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ABSTRACT BOOKLET

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KEYNOTE SPEAKERS

Gamal El-Leithy

Head of the Egyptian Chamber of Pharmaceutical Industry and the CEO, Chairman, and Managing Director of Future Pharmaceutical Industries

Bringing advanced pharmaceutical compounds from academia to the industry

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Academia are dedicated to education and research, but in recent years, societal impact also has become an important topic for universities. New technologies and inventions resulting from academic research should be used for the benefit of society. In pharmaceutical sciences, societal impact often includes transfer of Intellectual Property (IP) to pharmaceutical companies. This allows companies to use new knowledge or innovative technologies for drug development and (pre-) clinical studies to find new therapies. There are different ways to bring knowledge to the industry and three case studies will be highlighted, using different strategies to transfer IP from academia to commercial partners. These case studies are derived from our experiences in The Netherlands and comprise (I) transfer of IP to a spin-off company, (II) licensing IP to a spin-off company with the university as shareholder and (III) creating shared IP in collaboration with the pharmaceutical industry. Each strategy offers different benefits but also different challenges for university-based research teams. These cases will be presented in the context of our ongoing research, which is focused on the development of new therapeutic proteins and innovative drug targeting constructs for the treatment of inflammatory and fibrotic diseases in the liver. The discovery of a new strategy to detoxify lipopolysaccharide as a new therapy against sepsis is presented. Secondly, the development of a new drug targeting strategy to fibroblast-like cells for the treatment of liver fibrosis is also presented. In a third case, an innovating coupling strategy to couple drugs to proteins or drug carriers is shown. In most cases, research activities have led to clinical trails, which could not have been achieved by an academic group alone. The presented examples illustrate how the current pharmaceutical landscape functions in Science Parks around universities. An ecosystem of small and medium-sized companies around universities provides many opportunities for academic groups. It stimulates the transfer of knowledge from university to companies and the economic use of this knowledge.

Biotechnology Product Development Integrated with Business Model in Malaysia

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Biotechnology is considered as one of the most growing research fields. Using biotechnology solutions can solve many problems in health, agriculture, and industrial sectors. Therefore, Biotechnology business is one of the main drivers of knowledge-based economy (KBE) beside IT and material science. It has also been used as indicator for the country's development. In general, the percentage of contribution of KBE in national GDP provides director indication of the country's innovation capability and competitiveness. Therefore, many governmental, non-governmental and industrial funds were allocated to support this sector. However, very little number of research were able to go through the innovation-industrialization cycle for the product development to be considered as an added value to the national economy. In this cycle, the conversion of scientific value to business value product or services is needed through the transfer of knowledge from research-discovery platform to techno-industrial platform. The success of translational research cycle in biotechnology is based on many internal and external factors. In addition, before all, researchers need to understand the product/business development culture of biotechnology.

This presentation will provide a comprehensive overview and road map for researchers in the field of biotechnology/bioprocessing for biotechnology-based product industrialization. In addition, it will also give some recommendations for top management and decision makers to develop a fruitful business-Ecosystem integrated platform and efficient a quadrate helix model including: (Government-Academia-Industry-Community) to improve the biotechnology translational research in national level. This for sure will support socioeconomic sustainability in critical sectors such as food security, human health, and environment. The Malaysian Biotechnology business supportive platform and ecosystem will be also presented as one of the newest and attractive models in Southeast Asia."

Collaborations with the National Institutes of Health

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The National Institutes of Health (NIH) stands as one of the largest and most esteemed medical research organizations worldwide. As a key component of the U.S. Department of Health and Human Services, the NIH is instrumental in driving forward biomedical research, fostering scientific innovation, and advancing public health outcomes. Through its vast network, the NIH supports groundbreaking research across a multitude of medical fields. This includes conducting in-house research at its premier laboratories and providing funding for external research initiatives both within the United States and internationally. This presentation will offer a comprehensive overview of the NIH's mission, structure, and core programs, emphasizing its fundamental role in the global scientific arena. Furthermore, we will delve into promising avenues for collaboration between the NIH and Egypt, highlighting how Egyptian research institutions and scientists can participate in NIH-funded projects and partnerships through diverse funding mechanisms. A key example of fruitful collaboration comes through joint efforts facilitated by USAID (United States Agency for International Development), the U.S. National Academies of Sciences, Engineering, and Medicine, and Egypt's Science and Technology Development Fund (STDF). These partnerships have led to groundbreaking innovations in medical diagnostics, significantly enhancing patient care and improving health outcomes. The collaboration has not only produced several influential scientific publications but has also contributed to global scientific knowledge, driving advances in healthcare delivery and medical practice. This presentation will showcase how such collaborative efforts can stimulate innovation, refine medical methodologies, and bring about substantial benefits for both Egypt's healthcare system and the global medical community.

Applying Precision Medicine in Cancer Care: A Health Economics Perspective

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Health Related Quality of Life in Different Chronic Diseases and Its Related Factors

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The Health Related Quality of Life, or HRQoL, is a crucial metric for assessing the impact of both medical therapies and illness. The majority of chronic illnesses can decrease a patient's overall health, performance, HRQoL by limiting their capacity to live. HRQoL may be utilized as an index of the primary outcome and a determinant of the treatment benefit as it is a valuable tool for assessing the impact of both disorders and treatment treatments. The purpose of the current presentation was to present the HRQoL of individuals with a range of common chronic illnesses such hypertension, diabetes, heart disease, irritable bowel syndrome (IBS), arthritis, and chronic obstructive pulmonary disease (COPD) has been the subject of several studies.

Regulating Cosmetics: The Integral Role of Pharmacists in Compliance and Safety Assurance

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The use of cosmetic products by man dates back to antiquity and has evolved significantly to the present day. Over the last decade, the global market for cosmetic products has experienced exponential growth, with daily use of these products becoming commonplace for people of all ages and genders. These products contain a multitude of ingredients divided into several classes, raising concerns about their potential toxic effects on the body, whether acute or chronic. Potential toxicity is exacerbated by frequent exposure, thus increasing the risk to health, underscoring the importance of appropriate regulation. The objective of this conference is to present the different classifications and regulatory approaches adopted by various countries and their impacts on markets. We will also examine different control approaches, including in-market control and pre-market control. The role of the pharmacist is fundamental in all phases, from manufacturing to dispensing, quality control, consumer counseling, and cosmetic regulation. Furthermore, the importance of academic training in the field of cosmetology will be emphasized to ensure the safety and efficacy of cosmetic products while meeting consumer needs and expectations.

The 7 Habits for Living Well with Diabetes: Science approved

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This presentation introduces healthcare providers to the American Diabetes Association 7 Self-Care Behaviors, essential for empowering patients in managing diabetes. The session offers a high-level overview of seven critical habits: healthy eating, being active, monitoring, taking medication, problem-solving, reducing risks, and healthy coping. Attendees will learn about each habit's role in diabetes management to empower patients toward healthier lifestyles. This presentation serves as a foundation for the interactive workshop later in the day, where participants will explore hands-on strategies to implement these habits in clinical practice.

Navigating the Triad: Connecting Academia, Pharma, and Innovation

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Prof. Pharmaceutical Chemistry, GUC

Program manager, IS

Attendees will gain insights into how academic research can inform pharmaceutical development, how industry needs can shape academic inquiry, and how entrepreneurial ventures can accelerate the translation of scientific discoveries into market-ready solutions. By examining case studies and successful partnerships, we will discuss best practices for navigating this complex landscape, fostering innovation, and creating impactful solutions that address unmet medical needs. Join us to discover how collaboration across these sectors can lead to transformative advancements and drive the future of healthcare.

Bridging Science and Entrepreneurship: The Birth of my Start-Up

Maha Elgaafary

CEO and founder of Dr. MeeM Cosmeceuticals

Eco- Friendly Cosmetics Inspired by Insects

Mosad Daoud

CEO and Founder of AgriKemet Biotechnology

Technology Transfer and Process Validation: Pharmaceutical Manufacturing Best Practices from Saudi Arabia

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This presentation explores the key elements of technology transfer and process validation in the pharmaceutical industry, focusing on best practices implemented in Saudi Arabia. It covers strategic planning, project management, regulatory compliance, and innovative approaches to enhance manufacturing efficiency and product quality. The discussion includes insights into the successful localization of over 80 SKUs and highlights how advanced manufacturing technologies and risk management strategies can drive continuous improvement in the pharmaceutical sector. The goal is to provide a comprehensive overview of the practices that contribute to the advancement of the pharmaceutical industry in Saudi Arabia.

Ahmed Yosry

QC and R&D General Manager at Borg Pharmaceutical Industries

Sherif Abouzaid

Business Development Manager at Parkville Pharmaceuticals

Hossam Abdel Kader

Head of the Central Administration for Entrepreneurship - The General Investment Authority

The Central Administration for Entrepreneurship - Fekretak Sherketak Center's Services " - Your idea your business Fekretak Sherketak center started as an initiative launched by the general authority for investment to support entrepreneurial activity in Egypt and to provide full-service packages for startups in every stage of their development in the mandate of the government of Egypt’s objectives to support youth and promote business activity.

In 2020, and due to the remarkable results achieved by the initiative, it was included in the administrative governmental structure of the General Authority for Investment as the Central Unit for Entrepreneurship with a more sustainable plan of action.

Pharmaceutical Technology Transfer: A Quality by Design Approach

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Pharmaceutical technology transfer (TT) is a critical process in drug development and commercial manufacturing, where manufacturing processes and product knowledge are transferred from one organization to another, or from development to production stages. A successful technology transfer is essential to ensure consistent product quality, efficacy, and regulatory compliance. Integrating Quality by Design (QbD) into technology transfer enhances this process by systematically identifying, understanding, and controlling variability in manufacturing processes. QbD emphasizes a deep understanding of product and process design based on sound science and quality risk management (QRM), ensuring that critical quality attributes (CQAs) are maintained during scaling-up, site changes, or production modifications. By employing QRM, design space (DS) modelling, and control strategies (CS), QbD enables robust process validation and real-time quality assurance. The employment of evolutionary operation (EVOP) within the QbD framework further facilitates continuous process improvement, allowing for adaptability and optimization based on real-time data. Self-validated ensemble modeling (SVEM) is a state-of-the-art tool for predicting process outcomes and minimizing variability using minimum number of experiments thus saving time, effort and resources. Additionally, the role of Analytical Quality by Design (AQbD) is substantial for ensuring robust analytical procedures development and transfer. To conclude, QbD approach fosters seamless TTs, resulting in more robust, efficient and reliable pharmaceutical manufacturing processes and related analytical procedures.

Bioactive Products from the African *Croton* genus

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Visiting Lecturer at Royal Holloway University of London (UK)

For the past 15 years we have been studying the chemistry and authentication of African Medicinal plants. We have regularly researched ca 20 medicinal plants from the Croton genus. In this paper, we present constituents of *Croton* genus with potential anti-HIV and anti-cancer activities. Kenyan *Croton megalocarpus* and *C. dichogamus*, have exhibited crotofolane diterpenoids and sesquiterpene lactones with modest anti-HIV effects. Previously, *C. megalobotrys* was shown to have anti-HIV phorbol esters, in a Botswanan regimen used for HIV/AIDS management, and recently, we demonstrated using chemical analysis, in silico and in vitro reverse transcriptase, protease and integrase inhibitory experiments that patented Kenyan, anti-HIV tea, Carevid made of various parts of 14 Kenyan plants, including C. macrostachys, has potential against HIV virus. Congolese, *Croton mubango* exhibited an isopimarane diterpenoid and C. haumanianus exhibited a kaurane diterpenoid, with significant activities and selectivity, each, against three of the NCI's 60 cancer cell lines at the single dose concentration of 10−5 M. The isopimarane from C. mubango was active against the melanoma (MALME-3M), the ovarian (IGROV1) and renal (UO-31) cancer cell lines, whereas an esterified kaurane from C. haumanianus was active against the colon (HCT-116), the melanoma (M14) and the renal (786-0) cancer cell lines. South African *C. gratissimus* exhibited a rare example, 2,12-cyclocembrane diterpenoid, with moderate activities against the PEO1 and PEO1TaxR ovarian cancer cell lines. We have observed that chemical constituents from the Croton species have potential anti-HIV and anti-cancer activities.

Traditional Plants to Marketed products, Just few steps away

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Traditional Medicine can play important role in our modern Healthcare system and Pharmaceutical industry. Intensive research was done and still needed for verification of the claimed therapeutic potential of plants used Traditionally. The active secondary metabolites present in such plants could serve as drugs or lead compounds to develop more potent or safer entities. Nature was always unique in providing molecules with novel structures and or mechanisms of action. Study of traditional plants could also demonstrate new effects of known compounds. Our investigation of selected Traditional plants in the last decade led to the identification of some novel active compounds with high potential to be developed as marketed products. In other cases, the proper methods for preserving the plant components and effectiveness was also described.

Investigation on the bioactive properties of silkworm pupae and development of its health products

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In this study, we conducted proteomic and metabolomic analyses of silkworm pupae at various growth stages to determine the optimal active stage. We established rigorous criteria for identifying active silkworm pupae and performed comprehensive analyses of their protein and metabolite profiles across different growth stages. Additionally, we employed molecular biology, cell experiments, animal experiments, and SHIME to evaluate the bio-activity of different silkworm pupae and elucidate their underlying mechanisms. Furthermore, we developed a scientific evaluation system for active silkworm pupae and their bioactive components. Based on our findings, we successfully developed the related health products.

Induction Mechanism of Diels-Alder Adducts in Mulberry Leaves and their Potential Applications

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Morus is an important medicinal plant. Studies showed that the active ingredient Diels-Alder adducts which had anti-inflammatory, antioxidant, antibacterial, and anti-cancer activities were mainly in the root bark of Morus. However, the limited availability of mulberry resources restricts their utilization. Our previous study indicated that the contents of Diels-Alder adducts in mulberry leaves could be induced under ultraviolet-B radiation, especially in epidermal cells of mulberry leaf. To reveal the molecular mechanism underlying UV-B induction, we conducted a comprehensive analysis combing systematic biology of mulberry leaf with gene functional verification. Furthermore, we explored the potential application of UV-B induced mulberry leaf for BmNPV treatment.

Artificial Intelligence in Cardiovascular Diseases

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Generative AI in Healthcare and Clinical Medicine: Revolutionizing & Reshaping the health frontier

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The health care ecosystem finds itself at a critical juncture marked by a series of interlocking crises. The industry has attempted to incrementally solve these issues, and yet we have not made progress toward equitable, quality health care delivery. We are mired in operational, talent, financial, and value crises that demand a new disruptive paradigm. Generative AI is the missing element to truly drive the value, efficiency, effectiveness, and innovation that we require. Successful integration of Generative AI into health care hinges on effectively balancing the potential for impactful improvement against the inherent risks. As an industry, health care requires bold leadership to drive the industry forward with outcomes for consumers and efficient management of resources, both human and capital. Case-by-case assessment of each potential Generative AI application, carefully weighing the potential benefits against the associated hazards.

Artificial Intelligence in Surgery: paradigm shift in decision making

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A Convolutional Neural Network for Cardiovascular Risk Stratification in Early Prediabetes Using Continuous Blood Pressure Signals

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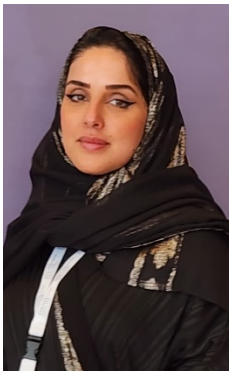
Hemodynamic time series carry considerable information about the status of cardiovascular control. Quantification of variability in biological signals, i.e. heart rate or blood pressure variability, was shown to reveal some information pertaining to disease states. However, the utilization of current variability parameters has many shortcomings. As such, we employed a convolutional neural network (CNN) to classify arterial pressure (AP) signals from rats according to age, sex, and diet and identify salient frequencies for risk stratification. AP timeseries were processed into spectrograms and scalograms, using short Fourier and wavelet transforms, respectively, then fed to the CNN. The latter produced accurate binary and multi-level classifications indicating peculiar sex- and age-specific patterns and changes in AP control in prediabetes. Time-averaged saliency unveiled novel frequencies beyond those conventionally considered to assess autonomic control in frequency domain analyses. A CNN carries the power of revealing key features of cardiovascular control necessary for risk appraisal.

The Interplay of Ovariectomy, Cognitive Decline, Alzheimer's Biomarkers, and the Modulatory Influence of Irisin and Metformin: Insights from a Post-Menopausal Simulation Study



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Background: Female hormones offer protection against chronic inflammation, yet chronic inflammation plays a significant role in cognitive decline (CD), emphasizing the inflammation-neurodegeneration link. We study ovariectomy's impact on cognitive function, potentially worsening CD. Additionally, we investigate metformin and irisin for their anti-inflammatory properties, aiming to synergistically preserve cognition during chronic inflammation. This research seeks to unveil therapeutic approaches to mitigate CD amid hormonal shifts and chronic inflammation. Method : Twelve-week-old female C57BL/6, mice underwent ovariectomy, followed by assessment of spatial memory using Y-maze and Morris water maze tests. Alzheimer's disease biomarkers in saliva and brain were quantified via ELISA, while RNAseq analysis was conducted on fecal samples. H&E and IHC were conducted on brain cortex and Hippocampus for the signs of CD Result Ovariectomized exhibited a significant impaired spatial learning and memory relative to control. An increased in AD biomarkers in the brain and saliva was also found as well as astrocyte activation, pre- and post-synaptic protein degeneration, and gut microbiota alteration. Furthermore, blood inflammatory markers including IL-6, IL-8, GM-CSF, TNF-α, IL-1β, IFN-γ, and MCAF were significantly elevated. All these findings were significantly decrease after irisin and metformin. H&E as well and IHC work is still ongoing. Conclusions To this point, our study underscores the link between ovariectomy-induced cognitive impairments and neuroinflammation, suggesting irisin and metformin as potential therapeutic interventions for menopausal women's cognitive health. Further research into these mechanisms is crucial for developing targeted strategies to mitigate cognitive decline.

Association Of Per- And Polyfluoroalkyl And Its Components' Exposure With Metabolic Syndrome In Malaysian Adults

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Perfluoroalkyl substances (PFASs) such as perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are persistent environmental contaminants. Despite the lack of toxicological studies, most PFASs can cause changes in the transcriptional level of UDP-glucuronosyltransferases (UGTs)(1,2). The inhibition of the activity of UGTs can disturb the metabolism elimination of endogenous substances, which might be a potential contributing factor for xenobiotics-induced toxicity. Studies on the association between PFOS and common diseases such as metabolic syndrome (MetS) in Southeast Asian countries are limited. This work aimed to demonstrate a simple, sensitive, and selective liquid-chromatography triple quadrupole mass spectrometry method for the quantification of PFASs in metabolic syndrome patients.

Optimising Pharmacotherapy in Pediatric Nephrology Patients: Challenges and Opportunities

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Kidney disease (KD) is a prevalent chronic condition in children that necessitates lifetime medical treatment and the need for a kidney transplant. Approximately 50% of all cases of KD in children are caused by congenital abnormalities. The pharmacotherapy for children with kidney disease (cKD) is complicated, as it typically involves using drugs that are not officially approved for this purpose and insufficient evidence of their safety and effectiveness. The combination of factors such as underdeveloped organs, constantly changing pharmacodynamic and pharmacokinetic parameters, the intricate nature of disease complications, cognitive reasoning in medication adherence, and reliance on carers for medication management may potentially expose this group of children to the potential risks of medication-related problems (MRP), which can result in significant morbidity and mortality. The prevalence of MRP in cKD is nearly twice as high as in the general child population, ranging from 32% and 51.2% with a higher magnitude in the inpatient setting than in the outpatient setting. The most prevalent MRP identified was the suboptimal efficacy of medications and the difficulty in adhering to treatment regimens. The primary factors contributing to these MRPs were the higher number of medications, prescribing errors, and patients' (or parents') literacy about the treatment and disease. Although most of the MRP in cKD were considered to be of mild to moderate severity, it is still important to implement effective preventative methods to improve the use of medication in this population, as they rely on life-long pharmacotherapy. One of the difficulties in managing pharmacotherapy in this group of interest is the lack of a standardised and validated tool for identifying their MRPs. Additionally, there is a limited availability of affordable child-friendly dosage forms and age-specific education modules to help improve medication adherence. The implementation of potential interventions may vary depending on regional practice and the healthcare system. However, by fostering collaboration in the pharmaceutical sciences field and incorporating digital health technologies, it is possible to enhance the effectiveness of drug treatment for paediatric nephrology patients.

New basic science approaches for the study of liver cancer development and progression

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Hepatocellular Carcinoma (HCC) is the predominant form of liver cancer, and is the third most common cause of cancer- related mortality worldwide. HCC arises on the background of cirrhosis that is caused by viral and non-viral causes. The most common driver mutations of HCC development are B-catenin, TERT promoter and TP53 mutations. The role of different immune cells in HCC development and progression is still under investigation. This talk will focus on the interplay between the most common HCC mutations and the infiltration of immune cells to the tumor microenvironment. Also, the metabolic changes accompanying key drivers of HCC will be mentioned. Finally, a brief comment about novel HCC bio markers will be discussed.

