosa.

Research Relevance and Potential Impact

The study demonstrates that cholinergic stimulation regulates immune response at the mucosal intestinal interface, thus highlighting the intricate link between nervous and immune systems. Our findings suggest the potential use of this pathway to control chronic inflammatory intestinal disorders. These results could provide a therapeutic advantage for the design of novel pharmacological anti-inflammatory strategies.

Relevant Publications

- R. Al-Barazie, G. Bashir, M.M. Qureshi, Y. Mohamed, B.K. al-Ramadi and M.J. Fernandez-Cabezudo. Acetylcholinesterase inhibition modulates the mucosal interphase by enhancing the gastrointestinal barrier defense mechanisms. (In preparation)

Career Aspirations

My aspiration is to be in a career that I enjoy and love as myself, be beneficial for people and help in the improvement of human lives. Also I would like to be in a position that offers me a contentious development and improvement of my experiences and knowledge, has a nice working atmosphere and cooperative colleges. I hope to achieve that through doing a research in health related matters as a post doctorate professional or through academic teaching position where I can provide the best educational outcomes and experience for the future generations.

SUNITHA PULIKKOT

Department of Anatomy
College of Medicine and Health Sciences

Dissertation

Title *ESTABLISHMENT OF A 3D CULTURE MODEL OF GASTRIC STEM CELLS SUPPORTING THEIR DIFFERENTIATION INTO MUCOUS CELLS USING MICROFIBROUS POLYCAPROLACTONE SCAFFOLD*

Faculty Advisor Prof Sherif Karam (CMHS), Dr Yaser Greish (COS), Prof Abdel-Hamid Mourad (COE)

Defense Date 13 May 2015

Abstract

In the stomach, epithelial stem cells are responsible for glandular homeostasis and perpetual production of four main cell lineages secreting mucus, acid, pepsinogen and hormones. These stem cells could represent a source for cell therapy or tissue engineering in cases of gastric mucosal damage. The aims of this study were 1) to manufacture various forms of scaffolds using polycaprolactone, 2) to test the suitability of these scaffolds for growth of mouse gastric stem (mGS) cells, and 3) to evaluate whether this culture system could tolerate exposure to acidic environment for possible future applications. Three forms of polycaprolactone scaffold were fabricated: nonporous, microporous and microfibrous. Microscopic examination and mechanical testing revealed some similarities between the microfibrous scaffold and extracellular matrix of the stomach wall. Examination of mGS cells cultured on different forms of scaffold revealed their preferential growth on microfibrous scaffolds with an initial increase in cell number followed by their differentiation into gland mucous cells after 9 days. Various mechanical, chemical, morphological and molecular examinations revealed that this 3D culture system could partially tolerate a moderate acidic environment. Interestingly, only after 3-day culture at pH 5.5, mGS cells differentiated into mucous cells as demonstrated by binding of N-acetyl-D-glucosamine-specific Griffonia simplicifolia II lectin and significant up-regulation of Spdef mRNA expression. In conclusion, a 3D culture model of mGS cells supporting their differentiation into mucous cells has been established. This study provides the basis for future use of stem cells in gastric tissue engineering for regenerative therapy of some stomach diseases involving mucosal damage.

Keywords: stem cell, gastric mucosa, cell differentiation, tissue engineering

Research Relevance and Potential Impact

Since stomach inflammation leading to ulcers and tumors are common health problems which require new therapeutic modalities, this study will provide the basis for future use of stem cells and microfibrous scaffolds in tissue engineering for regenerative thera-py for some stomach diseases.

Relevant Publications

- Pulikkot P, Greish YE, Mourad AH, Karam SM (2014) Establishment of a three-dimensional culture system of gastric stem cells supporting mucous cell differentiation using microfibrous polycaprolactone scaffolds. Cell Proliferation, 47:553-63.
- Pulikkot S, Greish YE, Mourad A-HI, Thomas SA, and Karam SM (2014) Evaluation of 3D culture model of gastric stem cells for tissue engineering. Proceedings of the 8th Dubai International Conference for Medical Sciences, Dubai, UAE.
- Pulikkot S, Saseedharan P, Greish YE, Mourad A, Karam SM (2014) Growth and Differentiation of Gastric Stem Cells on Biodegradable Scaffolds. Proceedings of the 3nd Biotechnology World Congress, Dubai, UAE.
- Pulikkot S, Greish YE, Karam SM (2012) Fabrication of nanofibrous scaffold for gastric epithelial tissue engineering. Proceedings of the International Workshop on Advanced Material, Ras El-Khaimah, UAE.

Career Aspirations

This research inspires Sunitha to continue her career as a post-doctoral fellow and then to become an independent stem cell scien-tist and an academician.

ISMAIL ABDEL KARIM MOUSA EL HATY

Department of Chemistry
College of Science

Dissertation

Title *Molecular Recognition of Duplex and Quadruplex DNA by Small Molecules and its Application for Developing New Anticancer Therapies*

Faculty Advisor Prof. Alaa Eldin Salem

Defense Date 20 May 2015

Abstract

Human telomeres are the end caps of linear chromosomes. Under physiological conditions, telomere folds up into four stranded intramolecular structure called G-quadruplex. Formation of G-quadruplex has been associated with inhibiting telomerase enzyme found enriched in cancer cells and involved in cells' replications. Subsequently, G-quadruplex has become an active target for the development of anticancer agents. Small molecules stabilize G-quadruplex are potential for developing anticancer therapeutic agents acting by inhibiting telomerase.

In this work, several new benzoquinone derivatives were synthesized and their structures were elucidated using elemental analyses, IR, NMR and MS. Benzoquinone and its synthesized analogues were studied for their binding affinity and selectivity towards telomeric G-quadruplex DNA using UV-Vis absorption, fluorescence, circular dichroism, melting temperature and NMR. The results indicated that G-quadruplex DNA interacted with synthesized compounds in stoichiometric ratios ranged in 1:1 to 1:4. Binding affinities ranged between 5.60x104 - 1.33x107 M-1. Compounds TQ8 and TQ6 showed the best stabilizing effects on G-quadruplex with changes in melting temperature (ΔTm) of 21 and 10 □C, respectively. In addition, synthesized analogues showed good selectivity towards G-quadruplex DNA over duplex DNA.

