Book of Abstracts

International Conference on Drug Discovery

&

Development

(ICDDD 2017)

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Committee of the ICDDD - 2017

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MESSAGE FROM THE HOSTING PARTNER

It is indeed an honour for the University of Sri Jayewardenepura to be the hosting partner of the International Conference on Drug Discovery & Development 2017. Considering the dynamic and unpredictable nature of disease progression, discovery of new medicines, new drug delivery techniques and personalized healthcare are vital necessities. Hence this conference is a timely opportunity for showcasing related new developments and research findings to the scientific community. 'Medicines for the 21st Century' the theme of the conference, should be the direction for scientists today. New medicines and delivery methods will not only benefit in curing or preventing diseases that have not yet been conquered, but will also enable more effective and safer methods of handling already known treatment options. The University of Sri Jayewardenepura has already embarked on a mission of developing a research based culture among academics and students, and hosting this conference is yet another step towards our goal. I am confident that this international conference will provide a platform for sharing of knowledge related to drug discovery and development in a wide perspective, and will be immensely beneficial for both local and international participants. While congratulating the organizing team on their excellent work in organizing this event, I wish to convey my best wishes for a very successful conference in 2017.

Prof. Sampath Amaratunge,
Vice Chancellor,
University of Sri Jayewardenepura,
Sri Lanka.

MESSAGE FROM THE CONFERENCE CHAIR ICDDD 2017

I am delighted to welcome you to Colombo for the 2017 International Conference on Drug Discovery & Development. Scientific and societal developments in the 21st century offer a tremendous number of both challenges and opportunities in the development of new medicines. For instance, on the one hand it is now possible to sequence an individual's genome both rapidly and cost-effectively, allowing unprecedented precision in the targeting of disease. In tandem, new technologies offer the tantalizing promise of cheaply producing small batches of bespoke medicines. However, at the same time the population globally is aging and the incidence of obesity is increasing alarmingly, requiring complicated and expensive dosage regimes at a time where healthcare budgets are increasing under pressure. The International Conference on Drug Discovery and Development 2017 will take a holistic approach to considering how new medicines can be developed for the 21st century. We will experience presentations describing cutting-edge innovations in three key themes: new synthetic and screening technologies for discovering novel active ingredients; harnessing natural products chemistry for new medicines; and, manufacturing and processing technologies for dosage form development. By sharing knowledge with one another at this meeting, I hope that we will be able to identify new collaborators and learn from one another's experience to make a real difference to human health and well-being.

Dr. Gareth Williams,
School of Pharmacy,
University College London,
UK.

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KEYNOTE SPEECHES

POLYMER NANOMATERIALS FOR DRUG DELIVERY AND TISSUE ENGINEERING

G. Williams

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ABSTRACT

Electrospinning is a facile yet versatile technique which can be used to prepare polymer fibres with dimensions on the nanoscale. It involves preparing a solution of a polymer and a functional component in a volatile solvent, and then using electrical energy to evaporate the solvent. This yields one-dimensional polymer-based fibres with the functional component embedded. Electrospun nanofibres have been widely explored in drug delivery to achieve goals such as accelerating the dissolution rate of drugs, targeting delivery to a particular part of the body, or delivering a drug at a constant rate. Beyond drug delivery systems, electrospun fibres also have great potential in tissue engineering, for instance in the development of bioresorbable scaffolds. In this presentation, some recent studies using these fibres for both applications will be discussed.

NATURAL PRODUCTS FOR MEDICINES IN THE 21st CENTURY

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ABSTRACT

New medicines are identified through the drug discovery process and searching for new medicine requires teamwork from various disciplines. Isolation and identification of small molecules with novel chemical structures are significant in drug discovery. Natural products have been recognized as the best source for new drugs or lead compounds in therapeutic agents. Natural products are known to biosynthesize novel compounds with highly complex molecular architectures. They demonstrate remarkable arrangements of functional groups with many stereo specific centers. Hence, researches who are involved in search for new medicines are forced to explore new natural sources with bioactive compounds as these compounds or their derivative can be developed as potential structural templates for drug discovery and encounter the challenges of the twenty first century.

Novel pure compounds isolated from natural products or partial or total synthesis of derivatives of these compounds continue to a play major role in the drug discovery and development process. Importance of natural products in developing medicines has been reviewed in 2016 and it has been revealed that the exploitation of novel compounds in natural products to develop new drugs is still successful. For example, it has been reported that from 1940 to 2014, 175 small molecules were discovered in the area of anticancer drugs and 75 % of them were approved as new drugs from either natural products or directly derived from natural products. It is also stated that drugs developed against infective diseases were dependent on bioactive compounds with diverse chemical structures in natural products and it was highlighted the fact that a significant numbers of novel bioactive compounds or leads are isolated from microbes.

Drug resistance is a global threat that affects hundreds of millions of people worldwide. Antibiotic-resistant microbes are one of the main health terrorizations of the 21st century. It is reported that more people die today of bacterial infections than HIV and more people will die of bacterial infections than cancer by 2050. Hence there is an increased requirement for new drugs or drug leads to treat diseases in humans and animals in the 21st century. During 1975, drug discovery from natural products was very rare, consequently some pathogenic microorganisms develop resistant to all known antibiotics. Hence, there was an urgent need for discovery of new and safe drugs from natural resources to control emergence of new diseases and due to development of drug resistant to pathogenic microbes in human diseases. Consequently, discovery of a new class of antibiotic, 'Teixobactin' is announced in 2015 and became another milestone in novel drug discovery program. This new antibiotic kills MRSA and microbes that cause tuberculosis by inhibiting peptidoglycan biosynthesis, hence the microbes cannot develop a resistance to the drug.

Another invaluable innovation in the field of drug discovery research from fungi was reported with the discovery of penicillin, the first natural antibiotic discovered from a fungus, *Penicillium notatum*. Thereafter, exploration of fungal diversity has been encouraged by the fact that fungi are essential for

sustainable development of bioactive compounds. Further, fungi have been widely explored as a store house of bioactive compounds with their potential applications in pharmaceutical industry. Importance in the discovery of new bioactive compounds from fungi has greater attention than that of plants by the fact that fungi can be grown using fermentation methods or solid cultures and need insignificant amount of raw material indicating it does not affect the biodiversity of the country. Since over 60 % of the approved drugs available in the market are of natural origin, there is a great demand for bioactive secondary metabolites isolated from fungi with unique structural diversity in order to strengthen the drug discovery programs. Examples for isolation of biologically active molecules from fungal extracts with anticancer, antifungal and antibacterial activities are monocillin, radicicole and curvularin. In 2007, it has been reported the investigation of anticancer activity of secondary metabolites produced in endolichenic fungi, microorganisms asymptomatically live in lichen thalli as novel source of bioactive compounds and subsequently, there is a growing interest to identify new fungal species and isolate their secondary metabolites in order to obtain naturally occurring structurally diverse new bioactive compounds.

Search for bioactive compounds from sources of natural products has been linked with other disciplines such as natural product chemistry, biochemistry and synthetic organic chemistry. However, synthetic organic chemists play a major role in synthesizing novel medicines because they explore the possibility of synthesizing new molecular architecture presents in novel bioactive molecules and design new synthetic approaches to be used during the synthesis. As such, it is an ideal platform for the discovery of new reactions because every natural product presents a unique arrangement of bonds that have not been created before. In order to synthesize some of these bonds, new chemical reactions must be invented leading to the development of a new reaction methodology. Thus, total synthesis of medicine develops the discovery of new methodology which allows for the completion of total syntheses. Another increasingly popular strategy in drug discovery is preparation of drug-filled nanoparticles during formulation of medicine. Use of nanoparticles can overcome several side effects that are coupled with traditional drugs, such as poor aqueous solubility, low bioavailability and nonspecific distribution in the body.

Finally, the scientific challenges facing in the process of searching new medicines are important as these control the number of new drugs coming to market. A multidisciplinary approach to drug discovery will continue to provide the best solution to the current productivity crisis in discovery of new medicine in 21st century.

