3rd PUA International Conference

"Innovation in Pharmaceutical Sciences"

Faculty of Pharmacy

Pharos University in Alexandria, Alexandria, Egypt

3rd PUA International Conference

"Innovation in Pharmaceutical Sciences"

IC-IPS / 2022

14th, May 2022

Organized by:

Faculty of Pharmacy

Pharos University in Alexandria, Alexandria, Egypt

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Welcome Note

We are honored and delighted to welcome you on behalf of the Faculty of Pharmacy, Pharos University in Alexandria and to invite you to attend the 3rd International Conference on "Innovation in Pharmaceutical Sciences, IPS", which will be held in the Grand Hall at Pharos University in Alexandria, Egypt on the 14th of May 2022.

The Faculty of Pharmacy inhabits a distinguished position among national and international competitors in the field of research, which is considered as one of its priorities in the upcoming era.

The conference aims to provide an innovative and comprehensive overview of the latest research developments in Pharmaceutical Sciences. Hopefully, IPS would serve as a catalyst by connecting scientists within and across disciplines under a single roof. It would create an environment, favorable to information exchange, generation of new ideas and acceleration of applications.

The conference will be held in Alexandria, Egypt; "The Mediterranean Pearl", a thriving city, rich in beauty, heritage, culture and history.

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Plenary Speakers

Dr. Ahmad H. E. Hassan

Assoc. Prof. of Medicinal Chemistry & Drug Discovery
Faculty of Pharmacy - Mansoura University

"Discovery and Development of Drugs in RNA Era"

Dr. Rim Hafez ElBakary

Assoc. Prof. and Head of the Department of Applied Languages
Faculty of Arts- Alexandria University
Vice Head of Pedagogical Innovation and Distance Learning Center

"Localization and Intercultural Communication"

Dr. Mohamad Elmessiery

Medical Oncology Consultant, Coordinator of the Scientific Committee, Morbidity & Mortality Committee
Damanhour Oncology Center & Elbehira Health Insurance

"The Era of Biosimilars"

Keynote Speakers

Dr. Craig Russell

Lecturer at Aston Pharmacy School
College of Health and Life Sciences
Pharmaceutical and Clinical Pharmacy Research Group

"Application of 3D Printing Technology in Tablet Formulation"

Prof. Ahmad El Yazbi

Prof. of Pharmacology, Faculty of Pharmacy
Alalamein International University

"Localized Low-grade Adipose Tissue Inflammation Links Early Metabolic Impairment to Initial Stages of Cardiorenal Disease: Opportunities for Novel Therapeutics"

Dr. Valerie Metzinger- Le Meuth

Assoc. Prof. at University Sorbonne Paris Nord (USPN)

"Non Coding RNAs in Cardiovascular Disorders and Chronic Kidney Disease: New Clues for therapy"

Dr. Amany Salama

Assoc. Prof. of Clinical Nutrition
Faculty of Applied Health Sciences Technology, PUA

"Dietary Phytochemicals In Managing Chronic Low-Grade Inflammatory Conditions"

Dr. Omnia Elhossieny

Member of Ontario Pharmacist Association
Ontario College of Pharmacists and Canadian Pharmacist Association
NAPHS ASK Medical Manager

"Going Beyond Dispensing; The Future of Pharmacist Roles"

Dr. Nahla Kandil

MSc in Clinical Pharmacy, Queen's University, Belfast
Board Certified Critical Care and Infectious Disease
NAPHS Cofounder

"Post Graduate Certificates in Clinical Pharmacy"

Dr. Samar Zuhair Alshawwa

Assoc. Prof. of pharmaceutics and pharmaceutical technology
College of Pharmacy, Princess Nourah bint Abdulrahman University
Riyadh, Saudi Arabia

"mHealth Interventions for Cancer Care and Support; A Systematic Literature Review"

Dr. Yasmine Shahine

Lecturer of Microbiology and Immunology
Faculty of Pharmacy, PUA

"Covid -19 and Immunity: Where Do We Stand Now?"

Dr. Tamer Ibrahim

Assoc. Prof. of Pharmaceutical Chemistry, Faculty of Pharmacy, Kafrelsheikh University, Kafrelsheikh, Egypt

"Promoting The Drug Discovery for COVID-19 via Structural Bioinformatics Approaches: A Case Study"

	***Dr. Amira El-Yazbi*** *Assoc. Prof. of Pharm. Anal. Chem.* *Faculty of Pharmacy - Alexandria University* **"Simple Probing for DNA Damage: Development and Expansion"**
	***Dr. William Fraser*** *Lecturer at Aston Pharmacy School* *College of Health and Life Sciences* *Pharmaceutical and Clinical Pharmacy Research Group* *Aston Research Center for Healthy Ageing* **"Synthetically Green APT Inhibitors of *C. difficile*"**
	***Dr. Nefertiti El-Nikhely.*** *Lecturer of Biotechnology and Molecular Biology* *Institute of Graduate Studies and Research* *Alexandria University* **"Pharmacogenomics: The Guide to Precision Medicine"**
	***Dr. Karim Raafat*** *Assoc. Prof. of Phytochemistry and Pharmacognosy* **"Novel Extraction Method and the Impact on Management of Current Chronic Disorders"**

3rd PUA International Conference
"Innovation in Pharmaceutical Sciences"
14th, May 2022
Conference Agenda

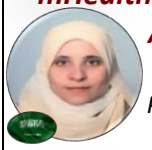
9:00 - 10:00	**Registration (PUA Grand Hall)**
10:00 -10:45	**Opening Ceremony (PUA Grand Hall)**  **Prof. Mahmoud Mohy El Din** ***University President*** ***Pharos University in Alexandria***  **Prof. Maged El-Ghazouly** ***Dean of Faculty of Pharmacy*** ***Pharos University in Alexandria***
	Plenary Session (PUA Grand Hall) ***Chairperson: Prof. Ahmed ElMallah*** *Professor of Pharmacology - Alexandria University*
10:45-11:05	 ***"Discovery & Development of Drugs in RNA Era"*** **Assoc. Prof. Ahmed H. E Hassan** *Associate Professor of Medicinal Chemistry* *Faculty of Pharmacy - Mansoura University*
11:10 -11:30	 ***"Localization and Intercultural Communication"*** **Assoc. Prof. Rim Hafez ElBakary** *Vice Head of Pedagogical Innovation & Distance Learning Center* *Faculty of Arts - Alexandria University*
11:35–11:55	 ***"The Era of Biosimilars"*** **Dr. Mohamad Elmessiery** *Medical Oncology Consultant, Coordinator of the Scientific Committee, Morbidity & Mortality Committee* *Damanhour Oncology Center & Elbehira Health Insurance*
11:55-12:10	**Open Discussion**
12:10–12:35	**Dhuhr Prayer and Coffee Break (PUA Grand Hall)**
12:30–1:00	**Poster Session (Faculty of Pharmacy - Entrance Hall)**

Session A: Innovation of Smart Pharmaceutical Technology ***(PUA Grand Hall)*** ***Chairperson: Prof. Wael Samy*** *Head of Industrial Pharmacy Department - Alexandria University*	
12:35-12:55	***"Application of 3D Printing Technology in Tablet Formulation"***  **Craig Russell, Ph.D** *Aston Pharmacy School,* *College of Health & Life Sciences*
1:00- 1:10	***"Engineered Polymer Therapeutics for Modulating the Tumor Microenvironment"*** **Assoc. Prof. Marwa Sallam** *Industrial Pharmacy* *Faculty of Pharmacy, Alexandria University*
1:15- 1:25	***"Metal Oxides Loaded Electrospun Nanofibrous Polymer; Potential Face Protector Against Respiratory Viral Infections"*** **Dr. Hassan Nageh** *Assist. Prof. at the Nanotechnology Research Center* *The British University in Egypt*
1:30 – 1:40	***"Heavy Metals & Cosmetics Industry: A Review Article"*** **Pharmacist Sohaila Shoala** *Faculty of Pharmacy* *Arab Academy for Science, Technology & Maritime Transport*
1:40- 1:50	**Open Discussion**

Session B: New Horizons in Pharmaceutical Sciences ***(Conference Hall - Faculty of Pharmacy - 6th Floor)*** ***Chairperson: Prof. Hadir Maher*** *Head of Pharmaceutical Analytical Chemistry Department* *Alexandria University*	
1:00- 1:10	 ***"Promoting the Drug Discovery for COVID-19 via Structural Bioinformatics Approaches: A Case Study"*** **Assoc. Prof. Tamer Ibrahim** *Pharmaceutical Chemistry* *Faculty of Pharmacy, Kafrelsheikh University*
1:15- 1:25	***" Simple Probing for DNA Damage: Development & Expansion"***  **Assoc. Prof. Amira El Yazbi** *Pharmaceutical Analytical chemistry* *Faculty of Pharmacy, Alexandria University*
1:30 – 1:40	***"Synthetically Green APT Inhibitors of C. difficile"***  **William Fraser, Ph.D.** *Aston Pharmacy School* *College of Health & Life Sciences*
1:40- 1:50	**Open Discussion**

	Session B Cont.: New Horizons in Pharmaceutical Sciences ***(Conference Hall - Faculty of Pharmacy – 6th Floor)***
1:50 -2:00	***"Pharmacogenomics:The Guide to Precision Medicine"***  **Dr. Nefertiti El-Nikhely** *Biotechnology & Molecular Biology* *Institute of Graduate Studies & Research* *Alexandria University*
2:05 - 2:15	***"Integrons: Beyond Antibiotic Resistance"*** **Assoc. Prof. Nevine Lotfy** *Microbiology & Immunology* *Faculty of Pharmacy, PUA*
2:20 - 2:30	***"Novel Extraction Method & the Impact on Management of Current Chronic Disorders"***  **Assoc. Prof. Karim Raafat** *Phytochemistry & Pharmacognosy* *Faculty of Pharmacy, PUA*
2:35 - 2:45	***"Microbial Cell Factories: The future for Sustainable Production of Natural Products?"*** **Dr. Ingy I. Abdallah** *Pharmacognosy* *Faculty of Pharmacy, Alexandria University*
2:50 - 3:00	**Open Discussion**

	Session C: New Perspectives in Pharmacotherapy & Bioinformatics **(PUA Grand Hall)** **Chairperson: *Prof. Maged Wasfy*** *Vice Dean for Graduate Studies & Research–Damanhur University*
1:50 -2:00	***"Localized Low-grade Adipose Tissue Inflammation Links Early Metabolic Impairment to Initial Stages of Cardio-renal Disease: Opportunities for Novel Therapeutics"***  **Prof Ahmad El-Yazbi** *Pharmacology, Faculty of Pharmacy* *Al-Alamein International University*
2:05 - 2:15	 ***"Non-Coding RNAs in Cardiovascular Disorders & Chronic Kidney Disease: New Clues for Therapy"*** **Assoc. Prof. Valerie Metzinger- Le Meuth** *University Sorbonne Paris Nord (USPN)*
2:20 - 2:30	 ***"Dietary Phytochemicals in Managing Chronic Low-Grade Inflammatory Conditions"*** **Assoc. Prof. Amany Salama** *Clinical Nutrition* *Faculty of Applied Health Sciences Technology, PUA*
2:35 - 2:45	***"Protocatechuic Acid Protects Against Thioacetamide-Induced Chronic Liver Injury & Encephalopathy via Modulating mTOR, p53 and IL-6/ IL-17/ IL-23 Immunoinflammatory Pathway"*** **Dr. Ghada Samy** *Pharmacology, Delta University for Science & Technology*
2:50 - 3:00	***"New Approaches in Pharmacotherapeutic Management of Inflammatory Bowel Diseases"*** **Pharmacist/ Ibrahim Ossama** *Medical sales representative, AUG pharma, 6th of October city, Egypt.*
3:00 - 3:10	**Open Discussion**

2:45 – 3:15	**Poster Session (Faculty of Pharmacy - Entrance Hall)**
	Session D: Digital Transformation and Remote working in Clinical Pharmacy ***(PUA Grand Hall)*** ***Chairperson: Assoc. Prof. Alyaa Ramadan*** ***Associate Professor of Pharmaceutics– Alexandria University***
3:10 - 3:20	***"Going Beyond Dispensing; the Future of Pharmacist Roles"***  **Dr. Omnia Elhossieny** *Member of Ontario Pharmacist Association, Ontario College of Pharmacists &Canadian Pharmacist Association* *NAPHS ASK Medical Manager*
3:25 - 3:35	***"Post Graduate Certificates in Clinical Pharmacy"***  **Dr. Nahla Kandil** *MSc in Clinical Pharmacy, Queen's University, Belfast* *Board Certified Critical Care & Infectious Disease* *NAPHS Cofounder*
3:40 – 3:50	***"mHealth Interventions for Cancer Care & Support; A Systematic Literature Review"***  **Asst. Prof Samar Zuhair Alshawwa** *Pharmaceutics & Pharmaceutical Technology* *College of Pharmacy, Princess Nourah bint Abdulrahman University Riyadh, Saudi Arabia*
3:55 – 4:05	***"Covid -19 & Immunity: Where do we stand Now?"***  **Dr. Yasmine Shahine** *Microbiology & Immunology* *Faculty of Pharmacy, PUA*
4:10- 4:20	***"Health Literacy & Cancer"*** **Dr. Hebatullah Mostafa** *Clinical Pharmacy & Pharmacy Practice* *Faculty of Pharmacy, PUA*
4:20 - 4:30	**Open Discussion**
4:30 – 5:00	**Lunch Break and Closing Ceremony (PUA Grand Hall)**

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Speakers Abstracts

Plenary Session

Discovery and Development of Drugs in RNA Era

Ahmed H.E. Hassan

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Over decades, proteins were the major focus as drug targets. Therapeutic effects of many of the currently marketed drugs are known to be mediated via their direct action on enzyme, receptors or channels, which are proteins. Unfortunately, a considerable portion of them is undruggable proteins. However, all proteins are the products of the upstream ribosomal translation of mRNA coding for proteins. In theory, RNA manipulation offers an opportunity to modulate both druggable and undruggable proteins. In fact, coding RNA represents less than 2% of human genome while the majority of the transcribed RNAs are non-coding. Diverse RNA-based intervention strategies are in current development to meet different medical needs. The introduction of Pfizer and Moderna mRNA-based vaccines might be a mark of the beginning of a perspective RNA era in drug discovery and development. In this plenary lecture, RNA-based discovery and development strategies are briefly introduced and discussed.

Keywords: RNA-based drug discovery; Perspective drug discovery; RNA-based therapeutics; Coding RNA; Non-coding RNA

Localization and Intercultural Communication

Rim Hafez ElBakary

Head of the Department of Applied Languages- Faculty of Arts-Alexandria University. Vice Head of Pedagogical Innovation and Distance Learning Center
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Localization is a recent discipline, which is part of multimedia translation and is inherent to technology. Good localization of a product contributes, like any form of communication, to breaking down any cultural barrier that may arise between the source language and the target language; or to reduce the cultural gap that may exist between the culture of departure and that of arrival. The work of the localizer is therefore essential for a good reception, marketing, and acceptance of the product in the target society as well as for a good intercultural dialogue. In this study, we will therefore begin by defining localization, following its evolution, and highlighting the role played by translation as the first element in intercultural communication; we will then try to identify more closely the differences and convergences that may exist between translation and localization to identify the different roles played by this new form of translation-adaptation in intercultural communication. We will then explain the process of localization - as one of the types of translation that presents a number of very current challenges, shaped by globalization and the evolution of new technologies. We will finally, by adopting a comparative approach as we have just mentioned above, review the different types of localization with examples of localized products in support.

Keywords: Localization; Adaptation; Intercultural communication

The Era of Biosimilars

Mohamad Elmessiery

Medical Oncology Consultant at Damanhour Oncology Center and Elbehira Health Insurance.
Vice Manager and the coordinator of the Scientific Committee, Morbidity and Mortality Committee of Damanhour Oncology Center
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The term biosimilar is used for a subsequently launched version of a biologic product which is similar in terms of quality, safety, and efficacy to an already licensed "Reference Biologic" product. The primary purpose of biosimilars is to reduce the healthcare costs associated with the use of biologics and thereby increase access to healthcare. Unlike small molecule generics, the bioequivalence approach is not considered appropriate for the approval of biosimilars. The approval of biosimilars is based on a stepwise comparability exercise with the "Reference Biologic", starting with a comprehensive physicochemical and biological characterization. The extent and nature of the required nonclinical *in vivo* studies and clinical studies depend on the level of evidence obtained from the previous steps. Regulations require that the "Reference Biologic" should have been licensed/approved in the same country/region or in other ICH countries based on a full registration dossier. Apart from the comparability exercise, regulations also deal with indication extrapolation, pharmacovigilance, and substitution and interchangeability. We will briefly describe the considerations for exclusivity, market access, and commercialization of biosimilars.

Keywords: Biosimilars; Reference Biologic

Scientific Sessions

Innovation of Smart Pharmaceutical Technology Session

Application of 3D Printing Technology in Tablet Formulation

Craig Russell

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Introduction: 3D printed tablets are revolutionary dosage forms delivering to individual patients bespoke features including dosage, release profile and tablet geometry. The ability to tailor drug release profiles based on the needs of individual patients also opens the way to novel and personalized controlled-release devices, thus overcoming a one-size-fits-all approach not addressing individual differences in pharmacokinetics.
Stereolithography (SLA), a vat photopolymerisation technique, is emerging as an attractive tool in pharmaceutical additive manufacturing for the fabrication of 3D printed tablets and polypills and offers advantages such as working at room temperature, no need for solvents and no direct use of powders as feedstock material, thus avoiding flowability issues.
However, the limited number of biocompatible photopolymers suitable for SLA coupled with the large amount of material required for a single print hold back the further development of the technology.
Therefore, the aim of this work was to develop a novel Stereolithography apparatus specifically designed for high-throughput screening of novel pharmaceutical printable formulations.