Synthesized compounds were also tested against lung, breast, colorectal, prostate, pancreatic, colon and lymphoma cancer cell lines. Loss in cells' viabilities in the range of 25-100 % with IC50's between 6.18 and 100.0 μM were reported for synthesized analogues after 24 h relative to the control. These results revealed compounds of high potential for further processing as anticancer therapeutic agents.

Research Relevance and Potential Impact

Cancer is the third cause of death in UAE and worldwide. Therefore searching for new effective and selective anticancer drugs con-tinued over decays as a topic of high importance in science. This work revealed compounds of high potential for further pro-cessing as anticancer agents. The study combined molecular recognition of G-quadruplex DNA and the effect of synthesized com-pounds on cancer cells in-vitro.

Relevant Publications

• Alaa A. Salem, Ismail M. El Haty, Ibrahim M. Abdou and Yaguang Mu, Interaction of human telomeric G-quadruplex DNA with thymoquinone: A possible mechanism for thymoquinone anticancer effect. Biochimica Biophysica Acta (BBA), 2015. 1850 (2): p 329-342.Career

Career Aspirations

My dream is to be an active team player within an academic institution to contribute in the education development. On the other hand, I would like to use the experience and skills that I have gained during PhD and Post doctorate to synthesize new compounds that may help in developing anticancer therapies.

MARIAM SUROUR AL SHAMSI

Department of Food Science
College of Food and Agriculture

Dissertation

Title *Biofilm Production by Food-Transmitted Bacteria and the Use of Selected Nanoparticles to Control their Biofilm Production*

Faculty Advisor Dr. Aisha Abushelaibi

Defense Date 26 May 2015

Abstract

Biofilm is a population of bacteria attached to any types of surfaces and impeded in a self-produced matrix of extracellular polymeric substances. Biofilm exhibit up to 1000 fold antibiotic increased resistance to a broad range of antimicrobial agents. Several food-transmitted microorganisms are capable of forming biofilms and considered as a major source of contamination, transmission and infection. In the last few decades, nanoparticles has gained a great attention for their potential applications as antimicrobial agents. The aim of this work was to assess the biofilm formation capacity of food-transmitted bacteria under various environmental conditions and to investigate the efficacy of different nanoparticles (i.e. Ag-Cu-B, Ag-Na-B, and Ag-Cu-B) to kill microbial pathogens in biofilms. Nanoparticles were synthesized by using co-precipitation and microwave techniques and characterized for their physiochemical properties by transmission electron microscopy and light dynamic scattering. The antibiofilm and antimicrobial properties of the synthesized nanoparticles were investigated using S. aureus (10 strains), P. aeruginosa and E. coli (3strains). The findings revealed that all NPs significantly inhibited planktonic cells and biomass of the grown biofilms. Moreover, the sanitization efficacy of nanoparticles were assessed on stainless steel surface that commonly come into contact with food. The surfaces were inoculated with strains of S. aureus and Salmonella and cleaned with NPs saturated sanitary wipes. A significant reduction was observed in viability of the cells on the stainless steel surfaces. The results demonstrated that the use of NPs incorporated into sanitary wipes is useful method to eliminate bacteria on food contact surfaces.

Research Relevance and Potential Impact

In recent years, the development of new technology such as nanotechnology has gained the attention of the scientific community. However, the application of nanotechnology in the food systems is still in infancy. It is well known that metallic nanoparticles have anti-microbial effects and have been used as external sanitizers, disinfectants and in non-food applications. In the meantime, food safety has become a global issue due to continuously and repeatably of outbreaks of foodborne pathogens such as Listeria mon-ocytogenes, Salmonella sp. and E. coli O157:H7.

Relevant Publications

Abushelaibi, A. A.,Mariam. S. Alshamsi, Hanan Afifi. Use of antimicrobial agent in food processing systems. Resent patent in Food, nutrition and agriculture. April 2012. 4 (1)2-7.

Career Aspirations

Highly motivated, research and development manager at Abu Dhabi Quality and Conformity Council. My career mission is to develop into an outstanding person in my work and to use my technical skills to direct and utilize research to deliver benefits for the community and support the development of evidence based innovative practices.

ASHA CHRISTOPHER

Department of Aridland Agriculture
College of Food and Agriculture

Dissertation

Title *Development and Functioning of Mycorrhizal Root Systems under Non-Uniform Rootzone Salini-ty*

Faculty Advisor Dr. Elke Gabriel Neumann

Defense Date 27 May 2015

Abstract The roots of most crop plants can become colonized by symbiotic arbuscular mycorrhizal (AM) fungi. These soil fungi form a dense network of hyphae around the root of their plant host. The AM myceli-um extracts the soil for nutritional elements, and transports and transfers them to the host plant. In return, the plant supplies the fungal partner with energy in form of hexose. So far only relatively little is known about the development and functioning of this symbiosis in sandy soils of the UAE, where plants are commonly exposed to complete or partial rootzone salinity or drought. The present study investigated the effect of root colonization by AM fungi on growth and nutrient uptake of tomato and Sudan grass plants exposed to topsoil salinity. The plants were grown in horizontal split-root contain-ers. Roots in the upper compartment were exposed to substrate salinity, while roots in the lower compartment had access to a non-saline nutrient solution. Despite roots being well-colonized by AM fungi, the relative contribution of the symbiosis to plant growth and nutrient uptake was small across all treatments. Salinity had a negative impact on plant growth, but not on the development of the my-corrhizal symbiosis. In another experimental approach, young clonal date palms were exposed to ele-vated salinity or reduced soil moisture, either affecting the whole root system, or only the upper or lower part of it. Horizontal split root containers were used for this study. Results of this experiment suggest that mycorrhizal date palms can well adjust to heterogeneous water availability in the rooting zone. Partial rootzone salinity, however, had a negative effect on plant growth. Another experimental approach aiming at investigating Prosopis spp. trees with grafted root systems could not be under-taken, as plants of this genus showed considerable graft incompatibility. A wide range of grafting techniques were tested. In vitro grafting approaches had the highest rates of success, and this tech-nique could be tested and developed further in future studies.