PLENARY SPEECH

DISCOVERY OF IMMUNOMODULATORS THROUGH NATURE INSPIRED THINKING

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ABSTRACT

Current paradigm of drug development focuses on developing molecules against a single drug target by which curing of a disease caused by complex network of root causes is anticipated. However, this approach soon requires a paradigm shift towards the discovery of chemopreventive agents employing multiple active ingredients which would successfully prevent and cure diseases by manupulating multiple drug targets. Through this approach we could bypass traditional drug development process in a smart and a cost effective manner.

In this nature inspired approach, the immune system is considered a potential target since it plays a pivotal role in the mechanisms involved in many diseases. The role of host immune function has become increasingly important in our understanding of the mechanisms of body's ability to prevent cancer, infections, inflammations, allergic conditions ect. Ayurvedic and traditional concepts of preventive health care has already shown certain links with non-specific immunostimulation or immunopotentiation by medicinal plants. Furthermore, the immunomodulatory properties of several medicinal plants have been extensively investigated in various studies. In this quest, medicinal plants described in traditional systems of medicine serve as a rich resource of novel medicinal agents including immunomodulators. This talk will mainly present new findings about the topic.

ORAL PRESENTATIONS

A1 **[01]**

AN *IN- SILICO* APPROACH TO STUDY THE BINDING INTERACTION OF COUMARIN DERIVATIVES TO AROMATASE

T.R. Silva, C. Udawatte and C.N. Ratnaweera

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ABSTRACT

Human cytochrome P450 aromatase, which is an enzyme located in the endoplasmic reticulum of estrogen producing cells, plays a significant role in the development of estrogen receptor positive breast cancer. The aromatase catalyzes the conversion of androgens (Androstenedione) to estrogens (Estrone). The third generation of aromatase inhibitors were found to be highly potent drugs for breast cancer treatment, and are in clinical use today. Exemestane (EXM), Letrozole (LTZ), and Anastrozole (ANZ) have higher selectivity, less toxicity and improved potency over other drugs. The coumarins present in natural products show high pharmacological activities for cancers such as anti-inflammatory, anti-tumor, anti- cancer, anti-viral, anti-depressant etc. Therefore, thirty different coumarin derivatives together with two different Exemestane derivatives were designed and studied using Molecular Docking. Exemestane and Androstenedione were used as reference molecules to assess the ability of the coumarins to bind to aromatases. Three crystal structures of the human aromatase enzyme were chosen for this study (PDB entry: 3S7S, 3S79, 3EQM). Docking studies were performed using AutoDock Vina, AutoDock 4, GEMEDOCK and DOCK6.7. AutoDock Vina redocked poses of the reference molecules perfectly matched with their existing crystalline structures. Therefore, AutoDock Vina was selected to further study the binding affinities of Coumarin derivatives. Key interactions between the aromatase inhibitors and the receptor protein were identified as HEM 600, ALA 306 and THR 310. It was found that, three coumarin derivatives showed these interactions and their binding affinities are comparable with that of the references molecules. The insights gained from the study herein have potential for the design of novel derivatives of coumarins for the inhibition of aromatases.

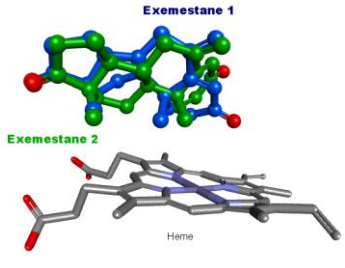

Figure 1 Redocked reference structures of AutoDock Vina with crystalline reference structures in 3S7S protein

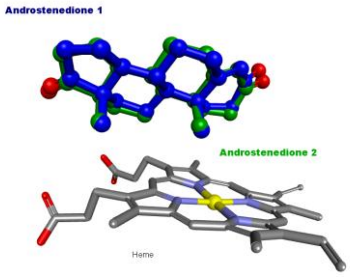

Figure 2 Redocked reference structures of AutoDock Vina with crystalline reference structures in 3S79 protein

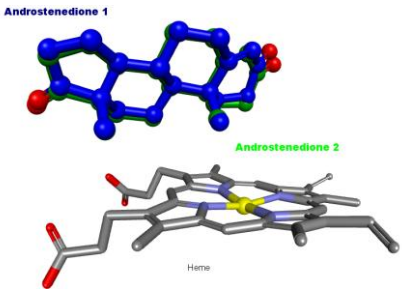

Figure 3 Redocked reference structures of AutoDock Vina with crystalline reference structures in 3EQM protein

Blue color reference molecule denotes crystalline reference structure whereas green color reference molecule denotes redocked form of the reference structure.

Ligands	Binding Energy for 3S7S / KJ/mol	Binding Energy for 3S79 / KJ/mol	Binding Energy for 3EQM / KJ/mol
Androstenedione	-13.20	-13.60	-13.60
Exemestane	-12.50	-12.50	-12.40
ligand_21 (Exemestane derivative)	-12.90	-13.30	-13.50
ligand_23	-9.90	-9.80	-10.20
ligand_24	-9.90	-9.10	-10.30
ligand_32	-9.90	-9.60	-10.00
ligand_12	-9.70	-9.50	-10.00
ligand_13	-9.70	-9.70	-9.80
ligand_3	-9.80	-9.40	-9.60
ligand_2	-9.70	-9.30	-9.50
ligand_25	-9.50	-9.20	-9.00
ligand_4	-9.30	-9.10	-9.30
ligand_8	-9.30	-9.10	-9.30
ligand_1	-9.20	-9.10	-9.30
ligand_9	-9.00	-9.10	-9.40
ligand_5	-9.30	-9.00	-9.30

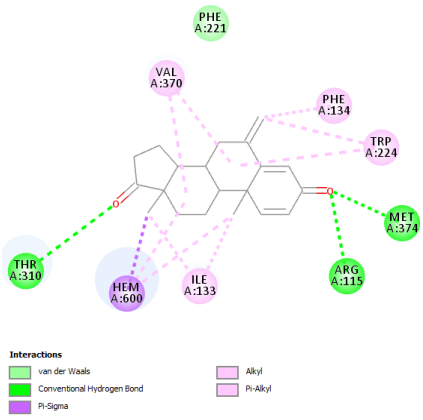

Figure 4 Ligand interaction diagram of 3S7S protein with Exemestane

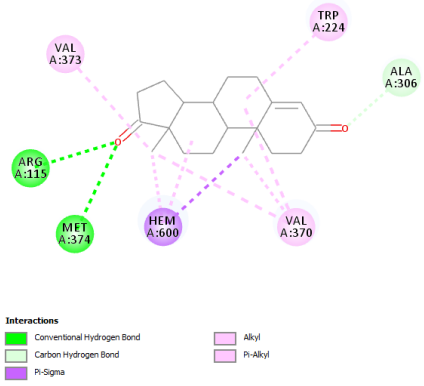

Figure 5 Ligand interaction diagram of 3S7S protein with Androstenedione

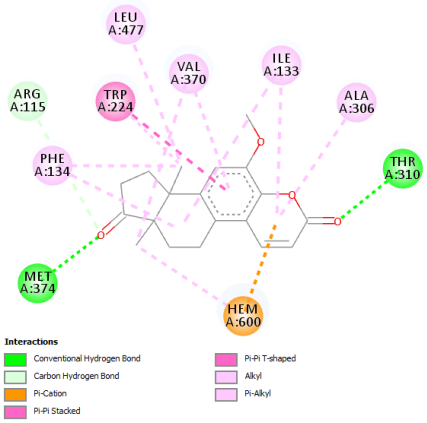

Figure 6 Ligand interaction diagram of 3S7S protein with Ligand 23

Keywords: Aromatase, Estrogen, Cancer, Coumarin, Screening

A2 **[02]**

IN-SILICO SCREENING OF XANTHONE DERIVATIVES FROM SRI LANKAN NATURAL PRODUCTS AGAINST ACETYLCHOLINESTERASE

A.S. Perera[1], G.A.S. Premakumara[1], P. Ranasinghe[1], C. N. Ratnaweera[2] and C. Udawatte[2]