Imidazo[2,1-b]thiazole Derivatives As Antitumor Agents

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Imidazo[2,1-b]thiazole analogs were designed, synthesized, and biologically evaluated as anticancer agents. In vitro biological evaluation of the anticancer properties of the compounds was performed against different cancer cell lines. The new compounds showed remarkable broad - spectrum cytotoxic potency on most of the tested cell lines, and exhibited potent activity against the MCF-7 breast cancer, compared to DOX and SOR. An enzyme inhibition assay was carried out to clarify the possible mode of action of the tested compounds. Compounds were identified as possible EGFR, HER-2, and DHFR inhibitors. Cell cycle arrest were performed and results indicated that compound caused cell cycle arrest at different phases in the MCF-7, Hep G2 and Hela cells. In vivo testing of the anticancer activity of the most promising molecules in this study was conducted, and the results indicated that they possess considerable in vivo anticancer activity in mice. Data obtained from the molecular modeling simulation study were consistent with the biological evaluation results.

Targeted Protein degradation an innovative approach in drug discovery

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At the cellular level, many known mechanisms leading to disease involve some type of interaction or imbalance between proteins (lack of degradation or excessive degradation). However, some of these target proteins (i) lack active binding pockets for small-molecule inhibitors, which limits the design and development of drugs targeting these proteins; (ii) have active sites too extensive to be covered by small molecules. Targeted protein degradation (TPD) represents a new class of drugs that hijacks endogenous protein quality control systems: these molecules typically comprise a binder for the target protein (protein of interest POI) at one end and an E3 ubiquitin ligase recruiter at the other, possibly separated by a linker. The result of this scaffold is the forced proximity of the target protein to the ubiquitin ligase, leading to ubiquitin labeling for proteasomal destruction. This approach opens up the possibility of developing therapeutic agents that are more resistant to point mutations and more potent, even in the nanomolar range. Since the first PROTAC molecule entered clinical development in March 2019 [NCT04072952], TPD technology has expanded rapidly for applications ranging from oncology to antimicrobial resistance and beyond. The presentation will focus on TPD (PROTAC and molecular glue) developed on the basis of the proteasome, which removes short-lived and misfolded soluble proteins. Although PROTAC technology has a promising future in drug development, it also faces a number of challenges in drug discovery.

Benchmarking in Structural-Based Virtual Screening: Recent Applications in the Era of Artificial Intelligence

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Structure-based virtual screening (SBVS) is an in-silico technique that is broadly applied in Structural Bioinformatics and during the early stages of Drug Discovery. It is mainly based on the molecular docking of a novel group of compounds against the binding site of the 3D structure of the target protein. It aims at predicting the binding poses of the new candidates and understanding the structural aspects of the targets binding sites. Compounds that show high predicted binding scores will be selected for further biological investigations. To ensure more successful SBVS efforts, the docking tool needs to be assessed by the aid of benchmarking molecular sets, such as DEKOIS 2.0 benchmark set (http://www.pharmchem.uni-tuebingen.de/dekois/). Practically, the utilization of benchmark sets grants various advantages for the user. For example, they can ultimately be useful to reveal an efficient virtual screening workflow for a specific protein target. Hence, by selecting the most suitable tool, structure, or set of structures and preparation procedures, SBVS hit rates can be elevated. Furthermore, benchmarking contributes to the development of Artificial Intelligence AI-based tools for VS tasks in drug discovery. In this presentation, I demonstrate the concept of benchmarking using DEKOIS 2.0 and some of its recent applications in the era of Artificial Intelligence (AI).

Transforming Marine Waste into Pharmaceutical Innovations: Sustainable Pathways for Drug Development

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Marine waste, specifically fish skin, scales, and shrimp shells, offers a sustainable source for producing valuable biomaterials like collagen and chitosan. Collagen, extracted from fish skin and scales, is widely used in cosmetics, pharmaceuticals, and regenerative medicine due to its biocompatibility and low immunogenicity. Its extraction involves acid or enzymatic processes, resulting in high-quality collagen that supports wound healing and tissue engineering. Chitosan, derived from shrimp shells through the deacetylation of chitin, exhibits antimicrobial, biodegradable, and biocompatible properties. It finds applications in wound dressings, drug delivery, and water purification. Chitosan is an eco-friendly alternative to synthetic polymers, enhancing its value in biomedical and industrial fields. By utilizing marine waste, the production of collagen and chitosan not only reduces environmental impact but also creates a cost-effective, sustainable source of biomaterials, contributing to a circular economy while meeting the growing demand in the pharmaceutical and medical industries.

Minimizing Environmental Impact: Green Analytical Strategies

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The increasing global concern for environmental sustainability has led to a growing emphasis on green analytical chemistry. The concept of "green analytical chemistry" has gained significant momentum in recent years, emphasizing the development and application of analytical methods that minimize the negative impact of analytical procedures on human health and environment. Greenness assessment tools are crucial for evaluating the environmental footprint of analytical methods. This work focuses on the various metrics and tools commonly used to assess the greenness of analytical methods. For instance, the Analytical Eco-Scale, Green Analytical Procedure Index (GAPI), and Analytical GREEnness (AGREE) metric will be discussed. These tools consider factors such as solvent consumption, waste generation, energy usage, and toxicity of reagents. The application of these metrics to different analytical techniques, such as chromatography, spectroscopy, and mass spectrometry, will be presented, together with the strengths and weaknesses of such assessment tools, thus, highlighting their applicability to various analytical techniques and contexts. Moreover, the whiteness of analytical procedures will be discussed which extends beyond the traditional focus on environmental impact (greenness) to encompass a broader range of sustainability considerations. It includes the three primary dimensions of analytical methods: greenness, redness, and blueness and aims to balance analytical performance (redness) with ecological responsibility (greenness) and practical feasibility (blueness). By exploring these interrelated dimensions, this work aims to provide a comprehensive understanding of the multifaceted challenges and opportunities in the pursuit of sustainable and responsible analytical practices to ensure that analytical methods are not only environmentally friendly but also efficient, cost-effective, and reliable.

Harnessing Nature for Health: A New Era Towards Green Nano - based Drug Delivery Systems

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The burgeoning field of nanotechnology has revolutionized various sectors, including healthcare. In recent years, a paradigm shift has occurred, with researchers turning to nature for inspiration in designing sustainable and efficient DDS. Green nanotechnology, which utilizes natural materials as building blocks for nanostructures, offers a promising avenue for developing environmentally friendly and biocompatible drug delivery systems.We herein explore the potential of green nano-based DDS in addressing the challenges of conventional drug delivery highlighting the advantages of natural materials over synthetic counterparts, such as their inherent biodegradability, reduced toxicity, and enhanced cellular uptake. Moreover, green nano-based DDS can improve drug delivery efficiency, such as controlled release, targeted delivery to specific tissues or cells, and enhanced drug bioavailability. Additionally, it addresses the challenges and limitations associated with the development and implementation of these systems. In conclusion, green nano-based drug delivery systems represent a promising approach for addressing the limitations of traditional drug delivery methods. By harnessing the power of nature, researchers can develop innovative and sustainable solutions that improve patient outcomes and minimize environmental impact. As the field of green nanotechnology continues to advance, it is anticipated that these systems will play a pivotal role in shaping the future of healthcare.

Innovative Green Methods for Plant Extraction: Balancing Efficiency and Sustainability

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Global climate change, and the threat of resources deficiency in the future for the swiftly growing world population have contributed to the push for process greenness and sustainability not just to productivity. Conventional extraction of natural bioactives has been associated with high requirement of time, solvent, and energy. Green extraction of natural products is founded on the discovery and design of extraction processes, which will decrease energy consumption, allow use of alternative solvents and renewable natural products, warrant a safe and high-quality extract, and avoid the formation of toxic wastes. New extraction approaches include supercritical fluid extraction, pressurized liquid extraction, microwave assisted extraction, ultrasound assisted extraction, cold plasma extraction, amongst others. Green technology coupled with the use of green solvents, such as, deep eutectic solvents, is in line with green and sustainable development strategies. High running cost, complex configuration, training, maintenance cost, are some limitations to large scale application of green extraction techniques. The combination of novel technologies affords a better option to get the balance between the product quality, production costs, and solvent consumption. Extraction optimization is vital to identify optimal parameters for efficient extraction of natural compounds using green extraction methods. The use of response surface methodology is documented as a valuable tool for the optimization of process parameters and subsequently reduction of the number of trials.

Professional Oral Presentations

A new class of "forever chemicals" poses an emerging risk for autoimmune liver diseases

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Methylimidazolium ionic liquids (MILs) are a class of low volatility solvents used in an increasing variety of industrial applications. Recent studies identified the 8C MIL (M8OI) contaminating the environment, detected exposure in humans and proposed it to be a potential hazard trigger for the autoimmune liver disease primary biliary cholangitis (PBC). To more fully understand any PBC trigger mechanism, the interaction of M8OI with mitochondria has been examined. M8OI inhibited oxygen consumption in intact cells ($IC_{50\%}$ ~10μM). In permeabilised cells this was dependent on an inhibition in mitochondrial electron transport upstream of complex II/III. Accordingly, succinate supported mitochondrial oxygen consumption and protected against cell death in the presence of M8OI. M8OI inhibited complex I substrate NADH oxidation in mitochondrial membranes and purified complex I (using an alternative oxidase electron acceptor) with an $IC_{50\%}$ of 470μM and 340 μM respectively. Based on direct determinations of M8OI in cytosolic and organelle compartments, toxic medium concentrations of M8OI were estimated to readily reach mitochondrial concentrations commensurate with an inhibition of complex I. Accordingly, mitochondrial accumulation and complex I inhibition is the molecular initiating event for M8OI-dependent cell death. Purified complex I preparations in combination with an FMN site electron acceptor was not inhibited by M8OI, indicating no interaction of M8OI at the NADH site of complex I. Based on modelling, M8OI likely binds to the Q site in complex I. M8OI also gave rise to increases in reactive oxygen species in both isolated complex I preparations and intact cells. However, inhibitors of oxidative stress did not affect M8OI cell death. The metabolic consequences of M8OI complex I inhibition therefore likely lead to regulated apoptotic mode of cell death rather than as a consequence of increased ROS production. Understanding this interaction and the pathways activated and leading to cell death will be informative regarding mitochondrial stress, cell death and diseases such as PBC.

Cardiovascular Risk Prediction based on Retinal Vessel Analysis using Machine Learning Techniques

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As cardiovascular disease (CVD) represents a spectrum of disorders that often manifest for the first time through an acute life-threatening event, early identification of seemingly healthy subjects with various degrees of risk is a priority. More recently, traditional scores used for early identification of CVD risk are slowly being replaced by more sensitive biomarkers that assess individual, rather than population risks for CVD. Among these, retinal vascular function, as assessed by the retinal vessel analysis method (RVA), has been proven as an accurate reflection of subclinical CVD in groups of participants without overt disease but with certain inherited or acquired risk factors. Furthermore, in order to correctly detect individual risk at an early stage, specialized machine learning methods and feature selection techniques that can cope with the characteristics of the data need to be devised. Machine learning methods have the capability to consider a greater number and complexity of interacting variables than conventional statistical methods. Hence, further application of machine learning methods customised to the data to be used in the next steps of establishing RVA as a screening risk marker is anticipated to be of high importance.

Interruption of Thrombo-Inflammation Ameliorates Metabolic and Structural Manifestations of Mash on Rats: Role of Different Anti-Thrombotic Drug Classes

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Metabolic dysfunction-associated steatohepatitis (MASH) is a major public health concern, characterized by fat accumulation in liver with inflammation and cell damage. Like other complications of metabolic impairment, MASH patients present with hypercoagulability. We previously showed that some anti-coagulants elicit anti-inflammatory effects in initial stages of metabolic dysfunction by interrupting thrombo-inflammation in adipose tissue. study aimed to investigate potential preventive effects of anticoagulants, specifically rivaroxaban, enoxaparin, and clopidogrel, on MASH manifestations in a rat model. Rats were fed an atherogenic diet (15% fructose, 1.25% cholesterol, 0.5% cholic acid, 30% cocoa butter, and 30% palm oil) to induce MASH. Rats were divided into six groups: control, MASH, and four treatment groups receiving either silymarin (50mg/kg PO), rivaroxaban (20mg/Kg PO), enoxaparin (2mg/Kg SC) or clopidogrel (6.75mg/Kg PO). Treatments were initiated in the third week of induction and administered until the completion of an 8-week period. Local, systemic, metabolic, inflammatory, and coagulation markers were evaluated. In conjunction with elevated visceral adipose thrombo-inflammation, MASH-induced group exhibited elevated liver injury markers (AST, ALT, serum albumin), increased inflammatory cytokines (IL-1, IL-6), reduced antioxidant capacity, and imbalanced coagulation factors (elevated FXa, and FVIII/Protein C) compared to control. Anticoagulants and silymarin ameliorated these MASH-associated abnormalities to varying degrees. Notably, rivaroxaban showed the greatest improvement in thrombo-inflammatory markers, comparable to levels in control. The findings suggest that anticoagulants have potential therapeutic benefits in MASH by targeting underlying thrombo-inflammatory state. Further investigation is warranted to elucidate precise mechanisms and evaluate the clinical translational potential of these pharmacological interventions for MASH management.

Keywords: Metabolic Dysfunction-Associated Steatohepatitis, Thrombo-Inflammation, Silymarin, Rivaroxaban, Enoxaparin, Clopidogrel

Impact of Pharmacists in the Consultation-Liaison Psychiatry Team for Screening, Risk Stratification and Referral of Mothers with Peripartum Depression and Anxiety

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Peripartum depression and anxiety are common disorders that occur during the first 12 months after delivery. It's crucial to identify peripartum mental health disorders as they can have deleterious effects on mothers' mental states and newborns' development. One in seven women suffers from peripartum depression while one in five women suffer from peripartum anxiety. Owing to shortages in peripartum mental health services this cross-sectional study aims to highlight the role of pharmacists in the consultation-liaison psychiatry team through psychoeducation, screening, risk stratification and referral of mothers in need of professional psychiatric advice. The study was conducted in an outpatient obstetrics and gynecology clinic for mothers within their peripartum period from September 2022 to May 2023. Our Inclusion criteria were mothers who are within their 1st year postpartum, and the exclusion criteria were mothers with a history of psychiatric disorders. Screening for depression and anxiety was done by a validated Arabic language version of the self-rated Edinburgh Postnatal Depression Scale (EPDS) and Generalized Anxiety Disorder-7 scale (GAD-7). Screening results showed a 72% prevalence of possible peripartum depression and a 100% prevalence of possible peripartum anxiety ranging from mild to severe intensity. Mothers who exceeded the cut-off points for both scales were provided psychoeducation sessions and referred to a psychiatrist to undergo a structured psychiatric assessment and receive treatment recommendations. A risk stratification analysis was done to identify mothers who are more likely to develop depression or anxiety based on their age, number of previous deliveries and method of conception. The results showed no statistically significant difference among different risk factors which concludes that psychiatric pharmacy services should be provided to all mothers, regardless of their demographics to avoid the debilitating effects of depression and anxiety on themselves and their newborns.

Keywords: Peripartum Depression, Peripartum Anxiety, Consultation-Liaison Psychiatry, Pharmacist, Psychoeducation, Screening, Risk stratification.

Knowledge, Perception, and Attitude of Lebanese Hospital Pharmacists toward Biosimilars

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Biosimilars offers the potential for increased patient access to life-saving biologic treatments. However, the successful uptake and utilization of biosimilars largely depend on the knowledge, attitude, and perception of hospital pharmacists, as they play a vital role in drug selection, procurement, and dispensing. Accordingly, the current study aims to explore the knowledge, perception, and attitude of Lebanese hospital pharmacists towards biosimilars, shedding light on their understanding of these complex medications and their willingness to embrace these alternatives. A cross-sectional anonymous web-based survey was designed in January 2023 targeting Hospital Pharmacists all over Lebanon which compromise 348 pharmacists as specified by the Order of Pharmacists of Lebanon. Familiarity with biosimilars is diverse: while no pharmacist is completely unfamiliar, 27.3% are somewhat familiar, and 23.6% are very familiar. Sources of this familiarity include medical conferences (65.4%), pharma companies (55.8%), and articles (53.8%). Filgrastim, Epoetin, Palivizumab, and Interferin were not recognized as biological drugs by 58.2%, 18.2%, 33.0%, and 40.0%, respectively. On the other hand, most pharmacists correctly identified biosimilars as complex drugs similar to marketed biologics but differs from generics in terms of development and assessment requirements. Despite this, there are varying concerns about biosimilars. Hospital Pharmacists expressed moderate to high concerns about issues such as immunogenicity and quality. However, they generally supported the need for rigorous post-marketing surveillance and recognized that biosimilars can reduce healthcare costs, although opinions on switching from originator medicines are mixed. Education needs are also notable: 47.3% of pharmacists have a basic understanding but seek more knowledge, and 75.5% prefer webinars as a form of continued education. As a conclusion, a clear interest in ongoing learning and adaptation to new developments in biosimilar medicine is noticed.

Keywords: Biologics, Biosimilars, Knowledge, Perception, Attitude, Hospital Pharmacists

Linezolid therapeutic dose monitoring implementation in patients with renal impairment: A mono-center open-label prospective study

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Linezolid use carries the risk of thrombocytopenia induction, especially with chronic kidney disease (CKD) patients due to drug accumulation. Therapeutic Drug Monitoring (TDM) is recommended for efficacy and safety by targeting trough levels of 2-8 mg/L; however, limited data exist regarding CKD-specific dosing strategies. In our study, we evaluated the feasibility and outcomes of trough-based linezolid dosing in patients with advanced CKD (eGFR <30 mL/min) to inform dosing protocol development. Trough levels were measured before the 5th dose and analyzed by HPLC. Doses were reduced by 50% with elevated levels higher than 8 mg/L. Follow-up TDM at 48 hours assessed response to adjustments. Thirteen patients (11 adults) with varying kidney conditions participated (38.46% AKI on top of CKD, 23.07% CKD, and 38.46% hemodialysis dependent). Initial levels were within the therapeutic range for only 2 patients and sub-therapeutic in one patient with resolving post-obstructive AKI—two patients with initial supra-therapeutic levels discontinued treatment. The remaining eight patients with elevated levels had dose reductions. Follow-up TDM showed improvement, though some very high levels persisted. By the previous data we concluded that TDM-guided dosing is beneficial for optimizing linezolid therapy in CKD patients; however, further research is necessary to establish a CKD-specific dosing protocol.

Keywords: Linezolid, Therapeutic Drug Monitoring, Thrombocytopenia, Chronic Kidney Disease, Hemodialysis

Measures of cardio autonomic function as tools for cardiovascular risk prediction in early metabolic dysfunction

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Metabolic syndrome (MetS) is a pro-inflammatory state characterized by increased cardiovascular risk. Metabolic impairment is associated with cardiovascular autonomic neuropathy (CAN) due to altered sympathovagal balance and endothelial dysfunction. The Framingham risk score (FRS) is an example of a global risk score that integrates traditional risk factors to estimate a 10-year risk of cardiovascular death or nonfatal myocardial infarction. In addition, Cardiac Autonomic Reflex Tests (CARTs), such as the Valsalva maneuver, the deep breathing test, and the lying to standing test, are widely recognized for risk assessment and diagnosis of CAN. However, early identification of autonomic and vascular deterioration in patients with metabolic syndrome, regardless of whether they have diabetes, continues to be a challenge for prompt intervention. We aim to discover a new non-invasive marker that can diagnose this condition in apparently healthy individuals at an early stage, by correlating the CART results with FRS results, HbA1c and Homa-IR results. Thirty-five diabetic, 23 prediabetics and 44 non-diabetic subjects were recruited according to their HBA1C level and HOMA-IR. They underwent the CARTs, weighed by calibrated in-body scale, and had their FRS calculated. Diabetic patients had elevated HbA1c, insulin resistance and body fat content, whereas prediabetic patients only showed increased insulin resistance and body fat content, indicative of possible adipose tissue inflammation. Our initial findings indicate that classical CART results are useful in discriminating diabetic patients as they are mainly correlated with HbA1c values, yet fail to identify the risk levels in early prediabetes. However, only deep breath test showed a dependence on total body fat, potentially related to the parasympathetic dysfunction occurring in prediabetes as a result of adipose inflammation. Additional studies are underway to develop machine learning models capable of identifying features of the heart rate signal capable of discriminating early autonomic dysfunction in metabolically impaired patients.

Keywords: Metabolic syndrome, cardiovascular autonomic neuropathy, Cardiac Autonomic Reflex Tests, Framingham risk score

Workshops

Mental Health Myths and Facts: Debunking the Misconceptions

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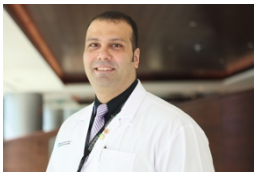
“It is OK not to be OK.” Mental illness is not a personal failure, it’s a medical condition that needs to be adressed. The negative stereotypes and social stigma surrounding mental health problems can make people feel excluded and misunderstood.

There are many myths about mental health disorders than facts, hence our interactive workshop aims to debunk those misconceptions and expose the hollowness and falseness of many common ideas and misbeliefs.

Clearing up misconceptions around mental health challenges is the best way to ensure that more people seek treatment and receive the care they need.

The 7 Habits for Living Well with Diabetes: A Practical Guide



Ziad Elgamal

Pharm.D., BCPS, CDE, APA, MLA
Lead Clinical Staff Pharmacist at Cleveland Clinic Abu Dhabi

Are you ready to elevate your diabetes care skills? Our dynamic 1.5 hours workshop, "The 7 Habits for Living Well with Diabetes: A Practical Guide," is designed specifically for healthcare providers who are passionate about empowering their patients. Dive into the evidence-based, self-care behaviors essential for diabetes management and discover practical strategies to integrate them into your patient care.

In this action-packed session, you'll:

- Quickly Review the American Diabetes
- Association 7 Self-Care Behaviors.
- Engage in Real-World Applications using behavioral psychology and practical tips for healthy eating, being active, monitoring, medication management, problem-solving, risk reduction, and healthy coping.
- Participate in Collaborative Group Exercises to apply your learning to realistic patient scenarios.
- Take Away Practical Tools and Strategies that you can immediately implement in your practice.