Research Relevance and Potential Impact

The findings presented broaden our understanding of how plant roots and associated symbiotic microorganisms respond to spatially limited soil salinity. The latter is a very common phenomenon in the UAE and other arid lands.
Based on the novel results of this study, innovative rootzone management practices, bearing the potential to sustain agricultural productivity in saline areas of the Gulf Region, could be developed.

Relevant Publications

- Asha Christopher & Elke Neumann. Insights on grafting incompatibility among Prosopis species. Arab Gulf Journal of Scientific Research (Under review).
- Asha Christopher & Elke Neumann. Effects of root exposure to spatially limited drought or salinity stress on growth characteristics, water use and nutrient uptake of mycorrhizal inoculated date palm (Phoenix dactylifera l.) (Under preparation).

Career Aspirations

The interdisciplinary effects of agricultural sciences will traverse a broad range of focal interests drawing in diversified natural resource management principles and practices for renewability of resources. Reminding the Bruntland Commission mission theme, "meeting the needs of the present ecosystem without compromising the ability of future generations to meet their own needs" is my lifetime objective. My area of future work would be focused on teaching the University students of the Arab world. My approach of educating and training the Arab students is unique. More importantly, I have conceived in my mind to pool-in research funds in the form of a mini-grant (from King Abdulaziz City for Science & Technology-KACST, Riyadh) at my Department of work. The area of research would be on discerning the effects of seaweed extracts (SWE) and humic acid on the salt, heat and growth physiology of Creeping bent grass, Agrostis stolonifera and the root-inoculated arbuscular mycorrhizal fungi site-specifically under desert-saline conditions will be investigated.

KLAITHEM SAEED AL NUAIMI

Department of Networking
College of Information Technology

Dissertation

Title *A Partial Replication Load Balancing Technique for Distributed Data as a Service on the Cloud*

Faculty Advisor Dr. Nader Mohamed

Defense Date 28 May 2015

Abstract Data as a service (DaaS) is an important model on the Cloud, as DaaS provides clients with different types of large files and data sets in fields like finance, science, health, geography, astronomy, and many others. This includes all types of files with varying sizes from a few kilobytes to hundreds of terabytes. DaaS can be implemented and provided using one data center or using multiple data centers located at different locations and usually connected via the Internet. When data is provided using multiple data centers it is referred to as distributed DaaS. DaaS providers must ensure that their services are fast, reliable, and efficient. However, ensuring these requirements needs to be done while considering the cost associated and will be carried by the DaaS provider and most likely by the users as well. One tradi-tional approach to support a large number of clients is to replicate the services on different servers at different locations. However, this requires full replication of all stored data sets, which requires a huge amount of storage. The huge storage consumption will result in increased costs. Therefore, the aim of this research is to provide a fast, efficient distributed DaaS for the clients, while reducing the storage consumption on the Cloud servers used by the DaaS providers. The method I utilize in this research for fast distributed DaaS is the collaborative dual-direction download of a file or dataset partitions from multiple servers to the client, which will enhance the speed of the download process significantly. Moreover, I partially replicate the file partitions among Cloud servers using the previous download experiences I obtain for each partition. As a result, I generate partial sections of the data sets that will collectively be smaller than the total size needed if full replicas are stored on each server. My method is self-managed; and operates only when more storage is needed. Therefore, replica removals are per-formed only when necessary. I evaluated my approach against other existing approaches and demon-strated that it provides an important enhancement to current approaches in both download perfor-mance and storage consumption. I also developed and analyzed the mathematical model supporting my approach and validated its accuracy. Therefore, I believe that it provides promising results to the area of load balancing and storage optimization for DaaS on the Cloud. Keywords: Cloud Computing, Data-as-a-Service (DaaS), load balancing, storage optimization.

Research Relevance and Potential Impact

This research aims to improve the download time and storage consumption on the cloud. The impact of this research is mainly in reducing the storage costs by reducing the amount of storage needed. Reducing the cost will result in being able to have more resources to improve other services or reduce costs for customers.

Relevant Publications

- Al Nuaimi, Klaithem, et al. "A Novel Approach for Dual-Direction Load Balancing and Storage Optimization in Cloud Services." Network Computing and Applications (NCA), 2014 IEEE 13th International Symposium on. IEEE, 2014. [ERA Ranking: A]
- Al Nuaimi, Klaithem, et al. "Partial Storage Optimization and Load Control Strategy of Cloud Data Centers." The Scientfic World Journal, communication section, 2015. In Press. [Impact Factor: 1.219]
- Al Nuaimi, Klaithem, et al. "A Self-Optimized Storage for Distributed Data as a Service", Convergence of Distributed Clouds, Grids and their Management Track, The 24th IEEE International Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises. [ERA Ranking: B]

Career Aspirations

My main goal of obtaining the PhD is to improve myself individually. Another goal is to have better knowledge and experience in the field and conduct practical research that could benefit other individuals, the community, and my country. A successful career in a related field is another goal I am working to achieve.