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ABSTRACT

Acetylcholinesterase (AChE) converts ACh to choline and acetic acid. Cholinesterase is inhibited by AChE inhibitors which prevents breakdown of ACh. Therefore AChE inhibitors can be used for treatment of Alzheimer's disease (AD). Natural products from over 100 Sri Lankan plant species were virtually screened, and binding of Xanthones to AChE was investigated. Geometry optimization of best conformer and calculation of HOMO/LUMO energies were performed. Molecular Dynamics were carried out to equilibrate the X-ray structure prior to docking. Docking was carried out for Xanthones using AutoDock Vina, AutoDock 4 and iGEMDOCK. The Xanthones had comparable binding affinities to the (+)ve control (Rivastigmine) in all docking methods used. Hydrogen bonds and van der Waals forces are the main features of these interactions with TRP84, TYR121, SER200, PHE330, TYR334 and HIS440 of AChE π-π interactions contribute to ligand-AChE stability and selectivity. These are formed between aromatic rings of ligands and the aromatic ring from the TRP84, HIS440 and PHE331 of AChE. All compounds make direct contact with TRP84 and HIS440 of AChE. The results suggest the importance of electronic effects on ligand recognition, as compounds with highest affinity to AChE have high LUMO energy and low HOMO energy. These compounds are active site directed for AChE. They bind predominantly with the Trp84 of AChE, and probably decreases enzyme activity 3000-fold. π-π interactions with HIS440 give ligand-AChE complexes high stability. The insights gained from the study have great potential for design of novel drugs for diseases such as AD.

Keywords: Xanthones, Acetylcholinesterase, Molecular Docking, DFT, Molecular Dyanamics

A3 **[03]**

DEVELOPMENT OF DOXORUBICIN, 6-GINGEROL CO-LOADED HYDROXYAPATITE BASED DRUG CARRIER FOR pH SENSITIVE DRUG RELEASE

D.C. Manatunga[1], W.R.M. de Silva[1] and K.M.N. de Silva[2]

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[2]*Sri Lanka Institute of Nanotechnology, Nanotechnology & Science Park, Sri Lanka*

ABSTRACT

The occurrence of multidrug resistance and severe side effects with chemotherapeutics like doxorubicin remains a major obstacle to successful cancer chemotherapy. The combination therapy of cytotoxic and chemosensitizing agents like 6-gingerol loaded in nanoparticles can be considered as an effective treatment for different cancers. There are reports suggesting that 6-gingerol could act as an adjuvant providing synergistic effects on doxorubicin while minimizing the possible side effects. But the problem with 6-gingerol is the poor aqueous solubility and instability. Therefore, this study reports a novel approach to create a drug carrier for co-delivery of doxorubicin and 6-gingerol where its delivery is targeted to achieve on breast cancer cells (MCF-7) and liver cancer cells (HEpG2). Iron oxide nanoparticles coated with hydroxyapatite (HAp/IONPs) was selected as the carrier molecule to encapsulate these drug molecules which in-turn has resulted with increased solubility and stability in aqueous medium. Later on as synthesized nanoparticles were analyzed for their ability to perform controlled release of curcumin in pH sensitive manner. Nanoparticles were then tested against MCF-7 and HEpG2 cells to evaluate their anti-proliferation effect in time responsive manner. The results implicated that these nanoparticles have given rise to enhanced anti-proliferative effect over both MCF-7 and HEpG2 cells with respect to neat drug molecules. Moreover, the fluorescence imaging and flow cytometric studies have further proven that these nanoparticles could induce potent apoptotic effect within-contrast to the neat drugs.

Keywords: Hydroxyapatite, Iron Oxide, Doxorubicin, 6-Gingerol

A4 **[04]**

AN *IN-SILICO* STUDY OF THE BINDING PROPERTIES OF RENIN WITH PHOENICANTHUSINE

S.M. Abdulla[1], G.A.S. Premkumar[1] and P. Ranasinghe[1]

[1]*Industrial Technology Institute, Sri Lanka*

ABSTRACT

Despite the great synthetic diversity derived from the development of computational chemistry and high-throughput screening methods natural products continue to be a very important element of pharmacopoeias. Plant species whose chemical and genetic diversity are being revealed by ultra-fast DNA sequencing and related genomics and bioinformatics tools are likely to be even more important for development of improved and new medicines. Thus, an *in silico* approach allows for a faster and cheaper identification of promising drug candidates by the virtual screening of compound databases.

The Renin-Angiotensin aldosterone system (RAS) plays a very important role in cardiovascular regulation and is a very useful target for this research study. Inhibitors of Renin are a primary line of therapy for myocardial infarction, heart failure, hypertension and diabetic nephropathy. Thus, a good hit through the molecular studies could result in a better drug. Angiotensinogen is the only known naturally occurring substrate for Renin; inhibition of this particular reaction could have many advantages.

In this study, Sri Lankan natural product database was virtually screened against Renin. Potent hits were put through refined docking using different algorithms and an advanced scoring function was used to filter the best results.

Phoenicanthusine displayed favorable results when it was docked against Renin. Phoenicanthusine is an endemic natural product of Sri Lanka, and is isolated from the stem bark of *Phoenicanthus obliqua*. Phoenicanthusine represents the first example of a N-6-C4' and C-7-C-5' linked dimeric aporphine alkaloid. Further computational studies were performed and the docked models were studied intensively with Phoenicanthusine and the enzyme Renin.

Keywords: Renin, Phoenicanthusine, Computational Modelling, Natural Product

A5 **[05]**

IN SILICO DISSECTION OF THE MECHANISM OF ANTICANCER ACTIVITY OF TACHYPLESIN

B.M.Y.D.E. Amarseakara[1], I.C. Perera[1] and L. Weerasinghe[2]

[1] *University of Colombo, Colombo, Sri Lanka*

[2] *Sri Lanka Institute of Nanotechnology, Sri Lanka*

ABSTRACT

Anticancer peptides (ACPs) derived from natural sources have become promising anticancer drug candidate molecules due to their extraordinary properties. In this study, we focused on in silico methods to recognize ACP that can induce apoptosis. Apoptosis or programmed cell death (PCD) plays a pivotal role in cancer. Tachyplesin (TP) is an antimicrobial peptide (AMP) from hemocytes of the horseshoe crab (Tachypleus tridentatus), can inhibit the growth of both Gram-negative and -positive bacteria at extremely low concentrations. TP is a 17-residue peptide containing six cationic residues with molecular weight 2,269 and isoelectric point (pI) of 9.93. Molecular docking was carried out with MDM2, HDM2, BIR2, BIR3, EGFR, Caspase1-9, procaspase 3 & 8, X linked IAP (XIAP) molecules using AUTODOCK vina 1.5.6 as the molecular docking tool and Discovery studio and PyMol as visualization tools. Suitability of the peptide was determined by choosing the lowest affinity (kcal/mol) mode and checking whether the ligand binds into a binding pocket. According to the results, lower binding affinity was observed only for BIR2 (-5.8 kcal/mol) and BIR3 (-6.6 kcal/mol). The initiation and execution phases of apoptosis are both dependent on caspases,a cytosolic cysteine proteases. Caspase activity is regulated by endogenous caspase inhibitors such as members of the inhibitor of apoptosis protein (IAP) family, which are characterised by the presence of at least one Baculoviral IAP repeat (BIR) domain. The caspase-3 and caspase-7 inhibitory function is related to a region that encompasses the second BIR domain (BIR 2), whereas a region encompassing the third BIR domain (BIR 3) inhibits caspase-9. Small molecules like TP that bind the hook or sinker region of the BIR domain are specific for antagonizing inhibition of caspase-3, 7 and 9. Here TP binds to the sinker region of the BIR 2 and as well as sinker and hook region of the BIR3. Therefore such molecules would be exquisitely specific, and may be especially useful to facilitate caspase activity.