Methods: A novel build platform and a resin tank insert prototypes were designed using TinkerCAD and fabricated with a Form2 SLA 3D printer using Clear photopolymer resin. The final build platform was manufactured through CNC milling of aluminium. The modified parts were subsequently assembled on the Form2 3D printer and tested to fabricate cylindrical tablets previously designed using TinkerCAD. Three tablet batches, each of 10 units, were fabricated and evaluated according to uniformity of weight and thickness.
Lastly, 72 photopolymer formulations were screened and evaluated based on a six-point arbitrary scale, targeting a score of 5 indicating a successful printing. Poly(ethylene)glycol diacrylate, diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide, poly(ethylene)glycol 300, propylene glycol and glycerol were used in different ratios as formulation components.
Results: The original resin tank having a capacity of 200 mL was modified to operate with only 10 mL of photopolymer resin. Moreover, the novel tank can contain up to 12 different resin formulations. Tablet uniformity data obtained from the modified build platform were comparable to the original platform.
Seventy two photopolymer formulations were finally screened, and 13 formulations reached the targeted printability score of 5.
Conclusion: A novel stereolithography apparatus was developed and used for the first time to carry a high-throughput screening of pharmaceutical photopolymer formulations. Formulation cost and waste were reduced by 20 times, while screening capacity was increased by 12 times. Thirteen photopolymer formulations were selected for future drug loading and 3D printing studies.

Keywords: 3D printing; Cost effectiveness; Digital light processing; Formulation development; Lean production; Personalised medicine; Solid oral dosage forms; Stereolithography; Sustainability

New Horizons in Pharmaceutical Sciences Session

Promoting the Drug Discovery for COVID-19 via Structural Bioinformatics Approaches: A Case Study

Tamer M. Ibrahim

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COVID-19 is a rapidly emerging pandemic caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS CoV-2). SARS CoV-2 is an enveloped, single stranded RNA virus that depends on RNA-dependent RNA polymerase (RdRp) and other Non-Structural Proteins (NSPs) to replicate. Therefore, important NSPs, such as RdRp, PLpro and Mpro are deemed as promising targets to tackle virus replication for Drug Discovery campaigns . This talk delivers a computational analysis utilizing Structural Bioinformatics approaches, on how to target one (or more) of these crucial targets. Ranging from in-silico benchmarking, molecular docking and molecular dynamics simulations, this talk provides insights on how to promote the Drug Discovery and Structure-Based Virtual Screening (SBVS) campaigns against the protein target(s) under investigation.

Keywords: Structural Bioinformatics; COVID-19; SARS-CoV2; Drug Discovery; SBVS

Simple Probing for DNA Damage: Development and Expansion

Amira F. El-Yazbi

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Human DNA plays a vital role in numerous biological processes. Exposure of DNA to different chemical insults leads to damage at the molecular level, which consequently leads to carcinogenesis, and cell death. Small molecules, such as drugs, can interact with DNA via covalent or non-covalent interactions. If drug-binding causes DNA damage in normal cells, then it may affect the replication cycle and may subsequently lead to mutations that would ultimately lead to cell over growth, i.e., cancer. Currently available methods for the sensitive detection of damaged DNA consist of multi-step procedures, are time-consuming, require expensive instruments and reagents and destroy the sample. As well, the exposure of DNA to most insults causes sequence-dependent damage, thus most of these methods are limited for the detection of DNA damage in specific DNA sequences and cannot be used for generic damage screening, since previous knowledge of the damaged sequence is required for the sensitive detection. As such, these methods are neither cost-effective nor suitable for routine everyday analysis applications. The main goal of this study is to develop a simple, inexpensive, high through-put, mix-and–read methods for the sensitive detection of DNA damage induced by different pharmaceutical and nutraceutical products. In addition to quantification of the minimum concentration of each drug that causes DNA damage in order to assess the potential safety of different pharmaceutical products. In this study, we explored the

interaction of several FDA-approved pharmaceutical drugs with DNA. For this purpose, we have used several analytical techniques, including absorption spectroscopy, MALDI-TOF mass spectrometry and fluorimetric analysis using different fluorescent probes to quantify the drug-induced DNA damage. This talk will discuss the application and the results of the proposed techniques.

Keywords: DNA damage; Fluorescent biosensors; MALDI-TOF; Cancer

Synthetically Green APT Inhibitors of *C. difficile*

William Fraser

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Clostridioides difficile is one of the leading nosocomial pathogens. The synthesis of novel antimicrobial agents is of crucial need as some *C. difficile* strains developed resistance against antibiotics including the frontline treatments metronidazole, vancomycin. Selective targeting of *C. difficile* would enable the retention of the normal gut flora, thus preventing the disruption of the gut-colonising bacteria caused by the current antibiotics, and decreasing one of *C. difficile* triggering factors. Arylidenepyrimidinetrione derivatives were synthesised by Knoevenagel condensation; an environmentally and economically friendlier, greener catalyst-free procedure where water or benign solvents are used. Various Knoevenagel products isolated from the reaction between barbituric acid and benzaldehydes were characterised then subjected to chemical reduction to give aralkylpyrimidinetriones. Allylic or propyl-spaced derivatives were obtained from regioselective or complete reduction of the cinnamaldehyde-derived dienes. The antimicrobial efficacy and selectivities of the synthesised compounds were evaluated against *C. difficile* NCTC 11204, and the control organisms *Escherichia coli* NCTC 35218 and *Staphylococcus aureus* NCTC 29213 by agar diffusion assay and Minimum Inhibitory/Bactericidal Concentration (MIC/MBC).

Keywords: *Clostridioides difficile;* Cinnamaldehyde-derived dienes

Pharmacogenomics: The Guide to Precision Medicine

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Advances in human genomics and proteomics provide huge insight into the genetics of many diseases. This growing knowledge is modifying how clinicians and scientists approach diagnosis, treatment, and drug monitoring. Genome-wide association studies allow the stratification of patients into subgroups based on the genome to predict better prognosis and assist in the choice of the most suitable treatment regimen. Such pharmacogenomic studies pave the way towards precision medicine which aims to customize health care to be tailored according to individual patients. Currently, there are several platforms and databases that provide the necessary guidelines for pharmacogenomics related testing. They provide clinical and drug information that assist clinicians in their decision-making process. The impact of precision medicine will range from improving patient response and prognosis, to avoiding severe adverse effect and it will even reach to socio-economic benefits. It might save many patients unneeded costly and painful trials. In future, genetic testing prior diagnosis and choice of treatment would become a necessity. Precision medicine and pharmacogenomics are bridging the gap between the studies of researchers and the work of clinicians; a direct bridge between the bench and the bed of patients

Keywords: Pharmacogenomics; Precision medicine; GWAS; genetic testing

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Novel Extraction Method and the Impact on Management of Current Chronic Disorders

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Complementary medicine is considered the future of chronic disorders management. This is supported by the complementary medicine's high efficiency, patient-adherence, and the higher side effects of conventional drugs. Time conservation and the competence in the extraction of active ingredients are cornerstones in the overall complementary medicine efficiency. Thus, this work aims to explore novel extraction method utilizing long electromagnetic radiation (LER) and their impact on the management of current chronic disorders, especially diabetic neuropathy pain (DNP). Novel LER source was utilized for extraction. The time of extraction and the efficiency of extraction were monitored utilizing chromatographic, analytical, and biological techniques. LER has shown double yield in half extraction time with prominent management of DNP when compared to conventional methods of extraction. LER has shown to be a novel extraction method with high efficiency and greater time conservation. Shortly, LER might pave the way for more efficient chronic disorder management.

Keywords: Novel Extraction Method; Chronic Disorders; Alternative Medicine; Diabetic neuropathy pain

New Perspectives in Pharmacotherapy and Bioinformatics Session

Localized Low-grade Adipose Tissue Inflammation Links Early Metabolic Impairment to Initial Stages of Cardiorenal Disease: Opportunities for Novel Therapeutics

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Over the past decade, the exponential rise in the health and economic burden of the complications of metabolic disease dictated the direction of biomedical and clinical research towards the search for radical therapeutics with a proven ability to halt or reverse the underlying pathological process. Until recently, the prevalent therapeutic guidance relied on tight glycemic control. Indeed, years of accumulating evidence have proven the futility of this approach. Significantly, studies found that complications of metabolic conditions, such as diabetes and obesity, commence at a stage much earlier than that accompanied by gross diagnostic markers including elevated body mass index and/or blood glucose levels. Over the past twelve years, our laboratory has dedicated its efforts to the identification of the root pathological causes leading to these early complications, their biomarkers, and potential therapeutic interventions. Using a non-obese, normoglycemic prediabetic animal model, we were able to identify localized adipose inflammation in peri-vascular and peri-renal adipose depots as the main driver behind these initial events. We were able to implicate several molecular players that are activated at this stage. As well, we were able to develop and repurpose a number of pharmacological tools to interrupt this

early pathology. Moreover, our group standardized several non-pharmacological approaches to assist with reversing these abnormalities. A summary of this research work together with future perspectives will be given in this session.

Keywords: Prediabetes; Cardiovascular complications; Renal impairment; Adipose inflammation

Non coding RNAs in Cardiovascular disorders and chronic Kidney Disease: New clues for therapy

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The existence of non-coding RNAs was discovered in the 1950s but at the turn of the 21th century, the number of new and putative functional ncRNAs has greatly expanded, when it was shown that post-transcriptional regulation was performed through small non-coding RNAs known as microRNAs (miRNAs) < 200 bp and long non-coding RNAs (lncRNAs) > 200bp. Up to 3 000 miRNAs and 30 000 lnc RNAs are expressed by human cells. MiRNAs are single stranded nucleic acids that trigger translational repression of mRNA by base pairing with the 3' untranslated region of their mRNA targets. We and others have published in the last decade that several miRNAs are deregulated during the onset of chronic kidney disease (CKD) and associated with cardiovascular damages. Two miRNAs, miR-126 and miR-223 expressions are increased *in vivo* in aortas of a mouse model of CKD whereas decreasing in the serum of both mice and human CKD patients. Our aim was to assess the impact of miR-223 modulation in a rat model of restenosis in carotid artery using the technique of balloon injury.
The over and down-expression of miR-223 were induced by adenoviral vectors, containing either a pre-miR-223 sequence allowing artificial miR-223 expression or a sponge sequence, trapping the native microRNA respectively. Then, restenosis was quantified on rat carotid sections stained by haematoxylin-eosin. We found that down-expression of miR-223 significantly reduced

neointimal hyperplasia in carotids, and was associated with a 2-3-fold overexpression of miR-223 targets (MFE2c, NFIA and RhoB) *in vitro*. In conclusion, down-regulating miR-223 could have a protective effect against restenosis and is a potential new therapeutic approach in order to protect blood vessels from restenosis after angioplasty.

Keywords: Non-coding RNAs; microRNAs; Chronic Kidney Disease; Cardiovascular disease; Therapy

Dietary phytochemicals in managing chronic low-grade inflammatory conditions

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The inflammatory response is a complex one and involves numerous mediators, a number of which may be affected by individual polyphenols and thus by dietary phytochemicals in fruit and vegetables and their peels and seeds as well as herbs and spices.

These pathways include the arachidonic dependent pathways, which involve the action of the cyclo-oxygenase (COX) enzymes, and the arachidonic independent pathways, which include peroxisome proliferator activated receptors (PPARs), nitric oxide synthase (NOS), nuclear transcription factor κB (NF-κB), which regulates the expression of pro-inflammatory cytokines including IL-8, as well as the non-steroidal anti-inflammatory drug (NSAID) activated gene.

A perception still persists that the free radicals produced by macrophages for defense and to reduce the growth of microorganisms or parasites can be neutralized by anti-oxidative compounds, but this is not correct; the anti-oxidant compounds react in a very specific manner to regulate a cell's redox potential. The most efficient way to generate an anti-inflammatory response is to either block TLRs or to down-regulate pro-inflammatory gene expression by blocking NF-κB or JNK.

Certain plant compounds, especially polyphenols, have been shown, at least *in vitro*, to be able to interact with these receptors and transcription factors. For example, rosmarinic acid has been shown to inhibit the pro-inflammatory PKC/NF-κB pathway. Curcumin, a predominant polyphenol in turmeric, also inhibits

NF-κB. COX-2 has also been shown to be down-regulated and/or inhibited by eugenol (clove) and apigenin (parsley).

Keywords: Chronic low-grade inflammation; Dietary phytochemicals; Anti-oxidant compounds; Polyphenols; Herbs and spices

Digital Transformation and Remote working in Clinical Pharmacy Session

Going beyond Dispensing; the Future of Pharmacist Roles

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The pandemic has changed us permanently, both on personal and professional levels. It has redefined the nature of professions for millions of white-collar workers and businesses, to an extent that familiar routines, such as the daily commute and face-to-face meetings, are gone forever.
The profession of pharmacy, accordingly, is developing radically to suit the "new normal". Future professional development is directed towards evidence-based therapeutic interventions delivered through software apps- known as DTx- Digital Therapeutics.

Keywords: Pharmacist roles; Profession of pharmacy

Post Graduate Certificates in Clinical Pharmacy

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Clinical pharmacy is a life-long learning process. After graduation, the majority of pharmacists may practice as a Generalist Practitioner, while pharmacists, who make a conscious decision to develop their professional careers in a specific way; this may require additional education, training, or credentialing. Increased recognition of the value of postgraduate degrees and board certification has occurred during the past years.
Being aware of different post-graduate certificates and degrees options available is essential for pharmacists' career pathway. In this session, we will list and discuss different options available. The difference between, professional and academic degrees, Board of Pharmacy Specialty (BPS) and board of equivalence, residencies and fellowship.

Keywords: Certifications; degrees; Clinical pharmacy; Post-graduates

mHealth Interventions for Cancer Care and Support: A Systematic Literature Review

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Background: Mobile health (mHealth) interventions for improving quality of life (QoL) are rising, particularly those related to promoting prevention, improving screening, managing care and supporting cancer patients and survivors. Though there is a clear surge in the mHealth interventions for cancer patients, yet the related research findings are fragmented. There is an urgent need to amalgamate the extant learnings, particularly those related to the review of the effect of the mHealth interventions on awareness and screening of cancer.
Objective: The purpose of this study is to systematically review the available literature on mHealth interventions for different types of cancer patients and survivors with a view to synthesize the outcomes and impact for these interventions on the cancer disease management, right from awareness till survival.
Methods: The study followed systematic literature review (SLR) methodology wherein the peer-reviewed literature from Scopus and Web of Science databases were identified and analyzed. The SLR that involved study selection, data extraction, and data synthesis comprised of two stages, first, identifying the relevant mHealth interventions in context to cancer patients, and second, summarizing the outcomes and themes of the SLR following a robust search protocol with clear inclusion and exclusion criteria, along with forward and backward searching of relevant records.
Results: A total of 57 publications (number of participants, n=112196) describing mHealth interventions for different types

of cancer were identified. Of the 57 included studies, 23 (40%) were randomized controlled trials (RCTs), 21 (37%) were qualitative experimental, 5 (9%) pilot feasibility studies, 3 (5%) cross sectional surveys, 3 (5%) quasi-experimental and 2 (4%) sequential-mixed methods.

Most studies found that mHealth interventions have positive impact on cancer survivors and caregiver teams, as well as family members. Additionally, several RCTs suggest that mHealth provides person-centered care in clinical management settings for different types of cancer and improved survivorship care.

Conclusion: This SLR confirms the efficacy of mHealth interventions in cancer care and highlights the growth in number of studies exploring the implementation of mHealth interventions for cancer treatment and prevention. However, less conclusive data examining the impact of mHealth interventions on various psychological dimensions is available. The SLR findings suggest that mHealth interventions should be developed based on a theoretical approach and defined framework design. It would be useful if future studies carefully describe key elements of mHealth intervention used by cancer patients.

Keywords: Cancer care; Cancer survivors; Cancer management; mHealth interventions; Systematic literature review

Covid -19 and Immunity: Where Do We Stand Now?

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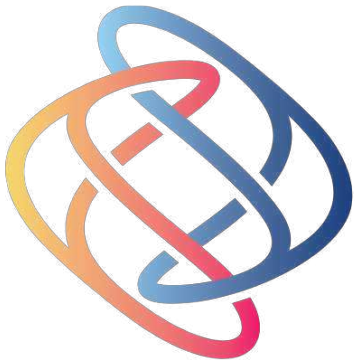
The Covid 19 pandemic had a great impact worldwide on multiple aspects of human life. Despite the major public health interventions and effective vaccines development, over 440 million cases and 6 million deaths have been documented worldwide.

Immune response to covid 19 is a key process that controls disease severity, vaccine efficacy and even response to various treatment strategies. Indeed, immunity elicited by COVID-19 vaccination with different types of vaccines approved till now has greatly reduced the incidence of symptomatic disease. But on the other hand, the immune responses declined overtime and SARS-COV-2 has shown to have the ability to mutate to different variants that may affect its severity, rate of spread and sensitivity to vaccine elicited immunity.

Thus, extensive research is conducted globally, regarding covid-19 herd immunity, the efficacy of vaccines against covid 19 different variances, the role of vaccine booster doses and new treatment strategies for covid-19 containment, just to answer the everlasting question, when the populations' lives will return to normalcy?