NADIA HUSSAIN

Department of Physiology
College of Medicine and Health Sciences

Dissertation

Title *The role of glutamate signaling pathway in diabetic neuropathy*

Faculty Advisor Professor Thomas E. Adrian

Defense Date 31 May 2015

Abstract

The majority of diabetics develop neuropathy, which can be debilitating, but the underlying pathophysiological mechanisms are poorly understood. Diabetic neuropathy progresses in a distal to proximal manner. Previous studies have shown that glutamate, the most common excitatory neurotransmitter, plays a role in the pathogenesis of neuropathy. The reason why the role of glutamate in nociception becomes a problem in diabetes and the mechanisms that are involved are unknown. Based on the preliminary data, the hypothesis was that glutamate pathways are likely to be involved in diabetic neuropathy particularly neuropathic pain. Pathways were investigated to look for changes that might reflect neuropathic pain and fit with previously established pharmacological evidence. The aim of this project was to identify changes in expression of genes and their protein products that are involved in glutamate signalling in diabetes. This will help to further the understanding of the mechanisms of diabetic neuropathy. In diabetic rats, there were consistent changes in expression, particularly in the lumbar and sacral dorsal root ganglia of the spinal cord and in the sympathetic ganglia. The changes were consistent between the different groups of animals as well as between adjacent groups of ganglia. The most prominent changes in both the GK groups included marked upregulation of Gria4 (ionotropic AMPA receptor), downregulation of Grik3 and Grik4 (both ionotropic, kainite receptors) and Grin1 and Grin2A (both ionotropic, NMDA receptors), activation of all of which has been shown to induce hyperalgesia; downregulation of Slc1a6 (excitatory amino acid transporter 4) and upregulation of Slc1a1 (excitatory amino acid transporter 3), both of which mediate neural reuptake of glutamate from the synaptic cleft; and upregulation of Gclc (glutathione synthase), which reflects a response to protect against oxidative damage.
Despite many theories existing about the pathogenesis of diabetic neuropathy, there is no unifying hypothesis. It is possible that changes in glutamate signalling can contribute to these other mechanisms and possibly unify these different theories. A better understanding of the role that glutamate plays in development of diabetic neuropathy may pave the way for future therapeutic intervention.

Keywords: Diabetes, Diabetic Neuropathy, Glutamate Signalling, Dorsal Root Ganglia, Sympathetic Ganglia.

Research Relevance and Potential Impact

Neuropathy affects more than 50% of diabetics but the underlying pathophysiological mechanism remains poorly understood. The symptoms and signs can range from mildly irritating to debilitating, depending on the system of the body affected. Glutamate is the most common type of excitatory neurotransmitter in the mammalian nervous system. Its receptors are broadly classified as slow acting metabotropic and fast acting ionotropic. Studies show that disturbance in neural glutamate signalling plays a role in the pathogenesis of several neurodegenerative and neuropathic disorders. Several glutamate receptor subtypes are known to mediate peripheral nociceptive transmission while their respective receptor antagonists can alleviate neuropathic pain. Reduction in the local production and release of glutamate from nerve terminals also alleviates allodynia, hyperalgesia, and thermal sensitivity in diabetic animals and shows therapeutic promise. While glutamate signalling appears to contribute to the development of diabetic neuropathy, the reason why its role in nociception becomes a problem in diabetes and the mechanisms that are involved are unknown. This project helped to shed light on the complex mechanisms that underlie diabetic neuropathy and pinpoint potential targets for future therapeutic intervention.

Relevant Publications

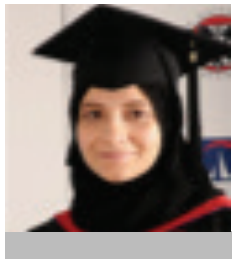
N/A

Career Aspirations

As a clinician and with a PhD, I intend to focus on two aspects of academia; teaching and research. As a passionate educator, I hope to be in a position to do both since these are vital for medical education and for the wholesome development of future health care professionals.

MOUMENA CHAQFEH

Department of Networking
College of Information Technology



Dissertation

Title *Scalable Multi-hop Data Dissemination in Vehicular Ad hoc Networks*

Faculty Advisor Dr. Abderrahmane Lakas

Defense Date 1 June 2015

Abstract

Vehicular Ad hoc Networks (VANETs) aim at improving road safety and travel comfort, by providing self-organizing environments to disseminate traffic data, without requiring fixed infrastructure or centralized administration. Since traffic data is of public interest and usually benefit a group of users rather than a specific individual, it is more appropriate to rely on broadcasting for data dissemination in VANETs. However, broadcasting under dense networks suffers from high percentage of data redundancy that wastes the limited radio channel bandwidth. Moreover, packet collisions may lead to the broadcast storm problem when large number of vehicles in the same vicinity rebroadcast nearly simultaneously. The broadcast storm problem is still challenging in the context of VANET, due to the rapid changes in the network topology, which are difficult to predict and manage. Existing solutions either do not scale well under high density scenarios, or require extra communication overhead to estimate traffic density, so as to manage data dissemination accordingly. In this dissertation, we specifically aim at providing an efficient solution for the broadcast storm problem in VANETs, in order to support different types of applications. A novel approach is developed to provide scalable broadcast without extra communication overhead, by relying on traffic regime estimation using speed data. We theoretically validate the utilization of speed instead of the density to estimate traffic flow. The results of simulating our approach under different density scenarios show its efficiency in providing scalable multi-hop data dissemination for VANETs.

Research Relevance and Potential Impact

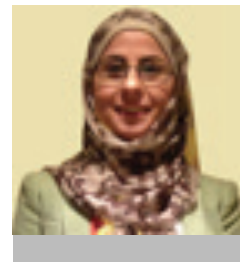
This research aims at improving data exchange in vehicular networks. The proposed solution contributes greatly to the deploy-ment of safety and comfort applications in next generation transportation systems. By exploiting communication between vehi-cles these applications make our everyday travelling safer and more efficient.

Relevant Publications

- Chaqfeh, Moumena, Abderrahmane Lakas. "A Novel Approach for Scalable Multi-hop Data Dissemination in Vehicular Ad hoc Networks." Acccepted in the Journal of Ad hoc Networks. 2015.
- Chaqfeh, Moumena, Abderrahmane Lakas. "Beacon-less Scalable Multi-hop Data Dissemination in Vehicular Ad hoc Networks." Accepted in the International Wireless Communications and Mobile Computing Conference (IWCMC). 2015.
- Chaqfeh, Moumena, Abderrahmane Lakas. "Scalable Multi-hop Data Dissemination in Vehicular Ad hoc Networks." Accepted in the UAE Graduate Students Research Conference (GSRC). 2015.
- Chaqfeh, Moumena, Abderrahmane Lakas, and Imad Jawhar. "A survey on data dissemination in vehicular ad hoc networks." Vehicular Communications 1.4 (2014): 214-225.
- Chaqfeh, Moumena, and Abderrahmane Lakas. "SAB: Speed Adaptive Broadcast for Scalable Multi-hop Data Dissemination in Vehicular Ad hoc Networks." The International Wireless Communications and Mobile Computing Conference (IWCMC). 2014.
- Chaqfeh, Moumena, and Abderrahmane Lakas. "Shortest-time route finding application using vehicular communication." IEEE Wireless Communications and Networking Conference (WCNC). IEEE, 2014.
- Chaqfeh, Moumena, Abderrahmane Lakas, and Sanja Lazarova-Molnar. "Performance Modeling of Data Dissemination in Vehicular Ad Hoc Networks." IEEE/ACM 17th International Symposium on Distributed Simulation and Real Time Applications (DS-RT). IEEE, 2013.