Keywords: Anticancer Peptides, Antimicrobial Peptides, Apoptosis, Molecular Docking

A6 **[06]**

COMBINED MOLECULAR DOCKING AND MOLECULAR DYNAMICS STUDY OF NATURAL PRODUCTS AS INHIBITORS AGAINST ACETYLCHOLINESTERASE

D.L.S. Dinuka and C.N. Ratnaweera

College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka

ABSTRACT

Acetylcholinesterase (AChE) is an essential enzyme that terminates cholinergic transmission by rapid hydrolysis of the neurotransmitter acetylcholine. Reversible inhibition of this enzyme activity could be used to treat cholinergic deficiencies. This study is mainly focused on investigation of inhibitory activity of novel molecules in the active site of human Acetylcholinesterase (AChE), using a combined molecular dynamics stimulation and a multiple ligand docking approach. The crystal structures of AChE; PDB entry: 1GQR was used in this study. Several natural product compounds including a class of Xanthone derivatives and several Coumarin derivatives were docked in to the pre-equilibrated protein structures using AutoDock4, AutoDock Vina and iGEMDOCK results. Results revealed there is a good binding affinity for coumarin derivative CORDATOLIDE A.

Keywords: Molecular Dynamics, Natural Products, Alzheimer's Disease, Acetylcholinesterase

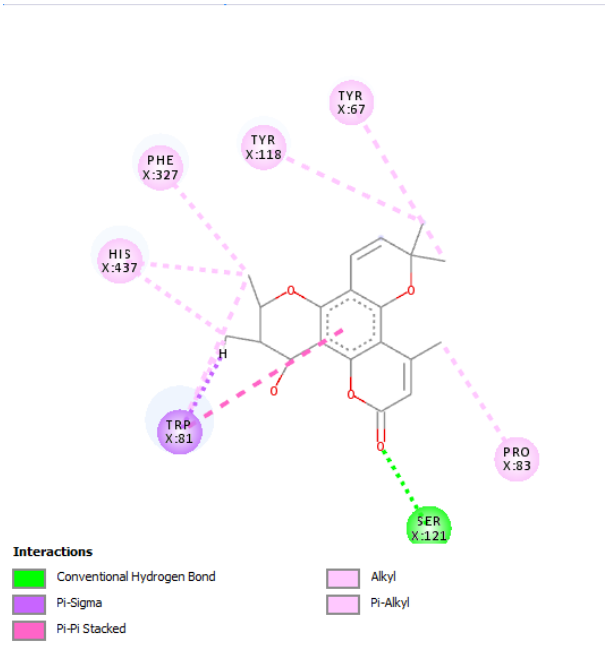

Figure 1 Schematic presentations of the AChE binding with compound Cordatolide A.

Table 1
Summary of the Binding Affinities of Best Ligands with Docking Software

Ligand	AD 4 (kcal/mol)	AD Vina (kcal/mol)
Cordatolide A	-8.7	-9.30
Cordatolide B	-8.7	-9.20
Calophyllolide_b	-8.6	-9.17
Ouregidione_c	-8.8	-9.13
Ouregidione_a	-9.3	-9.02
Calophyllolide_c	-9.2	-6.40
Ouregidione_b	-9.2	-8.40
Donepezil	-9.2	-8.26

B1 **[07]**

HEPATOPROTECTIVE EFFECT OF *Gmelina arborea* FRUIT PERICARP POWDER ON PARACETAMOL-INDUCED TOXICITY IN MALE ALBINO RATS

J.V.B. Roales, E.G. Sepelagio, F.R.P. Salvaña and K. Junatas

University of Southern Mindanao, North Cotabato, Philippines

ABSTRACT

The treatment of liver disease started when "doctrine pf signatures" was accepted and liverworts were used for its resemblance to human liver. However, medical approaches evolved and hepatoprotective agents like *Phyllanthus niruri, Panus giganteus,* and *Silybum marianum* were discovered. *Gmelina arborea* fruit pericarp powder was evaluated for its potential as hepatoprotective agent using paracetamol to induce toxicity in male albino rats.

The study followed Completely Randomized Design (CRD), with three treatment groups and seven replicates on each group. The treatment for *G. arborea* group was 150mg/kg of fruit pericarp powder administered for seven days. Toxic dose of 750mg/kg paracetamol was induced on the eight day. The mean value of ALT recorded for *G. arborea* treatment was 19.08±8 U/L. Statistical analysis revealed that *G. arborea* fruit pericarp powder and positive control were not significantly different from each other but were significantly different to the negative control. Histopathology of liver sections also revealed that *G. arborea* showed normal hepatic parenchyma, sinusoids and low concentration of erythrocytes in the sinusoids. Neutrophil and lymphocyte pooling was also observed which can be associated to stimulations during the treatment. The *G. arborea* fruit pericarp powder exhibited effects at a dose of 150mg/kg, thus, it can be utilized as a hepatoprotective, anti-thrombotic, and immunomodulatory agent.

Keywords: Hepatoprotective, *Gmelina arborea*, Fruit Pericarp, Liver, Histopathology, Paracetamol

B2 **[08]**

PRODUCTION OF BIODIESEL FROM MICROALGAE

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ABSTRACT

Continued use of petroleum sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of carbon dioxide in the environment. Renewable, carbon neutral, transport fuels are necessary for environmental and economic sustainability. Biodiesel derived from oil crops is a potential renewable and carbon neutral alternative to petroleum fuels. Unfortunately, biodiesel from oil crops, waste cooking oil and animal fat cannot realistically satisfy even a small fraction of the existing demand for transport fuels. As demonstrated here, microalgae appear to be the only source of renewable biodiesel that is capable of meeting the global demand for transport fuels. Like plants, microalgae use sunlight to produce oils but they do so more efficiently than crop plants. Oil productivity of many microalgae greatly exceeds resource productivity of the best producing oil crops. Sustainability is a key principle in natural resource management, and it involves operational efficiency, minimization of environmental impact and socio-economic considerations; all of which are interdependent. It has become increasingly obvious that continued reliance on fossil fuel energy resources is unsustainable, owing to both depleting world reserves and the green house gas emissions associated with their use. Therefore, there are vigorous research initiatives aimed at developing alternative renewable and potentially carbon neutral solid, liquid and gaseous biofuels as alternative energy resources. However, alternate energy resources akin to first generation biofuels derived from terrestrial crops such as sugarcane, sugar beet, maize and rapeseed place an enormous strain on world food markets, contribute to water shortages and precipitate the destruction of the world's forests. Second generation biofuels derived from lignocellulose agriculture and forest residues and from non-food crop feedstock's address some of the above problems; however there is concern over competing land use or required land use changes. Therefore, based on current knowledge and technology projections, third generation biofuels specifically derived from microalgae are considered to be a technically viable alternative energy resource that is devoid of the major drawbacks associated with first and second generation biofuels. Microalgae are photosynthetic microorganisms with simple growing requirements (light, sugars, CO_2, N, P, and K) that can produce lipids, proteins and carbohydrates in large amounts over short periods of time. These products can be processed into both biofuels and valuable co-products.

In this research proposal you will able to understand about the production of biodiesel from a very common specie of microalgae *Nitzschia* Sp which is found in the deep Arabian sea, *Nitzschia* sp produces a poisonous dolomite acid which harm the neurons and lead the person towards death. That poisonous acid is also harmful for marine animals as well. If we will extract lipid content from *Nitzschia* Sp then it would be beneficial for marine animal and this microalga is easily available so it is cost effective as well. *Nitzschia* Sp contain 45-47% wt lipid content so it enhances the production of biodiesel as well. We will do this process by the reactive extraction of *Nitzschia* sp then *insitu* transesterificationin the presence of alcohol and acid catalyst.

It also reviewed the synergistic coupling of microalgae propagation with carbon sequestration and wastewater treatment potential for mitigation of environmental impacts associated with energy conversion and utilization. It was found that, whereas there are outstanding issues related to photosynthetic efficiencies and biomass output, microalgae-derived biofuels could progressively substitute a significant proportion of the fossil fuels required to meet the growing energy demand. Various properties of biodiesel were investigated according to EN 14214 standards.