Keywords: SARS-COV-2; Immune response; Immunotherapy; Vaccine



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Research Abstracts

Pharmacology and Therapeutics

Oral Abstracts

PL-O-01

Protocatechuic Acid Protects Against Thioacetamide-Induced Chronic Liver Injury and Encephalopathy via Modulating mTOR, p53 and IL-6/ IL-17/ IL-23 Immunoinflammatory Pathway

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Protocatechuic acid (PCA), a natural phenolic acid, is known for antioxidant, anti-inflammatory, anti-apoptotic, and anti-fibrotic activities. However, the protective mechanisms of PCA on thioacetamide (TAA)-induced liver/brain injury are not well addressed. Chronic liver injury was induced in mice by intraperitoneal injection of TAA (200 mg/kg, 3 times/week) for 8 weeks. Simultaneously, PCA (100, 150 mg/kg/day, p.o.) was given daily from the 4th week.
Protocatechuic acid ameliorated liver and brain damage indicated by the decrease in serum activities of aminotransferases, gamma-glutamyl transferase, alkaline phosphatase, lactate dehydrogenase, levels of bilirubin, and ammonia concomitant with restoration of normal albumin levels. Additionally, PCA treatment ameliorated oxidative stress in liver and brain, confirmed by the decrease in malondialdehyde and nitric oxide levels and the increase in antioxidant activities. Moreover, PCA showed anti-inflammatory actions through downregulation of TNF-α expression in the liver and IL-6/IL-17/IL-23 levels in the brain, which is confirmed by the decrease in $CD4^+$ T brain cell numbers. Most importantly, PCA treatment showed a significant decrease in mTOR level and number of LC3 positive cells in both

liver and brain tissues. Consequently, PCA could inhibit mTOR-induced apoptosis, as it showed anti-apoptotic actions through downregulation of caspase-3 expression in liver and p53 expression in liver and brain. Furthermore, liver and brain tissues of treated mice showed restoration of normal histology.
It can be concluded that, several mechanisms, including: antioxidant, anti-inflammatory, anti-autophagic and anti-apoptotic activities can be implicated in the hepato- and neuroprotective potentials of PCA

Keywords: Protocatechuic acid; Thioacetamide; mTOR; Oxidative stress

PL-O-02
New Approaches in Pharmacotherapeutic Management of Inflammatory Bowel Diseases

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Inflammatory bowel disease (IBD), comprises two major disorders: Crohn's disease (CD) and ulcerative colitis (UC). Both are immune-mediated diseases and are characterized by chronic inflammation, a relapsing and remitting clinical course, requirement for lifelong medication and often, significant morbidity. Nowadays, unspecific drugs, which have multiple side effects, are used in the management of IBD to reduce inflammation and achieve remission of the disease. These drugs include immunomodulatory drugs, glucocorticoids, and sulfasalazine. However, several patients either fail to respond or lose response to therapy. Biological therapies including anti-tumor necrosis factor alpha (TNF-α) and anti-interleukins (IL)-12 and IL-13 represent one of the new approaches in the management of IBD. Advances in therapeutics, such as gut-specific anti-integrins, offer patients an alternative option to systemic immunosuppression. Janus kinases (JAKs) inhibitors and sphingosine-1-phosphate receptor (S1PR) agonists are also novel strategies in the management of IBD. They are small molecules with several advantages over biological therapies like low immunogenicity, short half-life and oral bioavailability. Anti-adhesion agents and anti-trafficking molecules also show promise as novel therapeutic techniques in achieving remission in patients with IBD. In the same context, fecal microbial transplantation

(FMT) and probiotics are being employed to re-maintain the intestinal microbial content to achieve remission since the disturbance of the intestinal microbial balance is implicated in the pathophysiology of IBD.

Keywords: Inflammatory bowel disease; Ulcerative colitis; Crohn's disease; Biological therapy

Poster Abstracts

PL-P-01
Repositioning Nifuroxazide in Management of Hyperlipidemia; an Experimental Study

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Hyperlipidemia is a serious disorder affecting the metabolism of fat in the human body and it is usually associated with some serious cardiovascular complications which makes hyperlipidemia patients at a serious risk for sudden death. Nifuroxazide (NIF) is an oral nitrofuran antibiotic that has long been used for management of diarrhea and recently various recent out merging valuable therapeutic impacts were reported. The current study sought the concept of Repositioning nifuroxazide in management of hyperlipidemia. Hyperlipidemias was induced in male rabbits (4 groups; n=4 rabbits/group) by feeding them with cholesterol enriched diet for 8 weeks and starting from week 5 of the experiment; NIF (100 and 300 mg/kg) were administered once daily for the further 4 weeks; till the end of the 8th week of the experimental procedures. Normal control rabbit (n=4) received the standard rabbit chow throughout the experimental period. NIF (100 & 300 mg/kg) significantly recovered balanced lipid profile as serum cholesterol, total glycerides, LDL significantly declined with significant elevation in serum HDL. Meanwhile, serum LDH, CK, ALT and AST activities were significantly corrected. These biochemical changes were correlated with significant improvement in the histopathological examination of hepatic, cardiac and aortic specimen with decreased expression of CD68 and Ki67 in the myocardium and he aorta specimen implying

retraction in macrophages' infiltration and tissue regeneration. Myocardial specimen confirmed recovery from edematous changes and preservation of cardiac muscle fibers. Aortic specimen confirmed retraction in the aortic thickness and fewer deposition of fat globules. In conclusion; NIF attenuated experimentally-induced hyperlipidemia with significant recovery of serum profile and tissue necrotic changes. The histopathological examination of hepatic, myocardial and aortic specimen confirmed the onset of tissues' recovery alongside biochemical improvement. Thus, NIF appears to hold a promising role in management of hyperlipidemia.

Keywords: Nifurozxide; Hyperlipidemia; Myocardium; Aorta

PL-P-02

Pioglitazone Synthetic Analogue Ameliorates Streptozotocin-Induced Diabetes Mellitus through Modulation of ACE 2/Angiotensin 1-7 via PI3K/AKT/Mtor Signaling Pathway in Rats

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Renin angiotensin aldosterone system has a localized key regulatory action especially in liver and body circulation. Furthermore, it accomplishes a significant role in down regulation of PI3K/AKT/mTOR signaling pathway that is involved in type II diabetes mellitus pathogenesis. The current study aimed to evaluate the effect of pioglitazone synthetic analogue

(benzenesulfonamide derivative), compared to pioglitazone standard hypoglycemic drug on enhancing liver insulin sensitivity via ACE 2/ Ang (1-7)/PI3K/AKT/mTOR in experimental STZ induced diabetes. After model established, forty rats were distributed into normal control group, diabetic group, pioglitazone group (20 mg/kg) and a benzenesulfonamide derivative group (20 mg/kg) the last 2 groups receiving oral treatment for 14 consecutive days. Our result suggested enhancing liver insulin sensitivity against ACE2/Ang (1-7)/PI3K/AKT/mTOR pathway. Moreover, synthetic compound produce reduction in a blood glucose levels, restored hyperinsulinemia back to normal and enhance liver glycogen deposition. Also, it up regulates ACE2/Ang (1-7)/PI3K/AKT/mTOR signaling pathway via increasing insulin receptor substrate 1 and 2 sensitivity to insulin, while it increases glucose transporter 2 expression in rat pancreas. The study finding imply that hypoglycemic effect of benzenesulfonamide derivative is due to enhancing liver sensitivity to regulate blood glucose level via ACE2/Ang (1-7)/PI3K/AKT/mTOR pathway.

Keywords: Angiotensin converting enzyme 2 (ACE 2); Angiotensin 1-7; Liver; Insulin sensitivity; type 2 diabetes mellitus; Phosphoinositide 3-kinases (PI3k); Serein/threonine kinase (AKT)

PL-P-03

Neurological Disturbance, Cognitive Decline, Muscular Disability and Oxidative Stress of Cisplatin in Rats: Mitigating Effects of Ginseng

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Neuronal disturbance is one of the most common serious effects of cisplatin chemotherapy that triggers memory impairment and cognitive disability. Based on the hypothesis that mechanistic pathways of ginseng against the neurological and biochemical disturbance remain unclear, therefore, this study was intended to investigate the neuroprotective effect of ginseng extract against neurological and behavior abnormality induced by cisplatin in male rats. Cisplatin (4 mg/kg BW) was injected intraperitoneally once a week for 3 months for cognitive decline induction. Cisplatin induced a learning and memory dysfunction in the Morris water maze task and locomotor disability in the rotarod test. In addition, cisplatin disrupted the oxidant and antioxidant systems, neuroinflammatory molecules, neurotransmitters, apoptotic and dementia markers. Ginseng extract (100 mg/kg BW) was treated daily for 3 months. Co-treatment with ginseng extracts successfully ameliorated the cognitive behaviors, intramuscular strength and presented a good protective agent against neurological damage. Histopathological and histochemical studies proved the neuroprotective effect of ginseng. Our data showed that ginseng is capable of counteracting the memory dysfunction induced by cisplatin via reducing oxidative stress and neuroinflammation restoring the neurological efficiency.

Keywords: Ginseng; Oxidative stress; Neuroinflammation; Apoptosis; Neurotoxicity

PL-P-04

Gestational Celecoxib Rectifies Liver Injury in Preeclamptic Rats via Modulating HMGB1/Nrf2 Signaling

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Cyclooxygenases (COX) and related arachidonate-derived prostanoids are key contributors to placental and end-organ damage caused by preeclampsia (PE). In this communication, we tested the hypotheses that prenatal pharmacologic COX inhibition improves the PE-evoked liver injury, and that this interaction is critically modulated by oxidant and inflammatory cascades. PE was induced in rats by nitric oxide deprivation during the last week of gestation (L-NAME, 50 mg/kg/day). Animals were treated simultaneously with one of the following COX inhibitors: celecoxib (10 mg/kg/day), diclofenac (0.5 mg/kg/day), or naproxen (1 mg/kg/day). Gene and protein expression studies were undertaken in hepatic tissues and sera collected from rats at weaning time. The data showed that rises in serum transaminases seen in weaning PE dams were eliminated by all COX inhibitors. Gene expression studies showed the upregulated hepatic high-mobility group box 1 protein in PE livers and associated inflammatory signals of the extracellular signal-regulated kinase

(MAPK-ERK), TNF-α and IL-1β were significantly and more effectively inhibited by celecoxib than by diclofenac or naproxen. Redox studies also revealed similar advantageous influences for celecoxib in boosting the protein expression of the antioxidant transcription factor Nrf2, serum IL-10, and antioxidant/oxidant ratio (GSH/GSSG). Overall, the data suggest an advantageous therapeutic potential for celecoxib over diclofenac or naproxen in controlling preeclamptic liver injury via distinctly modulating the interrelated High mobility group box protein 1 (HMGB1) and nuclear factor erythroid 2–related factor 2 (Nrf2) cascades.

Keywords: Preeclampsia; liver injury; NSAIDs; High mobility group box protein 1 (HMGB1); Nuclear factor erythroid 2–related factor 2 (Nrf2)

PL-P-05

A Study of a New Therapeutic Protocol Concerning the Pre-treatment of Two Different Breast Cancer Cell Lines by 5-Aza-2′-deoxycytidine

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Breast cancer is the second most common cancer in the world and the most frequent cancer among women. Hormonal therapy is the main stay in the clinical management of patients with ER+ breast cancer. However, as cancer progresses, patients become resistant anti-estrogens and most patients no longer respond to endocrine therapy which may highlights the urgent need for new therapeutic protocol other than anti-estrogen therapeutic regimen. The aim of the current study is to determine and evaluate the impact of re- expressing estrogen receptor beta through the demethylating agent 5-aza-2′-deoxycytidine (Decitabine) pre-treatment on two different breast cancer cell lines MCF-7 (4OHT sensitive) and LCC-2 (4OHT resistant) in the presence or absence of either tamoxifen or raloxifene. In order to determine the possible anti-tumor effects of these drugs, the level of expression and the activity of the following parameters; ERα, ER-β, caspase-3, β-catenin, cyclin-D1, human epidermal growth factor receptor 2 (HER-2) and insulin-like growth factor (IGF)-1 were determined. The result of the present work revealed that it is better to use either tamoxifen or raloxifene alone in tamoxifen sensitive breast tumors and to use them in combination with Decitabine in case of tamoxifen resistant breast tumors.

Keywords: Breast cancer; Tamoxifen; Raloxifene; Decitabine; Estrogen receptors

PL-P-06

Effect of Empagliflozin on Neuropilin-1 Signaling Pathway in Experimental Liver Fibrosis in Rats

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To date, liver fibrosis has no clinically approved treatment. Empagliflozin is a highly selective Sodium-glucose Cotransporter-2 (SGLT2) inhibitor that has never been tested as a treatment for liver fibrosis. In the current study, Empagliflozin's antifibrotic potentials and its effect on Neuropilin-1 (NRP-1) signaling pathway have been evaluated in an experimental liver fibrosis model of non-diabetic rats by administrating three different daily doses of Empagliflozin to the rats after liver fibrosis induction via carbon tetrachloride administration.

Empagliflozin 20mg daily dose had no effect, while the 40mg and 60mg daily doses significantly reduced all fibrosis biomarkers including alpha-1 type I collagen (Col 1A1), transforming growth factor-β (TGF-β), vascular endothelial growth factor (VEGF), platelet-derived growth factor-beta (PDGF-β). These doses also significantly improved the histologic fibrosis grade. Empagliflozin high daily doses also nearly normalized liver aminotransferases and showed a protective effect against portal hypertension by increasing endothelial nitric oxide synthase (eNOS) and decreasing endothelin-1 (ET-1) with an excellent safety profile. These effects could be in part achieved by the great

potential of empagliflozin to modulate NRP-1 pathway and down regulate its ligand; galectin-1 (Gal-1).
In conclusion, empagliflozin may serve as a promising candidate to treat liver fibrosis and provide protection against development of portal hypertension.

Keywords: Liver fibrosis; Hepatic stellate cell; SGLT2 inhibitors; Empagliflozin; Neuropilin-1; Portal hypertension

PL-P-07

Effect of Geraniol Alone and Combined with 5-Fluorouracil on Breast Carcinoma in Mice

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Breast cancer is the most commonly diagnosed cancer in females worldwide. With the high cost and the developed drug resistance, the need for new therapeutic alternatives is escalating. Phytochemicals are one of the most compelling alternative approaches showing anticancer activity. Geraniol is a monoterpenoid compound highly abundant in essential oils and showing anti-tumor potential in cell lines and models of cancer. However, the exact mechanism of geraniol in breast cancer has not been yet elucidated. In addition, the possible synergistic effect of geraniol and 5-flurouracil has not been previously addressed. Therefore, aim of the current work was to investigate the potential therapeutic effect of geraniol on breast carcinoma induced in female mice. The mechanism of anti-tumor activity of geraniol was examined on different tumor biomarkers and on the histopathological profile. Results showed a prominent suppression of tumor growth following geraniol treatment. In addition, geraniol prominently inhibited the expression of miR-21, and subsequently affected the downstream pathways including activation of PTEN & suppression of mTOR. Geraniol was also able to activate apoptosis and inhibit autophagy in tumor tissues. Histopathological examination revealed high necrosis

areas separating malignant cells in geraniol treated group. Combined geraniol and 5-flurouracil treatment induced more than 82% inhibition of tumor rate, surpassing the effect of each drug alone, In conclusion, results showed that geraniol might possess a potential chemotherapeutic effect in breast cancer.

Keywords: Breast cancer; Geraniol; Tumor growth; MiR-21; Apoptosis; Autophagy

PL-P-08

Modulation of TGF-β/p-Smad/p21 Cascade by Memantine and Rosuvastatin Mitigates the Cognitive Insults and Neuroinflammation in Alzheimer's Model in Rats

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Alzheimer's disease (AD) is a multifactorial neurodegenerative disorder of complex pathogenesis and is a leading cause of dementia in aged individuals. Although the number of AD cases is escalating worldwide, there is currently a handful number of drugs with limited mechanisms of action that can provide symptomatic treatment for AD. Here we investigated the possible modulation of TGF-β1/p-Smad/p21 signaling pathway as a novel molecular target of memantine and/or rosuvastatin in treatment of AD by applying a battery of behavioral assessments and integrative approach of biochemical, histopathological, molecular and gene expression techniques. AD was induced by a single intracerebroventricular injection of streptozotocin (ICV-STZ, 3mg/Kg) in rats and drug therapy was continued for 28 days after induction of AD. Compared with the effects of ICV-STZ, memantine ameliorated the STZ evoked decrease in (1) escape latency and number of crossovers in Morris water test (2) % spontaneous alteration in Y maze (3) discrimination and recognition indices in the object recognition test. Additionally, drug therapy decreased protein expressions of Aβ, TGFβ1, p-Smad and p21 in the hippocampus of AD rats associated with increased brain glutathione and decreased malondialdehyde levels. The favorable influences of memantine on cognitive

abnormalities and molecular insults were replicated in memantine-rosuvastatin combination. These findings were confirmed histopathologically by marked reduction of gliosis and restoration of neuronal integrity in the CA1 region of the hippocampus. Interestingly, the ameliorative effect of the combined memantine/ rosuvastatin was superior to either drug alone by amending Aβ, TGF-β1, GSH, MDA, and decreasing the number of glial cells in the hippocampus. Remarkably, the abrogation of the hallmarks of AD such as Aβ, TGF-β1 and p-Smad is correlated with the recovered cognitive parameters and redox potential in treated groups. These results implicated that memantine/ rosuvastatin combination exerted imperative neuroprotective role by abrogating the TGF-β1/p-Smad2/p21 pathway, a novel molecular target crucial in the development of cognitive and inflammatory insults of AD and suggested that the combined regimen could offer a new therapeutic potential for management of Alzheimer's disease.

Keywords:
Keywords: Alzheimer; β-amyloid; NMDAR antagonist; TGF-β1; statins

PL-P-09

Machine Learning, Artificial Intelligence, and Computational Modeling in Improving the Therapeutic Outcome of Anti-arrhythmic Drugs

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Cardiovascular disorders are the main cause of mortality worldwide, estimated that 17.9 million people die each year. Cardiac arrhythmias account for 15–20 % of all these deaths. One of the most common types of arrhythmias is atrial fibrillation (AF) which occurs in 1–2% of the population. Antiarrhythmic drugs (AADs) are considered the cornerstone for controlling arrhythmia, but their mechanism of action is highly complex, variable, and dependent on experimental and clinical conditions. For this reason, we demonstrate novel computational technologies that enable us to understand how the drug interacts with cardiac ion channels. Among these technologies are Machine learning, Artificial intelligence, Computational modeling, and in silico assessment that have been recently evolved in the cardiovascular field.

The Maastricht antiarrhythmic drug evaluator (MANTA) is a computational tool showing how class III (AADs) have a better effect in large mammals than in rodents. Machine learning in patient-specific induced pluripotent stem cell-derived cardiomyocytes investigated the antiarrhythmic effect of dantrolene by analysis of calcium transient signals. Artificial intelligence algorithms were used to analyze the effect of (isoproterenol, flecainide, and verapamil) on a heterogeneous AF population. The simulation in silico assessment explored the effect of amiodarone in comparison to disopyramide on sinus node dysfunction (SND) in AF patients. In conclusion, such

computational models can simulate the drug action on the heart to analyze and assess the efficacy of anti-arrhythmic drugs and define the optimal drug targeting for better therapeutic outcomes.