Don't miss this opportunity to enhance your clinical skills and make a meaningful impact on your patients' lives loin us and equip yourself with the knowledge

Student Oral presentations

Aromatase Inhibitors as Targeted Endocrine Therapy for Breast Cancer

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According to WHO, breast cancer (BC) is considered as the highest prevalence of malignancy among women worldwide and is still the leading cause of mortality in developing countries. However, BC mortality rates have declined in the past few years owing to early diagnosis and advances in treatments. BC develops from breast tissue and its classification imparts an accurate diagnosis of the disease for oncologic decision and provides insights into new treatment strategies for BC management. Chemotherapeutic agents are considered as the most widely used therapy for cancer. However, they constitute a non-specific treatment and results in many unwanted side effects and resistance liability. Consequently, new treatments for BC improving survival and quality of life with reduced morbidity are greatly sought by investigators. Therefore, it is important to design and develop new anticancer candidates with higher selectivity and lower side effects. Approximately, two-thirds of the newly diagnosed BC is hormone dependent, requiring estrogen for tumor growth. Aromatase (ARO) is considered as a useful therapeutic target in the treatment and prevention of estrogen-dependent BC. Its activity has been demonstrated in vitro and increased ARO cytochrome P450arom expression has been observed in BC tissues. The concentration of E2 present in breast tumors of postmenopausal women is about 20-fold greater than that present in plasma. Search for new lead structures for the development of efficient anticancer candidates is of great significance that can be achieved by targeting various sites. Among them, Aromatase inhibitors (AIs) block the activity of ARO involved in estrogen biosynthesis and are useful in treatment of hormone-dependent BC. They target estrogen signaling pathways that have been previously investigated as treatments for BC. Different natural and synthetic compounds have been developed, studied, and evaluated for ARO inhibitory activity. Currently, three ARO inhibitors (AIs) are in clinical use, namely anastrozole, letrozole, and exemestane.

Evaluating the risk factors causing emotional eating through the scope of gender difference and BMI

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Emotional eating (EE) is the tendency to overeat as a reaction to stress. This pattern has been linked to non-clinical anxiety and depressive symptoms. EE is one of the most significant predictors of higher BMIs and binge eating symptoms. Gender difference affects EE where females are more susceptible to stress-related mental illness, pregnancy-related stress, and higher progesterone and estradiol levels (ovarian hormones) which have been linked to the etiology of eating disorders in women. So, this study aimed to evaluate the different factors impacting stress and its role in emotional eating in university students from the perspective of gender difference and BMI. A cross-sectional observational study was conducted via a structured questionnaire of 35 questions distributed among university students in Alexandria. Questions were directed to collect data on stress and its relation with eating habits, food, self-image, and other health conditions. A sample of 384 students responded. After analyzing the data through an AI model we concluded that; from all the risk factors, failing to stick to a healthy diet, feeling of guilt, and food obsession were the most significant indicators for higher BMI and EE. Females are more susceptible to emotional eating as they have a lower ability to manage stress than males. Stress resulting from self-image was affected mainly by BMI rather than Gender. Also, underweight males showed higher stress patterns, which may be due to "Toxic Masculinity" related beliefs. Individuals with high BMIs showed psychological misconceptions (such as negative self-image, self-starvation, and feeling of guilt after eating.)

Keywords: Nutrition, Emotional Eating, Gender Difference, Stress Eating, BMI, Eating Disorders.

The Interrelationship between Climate Change and Pediatric Health; AI-driven Solutions to an Escalating Health Emergency

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The relationship between climate change and the quality of life on earth is not limited to heat waves, storms, droughts, and other environmental issues. The climate change crisis is continuing to grow affecting human health negatively in countless ways. According to the WHO, around 88% of the existing global burden of disease resulting from climate change occurs in children younger than 5 years old. These health adversities start with pregnant women, since heat waves have a strong connection to low birth weight, preterm births, stillbirths, and Neural Tube Defects (NTDs). Furthermore, children have less mature temperature regulation systems, higher body surface area relative to their mass, and a higher metabolic rate, which renders them more susceptible to heat waves risks than adults. Climate change impacts the central nervous system by triggering neuroinflammation. It also puts a strain on cardiovascular health by increasing circulatory demands. Additionally, it affects gastrointestinal health and the immune system by altering the ecology of parasites. Moreover, climate change threatens food and water security, which can lead to malnutrition. Numerous solutions are continuously being proposed to mitigate the overall influence of climate change including artificial intelligence (AI). AI-driven climate models offer a comprehensive representation of the complex climate systems of the globe. Additionally, machine learning algorithms can adjust existing climate models for the best climate projection of different greenhouse gas levels. This will enable better decision-making and more effective climate action strategies, whereupon, impacting global health. In addition to AI-based innovations, the UN highlighted the specific importance of switching to renewable energy resources and raising global awareness about the urgency of the issue. Herein we discuss the pediatric health adversities resulting from climate change, shedding the light on the current solutions including AI-based models.

Keywords: *Climate change; Artificial intelligence, Pediatric Health; Malnutrition; Infections; Cardiovascular diseases; Gastrointestinal health.*

Integrating Sustainability into Pharmacy

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This poster explores the integration of sustainability principles into the pharmaceutical sector, focusing on plant-based drug production and environmental impact. The poster delves into sustainable sourcing of medicinal plants, emphasizing different practices like hydroponic cultivation and plant milking. Green extraction principles, including solvent selection, energy efficiency, and waste reduction, are discussed, with a particular focus on techniques like supercritical fluid extraction. We also dive into the world of synthesis, understanding the principles of green chemistry and biocatalysis. The concept of biorefineries is introduced as a strategy to maximize resource utilization and minimize waste. Additionally, the poster explores the role of phytoremediation in addressing pharmaceutical waste and the potential of green walls for education and awareness. By combining traditional knowledge with modern innovation, the pharmaceutical industry can adopt a more holistic and sustainable approach to drug development and production.

Keywords: green extraction, green chemistry, phytoremediation, green walls.

Artificial Intelligence: Revolutionary Advances in Forensic Medicine

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The integration of artificial intelligence (AI) into forensic medicine marks a transformative shift in how investigations are conducted, enhancing both the accuracy and efficiency of forensic analysis. This study examines the innovative applications of AI technologies across various domains in forensic medicine. AI's capabilities extend to individual identification through DNA analysis to establish definitive connections between individuals and crime scenes. Facial recognition technology powered by sophisticated algorithms facilitates the momentary identification of individuals, dramatically accelerating investigative timelines. A notable advancement in forensic medicine is the application of AI in analyzing damaged craniofacial remains. By employing deep learning techniques, forensic specialists can reconstruct facial features from fragmented skulls, which is a valuable tool in identifying unknown individuals and solving mysterious cases by building familiar three-dimensional (3D) visualization methods and utilizing them to make 3D holographic meshes of skeletal fragments that can be manipulated. Additionally, handwriting analysis leverages machine learning to deliver more reliable results in document authentication. Altogether, age estimation methods harness AI to provide insights into the age of individuals, which is a crucial factor in diverse criminal investigations. The advent of microfluidic chip technology has further revolutionized trace sample analysis, enabling the detection of trace biological substances and thus enhancing evidence collection. Finally, in the framework of postmortem interval estimation (PMI), AI algorithms analyze a combination of biological and environmental factors for precise timeline assessments, significantly assisting in homicide investigations. These AI technologies will be discussed to highlight the profound implications of AI in forensic medicine and its potential to reshape the future of criminal justice.

Keywords: Artificial intelligence, Forensic medicine, Facial recognition, Handwriting analysis, Age estimation, Microfluidic chip, Postmortem interval estimation.

Analysis of Chiral CNS acting drug

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Chirality plays a tremendous role in determining pharmacokinetic and pharmacodynamic profiles of Central Nervous System (CNS) acting drugs. Historically, many CNS drugs were developed and marketed as racemic mixtures, containing both enantiomers in equal proportions. However, advances in analytical and synthetic techniques have enabled the separation and individual assessment of enantiomers, leading to a greater emphasis on developing enantiomerically pure drugs. The benefits of using enantiomerically pure drugs include increased specificity with chiral biological targets such as receptors, enzymes, and transport proteins, improved therapeutic index. This specificity can lead to more predictable pharmacological responses and better patient outcomes. Analytical assessments enhance therapeutic precision, elucidate the mechanisms of action, optimize dosing regimens, and identify potential side effects or toxicities. This ensures that CNS drugs are not only effective in their therapeutic roles but also safe for long-term use by patients. The growing emphasis on chiral purity in CNS drug development underscores the need for advanced analytical methods and rigorous evaluation to optimize therapeutic benefits while minimizing adverse effects. This presentation provides a concise overview of the top analytical techniques widely recognized in literature for the sensitive and selective analysis of CNS chiral drugs.

keywords: CNS chiral drugs, analytical determination, enantiomeric drugs, analytical separations.

Innovative Patient- Pharmacist Interaction: A Mobile Application to improve Healthcare

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Chronic diseases are increasing worldwide, demanding novel methods to improve healthcare accessibility. Research shows that the prevalence of medication errors including dose omission or wrong timing are high among patients which reflects inappropriate medication therapy. Non-adherence is another factor that contributes to treatment success, and it was reported low in some research. “Tamminy- طمنى” is a health mobile application which facilitates communication of patients with healthcare practitioners and aims to prioritize patients’ safety. “Tamminy-طمني " seeks to transform patient care by providing the following features: medication management where users can schedule medication reminders, monitor adherence, and obtain personalized dosage recommendations, adherence rewards system, medication history tracker in addition to health insights through delivering tailored health advice and early warning indications that results in improving lifestyle. Its approach is centered on user demands, resulting in an intuitive design that is easy to use. "طمني" is a positive step towards patient-centered healthcare where people can actively control their health.

Key words: Mobile application, medication errors, non-adherence, lifestyle

Green nanocosmeceutical formulations: A promising nanoplatform counteracting UV induced skin aging

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Aging is the crucial factor that leads to the physical appearance of skin collagen in various ways, such as decreased oil production, decreased elasticity, dry skin, loss of texture, and age spots. Diverse elements that nurture skin aging can be either internal or external factors. The internal factors comprise the irreversible process of aging by time or due to hereditary factors, while the external factors can exacerbate the internal factors through exposure to hazardous solar ultraviolet radiation, an unhealthy lifestyle, and stress. Aim and methodology: Investigate the impact of green nano-cosmeceutical formulations as an effective antiaging nanoplatform, enhancing skin penetration and drug deposition, leading to photoprotection against UVB radiation. The authors performed a computerized systemic literature review of studies related to the impact of nanocosmeceutical formulations loaded with natural ingredients as anti-aging platforms from electronic databases PubMed, Scopus, and Google Scholar from 2000 to 2023. Results and recommendation: The study highlights the potential of incorporating natural ingredients like gallic acids, catechins, epicatechins, luteolin, curcumin, quercetin, ascorbic acids, alpha- and beta-carotene, as well as caffeine, into various nanodelivery systems, including liposomes, niosomes, ethosomes, transferosomes, cubosomes, phytosomes, nanoemulsions, nanocrystals, polymeric nanoparticles, solid lipid nanoparticles, and nanostructured lipid carriers. The integration of nanotechnology with natural components has led to more targeted and effective treatments, enhanced drug loading, controlled drug release, and improved drug stability. However, safety concerns, high costs, and regulatory complexities should be considered. Conclusion: Green nanocosmeceutical formulations are gaining popularity due to their therapeutic potential and fewer limitations compared to synthetic drugs. However, concerns about the safety and toxicity of these materials remain unresolved. Therefore, continued research is crucial for optimizing their safety and fully harnessing their potential as anti-aging treatments.

Keywords: Green cosmeceuticals ; Nanoformulations ;UV damage; Antiaging

Semaglutide attenuates hepatic ischemia/reperfusion injury in rats via modulating GLP1/NF-κB/Nrf2 signaling trajectory

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Hepatic ischemia/reperfusion (HIR) injury is an inevitable issue during liver transplantation and tumor resection and is exacerbated by the subsequent inflammatory response and oxidative stress. Semgalutide, a glucagon-like peptide 1 (GLP1) agonist, is used for the treatment of type 2 diabetes mellitus and possesses anti-inflammatory and antioxidant effects in several paradigms. However, its impact on HIR injury remains unclear. Hence, the objective of this study was to evaluate the hepatoprotective effect of semgalutide, along with elucidating the potential underpinning mechanisms. Rats were randomly divided into three groups as follows: sham-operated, HIR group (30 min ischemia followed by 1 h reperfusion), and semaglutide-treated group (0.3 mg/kg 30 min before ischemia). Following reperfusion, rats were dissected for histopathological examination and biochemical analysis. Pretreatment with semaglutide considerably enhanced hepatic functions and structural integrity when compared to the HIR group, as manifested by a reduction in the levels of alanine transaminase (ALT) and aspartate transaminase (AST) and an improvement in lesion score. Mechanistically, semaglutide effectively hampered the high mobility group box 1 (HMGB1) level and subsequently prohibited the toll-like receptor 4 (TLR4), nuclear factor kappa B (NF-κB), and tumor necrosis factor α (TNF-α) trajectory relative to the HIR group. Furthermore, administration of semaglutide resulted in an upsurge in nuclear factor erythroid 2-related factor 2, leading to an increase in the expression of heme oxygenase 1 (HO-1) and repression of oxidative stress, as shown by an increase in total antioxidant capacity and a decrease in malondialdehyde (MDA) levels. Meanwhile, semaglutide increased the glucagon-like peptide-1 receptor (GLP-1R) when compared to the insult group. Our finding indicated that semaglutide has a hepatoprotective effect against HIR injury, which can be attributed to its ability to reduce inflammation and oxidative stress via modulation of the GLP-1R/NF-κB and GLP-1R/Nrf2 pathways.

Keywords: Hepatic ischemia/reperfusion, Semaglutide, GLP-1, Inflammation, Oxidative stress.

Computational screening of Remdesivir analogues as potential dual acting SARS-CoV-2 protease inhibitors

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COVID-19 pandemic has emerged as public health issue led to a serious health-socio-economic disaster. Due to urgency of the pandemic, drug repurposing is considered the best approach to find out suitable therapeutic agents against SARS-CoV-2 which is the causative agent of COVID-19. The viral main proteases: the major protease (Mpro) and the papain-like protease (PLpro) are essential for viral replication representing precious targets for potential therapeutics. Remdesivir is an antiviral medication that WHO has issued a conditional recommendation against its use in hospitalized patients. In this research we aim to find out remdesivir analogues with potential dual acting SARS-CoV-2 protease inhibition using virtual screening. In the present study, we described a step by step in silico design of a small library of compounds as dual acting SARS-CoV-2 protease inhibitors based on remdesivir analogue of indole- peptidomimetic structure with Mpro (IC_{50} = 1.72 μM) and PLpro (IC_{50}= 67 μM..Subjecting 1000 analogues to ADME filtration to evaluate their drug-like properties using two mathematical models, namely human intestinal absorption (HIA) and blood-brain barrier (BBB) penetration resulted in 299 compounds. The interaction of protein targets and 299 ligands was performed using BIOVIA-Discovery Studio 2020. Ligands exhibiting the most negative binding docking scores and significant protein interactions were selected for further in silico assays. We subsequently identified 4 hits for Mpro and 3 hits for PLpro. Compounds 227, 39, 99 and 37 inhibited Mpro with a docking score of -66.1825, -62.9514, - 61.5672 and - 58.5028 kcal/mol, respectively superior to that seen by the reference compound (-55.5291 kcal/mol). The docking data demonstrate that there are two main interactions between the CYS 145 and HIS 41 (from the protease active sites) and these compounds. Compounds 37,36 and 86 inhibited PLpro with a docking score of -67.8746, -65.7311 and -61.7746, respectively housing the catalytic triad Cys111, His272 and Asp28. In addition, we have determined the three-dimensional structures of this enzyme and its complex with compounds 37, 96 and 190 as they show superior binding affinity for both proteases. From the manually curated database, we found compound 37 to potentially serve as dual inhibitor of PLpro and Mpro.

Keywords: SARS-CoV-2, Remdesivir, In silico assay, Molecular docking.

Evaluating the Role of Food Bloggers in Shaping Healthy and Unhealthy Eating Patterns in Gen Z

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Food bloggers and influencers wield significant influence over our eating habits, particularly among younger generations. Social media platforms inundate us with visually appealing images of perfectly presented meals. Our research aims to develop and validate an online questionnaire for examining the role of food bloggers in shaping food habits and health, emphasizing the need for the media to encourage healthy eating practices and raise awareness about nutritious food choices. We conducted a literature review to gather related questions used in earlier surveys to assess these outcomes. Descriptive analysis for this research was performed with the help of SPSS software. A survey of 92 responses highlighted the significant influence of food bloggers on dietary choices, with 87% female and 90.2% aged 12-27. Preferences split closely between healthy eating (51.1%) and fast food (48.9%). Daily exposure to food bloggers occurs for 76.1%, with 65.8% seeing them more than twice daily. A notable 65.2% reported that bloggers influence their food choices, and 79.3% preferred those who include nutritional information, highlighting a potential area for improvement in health habits. Despite this, only 32.6% noticed weight changes, with 63.6% of these seeing an increase. Obesity was reported by 34.8%. Cravings were induced in 78%, while 69.6% did not exercise regularly. Interestingly, 30.4% felt pressure to eat in a certain way due to food bloggers, reflecting their strong impact on eating habits. In conclusion, understanding the role of food bloggers in shaping Gen Z's eating patterns is crucial for promoting healthier choices and raising awareness about nutritious foods to avoid the incidence of obesity and non-communicable diseases (NCDs), fostering a culture of nutritious food choices, and improving overall well-being.

Keywords: food bloggers, Gen z, obesity, healthy eating

Beyond Boundaries: The Evolution of 3D and 4D Bioprinting in Medicine and Technology

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The challenge of replicating the intricate structures and functionalities of biological tissues has long been a significant barrier in regenerative medicine. Traditional tissue engineering methods are often limited in their ability to produce complex, multi-layered tissues that can integrate seamlessly with the human body. 3D bioprinting addresses this issue by enabling the precise, layer-by-layer construction of biological structures using bioinks composed of living cells and biocompatible materials. This technology allows for the creation of tissues with complex geometries and cellular compositions, offering a promising solution to the limitations of conventional methods. However, while 3D bioprinting has revolutionized tissue engineering, it remains constrained in its ability to mimic the dynamic, time-dependent behaviors of living tissues. To overcome this, 4D bioprinting has emerged, introducing the concept of time as a fourth dimension. By incorporating smart materials that respond to external stimuli such as temperature, humidity, or pH levels. 4D bioprinting enables the creation of tissues that can change shape, function, or properties over time. This innovative approach opens new avenues for developing adaptive, self-healing tissues and organs that better replicate the dynamic nature of biological systems. Research and early applications of 4D bioprinting have demonstrated significant potential, particularly in the fields of regenerative medicine, personalized healthcare, and drug testing. These advancements not only offer the possibility of creating more accurate and functional tissue models but also represent a major leap forward in the quest to produce fully functional, transplantable organs. In conclusion, the evolution from 3D to 4D bioprinting is poised to overcome many of the current challenges in tissue engineering, offering new possibilities for medical and technological advancements that were previously unimaginable. We are going to demonstrate in our poster both the significant differences and applications of 3D and 4D bioprinting in tissue engineering.

Keywords: 3D bioprinting; 4D bioprinting ; Tissue engineering ; biological tissues

Professional Posters

Pharmacotherapy, pharmacogenomics and precision medicine

PHS 201: Effect of Nicorandil on Neuropathic Pain: Role of Opioid/TRPV1 Signaling Cascade

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Neuropathic pain is a serious neurological condition resulting from somatosensory neuronal damage. It is caused by various pathologies and is associated with poor therapeutic outcomes to date. Both transient receptor potential vanilloid 1 (TRPV1) channels and opioid receptors are co-expressed in the dorsal root ganglia (DRG) and are crucial in the development of neuropathic pain. Central ATP-dependent potassium channels (K_{ATP}) also contribute to antinociception. In this study, the potential interaction between TRPV1 channels and μ opioid receptors in mediating the antinociceptive effects of the K_{ATP} opener nicorandil was explored across four pain models: chronic constriction injury of the sciatic nerve (CCI) (neuropathic pain model), the formalin test, the capsaicin test, and the acetic acid writhing test; the latter two are primarily triggered by TRPV1 activation. Nicorandil (150 mg/kg, twice, 2 h apart, PO): i) reversed the effects of CCI on nociceptive threshold and cumulative scores assessed by von Frey and acetone test, respectively, ii) abolished CCI induced rises in plasma levels of both COX-2 and MDA, (iii) reduced the licking time and number of flinches in both phases of formalin test as well as in capsaicin test, and iv) reduced the number of writhes in acetic acid test. Additionally, ipsilateral intraplantar injection of nicorandil (37.5 mg/paw, twice) inhibited the nociceptive responses induced by intraplantar capsaicin and intraperitoneal acetic acid. Nicorandil partially reversed the damaging histopathological changes in the sciatic nerve and DRG in CCI rats. The beneficial effects of nicorandil across all models were reduced by the opioid receptor antagonist, naloxone. Therefore, the antinociceptive potential of nicorandil against neuropathic pain appears to be mediated, at least in part, through TRPV1 channels and μ opioid receptors. Systemic anti-inflammatory and antioxidant mechanisms also play a role. Further investigation is warranted to explore nicorandil as an alternative treatment option for neuropathic pain.