B3 **[09]**

INVESTIGATION OF ANTIBACTERIAL ACTIVITY AGAINST METHICILLIN RESISTANT *Staphylococcus aureus* (MRSA) AND SELECTED PHARMACOLOGICAL PROPERTIES OF "PANCHAWALKALA": AN AYURVEDIC FORMULATION

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ABSTRACT

The emergence of multidrug-resistant (MDR) human bacteria is inevitable, due to misuse and overuse of antibiotics. Among the current treatment options, plant based therapies occupies a significant importance. Panchawalkala is a polyherbal formulation comprising of five medicinal plants named, *Ficus benghalensis, Ficus racemosa, Ficus religiosa, Ficus tsiela* and *Garcinia cambogia*. The main objectives of the current investigation are; to determine the antibacterial and antioxidant activities of Panchawalkala. The Panchawalkala (50 g) was extracted to distilled water (500 ml) by reflux method (6 h) and freeze dried to obtain the crude powder. The preliminary antibacterial screening and minimum inhibitory concentration (MIC) was determined against 6 methicillin resistant *Staphylococcus aureus* (MRSA) strains, *S. aureus* ATCC 25923 and *S. aureus* NCTC 6571 strain by cut-well diffusion and micro-broth dilution method, respectively. The antioxidant capacity was determined by; 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay, ferric reducing/antioxidant power (FRAP) assay and oxygen radical absorbance capacity (ORAC) assay. Moreover, total phenolic content (TPC) and total flavonoid content (TFC) was determined. Preliminary antibacterial screening exhibited zones of inhibition (ZOI) within the range of 12-19 mm and MIC values were low as 0.312-0.625 mg/ml. The 50% inhibitory concentration (IC_{50}) for DPPH, ORAC and FRAP assays was determined as 5.47 ± 0.55, 302.19 ± 11.26 and 372.11 ± 12.32 mg Trolox equivalents/g of extract, respectively. The TPC and TFC values were obtained as 451.36 ± 3.74 mg Gallic acid equivalents/g of extract and 12.57 ± 0.49 mg quercetin equivalents/g of extract, respectively. Results of the present study suggest that the hot aqueous extract of Panchawalkala has significant antibacterial and antioxidant activity. Hence, further investigations are warranted on Panchawalkala to discover effective and low cost treatment options.

Keywords: Panchawalkala, Multidrug-Resistant, MRSA, Antibacterial Activity, MIC

B4 **[10]**

STANDARDIZATION AND QUALITY CONTROL OF HEALING HERBS SLIMOX CAPSULE

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ABSTRACT

Healing Herbs Slimox Capsule was formulated by Research and Development Division of Astron Limited pharmaceutical company, which is WHO-GMP accredited. The aim is to introduce high quality product to the market which address to weight management through appetite control, body fat reduction and control the conversion of excess carbohydrate in to fat. Healing Herbs Slimox Capsules contains *Garcinia cambogia* extract and Purple Tea (*Camellia sinensis*) extract. Hydro-alcoholic extracts of above herbal materials were complied with WHO-GMP accreditation. Authentication of the plant materials were done according to the in-house standard methods.

Garcinia cambogia extract and Purple Tea extract were tested for appearance, loss on drying, bulk density, marker compounds (Hydro Citric Acid / Polyphenols), total aerobic microbial count, *Escherichia coli* and total combined mold and yeast. Purple Tea extract and Healing Herbs Slimox Capsule were tested for DPPH assay to evaluate the anti-oxident activity and anti-tyrosinase assay for test anti-tyrosinase activity. Finished product was tested for coloring matters and marker compounds, microbial limit tests (total aerobic microbial count, *Escherichia coli* and total combined mold and yeast), weight variations and disintegration time were tested. All parameters tested were complied with standard parameters of relevant pharmacopoeias and in-house standards. According to the extensive authentic clinical evidence of this plant materials and therapeutic properties, standard preparation of this Healing Herbs Slimox Capsule is suitable for use as a nutraceutical for weight management. Further evidence need to be supported to these claims through standard clinical research in future.

Keywords :*Garcinia cambogia, Camellia sinensis*, *Escherichia coli*, DPPH assay, Anti-Tyrosinase Assay, WHO-GMP

B5 **[11]**

DETERMINATION OF ANTIOXIDANT, ANTIBACTERIAL AND ANTIFUNGAL ACTIVITIES OF SOME MARINE SPONGES OF SRI LANKA

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ABSTRACT

Marine natural products are a critical resource in the search for new, safe and effective pharmaceuticals. Because of the bioactive compounds present in the marine sponges which are responsible for the medicinal properties, nowadays marine sponges are playing a vital role in drug industry. This study was conducted to identify and assess some marine sponges with biochemical and photochemical properties. Total of eleven marine sponge samples were collected from sea off Kalpitiya and Dehiwala areas. The active ingredients of samples were extracted into methanol and were screened for antioxidant, antibacterial and antifungal properties. Antioxidant activity was determined by DPPH assay, while disc diffusion method was used for antibacterial and antifungal assessments. Antibacterial activity was tested against *Salmonella, Staphylococcus aureus* and *Escherichia coli*. Antifungal test was performed against *Candidaalbicans.* Photochemical screening was conducted to identify alkaloids, saponin glycosides, flavonoids and tannins present in extracts.

Two samples from Kalpitiya and two samples from Dehiwala showed high antioxidant activity. Antibacterial activity was showed by one species from each sampling sites against *Salmonella*, six species from Kalpitiya and one from Dehiwala against *Staphylococcus aureus*, two species from Kalpitiya and one again from Dehiwala against *Escherishiya coli.* For antifungal assay positive results were given by one species from Kalpitiya and two species from Dehiwala. From the results of qualitative photochemical screening, it was revealed the presence of alkaloids in three extracts, saponin glycosides in four extracts, flavonoids in two extracts and tannins in one extract. Among the tested sponges, *Ectyoplasiaferox* from sea off Kalpitiya showed the highest antioxidant (89.5 %), antibacterial(diameter of inhibition zone- 2.1cm) and antifungal (diameter of inhibition zone-1.2cm) activity. Since some of the marine sponges studied showed high biochemically activity, further studies required on identification and separation to lead the innovation of new pharmacologically important drugs.

Keywords : Marine Sponges, Antibacterial, Antifungal, Pharmaceutical

B6 **[12]**

MARINE *Brevibacterium frigoritolerans* A POTENTIAL SOURCE OF NEW ANTIBIOTIC AGAINST METHICILLIN RESISTANT *Staphylococcus aureus*

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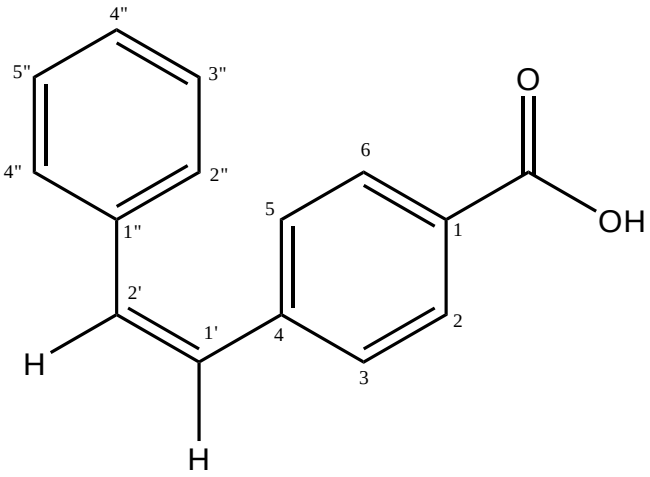
ABSTRACT

Newly emerging infectious diseases, re-emergent diseases and multidrug-resistant bacteria mean that there is a continued need to develop new antibiotics. The sea is an immense and practically unexploited source of potentially useful biologically active substances A novel compound designated Bravin 4-[(Z)-2-Phenyl ethenyl] benzoic acid was isolated from a crude extract of a marine bacterium identified as *Brevibacterium frigoritolerans.* Bravin showed strong antibacterial activity against both Gram-positive and Gram-negative bacteria. The compound was purified and its structure was elucidated by spectroscopic methods including 1H-nuclear magnetic resonance (NMR), 13C-NMR, 1D-NMR and 2D-NMR spectroscopy. It could be demonstrated that a purified solution of bravin was active against methicillin resistant *Staphylococcus aureus,* By contrast, bravin did not inhibit the growth of eukaryotic organisms Candida albicans the minimal inhibitory concentration for *Staph aureus* ranged from 50 to 75 μg mL−1. Bravin lysed *Staphylococcus* cells grown in an osmotically protected medium, suggesting that it does not act upon the cell wall. Further investigation using *Staph aureus* indicated that the compound is bactericidal and is likely to target the cell membrane.