Keywords: Cardiac arrhythmia; Atrial fibrillation; Antiarrhythmic drugs; Machine learning; Artificial intelligence; Computational modeling

E-Poster Abstracts

PL-EP-01

Suppression of HIF-1α/Smad/β-catenin Signaling Accounts for Pioglitazone Amelioration of Nonalcoholic Fatty Liver Disease: Enhancing Effects of Cranberry and Cinnamaldehyde

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Nonalcoholic fatty liver disease (NAFLD) is rapidly becoming the leading cause of chronic liver disease worldwide. Its pathogenesis involves multiple signaling pathways; however, the involvement of hypoxia inducible factor-1α (HIF-1α)/transforming growth factor-β1 (TGF-β1)/Smad/β-catenin is

not fully elucidated. Pioglitazone is known to improve NAFLD, whereas the underlying molecular mechanisms are not extensively clarified. In addition, cranberry and cinnamon have received increasing attention as potential therapeutic agents in metabolic disorders. Hence, this study aimed to test the hypothesis that HIF-1α/TGF-β1/Smad/β-catenin signaling is involved in NAFLD progression and that its downregulation might underlie the pioglitazone effect in NAFLD. In addition, the study aimed to determine whether the concurrent use of cranberry and/or cinnamaldehyde would boost biochemical and molecular gains of pioglitazone while limiting its major side effects; the weight gain. Rats were kept on high-fat diet for 14 weeks and NAFLD rats were orally treated with pioglitazone, cranberry, cinnamaldehyde or their combinations for 8 weeks. Pioglitazone, cranberry and to a lesser extent cinnamaldehyde significantly improved hepatic histological structure and successfully rectified liver index, AST, ALT, lipid profile, hepatic triglycerides, and HOMA-IR. Cranberry and cinnamaldehyde also inhibited multiple signaling pathways implicated in the progression of NAFLD to hepatocellular carcinoma, including HIF-1α, β-catenin, TGF-β1 and subsequently inhibited phosphorylated/total Smad2/3 and their ratios. The effect of cranberry was comparable to that of pioglitazone on almost all the studied parameters. Importantly, the most prominent results were observed in pioglitazone/cranberry/cinnamaldehyde treated group. In conclusion, the beneficial effects of this combination in NAFLD might be attributed to the modulation of hypoxia/HIF-1α, TGF-β1/Smads and Wnt/β-catenin pathways in liver. Thus, cranberry and cinnamon might be potential add-on agents to other pharmacotherapies in NAFLD.

Keywords:
High-fat diet induced NAFLD; Hypoxia inducible factor-1α; Transforming growth factor-β1; Smad2/3; β-catenin

PL-EP-02

Rhein Methotrexate-decorated Solid Lipid Nanoparticles Altering Adjuvant Arthritis Progression

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Methotrexate (MTX) and Diacerein (DIA) are two of the most potent Disease-Modifying Anti-Rheumatic Drugs used for the treatment of rheumatoid arthritis (RA). DIA has reflected some GIT and hepatobiliary manifestations in numerous cases. It undergoes biotransformation in the liver into the active metabolite Rhein (RH) which is characterized by its excellent anti-inflammatory activity and lower side effects. However, the hydrophobic nature of RH together with its low bioavailability do not encourage its use in RA. The current study aims to use RH in combination with MTX in targeted Solid Lipid Nanoparticles (MTX-RH-SLNs) for better effectiveness and lower adverse effects.

MTX-RH-SLNs were prepared and assessed for their quality attributes. The effect of the formulation was assessed *in-vivo* in an adjuvant arthritis animal model. Results revealed that MTX-RH-SLNs were in the suitable nanosize range with high negative zeta potential indicating good stability. *In-vivo*, MTX-RH-SLNs

significantly improved all measured inflammatory and arthritic markers, confirmed by electron microscopy, immunohistochemistry, and histology examination of the joints. In conclusion, MTX-RH-SLNs can represent a promising therapeutic approach for RA.

Keywords: Rhein; Methotrexate; Solid Lipid Nanoparticles; Adjuvant Arthritis; Rheumatoid Arthritis

نقابة صيادلة الاسكندرية

خدمات النقابة:

- الادارية:

عمل كارنيهات النقابة العامة والفرعية وإنهاء إجراءات القيد بالنقابة من وزارة الصحة .
استخراج ترخيص مزاولة المهنة من وزارة الصحة عربي - إنجليزى.
شهادات عدم امتلاك أكثر من صيدلية من الادارة المركزية لشئون الصيدلة بالقاهرة.
تراخيص فتح ونقل الملكية والموافقة على اسم الصيدلية.
إلغاء أو الاعفاء من التكليف من وزارة الصحة.
شهادات متنوعة (صيدلى حر، مكلف، للتأمينات، إثبات قيد، حسن سير وسلوك عربي و English،
أخصائي تحاليل، عمل خلاءات طرف متنوعة، وختم بطاقة الرقم القومى).
استخراج ومتابعة: (المعاشات، ومشروع العلاج، والإعانات للمستحقين) من إتحاد المهن الطبية.

- التعليمية:

تقدم نقابة صيادلة الاسكندرية أفضل البرامج التعليمية فى"البورد الأمريكى للالتحاق بالعمل بالخارج، تعاقدات مع عدد من الجامعات المعتمدة (ماجستير إدارة الاعمال ، ماجستير إدارة الجودة، ماجستير إدارة المستشفيات)، دبلومات (التغذية العلاجية ، إدارة الجودة ، مكافحة العدوى) برامج الكلينيكال، برنامج Top Managers والذى يؤهل الصيادلة للحصول على مناصب إدارية عليا بوزارة الصحة أو التأمين الصحى أو مستشفيات الجامعة. برنامج الصيدلية المتميزة، وبرامج الصيدلية المتخصصة:(التركيبات التجميلية، الأدوية البيطرية)، وبرامج الـ GMP. بالاضافة إلى استضافة السادة الزملاء بأهم المعارض والمؤتمرات العلمية فى مختلف التخصصات الصيدلانية.

- القضايا:

تبنى النقابة العديد من القضايا الهامة والتى تخص الصيادلة الحكومين أو الصيدليات الأهلية من خلال المركز القانونى بنقابة صيادلة الاسكندرية وأهمها:-

1 - تطبيق كادر المهن الطبية على صيادلة الجامعة، والتأمين الصحى.
2 - مساعدة الصيادلة الحكوميين فى الحصول على العديد من الحقوق والمزايا المالية التى يقرها القانون.
3- التصدى لظاهرة سلاسل الصيدليات من خلال اجراءات قانونية لوقف زحف هذه الظاهرة.
4 - مساعدة من يرغب من السادة الصيادلة استرداد صيدليته المؤجرة من الدخلاء والسلاسل.
5- إلزام وزارة الصحة والشركات بتطبيق القرار 499 بهامش ربح الصيدلى.
6 - تقديم مساعدات لترخيص صيدليات جديدة أو نقل ملكية صيدليات.
7 - تقديم مساعدات من أجل ترخيص مخزن أدوية أو نقل ملكية المخزن.
8 - استشارات قانونية وضريبية طوال العام ، ومتابعة الزملاء فى إجراءات التأمينات الاجتماعية.

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الصفحة الرسمية لنقابة الصيادلة بالاسكندرية

نقيب صيادلة الاسكندرية
د. محمد أنسى الشافعى

Pharmacognosy and Natural Products

Oral Abstract

PG-O-01

Microbial Cell Factories: The Future for Sustainable Production of Natural Products

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Plant natural products show huge chemical diversity, significant pharmacological activities, and are broadly used in cosmetics, pharmaceuticals and as food additives. Nevertheless, the majority of natural products are produced in low yields, and their extraction is usually labor-intensive and requires considerable consumption of natural resources. In addition, chemical synthesis of most of these compounds is problematic due to their complicated structures with many chiral center. A growing interest for sustainable production of natural products led to microbial cell factories garnering much scientific attention. Microbial cells are utilized as a production facility due to their potential to synthesize a range of both native and non-native metabolites to fulfill market demands. In recent years, several microorganisms have been identified, researched and optimized for the production of bioactive compounds for therapeutic and industrial applications. Through such genetically modified microorganisms, it is now possible to produce valuable biomolecules that are naturally produced in low yield. Currently, microbial cell factories have reached commercial-scale production for some biopharmaceuticals. Hence, microbial cell factories provide a promising platform for the sustainable

production of potential natural products. Various microorganisms have been engineered for such purpose such as the yeast *Saccharomyces cerevisiae*, gram-negative *Escherichia coli*, and gram-positive *Bacillus subtilis*. This research aims at engineering a platform microorganism for biosynthesis of valuable monoterpenoids such as geraniol, linalool, pinene or limonene. This requires studying the step-by-step biosynthesis pathway of the targeted monoterpenoids in their native plant sources and mimicking such pathway in the host organism through genetic and metabolic engineering. Engineering strategies should take into account; the product yield, the cost effectiveness, genetic stability and strain robustness. The goal is to direct the industry toward an alternative affordable method for production of terpenoids in general and monoterpenoids specifically.

Keywords: Natural products; Monoterpenoids: Microbial cell; Genetic engineering; Metabolic engineering

Poster Abstracts

PG-P-01

Tissue Culture Study and Biological Screening of *Lagenaria siceraria*

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Lagenaria siceraria (family Cucurbitaceae), commonly known as bottle gourd, is a medicinal plant cultivated mainly in countries of African and Asian origin. It is official in Ayurvedic Pharmacopoeia. It contains a number of primary and secondary metabolites. *Lagenaria siceraria* forms an excellent diet being rich in dietary constituents, minerals, amino acids and vitamins. It also contains important terpenoids, sterols, flavonoids, alkaloids, phenolics and phenolic acids.

It is traditionally used in India, China, Africa, Brazil and European countries as a nutritive agent having cardioprotective, cardiotonic, general tonic, anthelmintic, hepatoprotective, diuretic, antihyperlipidemic, analgesic and anti-inflammatory activity.

Plant tissue culture represent a potential renewable source of valuable medicinal compounds. Experiments are conducted to investigate organogenesis from *Lagenaria siceraria* explants and the effects of various plant growth regulators on the metabolic profile.

Several trials with different growth regulators were done for static culture to obtain callus, and it was concluded that 2,4-D is the most important plant growth regulator to obtain callus of good quality and in a short time, thus, 2,4-D was chosen to be in each combination of plant growth regulator in suspension cultures.

In vitro cytotoxic effect of different extracts of *L. siceraria* leaves and callus were examined using cancerous cell lines, Huh-7, PC-3 and MCF-7. These are representing liver, prostate and breast cancer, respectively aiming to discover new candidates against the available cancerous cell lines in laboratory. The cytotoxic activities of the extracts were expressed in terms of IC_{50}. *L. siceraria* leaves callus extract using 2,4-D showed significant cytotoxic activity for MCF-7 > PC-3 > Huh-7 cancer cells, respectively.

Evaluation of *L. siceraria* leaves and callus extracts for their possible potential antioxidant actions were tested using the DPPH scavenging method and gallic acid as the control. They showed moderate activity.

Keywords: *Lagenaria siceraria;* Tissue culture; Cytotoxic; Antioxidant

PG-P-02

De Novo Transcriptome Analysis Reveal the Putative Pathway Genes Involved in Biosynthesis of Moracins in *Morus alba* L.

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Moracins, a group of 2-phenyl-benzofuran compounds from Family Moraceae plants, serve as phytoalexins with reported antimicrobial, anti-inflammatory and anti-tumor activities. They are known to be formed in response to biotic and abiotic stresses, while their biosynthetic pathway and regulatory mechanism remain unclear. In this work, we present *de novo* transcriptome sequencing for different tissues of *M. alba* L. seedlings as well as leaves under ultraviolet-B (UV-B) treatment and *Botrytis cinerea* infection. Differential expression analysis and co-expression analysis were used to identify candidate genes involved in moracin biosynthesis and transcriptional regulation, and a putative biosynthetic pathway were proposed in *M. alba* L. is reported.

Several main metabolites in moracin biosynthetic pathway were identified by high-performance liquid chromatography (HPLC) and their relative contents were quantified. Moracins were only detected in the roots of mulberry seedlings but accumulated in leaves under biotic infection and UV-B radiation to different degrees. Enzymatic activity assays *in vitro* showed that oxyresveratrol could be converted into moracin M under the catalyzation of crude enzymes from fibrous roots of mulberry seedlings. A total of 88,282 unigenes were assembled with an average length of 937 bp, and 82.2% of them were annotated. Based on the differential expression analysis, and enzymatic activity assays *in vitro*, moracins were traced to the phenylpropanoid pathway, and a putative biosynthetic pathway of moracins was proposed. Unigenes coding key enzymes in the pathway were identified and their expression levels were verified by qRT-PCR. Particularly, a *p*-coumaroyl CoA 2'-hydroxylase was presumed to be involved in the biosynthesis of stilbenes and deoxychalcones in mulberry. Additionally, the transcription factors that might participate in the regulation of moracin biosynthesis were obtained by co-expression analysis. These results shed light on the putative biosynthetic pathway of moracins, providing a basis for further investigation in functional characterization and transcriptional regulation of moracin biosynthesis in mulberry.

Keywords: Transcriptomics; Moracins; *Morus alba* L.; Mulberry; Biosynthesis

PG-P-03

Metabolomic Study and Investigation of Anti-Covid 19 Activity of Red Sage (*Lantana camara* L.) Cultivars Using UPLC-MS/MS Coupled to Chemometric Analysis and Molecular Docking

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Red sage (*Lantana camara* L.) is a widely spread plant that has a historical role in relieving respiratory diseases such as catarrh but only limited studies progressed to the plant's probable inhibition to respiratory viruses especially after the striking spread of SARS-COV2 infections and flare up of its mortality rates. This study aimed to investigate the inhibitory activity of different plant cultivars to SARS-COV2 – that was not previously inspected and clarify their mechanisms of action.
UPLC-MS/MS was accomplished for metabolites identification. Principle component analysis and orthogonal projection to latent structure models were built using SIMCA®. Cytotoxicity and anti-COVID-19 were done followed by TaqMan Real-time RT-PCR to study extracts' effects on RdRp and E-genes expression levels. Detected biomarkers were docked into potential targets

pockets to investigate their possible interaction patterns using Schrodinger® suite.
Forty-seven metabolites were identified, mostly were triterpenoids and flavonoids. PCA plots revealed that inter-cultivar factor has no pronounced effect on the chemical profiles of extracts except for *L. camara*, cultivar Drap d'or flowers and leaves extracts as well as for *L. camara* cv Chelsea gem leaves extract. Flowers and leaves extracts of *L. camara* cv Chelsea gem, flowers extracts of *L. camara* cv Spreading sunset and *L. camara* cv Drap d'or showed the highest selectivity indices scoring 12.3, 10.1, 8.6 and 7.8, respectively, indicating their relative high safety and efficacy. Leaves and flowers extracts of *L. camara* cv Chelsea gem, flowers extracts of *L. camara* cv Spreading sunset and *L. camara* cv Drap d'or were the most promising inhibitors to viral plaques assay. Molecular docking of the active biomarkers against RdRp revealed that isoverbascoside, luteolin-7,4`-O-diglucoside, camarolic acid and lantoic acid exhibited higher docking scores values when compared to remdesivir (−5.75 Kcal/mol), thus these four compounds can serve as promising anti-COVID-19 candidates. Flowers and leaves extracts of *L. camara* cultivars are rich sources of phytoconstituents possessing anti-COVID-19 activity.

Keywrods: *Lantana camara* L. cultivars; UPLC-MS/MS; Chemometric analysis; Anti-COVID-19 activity; Efficacy-directed markers; Molecular docking

PG-P-04

Molecular Docking, Isolation and Biological Evaluation of Compounds from *Thymelaea hirsuta* and *Ziziphus spina-christi* as Pancreatic Lipase Inhibitors

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Activity-guided fractionation of the ethanolic extracts of *Thymelaea hirsuta* and *Ziziphus spina-christi* furnished eight compounds having pancreatic lipase inhibitory activity. Six compounds; one biscoumarin; daphnoretin (1), one flavonol derivative; 5,7,4′-trihydroxy-8-methoxycarbonyl flavanol (2), four bioflavonoids; neochamaejasmin A (3), daphnodorin G-3"-methyl ether (4), daphnodorin G (5), daphnodorin B (6) were isolated from the chloroform fraction of *T. hirsuta*. On the other hand, one flavonoidal glycoside; quercetin 3-O-α-L-rhamnopyranosyl- (1 → 2)- [α-L-rhamnopyranosyl-(1 →6)]-β-D-galactopyranoside (7) and one dammarane saponin glycoside; 3-O- [α -L-fucopyranosyl (1→2) -β -D-glucopyranosyl (1→3)-α -L-arabinopyranosyl] jujubogenin (christinin A) (8) were isolated from the *n*-butanol fraction. Structure elucidation of the isolated compounds was carried out by detail analysis of ^{1}H, ^{13}C NMR, HMQC and HMBC data. These compounds showed percentage inhibition 72% (1), 52% (2) and 61.8% (3), 39% (4), 69.5% (5), 3.5% (6), 68% (7) and 75% (8) at the concentration of 250 µM and XP-G scores of lipase inhibition were 11.40 (1), 8.71 (2) and 6.13 (3), 8.23 (4), 6.22 (5), 9.76 (6), 14.66 (7) and 12.00 (8). This is the first report of the isolation of lipase inhibitors from both plants *Thymelaea hirsuta* and *Ziziphus spina-christi*. In addition to that, this might corporate in presenting the biscoumarin;

daphnoretin and the dammarane saponin; christinin A as potent lipase inhibitors.

Keywords: Lipase inhibitor; *Thymelaea hirsuta*, *Ziziphus spina-christi*; Quercetin 3-O-(2,6-di-O-α-rhamnopyranosyl-β-galactopyranoside); Christinin A; Daphnoretin

E-Poster Abstract

PG-EP-01

Evaluation of the Anti-inflammatory and Antioxidant Activities of Selected Resin Exudates

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Plant resins are reported to have high medicinal values due to their content of bioactive metabolites. Few reports were found in the last two decades concerning the chemistry and anti-inflammatory activity of the resins belonging to *Eucalyptus* and *Araucaria* genera. Therefore, the exudate resins of *Eucalyptus maculata, Araucaria excelsa and Araucaria bidwillii* were evaluated for their phenolic and flavonoid content, together with their possible anti-inflammatory potential via carrageenan-induced paw edema in rats at the doses of 100, 200, and 400 mg/kg. Methanol extract of *E. maculata* (400 mg/kg) showed the highest antioxidant activity. The results confirmed that the methanol extract of *E. maculata* kino resin, *A. bidwillii* and *A. excelsa* oleo-resin (100, 200 and 400 mg/kg) reduced carrageenan-induced paw oedema in rats. The methanol extract of *E. maculata* kino resin (400 mg/kg) was the most potent through its anti-inflammatory and antioxidant activity in a TNF-α, NFκ-B and COX-2 dependent manner and this can be attributed to its high content in phenolics.