Career Aspirations

I am planning to become a professor and a leading researcher in the field of vehicular networking. My objective is to contribute in making our everyday driving safer and more convenient.



AMAL HUSSAIN IBRAHIM AL HADDAD

Department of Physiology
College of Medicine and Health Sciences

Dissertation

Title *Identifying the Molecular Mechanisms of Early Cachexia Using Whole Transcriptome Sequencing in Muscle and Fat Biopsies from Cancer Patients*

Faculty Advisor Prof. Thomas E. Adrian

Defense Date 10 June 2015

Abstract

Cachexia causes one third of cancer–related deaths and contributes to that of many others. Despite extensive research, the mechanisms of cancer cachexia are poorly understood. Identification of early changes in gene expression in the major cachexia target tissues will improve the understanding of its mechanisms. We investigated the entire transcriptome, using next generation sequencing (Illumina HiSeq 2500), to identify altered expression of genes in muscle and fat from cancer patients. Samples of rectus abdominis muscle and visceral fat were collected at surgery from patients exhibiting 5-10% weight loss prior to surgery, compared with stable-weight patients. Also, selected differentially ex-pressed genes were confirmed using real-time RT-PCR. In muscle, 30 genes showed highly significant change in expression (25 down and 5 up: P<0.0005 - P<0.00001, FDR 0.2). The 25 downregulated genes included 7 involved with metabolism (5 mitochondrial); 4 with signaling; 4 with ubiquitination; and 3 with intracellular trafficking. Multiple genes involved in glycogen metabolism were downregulat-ed, correlating with the lack of glycogen, muscle weakness, and fatigue; characteristic of cachexia. The 5 upregulated genes include 2 involved with calcium signaling and 2 with cell matrix interactions. Expres-sion of genes previously thought to be important in cachexia, including several inflammatory cyto-kines, was not significantly different. FBXO32, which encodes atrogin-1, upregulated in an in vitro cachexia model, was actually downregulated. No transcripts for the dermicidin gene, which codes for proteolysis-inducing factor, were detected. Expression of myostatin and its receptor (ACTR2B) were significantly decreased, possibly reflecting end organ adaptation to tumor produced myostatin. In visceral fat, expression of 6 genes were downregulated and 10 upregulated with high statistical signifi-cance (P<0.001-0.0002). Several of these encode metabolic enzymes. Of genes in fat previously impli-cated with cachexia, such as hormone sensitive lipase and adipose tissue triglyceride lipase, were un-changed. In contrast, leptin was significantly downregulated and the zinc-□-2-glycoprotein (lipid mobi-lizing factor) was significantly upregulated as expected. These studies explain some documented evi-dence in cachexia pathogenesis, highlight ambiguous data from animal models, and reveal unexpected changes in gene expression that underlie the pathophysiology of the cachectic state in cancer. These results bring reliable, representable, and consistent data from the clinic and back to the bench with more focused insights to be investigated and verified.

Research Relevance and Potential Impact

Most patients with cancer exhibit marked wasting of skeletal muscle and anorexia which is known as the cancer cachexia syndrome. Cachexia is a major cause of cancer death and it affects the quality of life, the response to therapy, the ability to withstand the rigors of therapy and even the psychological wellbeing of the patients and their families. The mechanisms of cancer cachexia are not well understood. We hypothesized that changes in gene expression in early cachexia would shed light on pathways involved which would then pave the way for a more targeted approach to therapeutic intervention. The entire transcriptome of skeletal muscle and visceral adipose tissue was investigated using next-generation sequencing and the major changes confirmed by fast real-time RT-PCR. These studies indicate the involvement of several metabolic pathways that explain much of the clinical observations in cancer cachexia. The data confirms some of the documented evidence in the pathogenesis of cachexia, highlights ambiguous data from animal models, and reveals unexpected changes in gene expression that underlie the pathophysiology of the cachectic state in cancer. Once confirmed in other groups of patients with cachexia these findings are likely to lead to improvements in the prevention and treatment of cachexia in patients with cancer.

Relevant Publications

- Al Haddad, A.H.I, Al-Azwani I., Mohamoud, Y., Safi, F., El Salhat, H., Malek, J., and Adrian, T.E. (2014). Analysis of the Muscle and Adipose Tissue Transcriptome in Patients with Cancer Cachexia, 2nd Cancer Cachexia Conference, Montreal, Canada; September 26-28, 2014 (Oral Presentation)
- Al Haddad, AHI, Adrian, TE. Challenges and Future Directions in Therapeutics for Pancreatic Ductal Adenocarcinoma. Expert Opinion on Investigational Drugs. 2014; 23(11):1499-515. Epub 2014 Jul 31. (Review)
- Al-Azwani I., Al Haddad, A.H.I, Mohamoud, Y., Safi, F., El Salhat, H., Malek, J., and Adrian, T.E. (2014). A Study of Muscle and Adipose Tissue in Cachectic Cancer Patients Using RNA-Seq. Human Genome Meeting 2014, Geneva, Switzerland; April 27-30, 2014 (Poster Presentation)
- Al-Azwani I., Al Haddad, A.H.I, Mohamoud, Y., Safi, F., El Salhat, H., Malek, J., and Adrian, T.E. (2014). RNA -Seq Study of Muscle and Adipose Tissue in Cancer Patients with Early Cachexia. Qatar Foundation Annual Research Conference, Doha, Qatar, November 18-19, 2014 (Poster Presentation)

Career Aspirations

I aspire for a challenging career where I can synergize my clinical experience, basic-sciences research, and passion in healthcare human resource management to promote evidenced-based clinical decisions, and to act as a role-model for other healthcare professionals.