Fifteen microbial strains, associated to the brown seaweed *Pelvetia canaliculata* (Linnaeus) attached to the rocks of Sonmiani Beach (Karachi, Pakistan), were screened for their capacity to produce secondary metabolites of industrial interest. Crude extract filtrates from CMG 2180 strain, grew on ZMA medium, showed the most remarkable antimicrobial activity, and thus was chosen for further examination. The identification of CMG 2180 as a probable new type strain of the actinobacterium *Kocuria marina* was based on phenotypic aspects and biochemical characteristics as well as on the nucleotide sequence analysis of its full-length 16S rRNA gene showing the highest similarity with the type strain KMM 3905 (GenBank accession number EU073966). Interestingly, a unique UV-bioactive compound, for which the name of kocumarin was proposed, was isolated and purified from the halotolerant Gram-positive micrococcoid CMG 2180 strain's crude extracts by flash silica gel column chromatography and TLC/HPTLC. Using routine methods, kocumarin demonstrated prominent and rapid activities against all tested fungi and pathogenic bacteria including MRSA. Its chemical structure was unraveled by 1D and 2D-NMR spectroscopy as 4-[(Z)-2 phenyl ethenyl] benzoic acid.

Taken together, and to the best of knowledge, our *in vitro* data report both a possible new *Kocuria* type strain and the breakthrough discovery of a promising antibiotic, kocumarin, exerting quick bactericide and permanent spore inhibition effects. Eventually, after *in vivo* validation, kocumarin could be produced at high-scale from crude extracts to treat newly infected or microbial resistant patients and/or clean environmental surfaces in order to prevent nosocomial infections.

Keywords: Seaweed-Associated Bacteria, Kocuria Marina CMG 2180, Kocumarin, Antimicrobial Activity, Antibiotic Resistance, Spectroscopy



(*Z*)-4-styrylbenzoic acid

C1 **[13]**

HEAVY METALS ON BIOTECHNOLOGICAL APPROACH OF CAFFEINE DEGRADATION BY IMMOBILISED *Leifsonia* SP. STRAIN SIU

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ABSTRACT

Caffeine is an important naturally occurring compound that can be degraded by bacteria. Excessive caffeine consumption is known to have some adverse problems. Previously, *Leifsonia* sp. strain SIU capable of degrading caffeine was isolated from agricultural soil. The bacterium was tested for its ability to degrade caffeine as the sole carbon and nitrogen source. The isolate was encapsulated in gellan gum and its ability to degrade caffeine in the presence of heavy metals was determined. Out of the nine heavy metals tested, Copper (Cu), Mercury (Hg), and Silver (Ag) had significant effects on caffeine degradation at 1 mg/L. Therefore, the concentration of these heavy metals was varied from 0 - 1 mg/L to see at what concentration each metal it has effect. Ag and Hg showed effect at 0.1 mg/L with caffeine degradation of 64.05 and 52.17% respectively, while Cu showed effect at 0.8 mg/L with caffeine degradation of 64.74%. These bacterium features make it an ultimate means for caffeine bioremediation. This is the first report of effect of heavy metals on caffeine degradation by immobilised *Leifsonia* sp. strain SIU.

Keywords: Caffeine, Degradation, Heavy Metals, Immobilisation, *Leifsonia* sp.

C2 **[14]**

COMBINATION OF SURFACTANT AND REVERSE IONTOPHORESIS TO ENHANCE TRANSDERMAL EXTRACTION OF GABAPENTIN

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ABSTRACT

Recently, the research has been focused on noninvasive methods for frequent clinical and therapeutic drug monitoring which could avoid blood sampling and improve patient compliance. Transdermal reverse iontophoresis offers a noninvasive tool for clinical and therapeutic monitoring of drug and indigenous molecules. We investigated the effect of sodium lauryl sulphate in receiver fluid (0-4%w/v) on reverse iontophoretic extraction of gabapentin. These experiments were carried out in custom made diffusion cell for a period of 4 h using pig ear skin. The extracted drug was analyzed by HPLC method. With the use of different concentration of sodium lauryl sulphate (2, 3, 4%w/v) in receiver fluid significantly increased the transport of drug and enhancement was 2.33, 1.76, and 1.10 folds respectively in anode chamber compared to the without sodium lauryl sulphate. Similarly, use of different concentration of sodium lauryl sulphate (2, 3, 4%w/v) in receiver fluid significantly increased the transport of drug and enhancement was 2.26, 1.61, and 1.37 folds respectively in cathode chamber compared to the without sodium lauryl sulphate. The maximum cumulative extraction was obtained with the 2% w/v sodium lauryl sulphate in both anodal and cathodal chamber. Reverse iontophoresis in conjugation with permeation enhancer had a significant synergistic effect in terms of extraction of drug across skin.

C3 **[15]**

SUSTAINED DELIVERY OF DILTIAZEM HYDROCHLORIDE THROUGH HYDROGEL BEADS COMPOSED OF HYDROLYZED GRAFTED-LOCUST BEAN GUM

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ABSTRACT

Diltiazem hydrochloride, a water soluble drug was entrapped within hydrogel beads of hydrolyzed acrylamide-grafted-locust bean gum prepared by ionotropic gelation and covalent cross-linking method. The hydrogel beads were characterized by Scanning Electron Microscopy, Differential Scanning Calorimetry, X-ray Diffraction, and Fourier Transform Infrared Spectroscopy. A maximum of 83.41 % drug entrapment efficiency was achieved. The developed acrylamide-grafted-locust bean gum hydrogel beads are survive the harsh acidity of stomach and preferably release diltiazem hydrochloride in intestine. The results showed that hydrogel beads are pH responsive. The release of drug from hydrogel beads was slower for the pH 1.2 solution than that of the pH 6.8 buffer solution. It has been observed that an increase in alluminium chloride ($AlCl_3$) concentration causes a decrease in the drug release from the hydrogel beads. Thus developed grafted-locust bean gum hydrogel beads could be useful carriers for the sustained oral delivery of diltiazem hydrochloride.

C4 **[16]**

DEVELOPMENT OF SOLID LIPID NANOPARTICLES OF CURCUMIN FOR CONTROLLED ORAL DELIVERY

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ABSTRACT

Solid lipid nanoparticles of carcumin were developed for sustained oral delivery of carcumin. Curcumin, was dissolved in lipid base (cetyl alcohol) and solid-lipid nanoparticles were developed by the emulsification with nonionic surfactant (Span 60) followed by rapid cooling. Three formulations were made by altering the ratio of drug and cetyl alcohol (1:20, 1:40, 1:60). Dissolution studies were carried out in phosphate buffer (pH 7.4) by tying the particles within a dialysis bag. To prevent fast degradation of curcumin in normal buffer, ascorbic acid (1% w/v) was added to the media. Results indicated with the increase in the proportion of cetyl alcohol in formulation, the drug release also increased. Overall, a biphasic release pattern was obtained. The initial phase (6 hours) was more or less of zero order, but later the release rate decreased significantly. As data was plotted against square root of time, linearity was observed indicating the diffusion controlled release pattern. Particle size analysis shows a tri modal pattern but more than 50 percent of the particles had size around 100 nm which was desirable. The result of the DSC analysis indicated, the drug was uniformly distributed in the matrix. In conclusion it appears that curcumin could be delivered in a sustained manner when developed into a nanoparticulate formulation using cetyl alcohol as carrier.