Keywords: Neuropathic pain; Nicorandil; TRPV1 channels; Opioid receptors

PHS 202: Protective effect of sodium butyrate on alendronate induced gastric ulcer aggravation and bone remodeling in rats

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Management of post-menopausal osteoporosis with alendronate is usually associated with gastric mucosal injury especially when combined with non-steroidal anti-inflammatory drugs. The aim of the present study was to investigate whether sodium butyrate could ameliorate gastric damage induced by alendronate and piroxicam combination while preserving bone integrity. To study the possible gastroprotective effect of sodium butyrate, male rats were treated with piroxicam(50mg/kg) or piroxicam+ alendronate(75mg/kg) or piroxicam+ alendronate +sodium butyrate (800mg/kg). To study the effect of sodium butyrate on bone remodeling, osteoporosis was induced in female rats by bilateral ovariectomy. Ovariectomized rats were treated with either sodium butyrate (100mg/kg) or alendronate (0.14mg/kg) or saline as a vehicle. Alendronate intensified piroxicam-induced gastric damage with a significant increase in ulcer index. Gastric juice showed a total abolishment of free acidity and a significant decrease in mucin content. Malondialdehyde (MDA) and tumor necrosis factor -alpha (TNF-α) levels were significantly elevated in gastric mucosa, with a significant reduction in glutathione level (GSH) relative to piroxicam treated rats. Sodium butyrate pretreatment reduced aggravated gastric damage with a significant decrease in mucosal content of MDA and TNF-α and a significant increase in GSH and vascular endothelial growth factor (VEGF) levels. Additionally, sodium butyrate increased mucin content of gastric juice significantly. Ovariectomized rats treated with sodium butyrate or alendronate showed suppression of bone resorption compared to the vehicle. Both drugs reduced serum level of osteocalcin, bone alkaline phosphatase, and calcium significantly. Histopathological examination revealed a significant increase in trabecular thickness with a significant reduction in the number of adipocytes and the percentage of non-mineralized bone in both groups. In conclusion, sodium butyrate through its antioxidant and anti-inflammatory activity could be advantageous for osteoporotic patients by protecting against aggravation of gastric damage induced by alendronate with additional benefit on bone integrity.

Keywords: Sodium butyrate; post-menopausal; osteoporosis; alendronate; gastric injury.

PHS 204: Interruption of thrombo-inflammation ameliorates metabolic and structural manifestations of mash in rats: role of different anti-thrombotic drug classes

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Metabolic dysfunction-associated steatohepatitis (MASH) is a major public health concern, characterized by fat accumulation in liver with inflammation and cell damage. Like other complications of metabolic impairment, MASH patients present with hypercoagulability. We previously showed that some anti-coagulants elicit anti-inflammatory effects in initial stages of metabolic dysfunction by interrupting thrombo-inflammation in adipose tissue. study aimed to investigate potential preventive effects of anticoagulants, specifically rivaroxaban, enoxaparin, and clopidogrel, on MASH manifestations in a rat model. Rats were fed an atherogenic diet (15% fructose, 1.25% cholesterol, 0.5% cholic acid, 30% cocoa butter, and 30% palm oil) to induce MASH. Rats were divided into six groups: control, MASH, and four treatment groups receiving either silymarin (50mg/kg PO), rivaroxaban (20mg/Kg PO), enoxaparin (2mg/Kg SC) or clopidogrel (6.75mg/Kg PO). Treatments were initiated in the third week of induction and administered until the completion of an 8-week period. Local, systemic, metabolic, inflammatory, and coagulation markers were evaluated. In conjunction with elevated visceral adipose thrombo-inflammation, MASH-induced group exhibited elevated liver injury markers (AST, ALT, serum albumin), increased inflammatory cytokines (IL-1, IL-6), reduced antioxidant capacity, and imbalanced coagulation factors (elevated FXa, and FVIII/Protein C) compared to control. Anticoagulants and silymarin ameliorated these MASH-associated abnormalities to varying degrees. Notably, rivaroxaban showed the greatest improvement in thrombo-inflammatory markers, comparable to levels in control. The findings suggest that anticoagulants have potential therapeutic benefits in MASH by targeting underlying thrombo-inflammatory state. Further investigation is warranted to elucidate precise mechanisms and evaluate the clinical translational potential of these pharmacological interventions for MASH management.

Keywords: Metabolic Dysfunction-Associated Steatohepatitis; Thrombo-Inflammation; Silymarin; Rivaroxaban; Enoxaparin; Clopidogrel

PHS 205: Geraniol ameliorates adjuvant-induced arthritis via inflammasome modulation

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Geraniol (GO) has been used in traditional medicine displaying anti-inflammatory and anti-arthritic effects in different in-vivo and in-vitro models of rheumatoid arthritis (RA). Its anti-osteoclastogenic properties have retained bone integrity and diminished bone resorption. Progression of RA is mediated by several immune cells and cytokines including interleukin-1 (IL-1), and interleukin-18 (IL-18). Recently, the nucleotide-binding oligomerization domain (NOD)-like receptor family pyrin domain containing 3 (NLRP3) inflammasome pathway has shown to be a main source of IL-1 and IL-18. MicroRNAs (miRNAs) are among the regulators of the NLRP3 inflammasome at the post-transcriptional level. The present work aimed to investigate the role of the NLRP3 pathway in the adjuvant arthritis (AA) rat model and evaluate the effect of geraniol on disease progression. In addition, the role of miRNA124 and miRNA30a was assessed. Fourteen Days after adjuvant injection, rats were treated with two doses of geraniol (100 and 200 mg/kg/day) or methotrexate (MTX, 1mg/kg/week) with/without low-dose geraniol for two weeks. Increased hind paw swelling and change in radiological and histopathological characteristics confirmed the AA development. Biochemical analysis of synovial tissue from the tibiotarsal joints showed decreased miRNA124 and miRNA30a expression, and increased NLPR3 expression, besides the increased autophagy and inflammatory markers. Geraniol, in a dose-dependent manner, could revert all studied parameters without any significant toxicological signs. The combination of MTX with low-dose GO has shown a comparative effect to the high-dose GO, representing a novel therapeutic strategy in RA treatment.

Keywords: Rheumatoid Arthritis; Adjuvant Arthritis; Geraniol; Inflammasome

PHS 206: The Effect of Sub-Chronic Exposure to Organophosphates on Cognitive Function: The Potential Ameliorating Role of Arachidonic Acid in Control and Prediabetic Rats

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Organophosphorus pesticides (OPPs) are extensively used worldwide in agriculture. Due to climatic changes, there has been an overuse of these pesticides, leading to potentially increased chronic exposure. Prolonged and repeated exposure to OPPs is linked to neuroinflammatory changes, results in memory loss, cognitive impairment, and dementia. This issue is further exacerbated by a rise in metabolic disorders such as prediabetes, type 2 diabetes, and obesity, which are also known to increase the risk of neuroinflammation and cognitive decline. We explored the potential interaction between prolonged exposure to OPPs and early-stage prediabetes in the development of neuroinflammation and cognitive impairment. Sixty Male Sprague-Dawley rats were randomly divided into two groups; control group fed standard and prediabetic group receiving high-fat diet (HFD). After 8 weeks, rats from either group were exposed to either DMSO or 40% of LD50 of chlorpyrifos (CPF) by dermal exposure. Half of the CPF-exposed rats from either group were treated with Arachidonic Acid (AA) 3 mg/Kg/day by oral gavage. Prior sacrifice, all rats underwent behavioral tests, including novel object recognition and Y-maze, to evaluate cognitive function. Additionally, blood perfusion was measured in the brain and mesenteric tree using laser speckle imaging system. Post-sacrifice, blood, serum and tissue samples were collected to measure HbA1C, lipid profile, liver and kidney functions, oxidative stress, and inflammatory biomarkers. CPF-exposed groups showed a significant increase in these parameters compared to healthy rats, while AA treatment showed a significant decrease. In conclusion, rats chronically exposed to CPF, and prediabetes led to short-term memory impairment, reduced blood perfusion, and increased inflammation. However, supplementing with arachidonic acid, restored memory function, normalized blood and serum parameters, and improved blood perfusion. These findings suggest that AA supplementation may mitigate the negative effects of CPF on cognitive function and metabolic parameters.

Keywords: Organophosphate; Chlorpyrifos; Arachidonic Acid; Neuroinflammation; Metabolic Disorders; Diabetes

PHS 207: Neuroprotection in Prediabetic Rat Model: Novel Therapeutic Intervention via Bypassing UCP1-mediated Thermogenesis

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Prediabetes is an early state of metabolic dysfunction characterized by insulin resistance along with glucose intolerance. Evidently, prediabetes is associated with cerebral hypoperfusion, a strong predictor of poor cognitive and memory performance. Previous work from our laboratory has demonstrated that prediabetic rats fed on high fat diet (HFD) showed mild cognitive decline and increased uncoupling protein 1 (UCP1) expression in certain adipose depots, which was associated with increased oxygen consumption, which triggers hypoxia, adipose inflammation, and subsequent cerebrovascular damage. This study aimed to unveil the impact of limiting UCP1-mediated thermogenesis on cognitive function in prediabetic rats. This was achieved by either inhibiting UCP1 through inorganic phosphate supplementation or enhancing futile creatine cycling, a UCP1-independent thermogenic pathway that is associated with a lower oxygen consumption rate. Moreover, our study aimed at in-vivo assessment of cerebral blood flow using laser speckle contrast imaging (LSCI) that can acquire high-resolution maps of cerebral perfusion. In this context, fifty male Sprague Dawley rats were randomly allocated to either control or HFD-fed groups. Following 10 weeks of HFD-feeding, rats were further randomized to receive either no treatment, creatine monohydrate, inorganic phosphate or pioglitazone. Prior to sacrifice, rats were subjected to a spectrum of behavioral tests to evaluate their memory and cognitive functions. Current findings confirm that the negative impact of HFD-induced adipose inflammation on cognitive performance can be potentially mitigated by inorganic phosphate or creatine, in a manner that was equivalent to that of pioglitazone. In agreement with these findings, elevated brain tissue levels of interleukin-1 beta and malondialdehyde in prediabetic group were reduced by inorganic phosphate or creatine administration. Histopathological examination of brain tissues came with molecular work. Another intriguing finding was that thermogenically modulated rat model could reverse HFD-induced cerebral hypoperfusion. Further analysis is under way to detect the expression levels of apoptotic markers.

Keywords: prediabetes; UCP1; adipose inflammation; thermogenesis; cognitive function.

PHS 209: Alogliptin mitigates diclofenac-induced hepatotoxicity in rats: An emphasis on NLRP3 inflammasome pathway

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Diclofenac (DIC), a non-steroidal anti-inflammatory drug, is widely prescribed in clinical practice. However, hepatotoxicity following its administration is a major concern. Although the exact mechanism remains not fully understood, oxidative stress and inflammation are crucial in such side effect. Alogliptin is an important candidate of the reversible dipeptidyl peptidase-4 (DPP-4) inhibitor family, which showed anti-inflammatory and antioxidant effects in various hepatic experimental models. Thus, the aim of the current study was to investigate the possible hepatoprotective role of alogliptin against diclofenac, along with revealing its mechanistic approach. Albino male rats were randomly divided into 3 groups with 6 rats each. Where, group 1 (control group) received saline intraperitoneally, group 2 received diclofenac (DIC; 50 mg/kg/I.P) for 7 days (starting from day 8), groups 3 received a daily dose of alogliptin via oral gavage (ALO; 20 mg/kg body weight) for 14 consecutive days starting from day 1 (7 days prior to the DIC injection). Results revealed that Diclofenac administration caused liver injury as demonstrated by significant increase in serum liver enzymes concomitantly with areas of hepatocellular necrosis and infiltrations of mononuclear inflammatory cells in liver tissues. Diclofenac also perturbed the balance between the proapoptotic (Bax) and anti-apoptotic (Bcl2) proteins, inducing apoptosis. In addition, it increased the oxidative stress as evidenced by elevated levels of malonaldehyde (MDA) while decreased levels of hepatic antioxidants such as reduced GSH and superoxide dismutase. Interestingly, diclofenac stimulated the activation of the classical NLRP3 inflammasome pathway with subsequent upsurge in inflammatory mediators including TNF-α, IL-1β, and IL-18. Alogliptin effectively mitigated all these molecular alterations, improved liver function markers, and helped the liver to maintain its normal architecture. Taken together, our findings highlight the potential hepatoprotective role of alogliptin against diclofenac, which appears to be multifaceted, through suppression of oxidative stress, apoptosis, and the inflammatory response.

Keywords: Alogliptin; Diclofenac; Hepatotoxity;NLRP3 inflammasome; Oxidative stress

PHS 210: Metabolomic Impact of Anti-Inflammatory Modulation of Adipose Tissue

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The increasing prevalence of metabolic disorders such as obesity and type 2 diabetes (T2DM), along with their associated cardiorenal complications, has necessitated the development of novel treatments targeting the underlying pathophysiology of these conditions. Recent studies have highlighted the potential involvement of adipose tissue inflammation during the early stages of insulin resistance and diabetes development, particularly emphasizing the intricate relationship between inflammation within perivascular adipose tissue (PVAT) and perirenal adipose tissue (PRAT) and metabolic dysfunction. This study proposes a metabolomic strategy to thoroughly investigate the lipidomic profile of PVAT and PRAT under metabolic stress using gas chromatography (GC). Given that lipids are the fundamental component of adipocytes, the lipid content of these cells has a considerable impact on their functions and interactions with other organs. Therefore, profiling the lipid content of PVAT/PRAT is crucial for understanding its involvement in adipose inflammation and may reveal therapeutic targets to address metabolite abnormalities and early inflammatory changes. Moreover, the study intends to determine PVAT/PRAT metabolome after modulating the inflammatory phenotype, using novel therapeutic tools including those that potentially target augmented uncoupling protein-1(UCP1)-mediated thermogenesis. Mitochondrial UCP1 is strongly linked to PVAT/PRAT hypoxia, inflammation, and vascular, cardiac, and renal dysfunction. Previous work showed that UCP1 inhibition, through creatine phosphate supplementation or inorganic phosphorus can increase mitochondrial futile creatine cycling and lower UCP1 activity. This process improves mitochondrial efficiency and reduces hypoxia, offering a potential approach to address early cardiovascular deterioration. Furthermore, a proteomic analysis will be conducted on the mitochondria of PVAT and PRAT to provide insights into significant mitochondrial proteins that demonstrate alterable expression in PVAT and PRAT at the earliest stages of metabolic dysfunction, ultimately providing a proof-of-concept for the efficacy of UCP-1 inhibition interventions on mitochondrial proteins to reverse the earliest mitochondrial dysfunction preceding diabetes and its associated complications.

Keywords: Metabolic dysfunction, Adipose tissue inflammation, Metabolomics, Mitochondrial proteome

PHS 211: The Molecular Targets of Astaxanthin and Donepezil Loaded Nanoparticles in Experimental Model of Alzheimer's Disease

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Alzheimer's disease (AD) is a prevalent kind of dementia that causes a person's capacity to operate independently to continuously deteriorate in their intellectual, behavioral, and social activities. This study aimed to explore the therapeutic effects and the possible molecular targets of Astaxanthin and Donepezil-loaded nanoparticles in experimental AD-like model. The results of the present study indicated that AD-like rats showed poor performance in MWM, and disturbed neurotransmitters levels in both cortical and hippocampal tissues. Also, have significantly higher Aβ1-42 content, upregulation of BACE1 and BACE1-AS gene expression, decline in miR-124 expression. Most of the studied parameters showed significant improvement upon treatment with Astaxanthin and/or Donepezil as solution or as SLNs formulation with the best effects observed in the rats treated with the combination of ASX and Donepezil in nano-formulations. From the results of the present study, it is clear that Astaxanthin as a SLN-formulation has a potential therapeutic effect in AD-like rats through targeting multiple pathways including: amyloidogenic pathway, cholinergic neurotransmission, oxidative stress, gene expression of BACE1-AS, and miR-124 expression in the cerebral cortex and hippocampus.

PHS 212: Comparative PBPK Modelling of Valsartan in Patients with Lung Fibrosis Across Oral, Intravenous, and Pulmonary Inhalation Routes

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Valsartan, an angiotensin II receptor blocker, has potential therapeutic benefits for patients with lung fibrosis, a condition marked by progressive lung scarring. To optimize dosing strategies, this study developed a physiologically-based pharmacokinetic (PBPK) model to compare lung tissue concentrations of valsartan administered via oral, intravenous (IV), and pulmonary inhalation routes.A PBPK model was created using GastroPlus® to simulate valsartan pharmacokinetics in lung fibrosis patients. The model was calibrated with data from healthy subjects and adjusted for lung fibrosis-related changes in lung permeability, tissue binding, and blood flow. Valsartan was modeled at doses of 40 mg, 80 mg, 160 mg, and 320 mg for oral and IV routes, and at half these doses (20 mg, 40 mg, 80 mg, 160 mg) for inhalation. Lung tissue concentrations were the primary outcome measured. The model predicted varying lung tissue concentrations across the three administration routes. Oral administration provided moderate lung exposure with delayed peak levels. IV administration resulted in higher systemic exposure but lower lung targeting. Pulmonary inhalation achieved the highest lung tissue concentrations with reduced systemic exposure, particularly at the 160 mg dose, highlighting its potential as the most effective route for delivering valsartan to lung tissue in fibrosis patients. This PBPK model suggests that pulmonary inhalation of valsartan, even at reduced doses, offers superior lung targeting compared to oral and IV routes. These findings support the use of inhalation delivery as a preferred approach for treating lung fibrosis, offering potential benefits in minimizing systemic effects and maximizing lung tissue concentrations.

Keywords: Valsartan; PBPK modelling; lung fibrosis; pulmonary inhalation; drug delivery

PHS 213: Breast Cancer Stem Cells Targeting Using Valsartan Nanomedicine: Efficient Stemness Suppression and Breast Cancer Exosomes Elimination

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Breast cancer (BC) ranks as the second leading cause of cancer globally. BC-stem cells (BCSCs), a minor pluripotent tumorigenic population residing in the tumor microenvironment (TME), are the main reason behind tumor resistance and recurrence. Angiotensin-II (ANG-II) mediates its mitogenic effects through the ANG-II type-1 receptor (AT-1R). ANG II transactivates the insulin-growth-factor receptor (IGF-1R) expressed in BCSCs. BC cells secrete exosomes for intercellular communication and have pivotal roles in tumorigenesis, proliferation, metastasis, angiogenesis, and chemoresistance. Herein, valsartan (Val), an AT-1R blocker, was nano-formulated (Val-L-NPs) for BCSCs-targeted therapy by conjugation with hyaluronic acid (HA), a ligand for CD44 (BCSCs surface marker)(Val-L-HA-NPs), allowing precise drug delivery to breast tissue with minimal adverse effects. NPs were coated with the mucoadhesive chitosan (CS); Val-L-HA-CS-NPs, for oral delivery, and characterized for particle size, zeta potential, entrapment efficiency, and *in-vitro* drug release. Effective targeting was confirmed by fluorescent imaging for fluorescently labeled NPs, showing the highest accumulation in BC tissue in rats with a DMBA-induced MPA-promoted BC model. Tumor-bearing rats were allocated into four groups, receiving either; conventional Val (40 mg/kg daily) Val-L-NPs, Val-L-HA-CS-NPs for 28 days. At the end of the experimentation period, tumor sizes were calculated, and tumors were isolated. In tumor tissues, the expression of AT-1R and IGF-1R were assessed using the western blot technique. Stemness markers; CD44 and Aldehyde dehydrogenase, levels were determined by ELISA. Exosome biogenesis and angiogenesis were evaluated by assessing tetraspanin-8, miRNA-21, and Rab 25 genes expression by RT-PCR. In addition, histologic tumor grade and ki-67 (proliferation marker) by immunohistochemistry were analyzed. Results showed a superior effect for Val-L-HA-CS-NPs indicating successful targeting for BCSCs and downregulation of stemness, exosomes, proliferative markers, and tumor grade. Additionally, AT-1R and IGF-1R expressions were suppressed by Val-L-HA-CS-NPs. Thus, Val-L-HA-CS-NPs efficiently targeted BCSCs suppressing BCSCs-related markers and exosome production.

Keywords: Breast cancer stem cells; Exosomes; Nanoparticles; Targeted Therapy; Valsartan

PHS 214: Pharmacogenomics of Immunotherapies for Autoimmune Diseases: Current Situation and Future Perspectives

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Autoimmune diseases are heterogeneous disorders with complex pathogenesis including different genetic and environmental factors. Till now there is no definite treatment for autoimmune diseases, treatment strategies include different medications such as corticosteroids, immunosuppressive drugs, and non-steroidal anti-inflammatory drugs. However, these strategies don't modify the course of the disease and are associated with severe adverse drug reactions. Immunotherapies for autoimmune diseases, including anti-cytokine therapies such as anti-TNF α, IL-1 antagonists, and anti-IL6 antibodies, are considered promising immunotherapeutic strategies that have the ability to target a specific signaling pathway that contributes to the immunopathogenesis of the disease leading to complete alteration of disease progression. However, Immunotherapies for autoimmune diseases are associated with heterogeneity in treatment response among patients and even paradoxical effects. Pharmacogenomics has led to a revolution in the personalization of different drugs related to autoimmune diseases such as Methotrexate, Azathioprine, Tacrolimus, and cyclophosphamide, leading to improving their efficacy and limiting their adverse drug reactions. Till now the pharmacogenomic studies and guidelines related to immunotherapies for autoimmune diseases are limited. Thus, the current study aimed to demonstrate the effect of single nucleotide polymorphisms (SNPs) on the response to biological anti-cytokine therapy in different autoimmune diseases. A systematic review was conducted by assessing all studies that examined the association between polymorphisms and response to the targeted therapies in different research databases including PubMed, Google Scholar, OVID, Ebsco host, and Web of Science. The significance of the association between different SNPs and therapy response was detected and analyzed. To the best of our knowledge, this would be the first meta-analysis to report the association between SNPs and different immunotherapies for common autoimmune diseases, revealing the close genetic association that may decipher the heterogenic response among patients leading to better therapeutic outcomes.