Keywords: *Eucalyptus maculate*; *Araucaria excels*; *Araucaria bidwillii*; Resin exudate; Inflammatory biomarkers; Antioxidant

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Poster Abstracts

PC-P-01

Design of White Validated HPLC Method for Synchronized Estimation of Four Top Selling Antihyperlipidemic Drugs in Binary Mixtures Pharmaceutical Tablets.

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In our endeavor to attain the sustainable development goals, to save the environment and to implicate the novel paradigm of white analytical chemistry, we designed a rapid and white analytical methodology for the concurrent estimation of Ezetimibe (EZE) with Atorvastatin (ATO), Rosuvastatin (RSV) and Simvastatin (SIM). The adopted HPLC method employed Microsorb MV-C18 (4.6 × 250 mm, 5µm particle size). The mobile phase composed of 0.1% phosphoric acid and acetonitrile eluted in a gradient mode at 40ºC and flow rate 1mL/min. The Diode array detector was operated at 243 nm for ATO and RSV and 237 nm for EZE and SIM. The neat separation occurred in 10 min with retention times 3.48, 4.32, 4.73 and 8.74 for RSV, EZE, ATO and SIM respectively and the quantitation concentration ranges were 1-50 µg/mL. In addition to their validation according to the ICH guidelines, the greenness assessment using the novel AGREE calculator and the holistic functionality evaluation

applying the hexagon tool were performed. The results proved the efficiency and the whiteness of the suggested technique to be routinely implicated in quality control laboratories for the analysis of these drugs in bulk and in fixed dose combination pills.

Keywords: Statins; Ezetimibe; HPLC; White analytical chemistry; AGREE; Hexagon

PC-P-02

Validated Eco-friendly Spectrophotometric Methods for Determination of Doxazosin and Terazosin in Their Dosage Forms

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Lower urinary tract symptoms suggestive of benign prostatic obstruction are common in aging men. Medical therapy with alpha-blockade is the most common method for benign prostatic obstruction. Doxazosin and Terazosin as alpha-receptor blockers are considered as first-line therapy to relieve the symptoms of benign prostatic hyperplasia. Thus, there is a markedly increased need for selective and rapid analytical methods to analyze these drugs.

The spectrophotometric analysis of drugs in dosage forms are often subjected to spectral interference from formulation matrix. Therefore, direct UV absorbance measurements at low concentration is unreliable. In the proposed study, two validated spectrophotometric methods have been developed for quantification of Doxazosin and Terazosin in their dosage forms. **Method (I)** is based on the measurement of first derivative (D1) of absorption spectra of Doxazosin and Terazosin in 0.1N NaOH solution. The values of D1 were measured for determination of Doxazosin at 238-258 nm (peak-to-peak) using $\Delta\lambda$=3 nm and Terazosin using $\Delta\lambda$=11nm at 234 nm. Being pH dependent, **Method (II)** of first derivative difference spectrophotometry (ΔD1) has been designed for determination of Doxazosin at 290 nm and Terazosin at 274 nm using $\Delta\lambda$=11 nm for both drugs.

The validation of both methods was performed according to ICH guidelines. The linear responses for both drugs in method (I) occurred in concentrations of 2.5-30 µg/ml. In method (II) the linearity range was from 2.5-30 and 2.5-20 µg/ml for Doxazosin and Terazosin, respectively. The proposed methods can be successfully applied for analysis of both drugs in dosage forms. Compared to official HPLC methods, the proposed spectrophotometric methods have the advantages of low cost, rapid measurements and environmental protection.

Keywords: Spectrophotometry; Derivative; Derivative difference

PC-P-03
New Nano Selenium Model for Cancer Management

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This study aims to develop a simple method for synthesis of novel form vitamin c-coated selenium nanoparticles labeled with technetium-99m as a potential protective agent against breast cancer and a radiopharmaceutical for imaging of solid tumors. SeNPs are considered as a novel form of selenium that possesses strong antioxidant properties that increase the bioavailability and effects of selenium in addition to decreasing its toxicity. Also, owing to the Nano-size, SeNPs can cross intracellular and extracellular barriers of cancer tissues, so, increasing their sensitivity and selectivity to the cancer cells avoiding the surrounding healthy tissues. Vitamin C inhibits tumor growth by disrupting Phase G1 in the cell cycle and inducing apoptosis in abnormal cells. Technetium-99m radioactive isotopes emit gamma rays, which are picked up by a gamma camera and used for imaging. [^{99m}Tc-Vit-C (SeNPs)] complex is considered as strong antioxidant which makes it an excellent candidate for protection against cancer.

Keywords: Nano-medicine; Nano Selenium; Antioxidant; Anticancer; Technetium-99m

PC-P-04

Green Two Spectroscopic Methods for the Determination of Anticancer Drug, Nilotinib Hydrochloride: Application in Capsules and Spiked Human Plasma

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New, sensitive, and reliable spectroscopic methods were developed for the fast determination of the anti-cancer drug nilotinib hydrochloride (NILO) anticancer drug. The methods depend on the reaction of NILO with erythrosine B in an acidic medium forming an ion pair complex. The first method, Method I, depends on measuring quenching of the native fluorescence of erythrosine B after reaction with NILO at pH 4 using Britton Robinson buffer. Fluorescence quenching was measured at 550 nm after excitation at 528 nm. This method showed a good linearity over the concentration range 0.04– 0.7 µg/ml. The second method, Method II, is based on measuring the absorbance of the formed complex at 551 nm. The absorbance concentration plot was rectilinear over the range 1.0 to 9.0 µg/ml. Different parameters that influenced the formation of the reaction product were carefully investigated to obtain the optimized conditions. The two approaches were carefully validated regarding the international conference for harmonization (ICH Q2 R1) guidelines. Statistical analysis of the results obtained by the proposed and previously published comparison methods revealed no significant difference between the compared methods regarding accuracy and precision. The methods could be applied

successfully to determine NILO in pharmaceutical dosage form and spiked human plasma. The methods' eco-friendly properties were evaluated by two different tools; Analytical eco-scale and Green analytical procedure index (GAPI).

Keywords: Nilotinib; Dosage forms; Spiked plasma; Erythrosine B; Fluorescence quenching

PC-P-05

Green HPTLC Simultaneous Determination of Meloxicam, Diclofenac, and Diacerein with its Pharmacopoeial Impurity; Rhein: Greenness Assessment Using Three Different Metrics

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A green HPTLC method has been developed for the simultaneous determination of Meloxicam (MLX), Diclofenac (DCF) with Diacerein (DCN), and its pharmacopeial impurity and alkaline degradation product Rhein (RIN). Reviewing the literature revealed that no HPTLC method has been reported for the simultaneous determination of the three cited drugs along with DCN pharmacopeial impurity (RIN). Merck TLC plates precoated with 60 F 254 silica gel on aluminum sheet were used as a stationary phase and were developed with a green mobile phase composed of ethyl acetate: ethanol: water (9.5: 1: 0.5 v/v respectively). Densitometric scanning was performed at 259 nm for DCN and RIN, while MLX and DCF were detected at 360 nm and 281 nm, respectively. The developed chromatographic method provided neat separation and quantitation of the analyzed compounds in pure form and pharmaceutical formulations. The developed HPTLC method was validated according to the ICH guidelines regarding linearity, range, accuracy, precision, specificity, and robustness. Additionally, greenness assessment was performed using the Analytical Eco-Scale, GAPI, and the novel AGREE tool.

Keywords: Green HPTLC; Meloxicam; Diclofenac; Diacerein; Rhein

PC-P-06

Successive Spectrophotometric Approaches for the Determination of OTC Drugs Present in Wastewater Using Dispersive Liquid-liquid Microextraction

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OTC drugs are expected to be present in wastewater from different sources, such as hospitals and pharmaceutical industry's effluents, due to their abundance and wide use. Their presence in water samples will affect the human, animal, and aquatic health. This work presents the simultaneous determination of three drugs namely, paracetamol (PCM), diclofenac (DCF) and ibuprofen (IBU) in different water samples. The simulated and true samples were extracted using dispersive liquid-liquid microextraction followed by spectrophotometric manipulation. The three drugs were estimated in the range of (2−14 µg/ml), (2−10.5 µg/ml) and (4−30 µg/ml) of PCM, IBU and DCF, respectively using successive mean centring and successive derivative subtraction and amplitude centring method. The presented methods were fully validated regarding ICH guidelines at 95% confidence. The proposed methods were found to be green in terms of usage of hazardous chemicals and solvents, energy consumption, and waste production.

Keywords: Successive mean centring; Successive derivative subtraction; Amplitude centring method; Dispersive liquid-liquid microextraction

PC-P-07

High-Performance Thin Layer Chromatographic Methods for the Simultaneous Analysis of Three Novel Oral Anticoagulants in Binary Mixtures with Rosuvastatin

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The significant importance of the binary mixtures of the novel oral anticoagulants (NOACs); Apixaban (APX), Edoxaban tosylate (EDX) and Rivaroxaban (RIV) with the lipid lowering statin HMG Co-A reductase inhibitor; Rosuvastatin calcium (ROS) resides in their co-prescription to cardiovascular patients for prophylaxis from stroke. HPTLC methods were proposed for the quantitative assay of these important mixtures and were applied to pharmaceutical dosage forms and human plasma. Two mobile phases were developed for the assay in bulk and tablets: First mobile phase; toluene: ethyl acetate: methanol: ammonia (25%) (3.5:4.5:2:0.2, v/v/v/v) (method I) was used for the 3 mixtures and the second one; methanol: ammonia (25%) (9.95:0.05,v/v) (method II) was used for EDX/ROS mixture only. For analysis in human plasma, APX was utilized as internal standard in RIV/ROS and EDX/ROS mixtures using method I and II, respectively, while RIV was used as internal standard in APX/ROS mixture using method I. The proposed methods were validated according to the ICH for the pharmaceutical dosage forms and the FDA regulations for analysis in biological fluids. The simplicity of the methods emphasizes their capability to analyze the drugs in pharmaceutical preparations and in human plasma with a simple pre-treatment procedure involving protein

precipitation with acetonitrile. The methods' selectivity was demonstrated by their ability to simultaneously analyze the drugs in presence of dosage form excipients and in presence of endogenous plasma components at a single wavelength (291 nm) with the use of the internal standard.

Keywords: NOACs; HPTLC; Human plasma

PC-P-08

Application of a New Simple Spectrophotometric Method for the Determination of the Binary Mixture of Paracetamol and Domperidone

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A simple spectrophotometric method has been developed for the simultaneous determination of the binary mixture composed of the antipyretic and analgesic paracetamol (PAR) co-formulated with the anti-emetic domperidone (DOM) without prior separation. The proposed method is based on generation of ratio spectra of one compound using the other as a divisor followed by measurement of the ratio-difference amplitudes between two selected wavelengths in the ratio spectra. For the analysis of PAR in the binary mixture, 50 µg/mL DOM was used as a divisor, and the ratio-difference amplitudes (peak to trough) between 256 and 288 nm were plotted against PAR concentration. Similarly, by using 50 µg/mL PAR as a divisor, the (peak to peak) amplitudes between 216 and 288 nm were found proportional to DOM concentration and were used for its determination. Analytical performance of the proposed spectrophotometric method was validated with respect to linearity, range, precision, accuracy, selectivity, detection and quantitation limits. Calibration curves were linear in the range 3 – 70 µg/mL for PAR and 2.5 – 15 µg/mL for DOM with correlation coefficients not less than 0.9996. Detection limits were 1.16 and 0.18 µg/mL while quantitation limits were 3.52 and 0.54 µg/mL for PAR and DOM, respectively.

Keywords: Paracetamol; Domperidone; Spectrophotometric analysis; Ratio spectra

PC-P-09
Simple Non-extractive Spectrophotometric Determination of the Aliphatic Cytoprotective Agent: Amifostine

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Amifostine (AMF) is a cytoprotective agent used as an adjunct in cancer chemotherapy and radiotherapy to protect non-cancerous cells against the toxic effects of antineoplastic drugs and ionizing radiation. Due to the absence of a chromophoric group in its structure, amifostine only exhibits very weak absorbance at about 220 nm, which renders difficult its direct determination by spectrophotometry or even by HPLC with direct UV detection. Therefore, derivatization based on the reaction of its primary amino group with various reagents to yield colored products was adopted.

This study proposes three simple colorimetric methods for determination of AMF. Method I depends on the reaction of AMF with vanillin in 0.1N sodium hydroxide solution to give a yellow colored product with maximum absorbance at 400 nm. Method II describes the reaction with eosin Y in acetate buffer (pH=4) to form an orange-red product measured at 552 nm. Method III is based on the reaction of AMF with 1,2-Napthoquinone- 4-sulphonic acid in borate buffer pH 9 yielding a yellow product measured at 308 nm. Different experimental parameters were optimized for the three methods and validation regarding linearity, ranges, precision, accuracy and limits of detection and quantification was performed. The three methods showed good linearity with r values not less than 0.999 over concentration

ranges of 15–50, 2.5–22.5 and 0.75–6 µg/mL for methods I, II and III, respectively. Detection limits of AMF were 2.59, 1.11 and 0.31 µg/mL for methods I, II and III, respectively. The three proposed spectrophotometric methods are inexpensive, rapid and they do not require laborious extraction techniques or sophisticated instruments which makes them useful for routine quality control studies of AMF in pharmaceutical industry.

Keywords: Amifostine; Aliphatic drug; Colorimetric methods; Validation

PC-P-10

Eco-friendly Derivative Synchronous Spectrofluorimetric Method for Assay of Valsartan/Sacubitril Recent Heart-Failure Fixed-Dose Combination

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Valsartan (VAL) and Sacubitril (SAC) were recently approved by FDA as fixed-dose combination "LCZ696". It was rapidly involved in all international guidelines of heart failure. Nowadays, it is also employed as a powerful hypotensive agent. VAL/SAC dual therapy is considered expensive. However, its prescription increased dramatically worldwide. This increased the demand for developing analytical methods that could analyze VAL and SAC, simultaneously. A highly sensitive and selective spectrofluorimetric method was developed for this purpose. Synchronous spectrofluorimetry technique was applied and followed by spectra derivatization at the first order. Signals were recorded at 230 and 211 nm for VAL and SAC, respectively. The method validation was carried out following ICH guidelines. VAL and SAC showed linear calibration curves in the range of 60-200 and 17-190 ng mL^{-1}, respectively. A full comparison with the reported methods was held and showed several advantages for the suggested one. High selectivity, simplicity and greenness of the proposed method recommend its application in routine quality control analysis of LCZ696 tablets. Its affordability and sensitivity encourage its wide industrial application in the developing countries.

Key Words: LCZ696; Valsartan; Sacubitril; Synchronous spectrofluorimetry; First-derivative

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Microbiology and Immunology

Oral Abstracts

PM-O-01
Integrons: Beyond Antibiotic Resistance

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The extensive use of antibiotics, along with intra- and inter-species transfer of resistant determinants mediated by plasmids, transposons, and gene cassettes in integrons, has aided in the fast spread of drug resistance in bacterial pathogens. Bacteria can transmit genetic information to defend themselves against most antibiotics. The acquisition of resistance gene arrays necessitates the use of genetic mobile elements. Horizontal gene transfer (HGT) is the transfer of genetic material from one generation of bacteria to another. A successful HGT event is not dependent only on the insertion of DNA into the cytoplasm of a recipient cell, but also on the heritability of the transferred sequences in the recipient microbe. Integrons are known to be found all across nature and include a staggering variety of gene cassettes. In reality, these platforms have been identified as critical components of bacterial adaptability and genome evolution, with a significance that extends beyond the formation of antibiotic resistance. Such elements have a significant role in the global resistance conundrum. These resistance cassettes were most likely acquired and disseminated by activated chromosomal integrons. Their taxonomic and environmental origins, on the other hand, are unknown. Integrons participate in bacterial evolution and molecular diversity, they have a role beyond antibiotic resistance.

Keywords: Gene cassettes; Antibiotic resistance; Bacterial evolution

Poster Abstracts

PM-P-01

In Silico Investigation of the Effect of SARS Cov2 Receptor Binding Domain Mutations on Receptor Binding Affinity and Fitness, Interplaying ACE2

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Introduction: SARS CoV2 employs its metastable trimeric surface glycoprotein apropos of receptor recognition and fusion. S1 subunit of S protein holds Receptor-Binding Domain (S-RBD) binds to Angiotensin-Converting Enzyme 2 (ACE2). SARS CoV2 has been continuously evolving and mutating, which caused the rise and recognition of SARS CoV2 variants holding different recognizable mutations, particularly some mutations happen to be concerned with S-RBD.
Materials and Methods: MODELLER 10.1 a homology modelling tool that employs the Monte Carlo Principal was used to construct homology models of SARS CoV2 variants S-RBD. Afterwards, constructed models were prepared using Schrödinger Suite Protein Preparation Wizard, alongside ACE2 receptor X-ray cystography collected off Protein Data Bank (PDB code 6LZG: A). Solvated-Flexible-Protein-Protein Docking was carried using HADDOCK 2.4, resultant poses with the highest cluster numbers were used for further investigations.
Results: Our results showed, reproducibility with previously reported literature regarding SARS CoV2 possessing higher binding affinity toward ACE2 than SARS CoV1 (-45.98 kcal/mol compared to -75.47 kcal/mol) showing validity of the used methods. Concerning emerged variants Alpha B.1.1.7 variant

possessed the highest binding affinity (-79.13 kcal/mol) followed by Mu B.1.621 and Eta B.1.525 with nearly identical binding affinities (-72.9 kcal/mol and 72.56 kcal/mol). On the other hand, Delta and Omicron Variants showed fairly modest Binding affinities lower than that of SARS CoV2 wild type (-66.42 kcal/mol and 62.97 kcal/mol)

It's worth noting, that individually investigating the effect of the mutations on S-RBD-ACE2 complex shows that majority of the mutations had a destabilizing effect on the complex, while increasing molecule flexibility, thus favoring more energetically favored conformations.