C5 **[17]**

FABRICATION OF OPTIMIZED DICLOFENAC POTASSIUM MICRO-PARTICLES USING RESPONSE SURFACE METHODOLOGY

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ABSTRACT

Aims: This study was conducted to prepare modified release Diclofenac potassium loaded ethyl cellulose microparticles. **Methods:** 13 trail formulations were studied to form an optimized formulation. Non-solvent addition coacervation method was used for the preparation. Response Surface Methodology (RSM) was applied for modified release formulation optimization. Solid state study was conducted for optimized formulation both qualitatively and quantitatively. **Results:** As the polymer concentration (X1) and stirring speed (X2) increases Entrapment efficiency (Y3) also increases. Stirring speed (X2) has great effect over particles size (Y4). As polymer concentration (X1) and stirring speed (X2) increases compressibility index (CI:Y5) also increases. Optimized formulation was selected from 30 predicted values. Polymer concentration (X1) for optimized formulation was 1.96gm and stirring speed was 602rpm. Characterization study of modified formulation of Diclofenac potassium were given as; %DR after 1st hour (Y1) was 29.793%, % DR after 7th hr (Y2), E.E (Y3) was 94.511%, particle size was 343.70µm and CI (Y5) was 13.46%. *In vitro* dissolution study showed sustained release for 12 hrs. Kinetic study showed high R^2 values for zero order (0.9318) and Higuchi model (0.9962). Both qualitative and quantitative analysis proved the stability of optimized microparticles. **Conclusion:** SEM showed that particles of optimized formulation were nearly spherical, light yellowish in color, and having porous and rough surface entrapping drug crystals. Fourier transform spectrophotometry showed that drug is stable in polymer and having no interactions, X-rays powder diffraction (XRD) showed decrease in crystallinity of Diclofenac Potassium in optimized formulation and differential scanning calorimetry (DSC) proved the thermal stability of formulation.

C6 **[18]**

FORMULATION AND *IN-VITRO* SUN PROTECTION FACTOR (SPF) OF A LOTION CONTAINING LEMONGRASS EXTRACT

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ABSTRACT

Sunburn, pigmentation disorders, photocarcinogenesis, immunosuppression and other skin related damages are caused by the ultraviolet radiation present in the sunlight. The aim of this study was to determine the sun protection factor (SPF) value of the lemongrass extract, also the formation of its stable sunscreen lotion and to determine its SPF value as well. For the determination of SPF value of the developed formulation, spectrophotometric method was used along with Mansur equation.

The SPF value of lemongrass sunscreen lotion was 22 with the antioxidant potential of 94.20%. The hydrogen ion concentration (pH) of lotion was 5.5, which complied with skin pH. Viscosity profile of lotion indicated good rheology that is important aspect of a formulation during application. The formulation was stable as there was no phase separation observed after centrifugation, freeze-thaw and thermal stress tests.

Harmful effects of chemicals are evident so the natural source could become a good, economical, easily accessible and safe alternative formulation ingredient in sunscreen products due to its beneficial effects and safety.

Keywords: Sunscreen, Spectroscopy, Emulsions, Rheology, Photo Protection, Lemongrass

C7 **[19]**

CYTOTOXICITY ASSAY AND ANTIVIRAL ACTIVITY OF *Syzygium aromaticum* EXTRACT USING EMBRYONATED CHICKEN EGGS

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ABSTRACT

Poultry business is the second largest and progressive industry of Pakistan but poultry growth in Pakistan was hampered due to several viral and bacterial diseases, the most considerable viral disease is Newcastle disease (ND) among them. It can produce by Avian paramyxo virus type 1, (Avula virus genus, family Paramyxoviridae). Regardless of vaccination, other prevention and control measures are needed to prevent Newcastle disease (ND) outbreaks. Plant-based extract or medicinal substances are gaining importance in veterinary medicine worldwide. *Syzygium aromaticum* (Clove) is used by some farmers to treat a variety of animal disease or ailments. *Syzygium aromaticum* (Clove) is the dried flower bud belongs to the family Myrtaceae. Cloves have antimutagenic activity, anti-inflammatory activity, antioxidant activity, antiulcerogenic activity and antiparasitic activity. Several studies also show potent antiviral and antifungal effects of *Syzygium aromaticum* (Clove). This study performed to evaluate the immune stimulatory effects of clove extract against Newcastle Disease (ND), which is mainly responsible for immense losses in unvaccinated rural chicken populations in Pakistan. There are many natural plant resources, which were exploited to obtain antiviral compounds like extract, *Acacia arabica*, and *Perscia vulgaris* etc. In present research, the antiviral activities of aqueous clove extract were measured or evaluate *in-vitro* and *in-ovo*. Emryonated chicken eggs were used to evaluate cytotoxicty assay of extract. Based on overall results, from *in-ovo*, *in-vitro* and *in-vivo* trials show that the 1:2 dilution and stock solution of clove extract did have some antiviral activity but at the same time these concentrations are cytotoxic too. As the concentration decreased, cytotoxicity lost but with the loss of antiviral activity as well.

C8 **[20]**

FORMALDEHYDE EFFECT ON MANNITOL FERMENTED MRSA PATHOGENICITY USING BRINE SHRIMP LETHALITY AND RBC HEMOLYSIS TESTS AS A MATERIAL SIMPLE VACCINE CANDIDATE

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ABSTRACT

MRSA is bacterium that causes skin infections. This bacterium has evolved to be resistant to β-lactam antibiotic drugs. The most common treatment of these infections is through oral antibiotic. Yet, the ineffective use of antibiotic may increase the resistance of the bacterium. Vaccination is considered to be one of the best alternative to prevent the resistance and residue from the use antibiotics. Formaldehyde is thus used for attenuating the bacterium to be vaccine materials. This research aimed to investigate the effect of formaldehyde toward the pathogenicity level of MRSA bacterium by measuring the variation of Formalin concentration and Contact Time of Formaldehyde to bacterium isolates for each concentration. The formalin concentrations were 0.1%,0.2%,0.3%,0.4%, 0.5%, with contact time of 0,6,12, 24 hours. To test the pathogenicity level, two parameters were used, larval (*Artemia Salina lich*) mortality rate and RBC Haemolysis test in blood gel before and after attenuation. The result suggested that the MRSA Isolate was more pathogenic, as indicated by yellow Zone in MSA Media. *Minimum Inhibitory Concentration* (MIC) of formalin was 0.2% with 6 hours contact time. However, the decrease of pathogenicity occured in 0.1% concentration with 0,6,12,24 hours contact time. It is concluded that the use of formalin with 0.1% concentration with 24 hours contact time resulted in *Live Attenuated vaccine* and 0.2% concentration and 6 hours contact time should *Inactivated Vaccine*. The result of this research is expected to contribute as one of the method of attenuating MRSA bacterium, and can be developed as simple vaccine materials.