MAAD SHATNAWI

Department of Intelligent Systems
College of Information Technology

Dissertation

Title *Protein Domain Linker Prediction: A Direction for Detecting Protein-Protein Interactions*

Faculty Advisor Dr. Nazar Zaki

Defense Date 10 June 2015

Abstract

Protein chains are generally long and consist of multiple domains. Domains are the basic elements of protein structure that can exist, evolve, and function independently. The accurate identification of protein structural domains and their interactions has significant impacts in protein research fields. The accurate prediction of protein domains is a fundamental step in experimental and computational proteomics. The knowledge of domains is useful in classifying proteins, understanding their structures, functions and evolution, and predicting protein-protein interactions. The identification of interactions among proteins and their associated structural domains provide a global picture of the cellular functions and the biological processes. In this research work we introduce novel solutions for two main research problems. First, we present a method for the prediction of inter-domain linkers solely from the amino acid sequence information. This is achieved by introducing the concept of amino acid compositional index. Unlike previous approaches, we use the predicted inter-domain linkers to identify the actual structural domains. Second, we utilize the structural domain knowledge to predict protein-protein interactions. The proposed framework is evaluated against several state-of-the-art approaches and demonstrated that it provides a noticeable improvement. The higher accuracy achieved is a valid argument in favor of the proposed framework.

Keywords: Protein domain identification, domain-linker prediction, compositional index, physiochemical properties, protein-protein interaction prediction, PPI, domain-domain interactions.

Research Relevance and Potential Impact

The identification of protein-protein interaction is crucial to the understanding of the molecular events under normal and abnormal physiological conditions. It leads to significant applications for the diagnosis and treatment of diseases such as cancer and diabetes which are relevant to the UAE.

Relevant Publications

- Maad Shatnawi and Nazar Zaki (2015) Inter-domain linker prediction using amino acid compositional index. Computational Biology and Chemistry (CBAC) 55: 23- 30, April 2015. (ISI IF 1.595)
- Maad Shatnawi, Nazar Zaki, and Paul D. Yoo (2014) "Protein inter-domain linker prediction using random forest and amino acid physiochemical properties." BMC Bioinformatics 15 (Suppl 16): S8, December 2014. (ISI IF 2.670)
- Maad Shatnawi and Nazar Zaki (2015) Novel domain identification approach for protein-protein interaction prediction. 2015 IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology, Niagara Falls, Canada, August 2015.

Career Aspirations

To have an academic position within a reputable institution, to be an active team player within interdisciplinary research groups, and to extend knowledge to young generation.

KHAWLA AL-ALI

Department of Pharmacology
College of Medicine & Health Sciences

Dissertation

Title *Effects of Exercise and Pharmacological Intervention on Electromechanical Function of the Heart in the Goto-Kakizaki Type 2 Diabetic Rat*

Faculty Advisor Professor Frank Christopher Howarth

Defense Date 16 June 2015

Abstract

Type 2 diabetes mellitus (T2DM) accounts for more than 90% of cases of diabetes mellitus. Cardiovascular diseases are the major causes of morbidity and mortality in diabetic patients. A variety of diastolic and sys-tolic dysfunctions have been reported. The severity of the abnormalities depends on the patients' age and diabetes duration. The aim of the study was to investigate the age-dependent, exercise and drug interven-tion on electromechanical function of the heart in the Goto-Kakizaki (GK) type 2 diabetic rat. mRNA expres-sion was assessed in ventricular muscle with real-time RT-PCR. Ventricular myocytes shortening, intracellu-lar Ca2+ transport and L-type Ca2+ current were measured with video edge detection, fluorescence pho-tometry and whole cell patch clamp techniques, respectively. In vivo biotelemetry was used to measure the electrocardiogram (ECG). In young GK (8-10 weeks) rat, mRNA expression of Atp1a3, Cacna1h, Scn1b, Hcn2 were up-regulated and Slc9a1, Hcn4, Kcna2/4, Kcnj2 were down-regulated. Amplitude of ventricular myo-cyte shortening and intracellular Ca2+ transient were unaltered, time to peak shortening was prolonged and time to half decay of the Ca2+ transient was shortened in GK myocytes. Physical exercise is well established as a valuable form of non-pharmacological therapy. Experiments were performed in GK and control (10-11 months) following 2-3 months of treadmill exercise training. Expression of mRNA encoding Tpm2, Gja4, Atp1b1, Cacna1g, Cacnb2, Hcn2, Kcna3 and Kcne1 were up-regulated and Gja1, Kcnj2 and Kcnk3 were down-regulated in hearts of sedentary GK rats compared to sedentary controls. Gja1, Cav3 and Kcnk3 were up-regulated and Hcn2 was down-regulated in hearts of exercise trained GK compared to sedentary GK controls. Amplitude of ventricular myocyte shortening, Ca2+ transients and L-type Ca2+ current were not significantly altered. The effects of the anti-diabetic drug Pioglitazone (PIO) on ventricular myocyte shorten-ing and Ca2+ transport in addition to ECG were also investigated. PIO (0.1-10) μM reduced the amplitude of shortening in ventricular myocytes from GK and control rats. PIO reduced the amplitude of the Ca2+ transi-ent and modest reductions in L-type Ca2+ current in GK and control myocytes. Heart rate in GK rats was reduced. Although PIO reduced blood glucose in GK rats it had little effect on heart ECG.

Research Relevance and Potential Impact

Diabetes mellitus is a serious global and national health problem and cardiovascular complications are the major cause of morbidity and mortality in diabetic patients. Type 2 diabetes mellitus accounts for more than 90% of cases of diabetes and cardiovascular complications are the major cause of morbidity and mortality in diabetic patients. Experiments performed in this research project have provided further clarification of the cellular and subcellular basis of electromechanical dysfunction and the effects of exercise and drug intervention in type 2 diabetic heart. It is hoped that this mechanistic understanding will help to facilitate the development of new treatment strategies for this disease.