Conclusion: These findings suggest that mutations of S-RBD can improve the fitness of S-RBD on ACE2 receptor, yet reasoning these finding from epidemiological perceptive can envisage that increased affinity toward ACE2 receptor may not have a direct advantage for SARS CoV2, yet sheds light where the evolutionary pressure is directed, and can speculate that S-RBD affinity toward ACE2 is only one variable involved in infectivity.

Keywords: SARS CoV2: ACE2; Homology Modelling; Protein-Protein Docking: Infectivity Binding Affinity

PM-P-02

Arg89Cys: A New Mutation Detected in *gyrA* Quinolone Resistance Determining Region among *Acinetobacter baumannii* Isolates

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Abstract:
Acinetobacter baumannii is a Gram-negative, non-lactose fermenting, bacteria, which has emerged as a significant nosocomial pathogen. It has been reported to cause different types of infections including respiratory tract infections, bloodstream infections and urinary tract infections. Interestingly, it has been reported to be one of the key players in ventilator-associated pneumonia. Our aim was the characterization of some of the mechanisms of quinolone resistance among *A. baumannii* causing ventilator-associated pneumonia. A prospective study was conducted in which quinolone resistant *A. baumannii* causing ventilator-associated pneumonia were collected. *gyrA* and *parC* were amplified and sequenced. Twenty-one quinolone resistant *A. baumannii* were collected, most of them were extensively resistant isolates. Moreover, most of the isolates were found to be highly resistant to ciprofloxacin. Interestingly, all isolates harbored Ser81Leu mutation in *gyrA* and Ser84Leu mutation in *parC*. Moreover, one new mutation (Arg89Cys) was found in the quinolone resistance determining region of *gyrA* and another mutation (His43Tyr) was found outside of the *gyrA* quinolone resistance determining region. These mutations were in co-existence with Ser81Leu mutation in *gyrA* and Ser84Leu mutation in *parC*. More studies are needed to evaluate the significance of Arg89Cys and His43Tyr mutations in *gyrA* which were found among *A. baumannii* isolates resistant to quinolones.

Keywords: *gyrA*, *parC*; Mutation; *A. baumannii*

PM-P-03

Human Bocavirus Detection in Children Diagnosed with Acute Respiratory Tract Infection in Egypt and a Phylogeny Analysis for the Isolates.

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Introduction: Human bocavirus (HBoV) is a recently discovered parvovirus; it has been shown to be a common cause of respiratory infections and gastroenteritis in children. Since its identification, HBoV has been detected worldwide in nasopharyngeal swabs, serum and stool samples particularly those obtained from young children suffering from respiratory or gastrointestinal tract infections.

Aim: The aim of this work was to determine HBoV prevalence among children with acute respiratory tract infection in Egypt, to detect the most prevalent HBoV genotype and to compare PCR and ELISA as diagnostic techniques for HBoV infection.

Methods: Nasopharyngeal swabs and blood samples were obtained within the first day of admission from 75 children diagnosed with acute respiratory tract infection in El-Shatby University Hospital for Children in Alexandria, Egypt from October 2018 to March 2019. Conventional PCR was used to detect HBoV DNA, ELISA was used to detect HBoV IgM antibodies and sequencing of the VP1/2 genes was used for genotyping.

Results: Seven (9.3%) of the 75 nasopharyngeal swabs obtained from patients with acute respiratory tract infection were positive for HBoV by PCR, while 5 (6.7%) of the 75 serum samples were

positive for HBoV IgM antibodies using ELISA. The correlation between PCR and ELISA results showed a highly significant association between PCR and ELISA techniques ($X^2 = 52.041$, $P<0.01$). Phylogenetic analysis showed that all positive samples were related to the HBoV-1 genotype.

Conclusion: Human bocavirus was detected at 9.3% prevalence in nasopharyngeal swabs obtained from children with acute respiratory tract infection. The HBoV-1 genotype was the only genotype detected, suggesting that a single genetic lineage of HBoV is circulating in Egypt. PCR and ELISA are two reliable methods for detection and diagnosis of HBoV

Keywords: Human Bocavirus; Phylogeny; PCR; ELISA

E-Poster Abstracts

PM-EP-01

Novel Bipyridine Ionic Liquids Activity against Toxoplasma gondii Infection *In Vivo*

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Objective: *Toxoplasma gondii* is an obligate intracellular parasite that can spread to all warm-blooded vertebrates, causing a disease called toxoplasmosis (seropositive rates in human ranged from 10 to over 90%) with very limited treatment options.

Material & Methods: Some novel bipyridine ionic liquids derivatives (1, 2 and 3) were synthesized and characterized using different spectroscopic tools. Previously, pyridine compounds as anti-*Toxoplasma gondii* agents have been conducted and reported *in vitro*. However, this is the first study to test the anti-*Toxoplasma gondii* activity of manufactured pyridines in an infected mouse model with the acute RH strain of *T. gondii*.

Results: All the observed results demonstrated compound (3)'s powerful activity, with a considerable reduction in the parasite count reaching 85.6 % in brain tissues, followed by liver and spleen tissues (75.26 and 74.98 %, respectively) at a dose level of 10 mg/kg. The tested compounds were non-toxic at the orally administrated dose. Inflammatory and anti-inflammatory

cytokines assessments proved that Compound 3 possesses potent antiparasitic and anti-inflammatory effect. Furthermore, docking tests against TgCDPK1 and ROP18 kinase (two major enzymes involved in parasite invasion and egression) demonstrated compound 3's higher affinity with several hydrogen and hydrophobic interactions that contribute to the observed anti-*Toxoplasma gondii* activity.

Conclusion: Bipyridine ionic liquids derivatives under test can be employed as potent antiparasitic agents against the acute RH strain of *T. gondii*.

Keywords: Antiparasite; Bipyridine ionic liquids**;** *Toxoplasma gondii; In vivo* study; Immunological studies; Docking studies

PM-EP-02

Combating Metallo-Carbapenemase in E. Coli & K. Pneumoniae Isolates

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Objective: Carbapenems are widely regarded as the drugs of choice for the treatment of severe infections caused by extended-spectrum beta lactamases producing Enterobacteriaceae. The emergence of carbapenem-resistant organisms is worrisome due to the limited treatment options. Detection of carbapenemase-producing bacteria is critical for the choice of appropriate therapy. However, Inhibition of carbapenemases is an alternative approach to combat resistance to carbapenems.
Methods: In this study, Escherichia coli and Klebsiella pneumoniae carbapenem resistant isolates were recovered from 300 clinical isolates. They were subjected phenotypically for detection of class B metallo-carbapenemase (MBL) producers (by carbapenem disks with or without EDTA), and were subjected for confirmation genotypically by PCR. In addition, the synergistic activities of MBL-inhibitors in combination with carbapenems were elucidated.
Results: Two E. coli and 15 K. pneumoniae isolates were carbapenem resistant. The genes encoding blaNDM-1 carbapenemase were detected in 16/17 isolates solely, or collaboratively with either blaVIM, or blaIMP or both in all carbapenem resistant isolates, by PCR method. The VIM-carbapenemase was encoded by one isolate. In preclinical trials for development of MBL-specific inhibitors, sub-inhibitory concentrations of citric acid, malic acid, ascorbic acid and ciprofloxacin in combination with imipenem or meropenem exerted synergistic activities against metallo-carbapenemases.

Their activities are probably attributed to the chelation of zinc ions in the active site of carbapenemase.
Conclusions: The promising combined therapies might represent a new strategy for combating such serious infections caused by metallo-B-carbapenemase producers of E. coli and K. pneumoniae isolates.

Keywords: Metallo-carbapenemase; NDM-1; VIM; IMP; Zinc

PM-EP-03

Knowledge and Practice of Contact Lens Use among Adult Wearers: Cross-Sectional Study

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Background: Contact lenses (CLs) have been prescribed since more than a century for correction of refractive errors, cosmetic purpose, and as a therapeutic modality for corneal pathologies. Poor compliance to the recommended wear and care practice are considered the main cause of complications. Therefore, this study aimed to investigate the knowledge and general practice of CL use among adult wearers.
Methods: Online structured questionnaire was used to assess knowledge and practices of contact lens use among adult wearers. Results: The study involved 226 responders. A 56 % of CL use was for colored lens and female represent 59% compared to male (22%). On the other hand, 55.5% of males use the CL to correct vision. A 136 (60.6%) of the respondent got no information about the use and care of CL from the place where CL were obtained. Regarding the use of water in washing the contact lens , 50.5% wash their CL with water and 71 (31.4%) have no idea that certain microbes present in water could cause eye infection and complications. The hygienic practice questions show that 41.2% don't change the CL solution every day or two when they continue to use CL, only 26.5% replace their CL case with a new one with every new solution 78.8% wash their hand while wearing the CL and 89.8% don't exchange their CL with their friends.
Conclusion: Hygienic practices of the participants were not adequate; there is a need for more education to the consumers about the contact lens care, which should be provided by all contact lens providers so that the prevalence of eye complications will be lessened.

Keywords: Contact lens; Practice care; Contact lens wear

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Clinical Pharmacy and Pharmacy Practice

Oral Abstracts

PN-O-01
Health Literacy and Cancer

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Cancer remains a predominant health concern. Strategies for detecting and surviving cancer require systematic ongoing research, timely patient-centered evidence-based care, and dynamic policy-making. Increased survival, navigation of the healthcare system, the rising number of treatment modalities and the difficult adverse effects management add to the set of challenges in cancer care. A number of gaps has been identified when considering cancer diagnosis and management including lack of awareness about screening, low cancer literacy, and inadequate health care utilization. To fill these gaps, health literacy should be promoted. Health literacy (HL) is the cognitive and social abilities that are determinants in the motivation and capacity of the individuals and organizations to access, understand and use information for healthcare. Cancer patients should engage in timely shared decision making. Communicative health literacy is pre-requisite to patients and citizens empowerment. Cancer literacy requires cooperation between healthcare professionals, patients and caregivers for providing value-based care. Promoting cancer patients' health literacy may alleviate symptoms, positively impact health-related behaviors, extend survival and improve quality of life. Because health literacy is still difficult to define conceptually, identifying the structure, content and effectiveness of interventions to improve

health literacy about cancer is key. Preparing healthcare practitioners to communicate with people of limited health literacy skills through continuous education and continuous development programs is recommended. Cancer patients may benefit from contemporary health technology interventions aimed at improving self-management including online (eHealth) or mobile health (mHealth) applications. A call for adopting new national policies and implementation of interventions and strategies is essential to assess and address cancer health literacy barriers and to achieve the goal of better outcomes for all cancer patients.

Keywords: Health literacy; Health education; Cancer; Cancer literacy; Patient empowerment

Poster Abstracts

PN-P-01
COVID-19 Impact on the Mental Health of Egyptian Community Pharmacists: A Cross-Sectional Study

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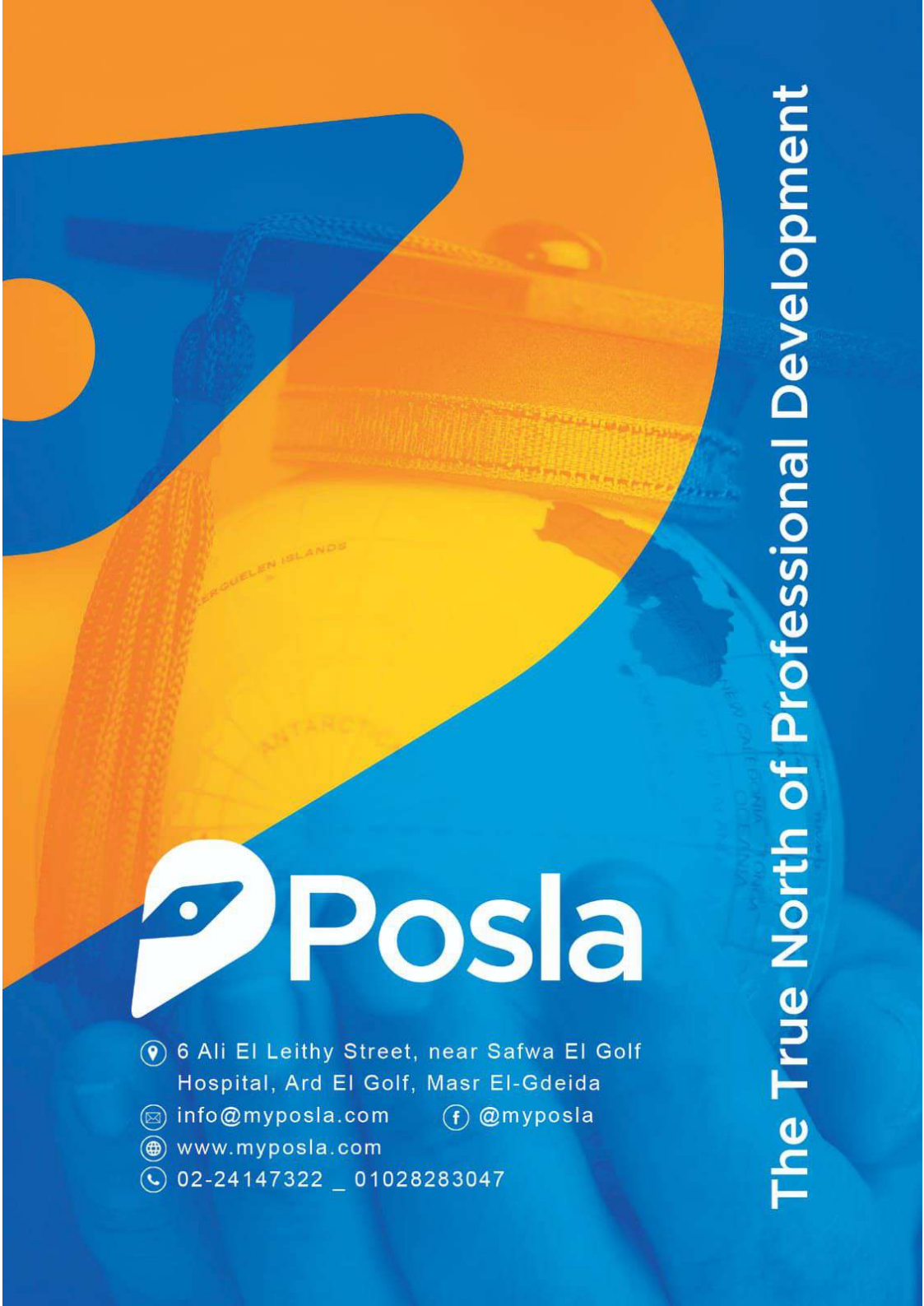
Background : The global COVID-19 pandemic had a great psychological morbidity on population worldwide. The immense impact of COVID-19 outbreak on the mental health of health care workers has been frequently reported worldwide; however, no publication has assessed the mental impact on Egyptian pharmacists working at the community pharmacies. The aim of the study was to assess the psychological changes on Egyptian community pharmacists under the national comprehensive strategy to combat covid-19 spreading .
Methods: A questionnaire survey was conducted to community pharmacists in Alexandria, Egypt between August and September 2021. A total of 1,054 community pharmacists participated in this study. Descriptive statistics and Chi-square test were used to compare categorical variables.
Results: Among the participants, 63.6% of them had covid-19 infection and 60.3% expressed that they worked longer hours than before. Most of the pharmacists who felt nervous and anxious during the pandemic were young, age 21- 30 (61.4%) (p=0.004), single (60.4%) (p=0.008) and female (67.7%) (p=0.001). Less experienced pharmacists (<5 years) were more afraid of talking to suspected or confirmed COVID-19 patients in the pharmacy

(45.7%) (p=0.011). The mental impact on non-smokers was significant on the fear of being the source of spreading covid-19 infection (87.5%) (p=0.001), suffering from social withdraw (62.4%) (p=0.002), experiencing eating disorder (66.8%) (p=0.001) and crying while working in the pharmacy (73.6%) (p=0.001). Single female felt more hopeless, uncertainty (75.2%) (p=0.001), and had difficulty in sleep (62.6%) (p=0.005). Full-time employed pharmacists often felt exhausted due to the heavy workload (61.7%) (p=0.003) and constant worry about their families (85.6%) (p=0.001). Over half of the pharmacies provided surgical masks, alcohol, hand sanitizers and gloves; however, only 11.8% provided gowns and 1.8% of the pharmacies did not provide any basic personal protection equipment.
Conclusion: Psychological support for community pharmacists should be addressed and assessed to develop the intervention if needed.