Keywords: Pharmacogenomics; Autoimmunity; Immunotherapy; SNPs

Clinical pharmacy practice and patient care

PHS 301: Evaluating the clinical outcomes of antimicrobial regimens and constructing antibiograms for microbial keratitis in Alexandria, Egypt

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This study aims to recommend effective therapies in microbial keratitis by detecting causative agents, antimicrobial resistance, which have not been previously explored in Alexandria, and comparing treatment outcomes of empiric antimicrobial eye drops. Conducted in 2022 at Alexandria Main University Hospital cornea clinic, this prospective cohort study constructed cumulative antibiograms by analyzing antimicrobial susceptibilities of microorganisms isolated from corneal scrapings. Patients with bacterial (BK), fungal (FK), or mixed mycotic and bacterial keratitis (MFBK) on empiric regimens were compared for time-to-epithelialization, ulcer healing, visual outcomes, interventions, and complications. The study was registered at ClinicalTrials.gov (identifier NCT05655689). Among 93 positive cultures, the frequently isolated causative agents were coagulase-negative staphylococci (CoNS, 30.1%), *Pseudomonas aeruginosa* (14%), and Aspergillus spp. (12.9%). Methicillin resistance among Gram-positive bacteria was 23.9%. The CoNS were highly susceptible to vancomycin (VAN, 100%) and moxifloxacin (MOX, 90.9%). Gram-negative bacteria showed higher susceptibility to gatifloxacin (90.9%) compared to MOX (57.1%) and were more resistant to ceftazidime (CAZ, 88.2%) than to gentamicin (GEN, 55.6%). Fungi showed 10% resistance to voriconazole (VRC). In 49 BK patients, the percentages of healed ulcers using GEN+VAN, CAZ+VAN, and MOX were 85.7%, 44.4%, and 64.5%, respectively ($p = 0.259$). Their median time-to-epithelialization was 21, 30, and 30 days, respectively (log-rank $p = 0.020$). In 51 FK patients, more ulcers (88.9%) healed with natamycin (NT)+VRC combination compared to VRC (39.1%) or NT (52.6%) alone ($p= 0.036$). Their median time-to-epithelialization was 65, 60, and 22 days, respectively (log-rank $p < 0.001$). The VRC group required more interventions (60.9%) compared to NT+VRC-treated group (11.1%) ($p=0.018$). Treatment regimens had equivalent complications and visual outcomes. For severe FK, we recommend NT+VRC due to better outcomes. Based on higher detected susceptibility, we advocate empiric MOX for suspected Gram-positive BK, gatifloxacin for Gram-negative BK, and GEN+VAN for severe BK.

Keywords: Microbial keratitis; antibiogram; fortified antibiotics

PHS 302: Vonoprazan-based therapy versus standard regimen for Helicobacter pylori infection management in Egypt: An open-label Randomized controlled Trial

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Introduction: As antibiotic resistance continues to rise, the development of novel Helicobacter pylori treatment regimens, combined with regular assessment of existing treatment regimens is imperative. The study aims to evaluate the efficacy, safety, and compliance of vonoprazan-based regimens versus standard triple therapy, along with investigating potential factors influencing patient compliance with treatment, response to treatment, and severity of infection symptoms. Method: An open-label randomized controlled clinical trial of H pylori-infected subjects randomly assigned into vonoprazan dual therapy group (VDT) receiving vonoprazan 20 mg twice daily and amoxicillin/clavulanate, 875 mg/125 three times daily or vonoprazan triple therapy group (VTT) receiving vonoprazan 20 mg, amoxicillin/clavulanate, 875 mg/125 mg and clarithromycin 500 mg twice daily or standard triple therapy group (STT) receiving PPI standard or double dose, clarithromycin 500 mg and amoxicillin/clavulanate, 875 mg/125 mg twice daily for 14 days. Eradication rates, compliance, and safety profiles were compared between the three groups. Results: By per-protocol analysis, the eradication rates of the STT, VDT, and VTT groups were 70%, 76.2%, and 79.2%, respectively (P=0.777). Among the three groups, the VDT group demonstrated the lowest number of adverse events per subject, the lowest frequency of taste disturbances, and the lowest number of patients with severe adverse events. No difference in compliance with treatment was found between the groups. Gender, frequency of COVID-19 vaccination, height, and BMI were the only assessed factors influencing infection symptoms severity. Conclusion: Vonoprazan-based regimens demonstrated comparable efficacy to the standard triple regimen. However, the cure rates achieved by the three treatment groups were suboptimal, which necessitates the optimization of dosage and frequency of available treatment regimens as well as the development of new regimens with higher eradication rates. VDT could be a promising alternative with lower adverse effects and less contribution to antibiotic resistance due to single antibiotic use.

PHS 303: Impact of Pharmacists in the Consultation Liaison Psychiatry Team for Screening, Risk Stratification and Referral of Mothers with Peripartum Depression and Anxiety: A Cross-Sectional Study

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Peripartum depression and anxiety are common disorders that occur during the first 12 months after delivery. It's crucial to identify peripartum mental health disorders as they can have deleterious effects on mothers' mental states and newborns' development. One in seven women suffers from peripartum depression while one in five women suffer from peripartum anxiety. Owing to shortages in peripartum mental health services this cross-sectional study aims to highlight the role of pharmacists in the consultation-liaison psychiatry team through psychoeducation, screening, risk stratification and referral of mothers in need of professional psychiatric advice. The study was conducted in an outpatient obstetrics and gynecology clinic for mothers within their peripartum period from September 2022 to May 2023. Our Inclusion criteria were mothers who are within their 1st year postpartum, and the exclusion criteria were mothers with a history of psychiatric disorders. Screening for depression and anxiety was done by a validated Arabic language version of the self-rated Edinburgh Postnatal Depression Scale (EPDS) and Generalized Anxiety Disorder-7 scale (GAD-7). Screening results showed a 72% prevalence of possible peripartum depression and a 100% prevalence of possible peripartum anxiety ranging from mild to severe intensity. Mothers who exceeded the cut-off points for both scales were provided psychoeducation sessions and referred to a psychiatrist to undergo a structured psychiatric assessment and receive treatment recommendations. A risk stratification analysis was done to identify mothers who are more likely to develop depression or anxiety based on their age, number of previous deliveries and method of conception. The results showed no statistically significant difference among different risk factors which concludes that psychiatric pharmacy services should be provided to all mothers, regardless of their demographics to avoid the debilitating effects of depression and anxiety on themselves and their newborns.

Keywords: Peripartum Depression; Peripartum Anxiety; Consultation-Liaison Psychiatry; Pharmacist; Psychoeducation; Screening; Risk stratification.

PHS 307: Are Expired Medications Dead Medications? A Cross-Sectional Survey on the Lebanese Community Perspective

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While expiration date indicates the last day the drug is guaranteed its full efficacy and safety, evidence suggests that some medications remain stable beyond this date, and others may degrade posing significant risks. In Lebanon, economic crises and drug shortages have prompted interest in the potential use of expired medications. This study assesses Lebanese residents' knowledge, attitudes, and practices regarding expired medications to improve public health strategies and ensure medication safety. A cross-sectional descriptive study was conducted from May to June 2022, across five Lebanese districts. Data were collected through self-administered anonymous questionnaires distributed via social media platforms that included questions on knowledge, attitudes, and practices toward using expired medications. Data was analyzed using SPSS-version-25. Among the 1,112 participants, 66.5% correctly identified an expired medication as one that no longer has guaranteed safety and efficacy. Additionally, 62.3% recognized that expired medications could have harmful effects, and 82.3% understood that such medications might lose their potency. About 89% of respondents accurately noted that factors such as light, temperature, and humidity influence medication stability. Notably, 27.2% of respondents admitted to using expired medications, particularly painkillers, antacids, and cough and cold preparations, with chronic medications comprising only 17.9%. The primary reasons cited for using expired drugs were cost concerns, availability, and perceived preservation of efficacy. In adjusted regression analysis, significant predictors of expired medication use included individuals aged 26-35 years (OR=0.59, 95% CI, 0.36-0.98, p=0.042), students (OR=2.36, 95% CI, 1.30-4.02, p=0.002), housewives (OR=1.9-, 95% CI, 1.14-3.17, p=0.014), and those with a medical background (OR=2.52, 95% CI, 1.86-3.42, p=0.001). The Lebanese community exhibits a partial understanding of the risks associated with expired medications, highlighting the need for targeted interventions through enhance education on safe medication practice.

Keywords: expired drugs; medication safety; public health; Lebanese community; drug disposal; health education

Drug analysis and quality control

PHS 401: Several green spectroscopic methods for the quantification of erdosteine; Extensive greenness evaluation using GAPI, Analytical Eco-scale and AGREE.

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Erdosteine (ERD), is a commonly used expectorant in the treatment of acute and chronic obstructive bronchitis. The reported analytical techniques for ERD determination suffer from several drawbacks as the use of expensive instruments, hazardous solvents and complicated sample pre-treatment procedures. In this work, four simple, sensitive, economical, and eco-friendly mix and read spectrophotometric methods for the assay of erdosteine (ERD) in bulk and dosage form have been developed. Method I involved the addition of the powerful oxidizing agent, potassium permanganate to ERD and measuring the oxidation product at 610 nm. Another Oxidizing agent; ceric ammonium sulfate was used in Method II where it oxidizes ERD resulting in a decline in the absorbance intensity of cerium (IV) ions, measured at 315 nm. Similarly, Method III employed the use of ceric ammonium sulfate, However, the fluorescence intensity of the resulting cerium (III) ions was recorded at λex/λem 255/355 nm, respectively. Whereas in Method IV, ERD was added to acriflavine leading to a proportional decrease in its native fluorescence. Various reaction conditions affecting the intensity of measurement were attentively investigated, optimized, and validated. The implementation of the proposed methods in ERD assay resulted in linear relationships between the measured signals and the corresponding concentrations of ERD in the range of 1-6, 0.1-1, 0.01-0.1, and 10-100 µg/mL with LOD values 0.179, 0.024, 0.0027 and, 3.2 µg/mL for methods I, II, III and IV respectively. All the suggested methods involve simple and rapid procedures involving mixing of few inexpensive, eco-friendly reagents without the need for tiresome analyte extraction and sample pretreatment steps. With comparable sensitivities, minimal energy consumption, simplicity of procedure, and greenness of the solvents, the superiority of our methods over the previously published procedures is evident. The developed methods were validated according to the ICH guidelines and successfully implemented in the analysis of ERD in pure form and in commercial capsules with acceptable accuracy and precision.

Keywords: Erdosteine; Spectroscopic determination; Green method; Permanganate; Ceric; Acriflavine**.**

PHS 402: Multiple Analytical Techniques for Genotoxicity Assessment of Commonly Used CNS Drugs

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The genotoxic and carcinogenic adverse effects of various drugs should be considered for assessing drug benefit/ risk ratio. On that account, the scope of this study is to examine the kinetics of DNA damage triggered by three CNS acting drugs; carbamazepine (CMP), quetiapine (QTP) and desvenlafaxine (DVF). Two precise, simple and green approaches were proposed for probing drug induced DNA impairment; MALDI-TOF MS and terbium (Tb^{3+}) fluorescent genosensor. The results revealed that all the studied drugs induced DNA damage manifested by the MALDI-TOF MS analysis as a significant disappearance of the DNA molecular ion peak with the appearance of other peaks at smaller m/z indicating the formation of DNA strand breaks. Moreover, significant enhancement of Tb^{3+} fluorescence occurred, proportional to the amount of DNA damage, upon incubation of each drug with dsDNA. Furthermore, the DNA damage mechanism is examined. It was found that DVF induced the fastest DNA damage While CMP showed the slowest DNA damage. However, a high concentration (100 μM) of DVF was necessary to induce DNA damage, while a low concentration (10 μM) of CMP and QTP was enough to induce significant DNA damage. The proposed Tb^{3+} fluorescent genosensor showed superior selectivity and sensitivity and is significantly simpler and less expensive than other methods reported for the detection of DNA damage. Moreover, the DNA damaging potency of these drugs was studied using calf thymus DNA in order to clarify the potential safety hazards associated with the studied drugs on natural DNA. The results indicated that both CMP and QTP are more potent than DVF to cause detectable DNA damage. This research helps to avoid the genotoxic adverse effects of these drugs or using them for the concomitant treatment of brain tumor and psychiatric illness.

Keywords: DNA damage; Carbamazepine; Quetiapine; Desvenlafaxine; Terbium fluorescent genosensor; MALDI-TOF MS

PHS 403: Development and validation of bioanalytical HPLC/Fluorescence detection for determination of Entresto ™ in rat plasma co-administered with common over the counter drugs

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Entresto™ (LCZ696) has been approved by the FDA for risk management of cardiovascular death and heart failure hospitalization. By virtue of being used as a long-life treatment for heart failure, its possible interaction, especially with over-the-counter (OTC) drugs, is critical and of high incidence. The current study aimed to develop a validated bioanalytical HPLC method coupled with fluorescence detector to determine LCZ696 analytes (valsartan, VAL, sacubitril, SAC and sacubitril active metabolite, LBQ657) in rat plasma. Additionally, a pharmacokinetic study of LCZ696 was carried out to determine Entresto ™ interaction with OTC drugs like ibuprofen (IBU) and fexofenadine (FEX), as they share the same metabolic and elimination pathways. The chromatographic condition was performed using Zorbax Eclipse plus-C18 (4.6 × 250 mm, 5 µm) with gradient-mode mobile phase system consists of acetonitrile and 0.025 M phosphate buffer (pH3). The pharmacokinetics study demonstrated a significant increase in the extent of the absorption and plasma concentration of LCZ696 analytes (VAL and LBQ657) when co-administered with IBU by 1.6- fold with a more significant effect in the case of FEX (2.8- and 4.2-fold respectively). Moreover, co-administration with either IBU or FEX demonstrated a decrease in the clearance of LCZ696 analytes with a more pronounced effect in case of FEX. Such findings may be a result of the inhibition of the first-path metabolism by IBU and P-glycoprotein intestinal efflux by FEX. Therefore, it was suggested that the intestinal efflux elimination has a key role in the clearance of LCZ696 analytes. In conclusion, FEX and IBU should be administered cautiously and dose spacing is recommended in patients receiving LCZ696 to prevent elevated serum concentrations and potential toxicity.

Keywords: Entresto™; LCZ696 analytes; pharmacokinetic; drug-drug interactions; Over-the-counter drugs.

PHS404:Implementation of sustainable ratio derivative spectrophotometry in the simultaneous analysis of repurposed medications for COVID-19 infections; Insilico pharmacokinetics evidence

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For the treatment of COVID-19 infections in patients with early diagnosis, a novel dosage form combining fluvoxamine (FVM) and ivermectin (IVM) has been proposed. Developing straightforward, sensitive, and effective techniques for the simultaneous quantification of FVM and IVM without any previous separation is the primary goal of this study. For the synchronous quantification, four green UV methods were used: the dual-wavelength method (DWM), Fourier functions convolution of absorption spectra (FFAS), Fourier functions convolution of derivative spectra of absorption curves (FFDS), Fourier functions convolution of ratio spectra of absorption curves (FFRS), and Fourier functions convolution of absorption spectra (FFAS). The highly interfering spectra of the two components given in this combination may be reconciled using FFRS and DWM techniques. For the FVM and IVM, respectively, good linearity was tested in the range of 5–40 and 2.5–25 µg/mL. Additionally, the "Green Analytical Procedure Index" (GAPI), the "Analytical GREEnness metric (AGREE)," the "Analytical Eco-Scale," and the "National Environmental Method Index" (NEMI) all predicted the approaches' greenness. Furthermore, a spider diagram was employed to evaluate the solvent's greenness index. Using the HEXAGON tool, we looked into the sustainability of our processes in addition to their greenness. Drug-drug interactions (DDIs) between FVM & IVM were anticipated using insilico tools to guarantee the safety of the recommended combo as a first step prior to invitro and in vivo research, continuing the never-ending quest of greenness. Regular quality control examinations of the specified formulations FVM & IVM may employ the recommended UV-methods since they were found to be successful, economical, and sustainable.

Keywords: fluvoxamine; ivermectin; repurposed; COVID-19; simultaneous; spectrophotometry; green; *Insilico*; drug-drug interactions.

PHS 405: Development of validated HPTLC-dual wavelengths method for simultaneous determination of Caffeine, Yohimbine, Niacin and Alpha-tocopheryl succcinate in their challenging quaternary mixture

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Erectile dysfunction (ED) is a symptom that affects million men all over the world. ED may result from vascular disease, neurological disease, diabetes, or prostate-related treatments. Sometimes it is as simple as the side effect of a particular medication. But for 75% of men, the cause is more complex. The treatment for ED may include certain prescription medications, lifestyle changes and other natural treatments. Yohimbine (YB) is an indole alkaloid derived from the bark of the Central African yohimbe tree that is widely used as therapy for ED. In Egyptian Market, YB has been formulated as capsules in combination with Caffeine (CF), Niacin (NA) and Alpha-tocopheryl succinate (EA). This quaternary mixture is effectively used for treatment of ED and other associated disorders like fatigue, heart attack, leg pain due to blocked arteries and vitamin B3 deficiency. So, it seems necessary to develop selective analytical technique for assay of this multi-combination. In proposed study, validated HPTLC method was developed for simultaneous determination of YB, CF, NA and EA, formulated in Super act® capsules. The suggested method depends on HPTLC separation of the drugs at 270 nm for YB, CF, NA and at 280 nm for EA. Separation was accomplished on Merck HPTLC aluminum sheets of silica gel 60 F254 using chloroform: methanol (9.8:0.2 v/v) as mobile phase. The method was found linear in the range of 0.8-6, 0.8-10, 0.4-6 and 6-14 μg band^{-1} for YB, CF, NA and EA, respectively. The proposed chromatographic approach was validated according to ICH guidelines and showed good performances in terms of linearity, sensitivity, precision, accuracy, and stability. It was successfully applied to the analysis of quaternary mixture in dosage form and the results were in good agreement with those obtained with the comparison method using F and t- test as statistic tools.

Keywords: HPTLC; Yohimbine; Niacin; Caffeine Alpha-tocopheryl succinate; quaternary

PHS 406: white assembly of N,S-dots carbon quantum dots as luminous nanoprobe for sensitive analysis of nifuroxazide

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Nifuroxazide (NFX) is an antimicrobial agent that is frequently used as an intestinal antiseptic and recently was proven to have anticancer properties. The current work offers a rigorous way for the synthesis of N, S doped carbon quantum dots (NSC-dots) from L-Cysteine and Citric acid. NSC-dots' native fluorescence was measured at λ emission = 416 nm following excitation at 345 nm. The fundamental theory of the proposed procedure is the quantitative quenching of native luminescence of the prepared NSC-dots after addition of NFX. The aforementioned approach was implemented in the quantification of NFX drug in bulk and pharmaceutical dosage form. the mechanism of fluorescence quenching was studied and discussed. The ICH guidelines were followed in the validation of the analytical technique. A linear response was found in the dynamic range of 0.04–15 µg mL^{-1}. The calculated limits for NFX quantification and detection were 0.015 µg $mL^{-1}$and 0.005 µg mL^{-1}, respectively. Moreover, two commercial pharmaceutical dose forms were subjected to NFX quantification using the suggested methodology. The percentage error (Er%), percentage relative standard deviations (RSD%), and percentage recoveries (R%) were all computed and found to be satisfactory. The suggested method is preferable in a number of ways when compared to previous published methods. The suggested method's superiority and sustainability over other previously published spectrofluorometric methods for the assay of NFX in different dosage forms were shown by evaluating its whiteness using the RGB 12 algorithm in conjunction with the most popular greenness evaluation tools, the Analytical Eco scale and AGREE.

Keywords: Carbon dots; quantitative quenching; spectrophotometric; sustainable; whiteness and greenness.

PHS 407: Comparison of Normal and Reversed-phase HPTLC Methods for The Simultaneous Determination of Three Antiviral Agents Against COVID19: Greenness, Whiteness and Blueness Evaluation

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In the present study two eco-friendly normal-phase and reversed-phase HPTLC methods were developed for the simultaneous quantitative determination of Remdesivir (RMD), Favipiravir (FAV) and Molnupiravir (MOL). For normal-phase HPTLC method, the employed mobile phase consisted of ethylacetate: ethanol: water (9.4:0.4:0.25, v/v), while, for reversed-phase HPTLC procedure, a greener mobile phase was employed consisting of ethanol: water (6:4, v/v). For both methods, detection wavelength of RMD and MOL was 244 nm while FAV was detected at 325 nm. Both methods were validated following the ICH guidelines with respect to linearity, range, accuracy, precision and robustness. The two established methods were proved to be linear over the range of 50-2000 ng/band for FAV and MOL and over the range of 30-800 ng/band for RMD. The excellent linearities were proved by the high values of correlation coefficients not less than 0.99988. The developed methods were successfully applied for the determination of the three drugs in their pharmaceutical formulations. Furthermore, a thorough comparative evaluation of sustainability of the designed methods was performed using Analytical Eco-Scale, GAPI and AGREE metrics for greenness assessment in addition to whiteness and blueness evaluation.