Relevant Publications

- Salem KA, Adrian TE, Qureshi MA, Parekh K, Oz M, Howarth FC. Shortening and intracellular Ca2+ in ventricular myocytes and expression of genes encoding cardiac muscle proteins in early onset type 2 diabetic Goto-Kakizaki rats. Exp Physiol. 2012 Dec; 97 (12):1281-91.
- Salem KA, Qureshi MA, Sydorenko V, Parekh K, Jayaprakash P, Iqbal T, Singh J, Oz M, Adrian TE, Howarth FC. (2012). Effects of exercise training on excitation-contraction coupling and related mRNA expression in hearts of Goto-Kakizaki type 2 diabetic rats. Mol Cell Biochem. 2013 Aug; 380 (1-2): 83-96.
- Salem KA, Jacobson M, Shafiullah M, Oz M, Adeghate E, Howarth FC. Effects of pioglitazone on electrical conduction in the Goto-Kakizaki type 2 diabetic rat heart (Accepted in JCERC)

Career Aspirations

My aspirations are to acquire a PhD degree in Medical Sciences (Pharmacology track) and then pursue a research and academic career. In the long term I would like to heighten awareness of the importance of research in our community.

RAUDA SAEED AL SAADI

Department of Architectural Engineering
College of Engineering

Dissertation

Title *A FRAMEWORK FOR GUIDING THE BRIEFING PROCESS IN PUBLIC-PRIVATE PARTNERSHIPS IN THE UAE CONSTRUCTION INDUSTRY*

Faculty Advisor Dr. Alaa Abdou

Defense Date 21 June 2015

Abstract

Public-Private Partnership (PPP) is a procurement method that employs a long-term contractual arrangement between public and private sectors with the intention of developing a public facility. A PPP brief must supply information that not only particularizes the project requirements but also specifies its program, risk management, expected performance output and payment mechanism. Many challenges currently face the briefing process of PPP projects in the UAE. A uniform briefing process has not been agreed, because there is no unified tender law or PPP procurement process in the country.

The main aim of this research is to develop a framework for guiding the development of PPP briefing in the UAE construction industry. To this end, a process framework for PPP briefing with special reference to UAE construction projects was developed first, on the basis of an intensive literature review and analysis of case studies. This framework was validated through interviews with PPP experts and professionals in the UAE. Following this, the Critical Success Factors (CSFs) in PPP briefing, with special reference to UAE construction projects, were investigated and identified through a literature review, expert interviews, and a questionnaire survey. This step led to developing another framework for CSFs in PPP briefing with special reference to UAE construction projects. With these in mind, CSFs were modelled to develop a Decision Support System (DSS) the main aim of which was to guide the of the briefing stage for PPP projects in the UAE. Its main objectives focused on assessing the readiness of public and private organizations for successful briefing development, highlighting areas for improvements and helping to develop action plans to improve the briefing process. The proposed model was validated using two mega PPP construction projects in the UAE. The outputs of the implemented evaluation validated the major aspects of this model and its developed prototype, together with its performance for its stated purpose.

Research Relevance and Potential Impact

"The proposed process Framework provides a clear systematic procedure for the briefing stage of PPP projects in the UAE, with clear activities and their key tasks. In addition, the developed Decision Support system (DSS) can assist and guide decision-makers and professionals in the UAE to improve their performance for brief development of these projects".

Relevant Publications

- Al Saadi, R. and Abdou, A. (2015) Factors Critical for the Success of Public Private Partnership in UAE Infrastructure Projects: Experts' Perception. International Journal of Construction Management (Accepted and under final editing).
- Al Saadi, R. and Abdou, A. (2015) A conceptual process framework for the development of briefs in public private partnership projects. Proc. of Eighth International Conference on Construction in the 21st Century (CITC-VIII), "Changing the Field: Recent Developments for Future Engineering and Construction", May 27-30, Thessaloniki, Greece, 1-13.

- Al Saadi, R. and Abdou, A. (2014) Factors critical for the success of PPP brief development, with special interest to Abu-Dhabi Emirate. Proc. of smart, sustainable and healthy Cities, first International conference of the CIB Middle East and North Africa Research Network (CIB-MENA), 14-16 December, Abu Dhabi, UAE, A1-24

- Al Saadi, R. and Abdou, A. (2013) The use of public-private partnership in infrastructure development in gulf cooperation council countries. Proc. of International Conference on PPP Body of Knowledge (P3BooK) 18-20 March, Westleigh Conference Centre, Preston, UK, A1-14

Career Aspirations

During my practical career, I would like to employ the knowledge and skills gained during my PhD study in the area of Public Private Partnerships (PPPs). I am very interested in being involved in establishing a PPP unit to handle the development and Management of all PPP projects in the UAE.

AMNA EISSA AL BALOUSHI

Department of Medical Microbiology and Immunology
College of Medicine and Health Sciences

Dissertation

Title *Characterization of carbapenemase producer Enterobacteriaceae isolated in the United Arab Emirates*