Keywords: Formaldehyde, MRSA, Vaccination, Pathogenicity, RBC Blood Agar

C9 **[21]**

ANTIMICROBIAL DRUG DISCOVERY: *Bergenia acumbis* FOR ANTI-INFECTIVES AGAINST ANTIMICROBIAL RESISTANCE

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ABSTRACT

Antimicrobial drug resistance is the major concern for today and, more importantly, the coming decades. With the microorganisms gaining superpower against the present group of antibiotics, spread of difficult-to-treat organisms has been rampant; hence, the need of discovery and development of newer and better anti-infectives is a prime concern. Many plants and their secondary metabolites have shown anti-infective potential and may be the way out for the present need of new molecules or probes against antibiotic resistance. *Bergenia pacumbis*, a hardy medicinal plant, is a promising plant for discovery and design of newer anti-infectives as it has antimicrobial potential for superbugs according to our study. The methanolic extract of *B. pacumbis* in 20% DMSO at various concentration of 70, 80, 90 and 100 mg/ml showed significant antimicrobial activity ($p<0.05$) against *Staphylococcus aureus* & *MRSA* and *Enterococcus faecalis* & *VRE* (*Enterococcus faecium)*, when tested using well diffusion method. Also, significant activity against *Proteus mirabilis* was observed for higher doses of methanolic extracts viz. 100, 112.5 and 125 mg/ml. For 100 mg/ml, 14.67±0.33, 14.67±0.33, 11.67±0.33, 11.00±0.58 and 9.33±0.33 mm of zone of inhibition was observed against *S. aureus*, *MRSA*, *E. faecalis*, *VRE* and *P. mirabilis* respectively after 24 hr incubation following pre diffusion at cold temperature for a day. Our study gives a hope for chemicals with potential for bacterial growth inhibition or bacterial killing in a hardy medicinal plant, *B. pacumbis*, which, eventually, can be of great value in development of newer leads for tackling antimicrobial resistance.

POSTER PRESENTATIONS

P1 **[22]**

FORMULATION DEVELOPMENT OF (AMOXICILLIN AND CLAVULANATE POTASSIUM FOR ORAL SUSPENSION) ASCLAV DRY SYRUP AND STANDARDIZATION

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[1] *Astron (Ltd) Pharmaceutical Company, Sri Lanka*

ABSTRACT

The Asclav Dry Syrup contains 125 mg/5ml of Amoxicillin (AM) and 31.25 mg/5ml of clavulanic acid (CA) and sufficient amount of excipients. It was formulated by Research & Development department of Astron (Ltd) pharmaceutical company, which is WHO GMP accredited. Active materials sourced from WHO-GMP manufacturing accredited companies.

AM is a β-lactam antibiotic and CA is β-lactamase inhibitor. The β-lactam resistant strains of micro organism hydrolyse β-lactam ring of AM by secreting β-lactamase. CA inhibit β-lactamase and prevent the hydrolysis of AM. According to United State Pharmacopoeia (USP), the AM and clavulanate potassium for oral suspension contains the equivalent of not less than (NLT) 90% and not more than (NMT) 120% of label amount of AM and the equivalent of NLT 90% and NMT 125% of the label amount of CA.

The blend was manufactured and filled under the environmental condition of 20^{o}C ±2 of temperature and 20% ± 2 of relative humidity (RH) in pilot plant. The samples were stored under the condition of 40^{o}C of temperature and 75% of RH (Accelerated stability) according to International Council for Harmonization (ICH) guide line for stability studies. The physical properties, chemical assay, microbial test and pH measurement of reconstitute of Asclav dry syrup was done through seven days in 3 months and 6 months of storage according to USP standard.

The chemical assay, microbial test and pH of all stability studies were within USP standard limits. According to ICH guide line, the six month accelerated stability is equal to two year real time stability.

Successfully developed and standardized Asclav dry syrup is stable in self for two year.

Keywords: Amoxicillin, Clavulanic Acid, β-lactam, β-lactamase, USP

P2 **[23]**

IN VITRO ANTI-BIOFILM ACTIVITY OF FERMENTED SOYBEAN TEMPEH EXTRACTS AND SUBFRACTIONS AGAINST ORAL PRIMARY COLONIZER BACTERIA

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ABSTRACT

In early dental plaque formation, oral primary colonizers, *Actinomyces viscosus* is initially attached to the pellicle-coated tooth surface to form a biofilm. This study, for the first time, investigated the *in vitro* inhibitory effects of soybean tempeh extracts and subfractions obtained with solvents of different polarity (hexane, dichloromethane, chloroform, diethyl ether, ethyl acetate, methanol, aqueous) in removing oral primary biofilm on a polystyrene 96-well microtiter plate. Initial cell attachment was evaluated in this study after treatment with tempeh extracts and subfractions at various concentrations (0 to 3 mg/mL) for different time incubation (24 and 48 h). The growth and development of the biofilm was assessed using the crystal violet assay. Anti-biofilm activity of tempeh extract and subfractions were measured as the percentage of the biofilm formation absorbance after the treatment in comparison with the untreated control. Fractioning of chloroform demonstrated that 2 out of its 4 subfractions were active against *A.viscosus* with hexane presenting the highest activity. Increasing the treatment time to 48 h, resulted no change in a reduction of the single primary biofilms. Data from colorimetric assay were confirmed by scanning electron microscopy analysis, which evidenced the significant reduction in biomass and a decrease of total cell volume when intact *A.viscosus* biofilms were treated with hexane fraction. These results suggest that fermented soybean tempeh may be naturally applied for oral care products targeting biofilm reduction.

Keywords: *Actinomyces viscosus*, Oral Primary Colonizer, Fermented Soybean Tempeh, Anti-Biofilm Activity

P3 **[24]**

UTILIZATION OF DRUG AMONG PATIENTS WITH DIABETES IN SRI LANKA

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ABSTRACT

Diabetes is a deep rooted non-communicable disease that is associated with vascular complications. A diabetes complication is expensive and more expensive than the treatment for the disease itself. However, most of this harmful situationcan be prevented with good glycerin control and also medication is essential. When we consider about similar to most of the other chronic diseases, drug compliance has been poor among patients with diabetes. The overall objective of this study was to assess the level of drug compliance and the factors that influence the drug compliance among Sri Lankan patients with diabetes. There were 75 patients selected for the study that used judgment sampling as the sampling method for this study. Out of the sample majority were females (80%). Data were collected using an in-depth interview with using semi structured questionnaire. The majority (75%) attended the clinics regularly. However, a reasonable number of patients (40%) focused to medication. Similarly a good number of patients prevent from in taking drugs as they have swallowed a large number of tablets and pills fear of side effects having after long term medication and unclear instructions about using drugs. Out of these patients unfortunately the diabetes patients are higher than other patients. The compliance to medication can he improved by avoiding pharmacy and introducing combined pills and also with proper education for patient on side effects and the drugs.

Keywords: Diabetes, Chronic Disease, Medication, Compliance

VIRTUAL PRESENTATION

[25]

ERYTHROCYTE MEMBRANE STABILIZING AND ANTI PLATELET PROPERTIES OF ARECA CATECHU

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ABSTRACT

Platelet aggregation inhibitors have been successfully used for more than 2 decades as effective medications for various illnesses including inflammatory disorders. These drugs are also key preventive and therapeutic agents for cardiovascular and cerebrovascular diseases. Cardiovascular diseases account for most non-communicable disease leading to 17.5 million deaths annually. The antiplatelet and anti-inflammatory properties are linked, as the platelets interact with leukocytes accelerating inflammatory cascade leading to different pathologies. There is need to develop more safe and effective antiplatelet agents. *Areca catechu* is used in folk medicine for the treatment of a number of illnesses including inflammation. Present study addressed antiplatelet aggregating and membrane stabilizing activities of areca nut extract and its fractions and sub-fractions using human platelets from healthy volunteers.Areca extract antagonized arachidonic acid induced platelet aggregation in dose dependent manner reaching to complete inhibition at 10 mg/ml. It also caused 60%, 40% and 8% inhibition of adenosine-di-phosphate, collagen and epinephrine induced platelet aggregation, respectively. Likewise, aqueous fraction at 6mg/ml caused 97%, 65%, 49% and 18% inhibition of arachidonic acid, adenosine-di-phosphate, collagen and epinephrine induced platelet aggregation, respectively. Both areca extract (EC_{50}= 609 µg/ml) and its aqueous fraction (EC_{50}= 220 µg/ml) elicited significant membrane stabilizing activity in a dose dependent manner. Areca nut extract, ethyl acetate fraction and aqueous fraction possess significant antiplatelet aggregating and membrane stabilizing properties. The aqueous methanol soluble sub fraction was most effective via different pathways that may be of clinical significance. However, further studies are required to identify its active compound(s) following bioassay guided-fractionation.

Keywords: Areca Nut, Anti Platelet, Membrane Stabilizing, Inflammation, Cardiovascular Disease