Keywords: Three anti-COVID19 agents; Greenness; Whiteness; Blueness; Normal-phase HPTLC; Reversed-phase HPTLC.

PHS 408: Bioluminescent Genosensors for the Assessment of DNA Damage Induced by Different Cardiovascular Drugs

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Cardiovascular drugs (CVDs) are medications used to treat a variety of cardiovascular illnesses by acting on the heart and vascular system. In the world, these illnesses are the primary cause of morbidity and death. A variety of chronically delivered medications are part of the treatment regimen. Drug-radiation interaction results from the accumulation of medications in the human body along with exposure to electromagnetic radiation from various sources. This photosensitization phenomenon has the potential to cause molecular damage to DNA, which can result in mutagenesis, cancer, and cell death. Two bioluminescent genosensors, terbium chloride and EvaGreen, are being used in this work to quantify the DNA damage caused by various CVDs following UVA irradiation. Numerous CVDs are studied, ten drugs produced DNA oxidation and damage: Amiloride, Atorvastatin, Captopril, Enalapril, Felodipine, Hydrochlorothiazide, Indapamide, Losartan, Triamterene, and Valsartan. The damage was identified and measured using a fluorimetric method. Terbium chloride's fluorescence increased and EvaGreen's decreased as a result of the induced DNA damage. Viscosity measures, which suggested that CVDs might intercalate with DNA before causing damage, validate the results. Furthermore, the technique is used to mimic the biological structure using calf thymus DNA. For use with basic analytical tools, the bioluminescent genosensor offers an automated, straightforward, sensitive, and affordable approach of evaluating DNA-drug interactions.

Keywords: DNA-damage; Cardiovascular drugs; Terbium luminescent probe; EvaGreen luminescent probe; absorption spectroscopy; viscosity measurements; UV-irradiation; Photosensitization.

PHS 409: Recent analytical methodologies for the quantification of RNA therapeutics

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The evolution of RNA-based therapies is bringing a new era for the pharmaceutical industry. Owing to their unique physiological and physicochemical characteristics, RNA therapeutics are currently the subject of large investments in research and development. As a result of their crucial role in gene regulation, therapeutic oligonucleotides can be specifically designed to bind to their RNA targets, making them promising customized candidates for targeted drug delivery and the treatment of various human diseases. RNA therapeutics offer countless advantages compared to conventional drugs or antibodies. RNA therapeutics are divided into different classes including antisense oligonucleotides (ASOs), RNA interference (RNAi), messenger RNA (mRNA), and aptamers. Various RNA-based therapeutics have been approved for clinical use, while others are still under investigation or preclinical trials. Considering the complex nature of RNA-based therapies, the optimization of selective and sensitive analytical techniques for their quantification is crucial. Several analytical techniques have been reported for the characterization, separation, and quantitation of RNA therapies including liquid chromatography operating in various modes such as Ion Pair Reversed-Phase High-Performance Liquid Chromatography (IP-RP-HPLC), Ion Exchange Chromatography (IEC), Size exclusion chromatography (SEC) and Hydrophilic Interaction Liquid Chromatography (HILIC). Moreover, other techniques including capillary gel electrophoresis, and Hybridization Enzyme-Linked Immunosorbent Assay (ELISA) have been previously described. This work outlines some of the widely used analytical techniques for the characterization, separation, and determination of RNA therapies.

Keywords: RNA therapies; Antisense oligonucleotides; Aptamers; Ion pair Liquid Chromatography; Ion Exchange Chromatography.

PHS 410: Analytical methods for the quantification of medications employed in the management of the public health emergency; Monkeypox

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According to the World Health Organization (WHO), about 99176 confirmed monkeypox (mpox) cases, including 208 deaths, have been reported in less than two years. With cases of the disease confirmed in over a dozen countries among adults and children, mpox poses a threat to public health worldwide. The origin of mpox remains unknown, however scientists suspect the transmission of the virus from African rodents and monkeys to humans. Commonly, mpox is manifested as a rash that develops into itchy blisters and skin lesions that spread all over the patient's body. Tecovirimat (TVM) is an effective antiviral agent against all orthopox viruses, including smallpox and monkeypox. Based on studies in non-human primates infected with monkeypox, TVM was approved for the treatment of the disease. Moreover, other antiviral agents are currently used in the management of the disease, including Cidofovir (CDF) and its oral prodrug Brincidofovir (BDF). These antivirals play a dual role in the prevention and treatment of viral infections when combined with TVM. Optimizing analytical methods for the selective and sensitive quantification of the aforementioned drugs in pharmaceutical dosage forms and plasma samples is a must in the current situation. Several analytical techniques were reported for the estimation of antivirals utilized in mpox therapy. For instance, various chromatographic methods including High-Performance Liquid Chromatography using Mass Spectrometer (LC-MS/MS) and Ultra High-Performance Liquid Chromatography (UPLC-Q-TOF-MS) were developed. Herein we will focus on the clarification of trendy, simple, rapid, accurate, precise, sensitive, and selective analytical methods used for the analysis of drugs used in the management of mpox in bulk, dosage forms and biological matrices.

Keywords: Monkeypox; human plasma; dosage forms; chromatography; antiviral agents.

Medicinal chemistry advances: molecular modeling and drug design

PHS 501: Design, synthesis and biological screening of novel pyrazole derivatives as selective TrkA inhibitors

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Cancer remains one of the most significant health challenges worldwide. Despite the continuous development of anticancer drugs, the battle against cancer persists due to frequent mutations. Tropomyosin receptor kinase A (TrkA) is considered one of the promising targets in cancer therapy. The urge to overcome drug resistance has prioritized the need to synthesize potent TrkA inhibitors. In this study, a series of novel pyrazole derivatives that show potent activity against TrkA enzyme were synthesized using sequential chemical reactions. FTIR, ^{1}HNMR, ^{13}CNMR, mass spectrometry, and elemental analysis were done to confirm the chemical structures of the targeted compounds. The targeted compounds were screened *in vitro* using MTT assay against four different cell lines: MDA-MB-231, MCF-7, A-549, and HepG2. Compound **(5c)** and compound **(5n)** showed more potent activity against HepG2 cell line, with IC_{50}= 84.32 ± 6.21 µM and IC_{50}= 33.02 ± 1.53 µM respectively, compared to IC_{50}= 8.67 ± 1.24 µM for 5-fluorouracil as a reference drug. Furthermore, enzyme inhibition assay was done for all prepared compounds against TrkA enzyme, and compound **(5c)** showed inhibitory effect on TrkA with IC_{50}= 12.42 ± 0.53 µM compared to Sorafenib IC_{50}= 0.63 ± 0.11 µM as a control drug. Moreover, *in silico* computational tools, such as docking and SWISSADME, were used to predict ligand-protein interactions and the physicochemical properties in addition to the oral availability of the proposed compounds. The synthesized pyrazole derivatives, specifically compound **(5c)**, exhibited promising anticancer effect with successful inhibition of TrkA enzyme.

Keywords: TrkA; pyrazole derivatives; MTT; enzyme inhibition; *in silico* tools.

PHS 502: Enhancing the Success Rate of Structure-Based Virtual Screening against KRAS G12D: A Benchmarking Study using DEKOIS 2.0

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The KRAS G12D mutation, frequently associated with pancreatic cancer, plays a pivotal role in cell signaling pathways, making it a key target for drug discovery. This research is focused on identifying the best docking tool for a virtual screening campaign targeting KRAS G12D inhibitors. A highly challenging decoy set was generated following the DEKOIS 2.0 protocol, which was used for benchmarking analysis against selected KRAS G12D structures. The docking performance of three programs FRED, PLANTS, and AutoDock Vina was assessed in this benchmarking study. All three programs outperformed random selection, as indicated by their pROC-AUC values against the KRAS G12D crystal structure (PDB ID: 7rt1). Among them, FRED exhibited the best screening performance, excelling at identifying potent active compounds in early enrichment stages. This research highlights a strategy using a tailored DEKOIS 2.0 benchmark set to improve the success rates of virtual screening for novel cancer therapy targets.

Keywords: pancreatic cancer; KRAS G12D; docking; virtual screening (VS); benchmarking; DEKOIS 2.0

PHS 503: Boosting Structure-Based Virtual Screening Performance for antimalarial Drug Discovery: Benchmarking Against DHFR

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The study provides a workflow on evaluating the virtual screening performance against Dihydrofolate Reductase-Thymidylate Synthase (DHFR-TS). *Plasmodium falciparum* DHFR-TS is a critical target for antimalarial drug development, particularly in the context of rising malaria cases exacerbated by the COVID-19 pandemic and climate change. Using a crystal structure obtained from the Protein Data Bank (PDB ID: 6A2M), the three docking tools —AutoDock Vina, PLANTS, and FRED—were benchmarked, and their performance was assessed using pROC-AUC values to determine their ability to predict active compounds. The benchmarking revealed significant differences in their ability to differentiate active compounds from decoys for the DHFR-TS wild-type. FRED outperformed the other tools, achieving the highest pROC-AUC value of 0.85, indicating strong predictive capability. In contrast, PLANTS and AutoDock Vina exhibited lower performance, with pROC-AUC values of 0.75 and 0.33, respectively. These findings suggest FRED is the most effective tool for virtual screening of antimalarial compounds targeting DHFR-TS. In this study, we provide a comprehensive analysis of chemotype behavior and assess the performance of various docking tools, offering valuable insights for drug discovery with the increase of drug resistance and the urgent need for new treatments.

Keywords: Dihydrofolate Reductase-Thymidylate Synthase; Malaria, FRED; PLANTS; AutoDock Vina

PHS 504: Design, Biological Assessment, and Stability Studies of Febuxostat-Probenecid Mutual Prodrug as a Dual Inhibition Approach to Manage Hyperuricemia and Oxidative Stress

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Mutual prodrug approach appears as a promising strategy for developing candidates with great therapeutic effectiveness and enhanced safety profile. In this view, the present study addresses the assessment of merging febuxostat (FEB; the well-known xanthine oxidase (XO) inhibitor) with probenecid (PRO; the urate transporter (URAT1) inhibitor) on the mutual reduction of uric acid production and improvement of uric acid excretion. The synthesized prodrug **(FEB-PRO)** was intended to manage hyperuricemia, gout, and oxidative stress disorders as well. The results revealed that **(FEB-PRO)** could significantly enhance the *in vivo* hypouricemic and antioxidant effects as compared to its parent precursors and their physical mixture at equimolar doses. Additionally, **(FEB-PRO)** exerted effective lowering in serum and hepatic XOD activities as compared to its parent compounds as well as the FEB + PRO physical mixture. The inclusion of PRO presented an obvious advantage in boosting the pharmacological characteristics of FEB when linked as a prodrug. Moreover, the target prodrug could exhibit a protective efficacy against hepatotoxicity caused by CCl_4, beside lacking any cytotoxic effect on normal human breast cells. In addition, RT-PCR analysis for the expression of the antioxidant biomarkers CAT and SOD2 revealed that their expression was significantly increased in the group administered with **(FEB-PRO)**. Furthermore, **(FEB-PRO)** recorded increased lipophilicity and reduced aqueous solubility compared with its parents FEB and PRO, resulting in enhancement of the absorption rate with consequent improvement in the oral bioavailability. Additionally, stability assessments of the prodrug **(FEB-PRO)** exhibited great chemical stability across all tested pHs and temperatures. Whereas, enzymatic stability investigations in both rabbit plasma and liver homogenate indicated rapid hydrolysis, confirming that the prodrug was hydrolyzed by carboxylesterase enzymes in biological systems.

Keywords: Febuxostat-Probenecid; Mutual Prodrug; Hyperuricemia; Oxidative Stress

Natural products in drug discovery

PHS 601: Natural products as a source of SARS-CoV2 NTPase/Helicase enzyme inhibitors: an in-silico study

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COVID-19 has been the primary concern of the scientific research community for the past five years due to the high number of confirmed cases, which reached up to 770 million people around the world with about 7 million deaths. Although many vaccines are used around the world, people are in need of an arsenal of therapeutic drugs that could inhibit SARS-CoV2 and preclude another outbreak. In this in silico study, we aimed to find probable inhibitors of SARS-CoV2 through the virtual screening of 4924 natural products of various scaffolds and origins into the NTPase pocket of the SAR-CoV2 NSP13 enzyme (PDB code: 5RL9) and to predict the physicochemical, pharmacokinetic, and toxicological properties of such inhibitors. Three reported inhibitors of the NTPase pocket of SARS-CoV2 nsp13 with IC50s of 6, 57, and 115 μM were used for the validation of the molecular docking protocol, and their affinity scores were 6.82, 6.2, and 6.01 kcal/mol, respectively. Our findings revealed that an oleanane-type triterpenoid saponin, an oligosaccharide, and two ellagitannins could interact with at least three amino acids out of the six amino acids forming the SAR-CoV2 nsp13 NTPase pocket with binding affinity scores of (-10.2 Kcal/mol), (-9.98 Kcal/mol), (-9.65 Kcal/mol), and (-9.61 Kcal/mol), respectively. Relying on these findings, we can consider natural products as an important source for COVID-19-predicted inhibitors.

Keywords: COVID-19; molecular docking; NSP13; natural products

PHS 602: Integrative serum pharmacochemistry and network pharmacology analysis decipher the molecular mechanisms of *Spirulina platensis* against rheumatoid arthritis

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Inspired by the nutritive and pharmacological attributes of *Spirulina platensis, it* is regularly consumed as a premium food and complementary medicine in Far Eastern countries. *Spirulina* exhibits promise as a potential functional food for RA mitigation, however, the mechanistic basis beyond *Spirulina* action against RA remains elusive. The current study offered the first integrative workflow featuring serum pharmacochemistry and network pharmacology to clarify the bioactive components and efficacy mechanisms of *S. platensis* against RA. Firstly, RA model was conducted using Complete Freund's Adjuvant (CFA). Secondly, serum circulating compounds following *Spirulina* treatment were chemically profiled. Using network pharmacology approach, potential target genes of migrating components and related pathways were pinpointed. Lastly, the efficacy mechanisms of *S. platensis* in RA model were validated through a series of master serum and synovial biochemical markers along with key RA-associated pathways by western blotting. Nineteen transitional compounds, including four prototypes and fifteen metabolites were monitored and selected as candidate bioactive compounds. Concerning network pharmacology results the top predictive genes highly correlated with *S. platensis* action on RA were NFKB, TNF, NLRP3, VEGFA and MMP-9. Coincidently, KEGG pathway analysis portrayed PI3K-Akt signaling pathway, osteoclasts (OCs) differentiation, VEGF signaling pathway and MAPK signaling pathway as the top-ranked RA pathways. Our efficacy experimental findings unravelled that *Spirulina* significantly supressed the inflammatory mediators (IL-1, IL-17, IL-6, TNF-α and MMP-9) levels. Following *Spirulina* administration, western blotting dissected remarkable alterations in RA key proteins namely TLR4, NLRP3, Caspase-1 and NF-κB p65. This integrated study highlights the control mechanisms and efficacy compounds of *S. platensis* as referenced templates to rectify RA. In a broader view, future investigations and sufficient data be explored to expand the therapeutic strategies in the personalized medicine era to accomplish a thorough "treat-to-target" strategy which is of a significant potential in the clinical settings.

Keywords: Rheumatoid arthritis; *S. platensis*; Network pharmacology; Serum pharmacochemistry; Mechanistic study.

PHS 603*: Plumeria alba* L. and *Plumeria rubra* L. essential oils; *in-vitro* anti-cholinesterase action, molecular dynamics, and GC/MS analysis.

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Plumeria species essential oils (EOs) are valuable for use in medicine, cosmetics, and fragrance because of their unique chemical compositions and range of biological activity. The aim of this studt is to look at the chemical profiles of *P. alba* L. and *P. rubra* L., two biologically active crops grown in Egypt. Steam distillation and headspace were used to prepare the essential oils (EOs) from *P. alba* and *P. rubra* flowers that were grown in Egypt and GC/MS was used for analysis. The chemical composition of the EOs and those reported for EOs of *Plumeria* species in different countries were compared using principal components analysis (PCA). Significant variations in the components of headspace and steam-distilled essential oils have been demonstrated by the score plot. The main chemical found in the *P. alba* steam-distilled sample was geranyl benzoate (27.55%), while the main compound in the headspace-prepared sample was linalool (32.52%). On the other hand, the main constituent in the *P. rubra* steam-distilled sample was 1-heptacosanol (23.86%), while the main constituent in the headspace-prepared sample was 2-methyl-butyl aldoxime (36.38%). Acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) enzymes were shown to be inhibited by both EOs. The findings of the docking study indicated that aromatic compounds exhibited better fitting, whereas aliphatic compounds exhibit better stability with lower docking interaction energy. Additionally, geranyl benzoate demonstrated docking results and a binding mode resembling the ligands of both enzymes. It is highly encouraged to use essential oils from the *Plumeria* species as an efficient natural aromatherapy solution for Alzheimer's patients.

Keywords: Essential oils; *Plumeria rubra* L., Alzheimer’s disease; Cholinesterase inhibitors

PHS 604: Biomarker profiling of essential oils of Palestinian plants belonging to family Lamiaceae and their insecticidal activity

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Aromatic plants are rich in essential oils and are mainly found in the Mediterranean region, where the production of such oils is a profitable source of ecological and economic development. The importance of using essential oils with antimicrobial and insecticidal effects is to increase the shelf life of food and the productivity of economical crops as a promising technology. Lamiaceae is one of the most important families in the production of essential oils with significant pharmacoogical effects. Plants belonging to Lamiaceae family, such as Basil, Mentha, Thyme, and Sage, have been extensively studied with respect to their use as food preservatives. Essential oils of seven Palestinian plants including *Micromeria fruticosa, Teucrium polium, Thymus vulgaris, Mentha piperita, Mentha longifolia, Salvia officinalis* and *Ocimum basilicum* were evaluated. Supercritical carbon dioxide extraction technique was used as a promising green technique then identified using GC/MS. A trend towards environmentally friendly chemicals for use in termite management has been occurring globally. Our study will examine the seven naturally occurring essential oils against the termite and evaluate their chemical composition with the anti-termitic activity compared with the commercial pesticides used in termite control.

Keywords: Lamiaceae; Essential oils; food preservatives; anti-termitic activity

PHS 605: Somatic Embryogenesis Induction of Ficus Carica

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Common fig (*Ficus carica L.*) is a valuable food and medical subtropical plant. Somatic embryogenesis serves as an effective alternative system for *in vitro* cultivation of endangered plants , as it allows for the propagation of plants under a controlled environment. So, it produces hundreds of embryos that can be used as artifi cial seeds. Somatic embryos of *Ficus carica*, family *Moracae*, were induced from the calli of a sterile leaf explant in Murashige and Skoog's medium with 6 ppm 2,4-D. After the transfer of the developed calli into liquid media supplemented with the same concentration of growth regulator, all three embryonic stages (globular, heart and torpedo) were observed after 6weeks. Liquid media with growth regulators appeared to enhance the development to torpedo-stage embryos, especially at seven weeks of age cultures. 1 2weeks after the transfer of the callus into liquid media, flasks containing predominantly one microscopic stage were pooled and plated on fresh solid media lacking a growth regulator, where the embryogenic calli germinated showing shoots and aerial parts. Embryogenesis production protocol is considered a good tool to save plants from extinction, especially in *Ficus carica* which is a very important anti-cancer drug.

Keywords: In vitro cultivation; Somatic embryogenesis; *Ficus carica*; Callus initiation.

PHS 606: Identification of selective C-domain ACE-1 inhibitor via *in silico* and *in vitro* screening of selected antihypertensive edible plants

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Angiotensin converting enzyme (ACE) has a pivotal role in blood pressure control as a part of renin angiotensin aldosterone system (RAAS). ACE enzyme inhibitors have wide-ranging medical uses as in hypertension, cardiac diseases, diabetic nephropathy, and many others. However, side effects of synthetic ACE-1 inhibitors limit their use. Plants and natural products serve as vital sources of natural compounds that could act as potential leads. The aim of this study is identification of natural ACE-1 inhibitors through *in silico* molecular docking using Schrodinger® software and biological testing. Computational docking analyses were conducted on 1526 phytoconstituents found in different edible plants. *In vitro* testing of extracts representing the top ten hit plants as well as the top hit compounds were performed using Cushman and Cheung ACE-1 inhibitory assay. *Moringa oleifera* was the most potent plant extract with an IC_{50} value of 104.4 µg/mL. Additionally, its isolated compound, 4-*O*-caffeoylquinic acid, demonstrated an IC_{50} value of 62.92 µM. Synergistic effect was identified between the moringa extract and 4-*O*-caffeoylquinic acid in combination with captopril, particularly at a 90% effect level, This, in turn, potentially reduce side effects of captopril. On the other hand, studies showed that somatic ACE composed of two-domains (N- and C-domains) and C-domain is the major site for ACE-1 breakdown so it is more responsible for blood pressure control. Molecular docking analysis targeting specific domains revealed a high affinity of 4-*O*-caffeoylquinic acid towards the C-domain of the ACE-1 which reflects that 4-*O*-caffeoylquinic acid is more likely to have less side effects than the synthetic inhibitors as captopril and fosinoprilat. In conclusion moringa extract and 4-*O*-caffeoylquinic acid could be used as safe ACE-1 inhibitors after further *in vivo* and clinical trials.

Keywords: Molecular docking; Edible plants; 4-*O*-Caffeoylquinic acid; Synergistic effect; C-Domain ACE.