Keywords: Covid-19; Pandemic; Mental health; Community pharmacist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Pharmaceutics and Pharmaceutical Technology

Oral Abstracts

PP-O-01

Engineered Polymer Therapeutics for Modulating the Tumor Microenvironment

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Tumor associated macrophages (TAMs) play a paradoxical role in the fate of aggressive tumors as melanoma. TAMs display a wide range of phenotypes that are often simplified into an ostensible M1/M2 dichotomy, with the anti-inflammatory (tumor-permissive, M2) phenotype on one side and proinflammatory (antitumoral, M1) phenotype on the other side. TAMs tend to polarize to an activated M2 rather than the activated M1 phenotype, assisting tumor development by inducing immune suppression, and angiogenesis. Reeducation of TAMs from the M2 to M1 phenotype is an emerging attractive approach in cancer immunotherapy. Here, we propose hyaluronic acid (HA) conjugates for the codelivery of two selected immunomodulatory agents. HA conjugates were synthesized loaded with TLR7/8-agonist and a retinoid via carbodiimide coupling reaction. The impact of the conjugates on bone marrow derived macrophages was investigated regarding effect on viability, cytokines production, expression of phenotypic markers

and phagocytic capability. The conjugates were evaluated for their inhibitory efficacy against B16F10 melanoma cell line. The synthesized HA-conjugates acted synergistically as dual macrophage polarizer reserving the immunomodulatory effects of the parent drug molecules and showing enhanced inhibitory effect against B16F10 cells. *Invivo* studies on melanoma mouse model confirmed the superiority of the dual conjugate to the single HA-drug conjugates in ***inhibiting*** tumor growth. Immunoprofiling of the excised tumors revealed the dual conjugate treated group exhibited a significant increase in the M1/M2 ratio, activation of dendritic cells and increase in tumor infiltrating cytotoxic T-cells. In conclusion, a polymer conjugate was engineered as an immunotherapeutic strategy for melanoma by simultaneous delivery of two immunomodulatory drugs that synergistically skewed the polarization of macrophages towards an antitumorigenic phenotype, resulting in enhanced antitumor efficacy eliminating the need for alternating dosing schedules commonly practiced in combination immunotherapy

Keywords: Antitumor; Macrophage Polarization; Melanoma; Polymer conjugates

PP-O-02

Metal Oxides Loaded Electrospun Nanofibrous Polymer; Potential Face Protector against Respiratory Viral Infections

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In controlling the wide spread of infectious diseases, nanofibers loaded with antiviral materials were produced via the current proposed research. Nanofibrous Polyvinylidene fluoride (PVDF) loaded with zinc oxide nanoparticles (ZnO-NPs) were fabricated using electrospun technique. ZnO-NPs loaded in two concentrations; 2 and 5 wt% of the PVDF that decorating the polymeric nanofibrous mats. The mechanical properties were shown to be enhanced in case of loading by ZnO 5 %. Several characterization techniques such as Fourier Transformer Infrared (FTIR), X-Ray Diffraction (XRD), and Scanning Electron Microscope (SEM), were used to optimize the polymeric nanofibers. ZnO 5% /PVDF nanofibers were proved to be safe with pronounced antiviral activities against human adenovirus type-5 (ADV-5) as a human viral respiratory model can be cultivated safely in BSL2 lab., with the confirming the proposed interactions through In-silico studies.

Keywords: ZnO-NPs; PVDF; Electrospinning; Respiratory infections

PP-O-03
Heavy Metals and Cosmetics Industry: A Review Article

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Trace amounts of heavy metals are present during cosmetic products manufacturing. Therefore, they should be kept to a minimum acceptable level as stated by the FDA and pharmacopeias. It is so far known, that human external contact with these substances rarely result in a significant systemic exposure. However, many research studies showed that frequent local exposure to cosmetic products containing heavy metals may pose a risk of heavy metal contamination. Heavy metals such as mercury (Hg) are added to skin-whitening products; causing acute or chronic damage to human skin cells. Moreover, contamination of hair dyes and deodorants with Aluminum (Al) and Lead (Pb) threaten consumers' health dangerously for carcinogenic effects. Other possible side effects included microcytic anemia and osteomalacia. Additionally, it was found that Al provokes further side effects on human mental health as dialysis dementia and it has also been associated with the neurodegenerative disease, Alzheimer's disease (AD) in adults. Furthermore, Pb is a core component of many lipsticks, which reflects a high systemic absorption due to wrong consumers' habits. Frequent use of lipsticks containing Pb specially by children and adolescents has been significantly linked to

neurodevelopmental disorders such as autism and attention-deficit-hyperactivity-disorder (ADHD) symptoms in children. Therefore, strict regulations should be set for cosmetics manufacturing and quality control measurements should be assigned for pre- and post-marketed cosmetic products.

Keywords: Heavy metals; Cosmetics; Lead; Aluminum; ADHD; Alzheimer's disease; Toxicity; Carcinogenesis

Poster Abstracts

PP-P-01

Superparamagnetic Iron Oxide Loaded Chitosan Coated Bilosomes for Magnetic Nose to Brain Targeting of Resveratrol

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The objective of this study was to improve effectiveness of resveratrol (RES) through brain targeting by the intranasal olfactory mucosa for the treatment of Alzheimer's disease (AD). To attain this, chitosan coated bilosomes (non-ionic surfactant vesicles stabilized by bile salts, loaded with RES and superparamagnetic iron oxide nanoparticles (SPIONs) were prepared and incorporated into sodium alginate/PVP wafers. *In vitro* characterization of bilosomes including colloidal characteristics, entrapment efficiency and *in vitro* release was carried out. Hydration capacity, porosity percentage, morphology and *in vitro* release for selected wafer formulation were also investigated. Particle size of selected bilosomes, CS coated bilosome and SPION bilosomes was 208, 238 and 243nm, respectively and they provided sustained RES release for 24 h.

Both formulations were loaded in wafers and intra-nasally administered in mice with lipopolysaccharide induced AD model. Neurobehavioral tests, AD markers analysis, RT-PCR, western blotting and histopathological evaluation of the dissected brains were carried out. Results revealed the superiority of SPION bilosomes over conventional bilosomes and RES suspension in improving cognitive and memory functions, reduction of pro-inflammatory markers levels and down regulation of expression of NF-κB and P38. This may be attributed to enhanced RES therapeutic effects upon nanoencapsulation, loading into wafers, nasal administration and enhanced targeting upon the application of an external magnetic field.

Keywords: Neurodegenerative diseases; Stimuli responsive nanocarriers; Mucoadhesive wafers; Sporadic Alzheimer's disease

PP-P-02

Quercetin Loaded Oil Core Polymeric Nanocapsules for Anxiety: Intranasal Administration and Pharmacological Evaluation

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Anxiety is one of the most prevalent forms of psychopathology that affects millions worldwide. It gains more importance under the current pandemic status where the fear, moral distress and economic challenges led to higher stress resulting in high incidence of anxiety disorders. Anxiolytic drugs such as benzodiazepenes have an unfavorable risk/benefit ratio, while naturally occurring drugs such as quercetin suffer from less side effects. Quercetin is a well-known flavonoid with proved antioxidant properties. It was also reported to have neuroprotective and anxiolytic effects. In spite of its importance, quercetin is characterized by poor aqueous solubility, bioavailability, stability and extensive first pass effect. In this study and in order to improve its bioavailability and stability, quercetin was encapsulated in oil core polymeric nanocapsules and delivered through the intranasal route. The nanocapsules were prepared using nanoprecipitaion technique. The prepared nanocapsules were characterized and evaluated *in vitro* and their anxiolytic effect was evaluated in mice using elevated plus maze

and open field tests. The prepared nanocapsules were in the nanosize range with acceptable zeta potential values. TEM images showed that the prepared nanocapsules were spherical, homogenous and uniform in size. High encapsulation efficiency values were achieved due to the presence of the oil in the core of the nanocapsles. *In vitro* release study showed controlled release of quercetin from the nanocapsules to the release medium. The quercetin loaded nanocapsules showed significantly higher anxiolytic effect in mice compared to the pure quercetin powder in both elevated plus maze test and open field test. Therefore, it was found that the intranasal delivery of quercetin loaded oil core polymeric nanocapsules is a promising and successful strategy to improve the anxiolytic effect of quercetin.

Keywords: Anxiety; Quercetin; Nanocapsules; Intranasal; Elevated plus maze

PP-P-03

Novel Ionic Liquid Form of Ketoprofen Enhances Its Transdermal Delivery: An *In-Vitro* and *In-Vivo* Study

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Ionic liquids (ILs) are liquid organic salts with melting point below 100°C. A drug can be transformed into a pharmaceutical IL (API-IL) when paired with an oppositely charged counter ion. This is mediated by intermolecular interactions resulting in a melting point drop. The present work focuses on studying the effect of IL formation on physicochemical, pharmaceutical and anti-inflammatory properties of ketoprofen (KP). Piperine (PI) was chosen as a counter ion for KP IL formation. PI is a known bioenhancer of co-administered non-steroidal anti-inflammatory drugs and has complementary anti-inflammatory, analgesic, antiarthritic and anti-ulcerative effects. KP was combined with PI forming equimolar KP-PI IL via solvent evaporation method. Spectroscopic and thermal analyses indicated hydrogen bond formation between KP's hydroxyl and PI's carbonyl, amorphous nature of the liquid and a drop in its melting point. In the IL form, the solubility and skin permeation of KP increased by 71-83% and 218% respectively, in comparison to KP/PI physical mixture. The anti-inflammatory properties of KP-PI IL were assessed via *in-vitro* cyclooxygenase (COX) and lipoxygenase (LOX) inhibitory activity tests. IL cause significantly higher inhibition of COX-2 and 15-LOX enzymes in comparison to individual

drugs and physical mixture. Furthermore, the *in vivo* anti-inflammatory performance of KP-PI IL was tested using carrageenan-induced paw edema test. KP-PI IL exhibited superior edema inhibition effect upon transdermal administration resulted in a 68% less paw swelling than KP/PI mixture. These findings demonstrate the facility of using IL as a promising, economic and simple pharmaceutical approach for transdermal delivery of drug combinations.

Keywords: Ionic liquid; Ketoprofen; Piperine; Hydrogen bonding; Solubility; Permeability; Anti-inflammatory

PP-P-04

Earth Smoke Antidiabetic Activity: Phytochemical analysis, Preparation and Characterization of Oral Niosomal Delivery System

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The worldwide return to alternative medicine is bound to patient's adherence. Earth Smoke is utilized as immunomodulatory in folk medicine. The aim of the current research is to make an in-depth phytochemical analysis of Earth Smoke and the formulation of niosomal oral dosage form of its active constituent(s). Chromatographic and analytical methods were used in the phytochemical analysis of Earth Smoke. Niosomes formulation and biological testing were utilized also in this study. Earth Smoke alkaloids (ESA) have shown to be the most active ingredients in Earth Smoke. The ESA were utilized to construct niosomal formulation. The ESA niosomal formulation has shown more antioxidant and antidiabetic effects than the Earth Smoke extract. The ESA niosomal formulation might pave the way for an efficient antidiabetic oral delivery system.

Keywords: Niosomes; Anti-diabetic; Alkaloids; Earth Smoke; Oral Delivery System

PP-P-05

Development and *Invitro – Invivo* Characterization of Denture-Adhesive, Palate-Mucoadhesive Miconazole Nitrate Films for Denture Stomatitis

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Denture stomatitis commonly affects denture users. Most available antifungal buccal formulations are not capable of maintaining adequate drug levels in the mouth cavity for a sufficient time unless applied frequently .Denture-adhesive, palate-mucoadhesive buccal films were formulated and assessed in the management of upper denture stomatitis, caused by Candida albicans, in comparison to a marketed oral gel .Two films were prepared by solvent casting and characterized *in-vitro* and *in-vivo*. Performance-related tests assessed denture adhesion, palate mucoadhesion, *in-vitro* antifungal efficiency and *in-vivo* clinical effects in denture stomatitis patients (colony counts and pain scoring during treatment. Film F2 could be considered superior to F1 and to oral gel, based on patients' pain scoring at three days and colony count at ten days post treatment initiation, in spite of reduced amount of miconazole applied per day in case of films compared to gel, and based on *in-vitro* mucoadhesion time and fungi inhibition zones (double inhibition zone for F2

compared to gel, tested under equivalent amount of miconazole per agar well. Conclusively, Film (F2) proved promising for effective local treatment of denture-related candidiasis with reduced application frequency, and less daily amount of applied miconazole compared to conventional oral gel application.

Keywords:
Denture stomatitis; Mucoadhesive film; Denture-adhesion; Oral candidiasis

Note: This research has been submitted for paper publication in a scientific journal.

PP-P-06

Gel-in-core Liposomes Encapsulating Fluconazole as potential Topical Nanotherapy for Enhanced *In-vivo* Corneal Permeation and Deposition

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Fungal infections need long-term therapy with the appropriate antifungal agent. Fluconazole (FLZ) ocular delivery suffers from limited penetration, short residence time, in addition to the common barriers of the eye. Therefore, gel-in-core liposomes were fabricated as advanced ocular delivery systems integrating either hyaluronic acid (HA) or carbopol (CA) inside and surrounding vesicles by simple preparation technique. The impact of combining the selected polymers hydrogel and liposomes was investigated in various formulations. Full *in-vitro* characterization was performed regarding; the polymer and drug concentration, entrapment efficiency, particle size and stability to select the most promising formula. Structure elucidation of gel integration was done using polarizing and transmission electron microscopes before and after Triton-X100 addition. Corneal deposition and permeation were examined *ex-vivo* and *in-vivo* on male albino rabbits. Optimized formulations of gel-in-core hyalusomes (HYS7) and gel-in-core carbosomes (CBS5) showed gel in core structure and nanosize of (218 ± 5.50 nm) & (339.00 ± 5.50 nm); respectively. Cumulative amount of HYS7 and CBS5 permeated *ex-vivo* after 6 h was 2.6 and 3.4 folds higher than that of FLZ suspension, respectively. *In-vivo* corneal permeation of AUC0-24h values for HYS5 and CBS5 were

530.62 ± 44.94 and 487.12 ± 74.80; respectively with longer residence time in the eye lasts for more than 18 h. On the other hand, the AUC0-24h of FLZ suspension was 204.34 ± 7.46. In conclusion, gel in core liposomes could successfully be used as a promising delivery system for persistent ocular diseases.

Keywords: Gel-in-core; Hyaluronic acid; Carbopol; Ocular; Corneal permeation; Extended release

PP-P-07

Resveratrol Loaded Cubosomes for the Management of Ocular Disorder: Factorial Design Study

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Cubosomes are distinct, micron-sized, nanostructured particles of bicontinuous cubic crystalline liquid phase. These nanoparticles are composed of polymers, lipids and surfactants whose components are either polar or non-polar, so they are termed amphiphilic. Cubosomes possess numerous advantages including being economic, non-toxic, thermodynamically stable, in addition to their biocompatibility, drug loading capacity and preparation simplicity.

Visual impairment is a major health problem worldwide. The main causes of visual impairment and blindness are age-related diseases including age-related macular degeneration, cataract, glaucoma and diabetic retinopathy. The molecular mechanisms in Resveratrol (RSV) grant a countless of advantageous health benefits. RSV could help opposing the key molecular actions of ocular pathologies through its antioxidant control, in addition to its anti-inflammatory and anti-angiogenic properties.

In this study, Design Expert® software version 12 was used to adopt the 3^2 factorial design to optimize the resveratrol loaded cubosome nanoparticle. Each formulation contained the same amount of RSV and glycerol. The independent variables for optimization were the amount of glyceryl monoolein (GMO) and the amount of poloxamer 407. The three levels of the first variable GMO were 500 mg, 1000 mg and 1500 mg, while the levels of poloxamer 407 were 50 mg, 100 mg and 150 mg. The selected

responses were the particle size of RSV, the zeta potential of RSV and the entrapment efficiency. *In vitro* characterizations of the RSV loaded cubosomes revealed that the average particle sizes ranged from 167 nm to 488 nm, the zeta potential values ranged from -24.4 mV to -35.2 mV, and the entrapment efficiency ranged from 81.81% to 99.40%. The study revealed that the formulation combining the least amount of GMO with the highest amount of poloxamer 407 showed a significant difference when compared to the other formulations.

Keywords: Resveratrol; Cubosome; Factorial design; Ocular

PP-P-08

Elaboration of Novel Berberine Loaded Gel-Core Liposomes as a Promising Nanodermatological Approach For Leukoderma Treatment: Development, Biochemical, Biological and Gene Expression Studies

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Leukoderma is recognized as a common skin hypo-pigmentation disorder stemming from progressive selective destruction of epidermal melanocytes operating as pigmentation cells. It affects 0.5-2% of the world population. It has a severe impact on a patient's quality of life and even causes suicidal attempts. Up to date, no curative therapy is available among the marketed products which have created a substantial demand for novel leukoderma treatments. Berberine (BRB) is an isoquinoline

alkaloid with promising anti-oxidant and anti-inflammatory effects. However, it suffers from poor membrane permeability hindering its topical application. The current work is the first to elaborate and assess topical berberine loaded gel-core liposomes (BRB GC-LP) for effective and targeted leukoderma treatment. BRB GC-LP were prepared using a simple ethanol injection technique and showed promising *in-vitro* physicochemical properties such as (PS = 148.7 nm), (EE= 86.3%), sustained release, and physical stability. Novel *ex-vivo* permeability and deposition studies of BRB GC-LP was applied using full-thickness human skin to mimic its topical application. Furthermore, *in-vivo* studies were conducted using a leukoderma-induced mouse model followed by biochemical, histological and immunohistochemical investigations. In addition, gene expression of skin inflammatory markers was assessed using quantitative reverse-transcription PCR. *Biological* studies showed that topical application of BRB GC-LP displayed significant improvement in tyrosinase activity, antioxidant- and anti-inflammatory markers compared to the leukoderma-induced group and BRB conventional gel treated group with almost no significant difference relative to the negative control indicating the success of the proposed nanogel to revert leukoderma disease. It is worthy to mention that placebo gel-core liposomes demonstrated significant enhancement in biochemical markers relative to the leukoderma group confirming the intrinsic activity of the nanovesicular system. Conclusively, BRB GC-LP is considered a novel nanodermatological tool showing promising skin permeation and deposition features with high safety paving the way for its clinical application for leukoderma treatment.

Keywords: Leukoderma; Berberine; Nanodermatology; Hydroquinone; Mouse model

PP-P-09

Intranasal Repaglinide-Solid Lipid Nanoparticles: Factorial Design Optimization and *In-vivo* Assessment

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Repaglinide (REP) loaded solid lipid nanoparticles (SLNs) for intranasal administration is the subject of the current work aiming enhancement of diabetes pharmacotherapy. SLNs were prepared by applying 3^2 factorial design using hot melt emulsion technique. Surfactant and lipid types were selected as the independent variables. The optimized formula composed of glyceryl monostearate and Poloxamer 188 was coded ($REP.SLN_{F1}$). The optimized SLNs showed small particle size (113.5nm), high zeta-potential (-38.5 mV), acceptable entrapment efficiency (61.85%) and sustained drug release of 101.31 % after 6-hour. Drug release data results were best fitted to Korsmeyer–Peppa's kinetic model. The optimized formula was physically and chemically stable at 4°C. Transmission electron microscope showed solid dense spherical structure with a smooth surface nanoparticle. *In-vivo* pharmacodynamic study results in diabetic rats proved to be safe and succeeded to show superior hypoglycemic activity for REP after nasal administration versus oral route as manifested by higher maximum reduction (MR%) and total decrease (TD) in blood glucose level with a significant

longer duration of action > 6 h. Conclusively, the developed intranasal drug-loaded SLNs formula succeeded to achieve the maximum therapeutic outcome of REP in dose reduction frequency for diabetes mellitus treatment.