Faculty Advisor Dr. Agnes Sonnevend-Pál

Defense Date 22 June 2015

Abstract

The efficient control of the spread of carbapenemase producer Enterobacteriaceae, a major public health threat world-wide, requires knowledge on the molecular epidemiology and genetic background of the emerging carbapenemase genes. Our aim was to investigate the genetic support of New-Delhi metallo-beta-lactamase and OXA-48-type carbapenemase genes in carbapenem resistant Enterobacteriaceae isolated in the United Arab Emirates. The first seven NDM-producer Enterobacteriaceae, collected during 2009-2011 in the UAE and subsequently five NDM and OXA-48-type carbapenemase co-producer Klebsiella pneumoniae isolated during 2011-2013 in three hospitals of the Emirates, were characterized. Strains' clonality and the transmissibility of carbapenemase genes were assessed. The genetic support of carbapenemases was studied by characterization of plasmids and by sequencing the genes' surrounding. All isolates harbored the blaNDM-1 gene on conjugative plasmids. Furthermore, IncX3 plasmids with almost identical restriction patterns were present in Enterobacter cloacae, Escherichia coli and Citrobacter freundii. The NDM plasmid of one K. pneumoniae, harboring blaOXA-48 also, was almost identical to these IncX3 plasmis. Three of the five double carbapenemase producer ST14 K. pneumoniae possessing blaNDM-1 and blaOXA-232 were clonally related. The fifth, unrelated K. pneumoniae co-produced NDM-1 and OXA-162. These findings proved that IncX3 plasmids play an important role in the inter-species spread of the blaNDM gene, and also that the emergence of NDM- and OXA-48-type carbapenemase co-producer K. pneumoniae is partially a clonal phenomenon in the UAE. Since the carbapenemase producer Enterobacteriaceae are extremely drug resistant, leaving few treatment options, the efficacy of alternative antimicrobials was also assessed by testing the effect of the himenochirin-1B analogue antimicrobial peptide on selected strains and the fosfomycin susceptibility of 45 carbapenem non-susceptible Escherichia coli isolates. The [E6k,D9k]hymenochirin-1B showed high potency against all selected NDM-producer. Furthermore, fosfomycin could be a valuable therapeutic option against carbapenem-resistant E. coli, since the susceptibility of all isolates tested was retained.

Research Relevance and Potential Impact

Ms. Baloushi's research set the UAE's experience with carbapenem resistant Enterobacteriaceae, into a global context. The molecular investigation of multi-drug resistant organisms highlighted the mode of spreading of these bacteria. Furthermore, she proved that fosfomycin could be a useful option for the treatment of carbapenem resistant Escherichia coli infections.

Relevant Publications

- Sonnevend A, Al-Baloushi A, Ghazawi A, Hashmey R, Girgis S, Hamadeh MB, Al Haj M, Pal T Emergence and spread of NDM-1 producer Enterobacteriaceae with contribution of IncX3 plasmids in the United Arab Emirates J Med Microbiol. 2013 Jul;62(Pt 7):1044-50. IF:2.297)

- Mechkarska M, Prajeep M, Radosavljevic GD, Jovanovic IP, Al-Baloushi A, Sonnevend A, Lukic ML, Conlon JM. An analog of the host-defense peptide hymenochirin-1B with potent broad-spectrum activity against multidrug-resistant bacteria and immunomodulatory properties Peptides 2013;50:153-9. IF:2.522

Career Aspirations

I have always been interested in science and this interest widened when I started high school especially in Biology and Chemistry because I find them stimulating and challenging subjects. My interest has increased more when I studied Medical Laboratory Technology (MLT). Studying this program helped me to know more about diseases, their causes, diagnosis and treatment. However I want to widen my knowledge in Molecular Microbiology, this why pursuing PhD studies at university was an ideal choice for me. I studied in Sharjah Women's College and received Bachelor degree in MLT. At college, I studied many courses some of them are Microbiology, Biology of Disease, Hematology, Clinical Chemistry, Immunology and Genetics. This gave me the opportunity to touch on different subjects and choose the one that interests me. Moreover, undertaking these courses prepared me for the academic challenges and provided me with the required skills for higher education.I am still working in Al Ain Hospital as medical laboratory technologist in the Microbiology section. However, I am looking for a position that matches my skills and in which I can implement my skills and experience and contribute to the organization I am working for.

MOHAMMED ABDI JAMA

Department of Electrical Engineering
College of Engineering

Dissertation

Title *Control Strategies for Improving the Performance of Heaving Wave Energy Converters*

Faculty Advisor Prof. Hassan Noura

Defense Date 28 June 2015

Abstract

The main objective of this study is to develop control strategies to enhance the performance of single-body heaving wave energy converters (WECs). Maximizing the energy captured from sea waves while respecting the physical and thermal limitations of the WEC is of a paramount importance for any control strategy to be effective. In addition, it is desirable for the controller to be less vulnerable to model uncertainties and external disturbances. A complete wave-to-wire dynamic model has been derived for the heaving WEC. This includes models that describe the system hydrodynamic forces and the power take-off mechanism. In this work, heuristic controllers that are independent of any mathematical models are introduced such as fuzzy logic-based controllers. Moreover, model-based control strategies with low computational cost and inherent robustness capabilities are also examined, such as those strategies based on model predictive controllers. Numerical simulations are carried out to validate the developed controllers using MATLAB/Simulink. The simulation results show that a good balance between optimum energy capturing and system constraints handling can be attained. The dissertation also presents preliminary work on constructing a novel 1.5 kW PMLG experimental test bed for emulating heaving WEC. The test bed is part of a hardware-in-the-loop system, where the developed controllers will be tested under different operating scenarios.

Keywords: Wave energy, heaving wave energy converter, power take-off, control strategy, permanent magnet linear generator

Research Relevance and Potential Impact

This research mainly focused on proposing novel control strategies that are deployed to improve the energy capture of wave energy converters. A better control would enhance the chances for more effective operation at low to medium wave profiles, which are found in the UAE eastern territorial waters. Therefore, this project is aligned with UAE national priorities in improving sustainable energy capability of the country via generating electric power from clean renewable energy sources.

Relevant Publications

- Jama, M.; Noura, H.; Wahyudie, A.; Assi, A. Enhancing the Performance of Heaving Wave Energy Converters Using Model-Free Control Approach. Renewable Energy 83 (2015) 931-941.
- Wahyudie, A.; Jama, M.; Saeed, O.; Assi, A.; Harib, K. Robust and Low Computational Cost Controller for Improving Captured Power in Heaving Wave Energy Converters. Renewable Energy 82 (2015) 114-124.
- Jama, M.; Wahyudie, A.; Assi, A.; Noura, H. An Intelligent Fuzzy Logic Controller for Maximum Power Capture of Point Absorbers. Energies 7 (2014) 4033-4053.

Career Aspirations

I look forward to continue working in research that involves renewable energy and sustainable development. More specifically, I would like to further explore the application of control laws into renewable energy resources to make them more reliable and cost effective.


10X
40X