PHS 607: Comparative metabolomics of two saltwort (*Salsola* L.) species' various fractions in connection to their anti-inflammatory properties

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Many of the plants of genus *Salsola* are edible halophytes, known for their use in treatment of inflammation as well as their nutritional content. This study aims at chemical profiling of two *Salsola* species; *S. imbricata* and *S. jordanicola*, using UHPLC-QqQ-MS in an attempt to decipher the bioactive constituents of their aerial parts and their ex-vivo anti-inflammatory activity, 73 chromatographic peaks were annotated. OPLS-DA model coefficients plot indicated that tetradecanoic acid, beta sitosterol and pentacosane were positively correlated to discrimination of *S. imbricata* species while N-feruloyloctopamine, N-feruloyltyramine, and ferulic acid, were positively correlated to discrimination of *S. jordanicola*. Meanwhile, fractions of *S. imbracta*, reduced the 5 upregulation of TNF-α caused by LPS to levels lower than those produced by piroxicam while the petroleum ether and n-butanol fraction of *S. jordanicola* were more effective than piroxicam in reducing IL-6 gene expression. The coefficients plot depicted that methyl palmitate, aegicin, cleomiscoside, beta sitosterol and sitostanol possessed strong positive correlation to the down regulation of the pro-inflammatory marker TNF-α, IL-1β and IFN-γ while only norepinephrine derivatives showed strong positive correlation to the inhibition of IL-6. The results obtained may help to explain the potential anti-inflammatory effect of the various *Salsola* species fractions increasing the value of the *Salsola* species as putative functional foods.

Keywords: Salsola; anti-inflammatory; piroxicam; chemical profiling

PHS 608: UPLC/MS/MS based Metabolomics study for the investigation of the anti-viral activity in *Prosopis juliflora*

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Prosopis juliflora, has a long history of traditional application in treating respiratory tract infections. Incorporating mesquite into modern diets not only pays homage to ancient traditions but also highlights the potential of underutilized plants in promoting food security and diversifying culinary landscapes. In this investigation, the ability of extract of stems of *P. juliflora* to combat COVID-19 was initially evaluated using plaque reduction assays. The extract displayed a significant anti-COVID-19 activity, demonstrating IC_{50} value of 3.36 µg/mL. Employing UPLC/MS/MS, a comprehensive analysis of fractions from stems' extract, was conducted, leading to the annotation of sixty-four compounds spanning diverse chemical classes. Principal component analysis (PCA) indicated that butanol and hexane fractions exhibited greater variance when comparing their chemical profiles to dichloromethane and ethyl acetate fractions. To assess the impact of fractions on gene expression, the Real-time TaqMan RT-PCR assay was employed, revealing significant downregulation of both the E and RdRp genes across all fractions.

Keywords: UPLC/MS/MS; *Prosopis juliflora;* anti-viral activity; metabolomics

PHS 609: Serum metabolomics deciphers the underlying molecular mechanisms of Cost root extract in alleviating propylthiouracil-induced hypothyroidism in rats

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Saussurea costus (Falc.) Lipschitz is a well-known herb used in Arab and Middle Eastern traditional medicine to treat thyroid conditions. Though, more research is necessary to completely comprehend its efficacy and mode of action. The principal aim of this study was to evaluate the effect of *Saussurea costus* (COST) on the metabolic profiles of propylthiouracil (PTU)-induced hypothyroidism in rats. Using UPLC/QqQ-MS analysis, a thorough investigation of serum metabolites is conducted with the goal of identifying differential metabolites, clarifying underlying mechanisms, and assessing the possible pharmacological impact of COST in re-establishing metabolic equilibrium. Using the online Human Metabolome Database and a thorough literature search, intrinsic metabolites were annotated in serum samples from normal, PTU, and PTU + COST rats. Variations between the groups were identified by multivariate statistical studies, such as orthogonal partial least squares discriminant analysis (OPLS-DA). Thyroid gland tissues were used to measure serum levels of T3, T4, and TSH. Liver tissues were used to measure phospholipase A2 group IIA and lipoprotein lipase using particular ELISA kits. Using a one-step qRT-PCR approach, the expression of essential proteins in the principal evolutionary pathways was measured. Following COST therapy, there was a significant trend for 43 distinct intrinsic metabolites to return to normal levels. Differential modulation was observed in several metabolites, including gamma-glutamylserine, L-acetylcarnitine, and lysophosphatidylcholine, in response to PTU and subsequent treatment with *S. costus*. Interestingly, metabolic pathway analysis revealed substantial alterations in 21 metabolites linked to the metabolism of glycerophospholipids, arachidonic acid (ARA), and polyunsaturated fatty acids (PUFAs). By controlling the manufacture of PUFAs indicated by n-3, n-6, ARA, and glycerophospholipid metabolism, COST ameliorates PTU-induced hypothyroidism. This work shows a metabolic profile of hypothyroidism and related dyslipidemia treatment by COST and offers us a new starting point for investigating the biomarkers and pathophysiology of hypothyroidism.

Keywords: Serum metabolomics; Cost; Hypothyroidism; Polyunsaturated fatty acids biosynthesis

PHS 610: Acetogenins, cytotoxicity, immunomodulating activity and DNA barcoding of two cultivars of *Annona squamosa* L. cultivated in Egypt

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Annona squamosa L. Abdelrazik *(Annona A.)* and Balady (*Annona B.*) are two cultivars of *Annona squamosa* L. grown in Egypt. The purpose of this study was to compare the two cultivars in terms of their chemical profile, *in vitro* cytotoxicity against HCT-116 and A549 cell lines and total acetogenin. In addition, the two cultivars pulp were compared regarding carbohydrates and magnesium ions content and immunomodulating activity. The two cultivars were also differentiated genetically by DNA barcoding using the universal primer matK and the specific primer *Annona squamosa* matK. The chromatographic screening showed differences between leaves, seeds, and pericarp extracts of the two cultivars, either regarding the presence of certain compounds or their concentration, while the pulp extracts were almost the same. The cytotoxic screening of different organs, using MTT assay, showed that the methylene chloride extract of *Annona A.* seeds had the most potent cytotoxic activity against A549 and HCT-116 cell lines, with IC50 values of 0.58 µg/ml and 0.226 µg/ml, respectively. Acetogenins quantitation, using JustTLC software, showed that the acetogenin content is higher in *Annona A.* seeds extract than *Annona B.* seeds. Phenol-sulfuric acid method was used to determine the total carbohydrates content of the two cultivars pulp extract and the results revealed that the carbohydrates content of *Annona B.* pulp is higher than that of *Annona A.* pulp. On the other hand, *Annona A.* pulp showed a higher magnesium ions content, determined by complexometric method, than *Annona B.* pulp. The splenic lymphocyte proliferation assay showed that *Annona A.* pulp extract is slightly more active as immunostimulant than *Annona B.* Concerning the genetic diversity of the two cultivars, the universal primer matK showed about 64% percentage identity between the two cultivars. Additional studies should focus on seeds, leaves, pericarp and pulp constituents and their biological activities.

Keywords: Annonaceae; Acetogenins; Cytotoxicity; *Annona*.

PHS 611: UPLC-MS/MS in conjunction with chemometrics to identify phytoconstituents of *Chicorium intybus L.* and their potential as antidiabetic agents

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Diabetes mellitus is a metabolic disease that affects many organs, its consequences could be life threatening. In order to achieve normoglycemia and to lessen insulin resistance, healthy lifestyle and dietary supplements should be combined with antidiabetic medications. According to this study, chicory could be helpful in treating diabetes. Using UPLC-MS/MS analysis 86 compounds were identified in the extracts of different plant organs. Multivariate statistical analysis including principle component analysis (PCA), hierarchical cluster analysis (HCA)-heat map and orthogonal projection to latent structures discriminate analysis (OPLS-DA), and accompanied coefficient plots, were applied to investigate in-between and within-class discrimination of the different organs of *C.intybus.* The antidiabetic activity of these extracts was then assessed in-vitro by the alpha-glucosidase and alpha-amylase inhibitory activity and the stimulation of glucose uptake in HepG2 cells in-vitro. PLS model coefficient plots showed that lactupicrin, apigenin-7-O-glucoside, and betulinic acid were the major metabolites/biomarkers that correlated to the antidiabetic activity.

KeyWords: *C.intybus* L. ; UPLC-MS/MS; metabolomics; diabetes

PHS 612: A Validated Quality Control Protocol for Gluten-Free Oats Implementing NIR Spectroscopy Coupled to Chemometrics

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Oats offer significant nutritional benefits and serve as a gluten-free alternative, necessitating robust quality verification methods. NIR diffuse Reflectance spectroscopy and chemometrics were employed for authentication of oat in different forms; oat groats (unprocessed), steel-cut and rolled oat (processed) and their discrimination from gluten containing adulterants or contaminants; wheat, farro, triticale, barley, rye and rye grass. Both unsupervised and supervised multivariate analysis were approached, including Principal Component Analysis (PCA), Soft Independent Modelling of Class Analogy (SIMCA), Orthogonal Projections to Latent Structures-Discriminant Analysis (OPLS-DA) and Partial Least Squares Regression (PLSR) analysis. PCA and its corresponding Hierarchical Cluster Analysis (HCA) represented distinct grouping, segregation and pattern recognition among oat groats and the processed oats as well as the proposed adulterants. SIMCA authenticated both oats in different forms and oat groats combined to adulterants, with 100 % sensitivity based on their similarities and validated using Cooman's plots. OPLS-DA successfully discriminated them, as confirmed by permutation testing and accepted Root Mean Square Error of Calibration, Cross Validation and Prediction (RMSEC, RMSECV and RMSEP respectively). Furthermore, OPLS-DA accurately differentiated oat groats and the deliberately adulterated mixtures (1-50% adulteration), with > 99 % specificity. Also, the constructed PLS regression models quantified common adulterants in oat groats with limit of detection and quantitation (LOD and LOQ) not exceeding 1.4% and 4.1%, respectively. The presented protocol offers an effective and robust method for routine application in guaranteeing the purity and safety of gluten-free oats, addressing crucial gluten-sensitivity concerns.

Keywords: Gluten-free oats; NIR spectroscopy; Chemometrics; Oat contaminants; Oat authentication.

PHS 613: Integrated metabolomics, network pharmacology and in-vitro cytotoxic activity against liver and breast cancer of *Cynara scolymus* bracts

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Artichoke (*Cynara scolymus* L.) is highly reputed for its folkloric use in alleviating liver and gallbladder ailments in addition to its anticancer activity against different types of cancer cells. Extracts of different parts of *Cynara scolymus* plant parts (stems, leaves, bracts and receptacles) were chemically profiled using HPLC/QqQ/MS followed by unsupervised chemometric studies in order to demonstrate their detailed comparative metabolites. In-vitro cytotoxic potentials of the extracts were evaluated on breast and liver cancer cell line then an OPLS study using linear regression was conducted. Consequently, a network pharmacology analysis on the most bioactive plant organ was applied. Results of the unsupervised chemometric analysis revealed that kaempferol-3-O α-L-rhamnopyranoside-7-O-β-D-gal acturonopyranoside, chrysoeriol-7-rutinoside and 1-caffeoylquinic acid were responsible for the segregation of the bract (CSB) segregated from the rest of the plant organs. Interestingly, CSB extract possessed the highest potential in-vitro cytotoxic activity against both liver and breast cancer cells (IC 50 = 1.65 and 1.77 μ g/mL). As expected, the aforementioned biomarkers were observed to be the discriminatory cytotoxic metabolites in the constructed supervised chemometric model. Network pharmacology analysis on CSB revealed 27 liver cancer related metabolites of which, 1-caffeoylquinic acid was the most enriched one contributing to 13% of the total interactions. Furthermore, 38 target genes were involved, the most enriched of which were Aldo-keto reductase family 1 member B1 (AKR1B10) and interleukin-2 (IL-2). KEGG pathway analysis unveiled 23 significantly related pathways including metabolic pathways that possessed the lowest p-value (1.6E-5). In conclusion, the findings demonstrated that CSB is a significant source of cytotoxic metabolites against breast cancer and liver cancer cell lines, hence, drawing attention to the pharmaceutical and medicinal value of this negligible plant organ and paving the route for insightful research into its exact pharmacological cytotoxic mechanisms.

Keywords: *Cynara scolymus* L.; Breast and liver cancer; Comparative HPLC/QqQ/MS; Network pharmacology analysis

PHS 614: Metabolomics and chemometrics techniques reveal the metabolic variation and *in-vitro* anti-diabetic potential of two *Ziziphus* species

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Ziziphus spina-christi and *Z. lotus*, native species of Arabia, have received limited attention in scientific research. This study aimed to explore the metabolic variation in different organs (seeds, fruits and leaves) of *Z. lotus* and *Z. spina-christi* and identify bioactive metabolites associated with their *in-vitro* anti-diabetic activities. Phytochemical analyses revealed the presence of diverse compounds, including amino acids, alkaloids, flavonoids, phenolic acids, and fatty acids. Comparative profiling of the organs demonstrated significant variability in the chemical composition, with amino acids predominant in fruits, cyclopeptide alkaloids in seeds, and flavonoidal glycosides in leaves. Multivariate statistical analysis, including PCA and OPLS-DA, revealed distinct clustering patterns based on the chemical profiles of the different plant parts rather than plant species and identified discriminant metabolites for each plant part. The inhibitory effects of the extracts on α-amylase and α-glycosidase enzymes showed dose-dependent suppression, with *Z. spina-christi* extracts exhibiting the maximum α-glycosidase inhibitory activity and *Z. lotus* fruit extract as the most potent α-amylase inhibitor. Glucose uptake assays demonstrated increased utilization in HepG2 cells treated with *Z. lotus* extracts. Furthermore, multivariate analyses provided insights into the clustering patterns of samples based on bioactivity and highlighting metabolites positively correlated to the tested bioactivity. Notably, caffeic acid, ferulic acid, betulinic acid, hemsine, zizyotin, apetaline, quercetrin, jujubogenin, and zizyphursolic acid were identified as potential bioactive compounds. These findings may contribute to the understanding of *Ziziphus* chemical diversity and highlight its potential as a source of putative natural antidiabetic agents.

Keywords: *Ziziphus* species; anti-diabetic; chemical profiling; UPLC/MS/MS; multivariate analyses

Pharmaceutical technology and nanomedicine

PHS 701: Targeted tanshinone loaded nanostructured lipid carriers: A novel approach in Parkinson's disease therapy

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Parkinson's disease (PD) is the second most prevalent progressive neurodegenerative disorder, characterized by severe oxidative stress leading to neuronal cell death. Tanshinone IIA (TAN), a natural phytochemical, has shown clinical benefits in treating various CNS disorders, particularly PD, due to its distinctive anti-inflammatory and antioxidant properties. However, the clinical applicability of TAN is constrained by its suboptimal aqueous solubility, short plasma half-life, and limited concentration in the target cells. The objective of this research was to fabricate biocompatible chitosan-coated nanostructured lipid carriers (CS-NLC) for the effective brain delivery of TAN to manage PD. The developed nanocarrier was fabricated utilizing a melt-emulsification and ultrasonication technique, which was then optimized and evaluated through various in vitro methods as well as in vivo efficacy appraisal in a rotenone-induced PD rat model. The developed, TAN-loaded CS-NLCs (CS-TAN-NLCs) exhibited favourable colloidal characteristics (size $\leq$ 200 nm, PDI $\leq$ 0.2, and ζ-potential of 20 mV) and high TAN entrapment efficiency (> 97%), with a sustained release profile over 24 h. Following intranasal administration, CS-TAN-NLCs demonstrated a significant amelioration of parkinsonian and depressive-like symptoms in the diseased animal model, outperforming both the uncoated TAN-NLCs and the free TAN suspension, as evidenced by the obtained results of various conducted behavioural and histopathological assessments. Additionally, biochemical analyses of oxidative stress, inflammatory markers, the transcription factor nuclear factor-kappa B (NF-Kβ), and the lysosomal protease cathepsin B further substantiated the potential of the CS-TAN-NLCs to enhance TAN brain delivery and thus its therapeutic efficacy for PD treatment. Therefore, the CS-TAN-NLCs show potential as a promising nano delivery system for the effective management of PD.

Keywords: Phytomedicines; Neurodegenerative disorder; Cathepsin B; Tyrosine hydroxylase; Chitosan

PHS 702: Lactoferrin coated β-Cyclodextrin-based nanosponges for enhancing the antitumor effect of Fisetin in breast cancer

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Fisetin (FS) is a safer phytotherapeutic substitute for chemotherapeutics in breast cancer treatment. However, its poor systemic bioavailability limits its clinical benefit. Accordingly, this is the first study that developed lactoferrin-coated FS-loaded cyclodextrin nanosponges (LF-FS-NS) for the targeted delivery of FS to breast cancer. NS were prepared using diphenyl carbonate as across linker and its formation was verified using FTIR and XRD. The elaborated LF-FS-NS revealed favorable colloidal characteristics (size 52.7± 7.2 nm, PDI < 0.3, and ξ-potential; 24 mV), high loading efficiency (96 ± 0.3%) along with sustained drug release after 24 h. The synthesized NS had a mesoporous spherical structure with a pore diameter of ~30 nm, as demonstrated by SEM, which was further supported by surface area measurements. Furthermore, in comparison to FS suspension, LF-FS-NS increased the bioavailability of FS after oral and IP administration in rats by 2.5 and 3.2-fold, respectively. LF-FS-NS (30 mg/kg) showed considerably higher activity and targetability than the free drug and uncoated formulation on MDA-MB-231 cells and in vivo on an Ehrlich ascites mouse model. Subsequently, LF-FS-NS could be presented as a promising nanoformulation for the effective management of breast cancer.

Keywords: phytomedicine; nanosponges; lactoferrin; bioavailability; MDA-MB-231 cells; caspase-3; cyclin-D1

PHS 703: Exploring potential of bone marrow mesenchymal stem cells exosomes in effective luteolin delivery for treatment of liver fibrosis

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Liver fibrosis is a fatal illness with no approved cure. Luteolin (LUT) is a botanical flavonoid that has a well-documented activity against several hepatic pathological conditions, including liver fibrosis. Its mechanism of action is mediated through being an effective anti-inflammotory antioxidant agent. Furthermore, it triggers the apoptosis of activated hepatic stellate cells (HSC) and decreases their proliferation. Unfortunately, its vulnerability to metabolism and limited solubility in water impede its clinical usage. Nano-sized extracellular vesicles, exosomes, have extensively studied as a bioinspired drug delivery system of a promising innate pharmacological activity. Therefore, the aim of the current work is to explore for the first time the ability of exosomes to enhance the antifibrotic action of LUT. LUT-loaded exosomes (LUT-Ex) were prepared, optimized and assessed using different in vitro and in vivo methods. LUT-Ex displayed good colloidal properties (size; 150 nm, PDI; 0.3 and ζ-potential; −28 mV), reasonable drug entrapment efficiency (40%) with sustained drug release over 72 h. Interestingly, LUT-Ex demonstrated greater antifibrotic power when compared to both free drug and plain exosomes after a single intraperitoneal injection in a liver fibrosis rat model. Conclusively, LUT-Ex could be considered as an appealing bioinspired nanocarrier for the efficient management of liver fibrosis.

Keywords: Phytomedicine; exosomes–antifibrotic activity; mesenchymal stem cells; inflammatory cytokine; profibrotic markers

PHS 704: Tanshinone in polycaprolactone/levan nanofibers for phytotherapeutic management of skin cancer

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Skin cancer is a highly prevalent disease and is one of the most common types of cancer. Therefore, there is a pressing need for the development of effective local treatments for skin cancer. The use of phytotherapeutics such as tanshinone IIA (Tan) as anticancer agents has shown promise. In this study, we developed Tan-loaded polycaprolactone nanofibers (Tan@Lev/EL/PCL-NF) for local skin cancer therapy, biofunctionalized with levan and egg-lecithin. Tan@Lev/EL/PCL-NF were prepared using a w/o-emulsion electrospinning method, with a diameter of 365.56 ± 46.25 nm. Tan@Lev/EL/PCL-NF presented favorable hydrophilicity and tensile strength. Tan@Lev/EL/PCL-NF achieved controlled-release of Tan, with 50% skin deposition. The developed fibers demonstrated pronounced cytotoxicity on squamous-cell-carcinoma cell-line (SCC), while maintaining optimal cytocompatibility on fibroblasts. The nanofibers also showed high apoptotic activity, cell-cycle-arrest, and antimigratory efficacy. In vivo antitumor activity was confirmed in mice, with pronounced inhibition of tumor-growth and relative tumor weight. Tan@Lev/EL/PCL-NF also inhibited tumor biomarkers, upregulated caspase-3, and knocked down BAX and MKi67. Our findings highlight the potential of Tan@Lev/EL/PCL-NF as an efficient local skin cancer phytotherapy.

Keywords: Herbal medicine; w/o emulsion electrospinning; bioactive polymers.