Keywords: Diabetes mellitus; Factorial design; Nasal delivery; Repaglinide; Solid lipid nanoparticles

E-Poster Abstracts

PP-EP-01

Fabrication, Optimization, and *In Vitro*/*In Vivo* Evaluation of Diclofenac Epolamine Flash Tablet

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The objective of this work was to design a diclofenac epolamine (DE) flash tablets (FTs) intended to dissolve in the mouth saliva, thereby improving the DE bioavailability and reducing its first-pass liver metabolism. Design-Expert software was used to build a $3^1.2^2$ full factorial design (12 runs). FTs were fabricated using lyophilization process. The dissolution response was selected to pick the optimized run. The results indicate that the optimized run (R1) showed the fastest drug dissolution (total dissolution in 12 min). The predicted run (Rp) showed a desirability of about 0.93. Differential scanning calorimetry(DSC) analysis results showed a decrease in the drug melting point of the R1 formulation. Fourier–transform infrared spectroscopy (FTIR) showed the compatibility of the drug with other components of formulation, X-ray powder diffraction (XRPD) analysis showed the evolution of the drug physical state from a crystalline to an amorphous form and scanning electron microscopy(SEM) divulged the disappearance of drug crystals in gelatin strands. The results of the pharmacokinetic study performed in 6 human volunteers evidenced an increase in the maximum DE concentration in plasma and, consequently, an increased bioavailability of the FT

formulation as compared with a reference formulation(Fr). Concisely, the developed FTs (R1) showed promising results which could be able to enhance oral bioavailability, reduce the therapeutic dose of the drug, and abate of the complications accompanied with conventional dosage forms.

Keywords: Diclofenac epolamine; Optimization; Flash tablet; Bioavailability

PP-EP-02

Preparation and Evaluation of Optimized Zolmitriptan Niosomal Emulgel

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Objective: Novel niosomal formulation may be successfully applied to treat a systemic disease such as migraine through transdermal drug delivery system (TDDS), moreover, the treatment of topical diseases such as mycotic infections by targeting and localizing the drug to the stratum corneum is also possible. The current study aims to formulate zolmitriptan (Zt) in niosomal vesicles to potentiate its transdermal effect.

Significance: The development of a promising niosomal formulation will push the scaling up of pharmaceutical industry in this field.

Methods: Design- Expert10 was used to design twelve formulations using BoxBehnken. Zt loaded museums were prepared by the thin film hydration method using Span 60, Span 80 along with cholesterol at three different levels, the optimized formulation (F11) was formulated in Emulgel (1:1 emulsion/gel ratio).

Results: The obtained vesicle revealed vesicle size (VS) ranging from 133.1 to 851.3 mm, zeta potential (ZP) -43.8 to -82.8 mg, entrapment efficiency (EE%) from 66.7 to 88.7%, and Zt release after 4 h up to 67%. Optimized niosomal formulation (F11) depicted the smallest VS (133.1nm), highest EE (88.7%), high ZP (-80.6mg) and satisfactory release after 4h (61.5%). F11 depicted significant ($p < 0.05$) drug permeation 346.92 ,460.98 ug/cm2

after 8 h for niosomal F11 and niosomalF11 loaded Emulgel respectively, thixotropic behavior of rapid recovery, significant bioavailability and pharmacokinetic parameters as compared to the Zt-loaded Emulgel
Conclusion: Optimized F11 represents a promising formulation for transdermal drug delivery system to treat both topical and systemic diseases.

Keywords: Zolmitriptan; Niosomes; Pharmacokinetic parameters

NATURAL INGREDIENTS

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Students Abstracts

S-01
Firibastat as a New Approach in Treatment of Hypertension

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Numerous classes of antihypertensive medications are currently available in the market to control blood pressure. Large number of patients are suffering nowadays from the resistant hypertension and the first line drugs became not effective anymore. Thus, there must be a solution to that issue so, the researchers and scientists aimed to develop novel drugs aiming to work on new targets and having new mechanisms of action and new therapeutic pathways targeting Renin angiotensin system (RAS). Recently, Firibastat, a new first-in-class antihypertensive drug has been developed. Firibastat is a prodrug that when crossing the blood-brain barrier, is cleaved by reductase enzyme into two active EC33 molecules. EC33 is the active molecule that inhibits the enzyme (Aminopeptidase) (APA) that metabolize (Angiotensin II) to (Angiotensin III) which is the active peptide. A large body of evidence has previously established that angiotensin-III is one of the main effector peptides of the brain RAS that increases blood pressure by its own mechanisms. No severe adverse effects related to Firibastat treatment have been reported after performing clinical trials in animals and humans.

Keywords: Firibastat; Hypertension; EC33 molecules; Aminopeptidase; Renin angiotensin system

S-02

The Impact of COVID-19 Pandemic on Consumption of Medications and Dietary Supplements in the Egyptian Market

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Introduction: Worldwide prevalence of COVID-19, in the last two years, changed mindset towards medication use in many countries. Medication consumption changed in terms of quantity and quality. Moreover, fear of future consequences led to storage of specific types of drugs such as antibiotics, multivitamins and analgesics. As a result, these types of drugs suffered from shortage from time to time.

Objectives: This study aimed to assess the Egyptian customer's attitude towards consumption of medications and dietary supplements after prevalence of COVID-19 pandemic.

Methods: A cross-sectional randomized online questionnaire was shared within a sample of Egyptian adults. Participants were in the range of 18-60 years old. Seventy-eight percent of them were females while males constituted 22% of the study sample. For more reliability of the study results, more than 90% of chosen participants completed their higher education.

Results: 47% of the respondents are not covered by health insurance. 31% use synthetic medications for headache, common cold and dyspepsia. However, only 5.8% use natural products. Furthermore, 62.1% prefer to have their medical consultations from pharmacists over physicians. The rate of pharmacy visits

increased for 13.64% of respondents. 29.55% of them increased spending money on medications and vitamins. Over 50% of respondents started to take vitamins after the vast spread of Corona virus. 35.23% of participants showed increase in using natural herbs. Surprisingly, antibiotic use did not have an increase in 76 % of respondents. About 37% of participants have begun to accept buying alternative medicines when the required ones are not available. Paracetamol (Panadol®) and azithromycin (Zithromax®) were the main brands considered.

Conclusion: All Results indicate the significant effect of COVID-19 pandemic on Egyptian consumption of medications and dietary supplements. Their consumption significantly increased in the Egyptian market. In addition, the pandemic impact extended to the Egyptians' medical awareness.

Keywords: COVID-19; Antibiotics; Dietary supplements; Medical awareness; Egypt

S-03
3D printing: A Novel Approach in Ocular Drug Delivery

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This review provides an in-depth understanding of the applications of 3-dimensional (3D) printing in ocular drug delivery. The 3D printing, is a method of creating a 3-dimensional object layer-by-layer using a computer created design. Although it appeared since 3 decades, its implementation in drug delivery only started recently. This review discusses some of the 3D printed ocular drug delivery systems, for diseases of anterior and posterior segments of the eye including; contact lenses, intraocular implants, ocular rods, patches, …etc.
Cytomegalovirus retinitis, a vision-threatening disease, usually treated by invasive therapies; as frequent intravitreal injections of Ganciclovir due to its short half-life, or by sustained-release ocular implants, which are surgically removal after Ganciclovir depletion. 3D printing was used to formulate a non-invasive Ganciclovir loaded ultra-fluidic glycerosomes incorporated in polylactic acid-based 3D printed ocusert to prolong the release of Ganciclovir. Also, the retinal vascular disease usually treated by repeated intravitreal injection was recently treated by an implant developed as core/shell drug loaded rod to deliver both bevacizumab and dexamethasone using co-axial printing technique to release both drug from a single implant.
Moreover, the tear deficiency is a common ocular disorder with dry eye disease in which the therapeutic efficacy of topical drugs is limited due to poor ocular bioavailability and less patient

compliance. Recently, drug loaded puncture plug of dexamethasone was developed using digital light processing 3D printing. Lyophilized ocular patches of levofloxacin were also formulated to control the pain and inflammation associated with cataract surgery using semisolid extrusion 3D printing to get a successful outcome.

Conclusively, the applications of 3D printing in ocular drug delivery are extensive. It enables cost-effective design and production of ocular drug delivery systems built specifically for individual patients and provides solutions for unusual challenges.

Keywords: 3D printing; Ocular drug delivery

S-04

Repurposing Itraconazole for Cancer Treatment: An Overview of Recent Nanoformulations

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Itraconazole (ITC) is a triazole widely used antifungal agent, demonstrating potential anticancer activity by inhibiting the endothelial cell proliferation and colony formation through the Hedgehog, (Ki-67) signaling, angiogenesis and MCF-7 cells (breast cancer cells) proliferation and viability. Drug repurposing is a process of identifying new therapeutic use(s) for old/existing/available drugs and it is an increasingly attractive process as it avoids the lengthy process and cost implications associated with bringing a novel drug to market. Clinical trials have confirmed the benefits of ITC for the treatment of breast cancer, lung cancer, and basal cell carcinoma. Our work aims to gather published data about ITC nanoformulations for cancer therapy. It was reported that lipid nanocapsules (LNC) were prepared for the treatment of skin cancer, either unmodified or modified with the amphiphiles miltefosine or the lipopeptide biosurfactant surfactin. LNC formulations showed high ITC entrapment efficiency (EE) (>98%), small diameter (42-45 nm), sustained ITC release, and significant tumor growth inhibition. In

another study, LNCs were successfully prepared for the treatment of breast cancer. LNCs were modified with a subtherapeutic dose of miltefosine as a membrane bioactive amphiphilic additive (M-ITC-LNC) for the development of ITC nanoformulation with enhanced anticancer activity compared with ITC solution and unmodified ITC-LNC. Both LNC formulations showed a relatively small size (43–46 nm) and high EE (>97%), though ITC release was more sustained by M-ITC-LNC. Furthermore, there is another study for the treatment of lung cancer in which chitosan-coated poly (lactic-co-glycolic acid) nanoparticles of ITC were successfully prepared. Positively charged chitosan was used to improve the adhesion, interaction, and retention of nanoparticles at negatively charged mucosa or membranes and to promote the diffusion of nanoparticles. In conclusion, these findings confirmed that ITC nanoformulations would be a novel, safe, effective, and promising opportunity for the treatment of different types of cancer.

Keywords: Cancer; Drug repurposing**;** Nanoformulations; Itraconazole

S-05
How Hospitals are Using Artificial Intelligence to Improve Patient Outcomes?

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Artificial intelligence (AI) has increasing popularity due to technological advances. AI is being used in multiple specialties like intensive care and cardiology. Since the appearance of electrocardiogram (ECG), there have been many trials to get a better outcome by combining the use of technology and guidelines. Cardiovascular medicine is facing a lot of challenges, that's why scientists are trying to face all that racing information that comes out every second by using machine learning and AI. There are various applications of AI in cardiology, such as electrocardiography and clinical decision support. ECG is a keystone in cardiology. Now there are wearable devices of ECG that the patient can use at home or anywhere. Alive_cor is an example of a smartphone-based application that enables recording ECG. Concerning clinical decision support, the Francis-rich institution has established a model that can estimate death in patients with heart disease even better than experts. There are a lot of opportunities in hospitals to apply AI through electronic medical records. Different applications are used to

predict the length of stay, intensive care unit (ICU) readmission, mortality rate, and risk of developing medical complications. In addition, the neural network algorithm applied to the Medical Information Mart for Intensive Care III (MIMIC-III) database detects the problem of readmission in the ICU. This is open-source, free, and available. MIMIC-III data also predicts ICU mortality through demographic, physiological, and laboratory data changes. Nowadays mechanical ventilators are acceptable for delivering air to infected lungs. They are "feed-forward" systems, but sometimes lack adequacy of ventilation. A desirable solution is the development of the autonomous ventilator, a device that could monitor the patient's response to ventilation continuously while adjusting ventilatory parameters to provide the patient with a comfortable optimally delivered breath.

Keywords Artificial intelligence; Machine learning; Cardiology; Intensive care

S-06
How Personalized Medicine will Change Cancer Therapy?

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The fighting against cancer has extremely developed over the last years and the survival rate has doubled. However, to date, there is still a hurdle to achieving a generalized cure for cancer and the need for developing a specific medicine is increasing tremendously. Personalized medicine has a promising role in the diagnosis, prognosis, prediction and treatment of different types of cancer. It depends on an individual's genetic makeup and disease history before a treatment regimen is generated. It is considered a form of medicine that uses information about a person's own genes or proteins to prevent diagnose or treat disease. In cancer, personalized medicine uses specific information about a person's tumor to help make a diagnosis, plan treatment, find out how well treatment is working or make a prognosis. To obtain better specific personalized cancer treatment with minimal side effects, the integration between genomics, proteomics, transcriptomics, metabolomics, biomarkers and bioinformatics will be necessary. The heterogeneity and the complexity of tumors and epigenetic diversity remain a big challenge in cancer treatment, as well as the uniqueness of each patient's individual tumor. In this context, a better understanding

of precision medicine and personalized treatment is needed to more accurately attack a specific target tumor, reducing the possible side effects.

Keywords: Personalized medicine: Precision medicine; Cancer; Tumor

S-07
A New Hope to Cure Type 1 – Diabetes Mellitus

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Diabetes mellitus (DM) is a group of metabolic disorders characterized by high blood glucose levels due to insufficient insulin secretion, insulin action, or both. In type 1 diabetes mellitus (T1DM), an autoimmune-mediated destruction of β cells occurs which results in a lifelong dependence on exogenous insulin. Although insulin is a historic breakthrough in the management of T1DM, insulin is not a cure. Insulin injections can be expensive, difficult to administer, and insufficient to control the disease. While cadaveric islet transplantations were a promising approach in management of T1DM 1 management, its unavailability represented a major drawback, furthermore it increased the risk of infections and required the need for immunosuppressive drugs. In addition, some patients remain insulin-dependent.

There have been multiple upcoming approaches to cure T1DM including immunotherapy, artificial pancreas, and beta (β) - cell replacement therapy which will be our focus. Our aim is to discuss the concept of β-cell replacement therapy, its potentials and challenges. Beta cell replacement therapy involves the production of renewable and transplantable β-cells obtained from autologous induced pluripotent stem cells, this *in vivo* process depends on transcription factors, signaling molecules, growth factors, and culture microenvironment. However, as promising as

it is, it still faces some challenges including protecting the cells from the immune system, β-cells differentiating to be as mature as human islets and need to be equally able to secrete insulin in response to glucose.

Keywords: Type 1 Diabetes mellitus; β-cell replacement therapy; Pluripotent stem cells

S-08
The Health Impact of Climate Change: Blueprint towards Sustainable Development and Ideal Carbon Footprint

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Climate change is one of the major challenges in our life. Rising greenhouse gases as carbon dioxide (CO_2) triggered the climate changes, including heat waves, floods, droughts, forest fires, tornadoes, changes in rainfall, glaciers melting, increased sea level, desertification and disappearance of rivers, in addition to air, water and soil contamination which can directly/indirectly impact human health, including respiratory and cardiovascular systems, infectious diseases, physical and mental status. Moreover, climate change can lead to ecological collapse, loss of biodiversity, and deterioration of socioeconomic factors such as agricultural, livestock and fishery production. Carbon footprint refers to the total emission of CO_2 that can induce environmental pollution.

This study was performed via a questionnaire targeting in Alexandria, students and academic staff members in Faculty of Pharmacy, Pharos University in Alexandria, Alexandria, Egypt. The questionnaire objective was to collect data about their annual estimation of the individual carbon footprint for the participants and awareness regarding the risk factors of CO_2 emission on climate changes and human life such as the heat rising, quality of

plants, marine wealth, sea levels, high salinity of agricultural lands and a threat to food security, chronic diseases, infectious diseases, and the pregnant health and fetus.
About 1426 participated in this survey, 66.6 % from the participants had knowledge about the relation between CO_2 and climate changes, 66.7 % were aware of the relation between CO_2 and ocean acidity. 32% were aware of CO_2 effect on ozone elevation, only 16.7% had information on its effect on pregnant women and the mental health of fetus. The collected data revealed that the annual average carbon footprint for the investigated sample (2.86 tons/person) was more than its average in Egypt (2.5 tons/person) but significantly lower than the global CO_2 emission (4.8 tons). Therefore, raising the population awareness about CO_2 emission and climate changes is very important to avoid its risk.

Keywords: Greenhouse gas emissions; Carbon footprint; Climate change; Sustainable Development

S-09

Urinary Tract Infection in Patients with Chronic Kidney Disease: A Retrospective Observational Study in a Single Center Clinic

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Introduction: Chronic kidney disease (CKD) patients are at higher risk of UTI as CKD is a state of chronic inflammation, metabolic disturbance and impaired immunocompetence. In addition, Patient with CKD usually of advanced age and suffer from other comorbidities such as diabetes, hypertension, obesity, and CVD which also add to their risk of infection.

Objective: To access the etiology and associated risk factors for UTI outpatient nephrology clinic in Alexandria where 335 adult patients' medical record were retrospectively screened for UTI from January 2019 till March 2022. In addition, to identify the isolated micro-organism and its sensitivity pattern for better anticipation of treatment regimen.

Results: From 335 CKD patient included in our study, only a 36 experience a UTI in the past 3 years. Where two third (66.7%) of

them were females and one third (33.3%) were males. The most common comorbid conditions were hypertension and type 2 diabetes mellitus (T2DM), representing (80.6%) and (55.6%) of total patients respectively. Of the 47 isolates, E. coli was the most common, representing (59.6%) of all isolates, followed by klebsiella pneumonia (14.9%), enterococci (8.5%), and pseudomonas (8.5%).
Furthermore, Episodes of recurrence during last 6 months was associated with an increased risk for future recurrence and infection with a multidrug-resistant organism with a β of 0.617 (95% CI, 0.534 to 0.700)
Conclusion: Our study demonstrates the association between the UTI intrinsic risk factors and developing UTI in the future with a multidrug-resistant organism (MDRO)

Keywords: Urinary tract infection; Chronic kidney disease

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