PHS 705: Eudragit RS100/Chitosan - coated Genistein-NLCs incorporated in mucoadhesive in situ gel for enhanced ocular uptake and anti-inflammatory efficiency

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Ocular inflammation is a prevalent eye disorder that can lead to substantial adverse effects if left untreated. Genistein (Gen), a phytotherapeutic compound with tyrosine kinase inhibitory properties, has been shown to effectively suppresses inflammatory cytokines. However, its limited solubility poses challenges for ocular bioavailability and therapeutic efficacy. Herein, we developed Gen loaded nanostructured lipid carriers (NLCs) using both liquid (oleic acid) and solid (stearic acid, compritol) lipids via melt emulsification paired with an ultra-sonication technique. Surface modification of Gen-NLCs with chitosan (CS) or eudragit RS100 (ERS 100) resulted in cationic zeta potentials (25 and 27.4 mV, respectively) with nanosized particles (246 ± 1.6nm and 140 ± 13nm, respectively), high drug entrapment (≥98%), and sustained release. Cell line studies on corneal stromal fibroblasts showed excellent biocompatibility and enhanced cellular uptake of all NLC formulations. Furthermore, NLCs were incorporated into a mucoadhesive in situ gel, containing poloxamers (20%w/v) and hydroxyethyl cellulose (0.5%). The optimized gel (G9) displayed rapid gelling time, appropriate gelling temperature, good spreadability, shear-thinning properties, and prolonged mucoadhesion time with sustained drug release. In vivo studies confirmed improved ocular penetration and distribution of the formulations. Notably, CS-Gen-NLCs/G9 and ERS-Gen-NLCs/G9 significantly reduced interleukin-6 levels in the cornea and retina compared to the untreated group after three days of treatment. These findings demonstrate the potential of ERS-Gen-NLCs/G9 as a safe and effective nanocarrier for delivering Gen in the treatment of both anterior and posterior ocular inflammation.

Keywords: Nanostructured lipid carriers; Genistein; Eudragit; Chitosan; In situ gel; Ocular uptake ; Anti-inflammatory efficacy

PHS 706: Bioactive rhamno-nanocapsules: A novel phytotherapeutic platform to baicalin delivery in acute myeloid leukemia

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Leukemia is regarded as a serious medical disorder with a high prevalence among adults, especially acute myeloid leukemia (AML). Finding novel treatment strategies for AML is therefore critically needed. The objective of this work was to prepare a biocompatible nanoformulation that would enable the efficient oral delivery of the phytomedicine baicalin (BAC) for the treatment of AML. Rhamno-nanocapsules (RNC) with bioactive ingredients were prepared using a phase-inversion technique. The developed BAC-RNC had a size of 61.5± 1.6 nm, PDI = 0.15 ± 0.01, ξ-potential = -22.1 ± 2.1 mV, high BAC entrapment efficiency (> 98%), delayed drug release (~ 70 ± 0.4 % after 24 h), and high storage stability for 3 months. Furthermore, compared to BAC suspension, BAC-RNC improved the oral bioavailability of BAC in rats by 2.3 times with longer $t_{1/2}$ and mean residence time. In vitro evaluation of the anticancer effect of BAC-RNC verified their significant cytotoxicity against human leukemia monocytes (THP-1). Finally, a mechanistic study carried out by assessing multiple tumor biomarkers demonstrated that BAC-RNC elevated the apoptotic markers (caspase-3 and BAX) and downregulated the angiogenic marker, vascular endothelial growth-factor (VEGF) and the anti-apoptotic marker, BCl-2. The enhanced effectiveness of BAC bioactive-RNC strongly suggests that they have pharmacotherapeutic potential as a promising nanocarrier for the treatment of AML.

Keywords: Phytomedicines; Rhamnolipids; nanocapsules; Bioavailability; THP-1 cells; Caspase-3.

PHS 707: Preparation and evaluation of silk protein nanosystem for management of skin cancer

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Cutaneous squamous cell carcinoma (CSCC) is one of the most common types of skin cancer which is linked to excessive exposure to UV- rays.It constitutes about 35-40% of total cutaneous tumors. Although, surgical excision is the main treatment option for CSCC ,but its efficiency is terminated at the early-stage.Bioactive polymers recently have been used as promising agents in treatment of cancer due to its safety and effectiveness. Sericin(SER) is a novel bioactive polymer which is a silk protein produced by the silkworm Bombyx Mori(B.Mori).Further , Itraconazole(ITR) is a repurposed drug for treatment of several types of cancer due to its ability to enhance cellular apoptosis. However, it has poor solubility. Nanotechnology has been widely used to enhance drug targeting and its bioavailability and decreasing its toxicity. Thus,the aim of this study is to prepare itraconazole loaded silk protein nanoparticles(ITR-SER NP) for the management of skin cancer .The nano-preciptation of ITR in SER was developed .SER NP were characterized in terms of physicochemical properties, surface morphology, drug loading, release behavior and cytotoxicity study. Results showed that adopting nano-preciptation method in ethanol developed the most chemically and physically stable (ITR-SER NP). The optimized ITR-SER NP has particle size 320 ± 4 nm and PDI 0.3 with negative zeta potential -12 ± 1 mV and entrapment efficiency exceeding 93%. Furthermore, in vitro release experiment ensured sustained release of ITR over > 24 h with no signs of degradation.In addition, TEM analysis was done showing spherical particles. Cytotoxicity study showed promising results where the ic50 of drug loaded nanoparticles was 111.4ug/ml and that of free drug was 225 ug/ml.To ensure the efficacy of the system in vivo studies will be conducted on rats bearing skin cancer.To conclude,this study highlighted successful entrapment of ITR and promising anticancer effect of the system.

Keywords: silk protein , nanopreciptation, Itraconazole, skin.

PHS 708: From Solid to Liquid: Innovative Solubility Enhancement of Piperine via Deep Eutectic Solvents Formation

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Unfavorable physicochemical properties of active pharmaceutical ingredients (APIs), particularly poor aqueous solubility, often limit their therapeutic potential. Conventional strategies to improve API solubility, such as chemical modification, salt formation and prodrug formation are not always successful and have inherent limitations. Consequently, there is increasing interest in converting APIs into ionic liquids (ILs) and deep eutectic solvents (DESs), which offer enhanced solubility and stability without the drawbacks of solid forms. This study investigates the use of ILs/DESs approaches to improve the solubility of piperine (PI), a naturally derived, poorly water-soluble anti-inflammatory compound. PI was combined with fourteen structurally diverse acidic counterparts, leading to the successful development of ten liquid PI-counterpart systems. Thermal analysis confirmed the formation of IL/DESs, while computational and spectroscopic studies highlighted the crucial role of hydrogen bonding in these interactions. The study found that the availability of hydrogen bonding groups in the counterparts was key to the successful formation of DESs, and that these systems could enhance PI's solubility by 36% to 294%. Additionally, normalized polar surface area (PSA) and logP values were identified as effective predictors of solubility enhancement. These findings demonstrate that IL/DES systems can be strategically designed to improve the delivery and therapeutic potential of poorly soluble APIs, emphasizing the importance of counterpart structure in optimizing these APIs liquid forms.

Keywords: Deep eutectic solvent; solubility; piperine; counterpart; hydrogen bonding

PHS 709: Impacts of Artificial Intelligence in Pharmaceutical Industry

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Artificial intelligence (AI) has emerged as a powerful recent technology in different industrial fields as well as in pharmaceutical industry. Pharmaceutical industry involves various complex processes under maintained high quality system to ensure safety, efficacy and stability of pharmaceutical product. The cornerstone of pharmaceutical industry is drug discovery and drug formulation. Drug discovery is a challenging, expensive, and lengthy task. AI can aid in various aspects of drug discovery such as identifying hit and lead materials, validating drug targets, toxicity prediction and optimizing drug structure design for better permeation and selectivity. In addition, drug formulation faces challenges such as the choice of suitable dosage form for the Active pharmaceutical ingredient (API), variety of excipients and used quantities, optimum formulation method and conditions that should meet the specifications of the drug product. AI may accelerate drug formulation using rule-based algorithms to choose the type and quantity of excipients depending on the physicochemical properties of the drug. Afterwards, large scale drug manufacturing passes through several parameters and is susceptible to different sources of variations. AI can lead to automated manufacturing, identify the optimal process parameters and reducing errors possibility and batch to batch variability. Concerning assurance of quality in drug industry, AI can monitor the performance of critical equipment and machines besides determining the critical points to be evaluated, detecting defects and predicting the results of tests. In conclusion, AI is showing significant development in pharmaceutical industry with benefits such as enhancing rapid productivity, reduce costs and ultimately producing safer and effective drug meanwhile, monitoring the processes parameters and maintaining quality. Moreover, leading companies started implementing AI use in pharmaceutical industry.

Keywords: Artificial Intelligence (AI), drug discovery, drug formulation**,** Active Pharmaceutical Ingredient (API), quality.

PHS 710: A bioactive nanoemulsion for the intratracheal delivery of Tanshinone IIA in acute lung injury

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Acute lung injury (ALI) and acute respiratory distress syndrome have been reported as major causes of COVID-19 related mortality. This drives the interest in finding new therapeutic targets for ALI. In this context, the current work aimed at preparing a biocompatible nanoemulsion (NE) for the pulmonary delivery of the herbal drug; tanshinone-IIA (TSIIA) for the management of ALI. The NE is based on bioactive natural ingredients; rhamnolipid biosurfactant and tea-tree oil. The NE was developed using a simple ultrasonication technique and optimized by varying surfactant: oil ratio and oil concentration. The selected TSIIA-NE formulation was of a size 105.7 nm and a PDI ~ 0.3. TSIIA EE was more than 98 % and showed a biphasic sustained release profile and retained its stability over 3-months. ALI was induced in rats using lipopolysaccharide (LPS) for efficacy evaluation. A single TSIIA-NE (30 µg/kg) dose was administered intratracheally 2 h after instillation of LPS . Seven days post-treatment; pulmonary function, inflammation, oxidative stress and glycocalyx shedding markers were assessed. Moreover, histopathological examination of lung tissues was performed. In comparison to untreated rats, in-vivo 1.4 and 1.9-fold increases in tidal volume and minute respiratory volume, respectively were demonstrated, with 32 % drop in wet/dry lung weight ratio and improved levels of arterial blood gases. Biochemical analysis of biomarkers in bronchoalveolar lavage fluid and tissue homogenate in addition to lung histopathology indicated that treatment may ameliorate LPS-induced ALI symptoms thorough anti-inflammatory and anti-oxidative effects and inhibition of glycocalyx shedding. TSIIA loaded NE was superior to free TSIIA and blank-NE. The enhanced efficacy of TSIIA bioactive nanoemulsion significantly reflects its pharmacotherapeutic potential as a promising nanoplatform for alleviation of ALI.

Keywords: rhamnolipid, herbal drug, glycocalyx shedding, inflammation

PHS 711: Apocynin and lavender essential oil consolidation in brain targeted lactoferrin coated lipid nanocapsules in pentylenetetrazol induced seizures

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Apocynin (APO), a plant derived antioxidant, possesses a specific NADPH oxidase inhibitory action validating its neuroprotective effects in assorted CNS disorders, including epilepsy. Treatment with APO is challenging depending on its rapid elimination and poor bioavailability. Subsequently, novel APO-loaded lipid nanocapsules (APO-LNC) were formulated and coated with lactoferrin (LF-APO-LNC) conferring enhanced brain targetability and prolonged residence time. A bioactive ingredient, lavender oil (LAV), was embodied in LNC to act synergistically with APO in alleviating pentylenetetrazol (PTZ)-induced seizures. The elaborated LF-APO-LAV/LNC showed a particle size 59.7±4.5 nm with narrow distribution and 6.07±1.6mV zeta potential). It also expressed high entrapment efficiency 92± 2.4% and sustained release (35% in 72 h). Drug-Brain accumulation was expressed with increased Log BB value of 0.2±0.14 at 90 min. A ~2-fold increment in plasma AUC and MRT was ascertained in LF-APO-LAV/LNC comparable to APO succeeding subcutaneous injection. In a PTZ-induced acute seizures rat model, LF-APO-LAV/LNC revealed a Modified Racine score of 0.67 ± 0.47 with a significant increase in seizures latency and decrease in duration. Additionally, oxidant/antioxidant capacity (MDA, GSH and SOD) and inflammatory markers (TNF-α and IL-6) levels in brain tissue homogenate were significantly amended. Histopathological and immunohistochemical investigation of brain tissue sections further supported these findings. The results suggest APO/LAV consolidation in LF-coated LNC as an auspicious approach to rectify seizures.

Keywords: NADPH-oxidase inhibitor, essential oil, epilepsy, subcutaneous, bioavailability, Log BB

Microbiology, immunology and biotechnology

PHS 801: Anti-quorum sensing potential of carvacrol, cinnamaldehyde, and eugenol against uropathogenic *Escherichia coli* isolated from a teaching hospital in Alexandria, Egypt

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Uropathogenic *Escherichia coli* (UPEC) is the primary culprit of urinary tract infections, which are among the most common nosocomial and community-acquired illnesses. Considering the global rise in multidrug-resistant (MDR) UPEC, novel approaches are urged. One of these approaches is repurposing natural compounds as anti-quorum sensing (QS) agents to hinder bacterial virulence. Therefore, this investigation aimed to explore the anti-QS effect of carvacrol, cinnamaldehyde, and eugenol against *E. coli* isolates collected from urine cultures of Egyptian patients. The antibiotic susceptibility testing of the 67 *E. coli* isolates revealed that 94% displayed MDR phenotype. PCR was conducted to identify the *usp* gene, and as a result, 45% of isolates were classified as UPEC. When used at their sub-inhibitory concentrations, phytochemicals suppressed the twitching and swimming motility of UPEC isolates, with eugenol exhibiting the strongest inhibitory effect. The ability of the tested isolates to form biofilms was hindered by the agents at two different temperature settings, 37°C and 30°C. Eugenol was able to significantly suppress biofilm formation by 50% at both studied temperatures compared to untreated controls. The anti-QS potential of the phytochemicals was demonstrated by their downregulation of expression of the QS gene (*luxS*) along with certain crucial motility-related genes. A checkerboard assay was performed to assess phytoproducts' combinatory activity with five antibiotics. The minimum inhibitory concentrations of the antibiotics were significantly reduced by the addition of the phytoproducts, resulting in numerous synergistic or partially synergistic combinations. Overall, the investigated phytochemicals could potentially be used as anti-QS agents that can preferentially lower QS-based communication and impair gene expression cascades, ultimately reducing virulence factor production and the pathogenicity of UPEC. Additionally, the synergistic pairings of these phytochemicals with antibiotics may offer a novel approach to minimize the adverse effects of high antibiotic doses, thus paving the road to mitigate antibiotic resistance.

Keywords: uropathogenic *E. coli*; quorum sensing; repurposing; carvacrol; cinnamaldehyde; eugenol; Egypt

PHS 802: Evaluation of the ATP-Binding Cassette (ABC) Transporter Antigen as a Promising Vaccine Candidate Against *Acinetobacter baumannii* Infections

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The World Health Organization has classified *Acinetobacter baumannii* as a pathogen of urgent importance, requiring the development of novel treatment alternatives. This decision was made due to the emergence of multidrug-resistant strains of *A. baumannii* and the scarcity of available treatment choices. The purpose of this study was to investigate, for the first time, the possibility of using the ATP-binding cassette (ABC) transporter substrate-binding protein, an efflux-related protein, as a vaccine candidate against *A. baumannii* infections. The ABC transporter substrate-binding protein is involved in the process of iron acquisition of *A. baumannii*. After cloning the corresponding gene into the pQE31 plasmid vector, the ABC transporter substrate-binding protein was produced in *Escherichia coli*. Mice were given the refined antigen along with alum nanoparticles and Bacillus Calmette-Guérin (BCG) as adjuvants. Using a mouse infection model, immunological parameters were evaluated and protection against bacterial challenge was investigated. Serum samples were analyzed two weeks following the final dose of immunization for antigen-specific IgG antibody response. The results showed that the IgG antibody response was significantly higher in vaccinated mice compared to negative control mice. When the mice were challenged with *A. baumannii*, only a short-lived protection lasting for 24 hours was obtained. Virulence factors demonstrated by *A. baumannii* are diverse, suggesting that the development of a multi-component vaccine may be required to provide effective protection. Moreover, additional research should focus on the immunization regimen, the route of administration, and the adjuvants used to ensure full and enduring protection.

Keywords: *Acinetobacter baumannii*, ATP-binding cassette transporter, Vaccine, BCG, Iron acquisition, Alum, Nanoparticles.

PHS 803: Genomic Characterization of International High-Risk Clone ST410 *Escherichia coli* Encoding ESBL Genes on IncFIA/IncFIB/IncFII/IncQ1 Multireplicon Plasmid and Carrying a Chromosome-Borne *bla*$_{CMY-2}$ Isolated in Egypt

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The accelerated spread of multidrug-resistant (MDR) ***Escherichia coli*** with the ability to produce extended-spectrum β-lactamases (ESBLs) or AmpC enzymes has been documented in Egypt, presenting a substantial treatment challenge. In this study, we investigated the prevalence of ESBLs and AmpC enzymes among 48 ***E. coli*** strains isolated from patients with urinary tract infections admitted to a teaching hospital in Alexandria. Phenotypic and genotypic methods of detection were performed. Isolates producing both enzymes were tested for the mobilization of the corresponding genes through broth mating experiments. The results indicated that 80% of the isolates were MDR, where 52% produced ESBLs and 13% were AmpC producers. Conjugation experiments failed to show the mobilization of *bla*$_{CMY-2}$ in EC13655, which was chosen for whole genome sequencing analysis. The *in silico* investigation revealed that the isolate belonged to the ST410-H24Rx high-risk clone. It co-harbored the ESBL-encoding genes *bla*$_{CTX-M15}$, *bla*$_{TEM-1}$, and *bla*$_{OXA-1}$ on an IncFIA/IncFIB/IncFII/IncQ1 multireplicon plasmid. The chromosomal location of *bla*$_{CMY-2}$ was detected with an upstream flanking copy of the insertion sequence **IS*Ecp1***. This chromosomal integration of *bla*$_{CMY-2}$ establishes stable maintenance of the gene, necessitating imperative local surveillance to reduce the further spread of such strains in various clinical settings.

Keywords: *E. coli*; Extended-spectrum-beta-lactamases; IncFIA/IncFIB/IncFII/IncQ1 multireplicon plasmid; *bla*$_{CMY-2}$; Chromosomal integration; Egypt

PHS 804: Correlation between antimicrobial resistance and virulence profile in *Pseudomonas aeruginosa* clinical isolates from Alexandria, Egypt

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The widespread of multi-drug resistant *Pseudomonas aeruginosa,* in addition to the pathogen's numerous virulence factors, result in noticeable mortality and morbidity rates. This study explored the potential correlation between the antimicrobial resistance and virulence factors' production among *P. aeruginosa* clinical isolates obtained from Alexandria Main University Hospital in Egypt. The contribution of alginate in biofilm formation and the role of the mucolytic agent ambroxol in inhibiting biofilm formation were studied. Among the tested isolates, 79.8% showed a multi-drug resistant phenotype. Biofilm formation was the highest detected virulence factor (89.4%), while DNase was least observed (10.6%). Phospholipase C production was significantly associated with cefepime susceptibility, pigment production was significantly linked to sensitivity to ceftazidime, and DNase production was significantly linked to intermediate resistance to meropenem. Among the studied virulence genes, *lasB* and *algD* were the most predominant (93.3% and 91.3%, respectively), while *toxA* and *plcN* showed the least prevalence rates (46.2% and 53.8%, respectively). Significant association of *exoS* with ceftazidime and aztreonam susceptibility, *toxA* with ceftazidime susceptibility, and *plcH* with piperacillin-tazobactam susceptibility was detected. Ambroxol exhibited an anti-biofilm activity ranging from 5 to 92%. As revealed by quantitative reverse transcriptase polymerase chain reaction, alginate was not a crucial matrix component in *P. aeruginosa* biofilms. The isolates' high virulence in addition to their multi-drug resistance to frequently used antibiotics could contribute to the elevation of morbidity and mortality rates among *P. aeruginosa* infections. Using ambroxol as an alternative treatment option could be suggested. However, further *in vivo* studies are necessary to confirm such findings. Active surveillance of virulence determinant prevalence as well as antibiotic resistance is highly recommended to achieve better understanding of coregulatory mechanisms.

Keywords: Multi-drug resistance - Virulence - Ambroxol - Biofilm inhibition -Quantitative reverse transcriptase polymerase chain reaction - Alginate.

PHS 805: Whole genome sequencing characterization of colistin-resistant *Klebsiella pneumoniae* isolated from intensive care unit patients: First report from Egypt

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Egypt has witnessed a considerable surge in the incidence of multidrug-resistant *Klebsiella pneumoniae* infections in intensive care units (ICUs). The management of these infections is becoming increasingly difficult while colistin-carbapenem-resistant *K. pneumoniae* is on the rise. Due to the scarcity of data in the literature on the genomic characteristics of colistin-resistant *K. pneumoniae* in Egypt, it was essential to explore the genomic features, the virulence determinants, the antimicrobial resistance and the molecular mechanisms underlying colistin resistance in this pathogen. Seventeen colistin-resistant *K. pneumoniae* isolates were prospectively collected from ICUs in Alexandria, Egypt in 2020. Colistin resistance was detected phenotypically using modified rapid polymyxin Nordmann/Poirel and broth microdilution techniques. The susceptibility of the population to 20 antimicrobials was assessed using the Kirby-Bauer method. Whole genome sequencing and bioinformatic analysis were performed to explore the virulome, resistome, and the genetic mechanisms of colistin resistance. Among the tested *K. pneumoniae* isolates, 82.35% were extensively drug-resistant and 17.65% were multidrug-resistant. High susceptibility levels were observed towards tigecycline (88.24%) and doxycycline (52.94%). Population structure analysis revealed seven sequence types (ST) and K-types: ST383-K30, ST147-K64, ST17-K25, ST111-K63, ST11-K15, ST14-K2, and ST525-K45. Hypervirulence biomarkers, *iucA* (52.94%) and *rmpA*/*A2* (5.88%) were detected. Extended-spectrum β-lactamase- and carbapenemase-producers constituted 94.12% of the population, with $bla_{\text{CTX-M-15}}$, $bla_{\text{NDM-5,}}$ and $bla_{\text{OXA-48}}$ detected in 64.71%, 82.35%, and 82.35% of the isolates, respectively. Chromosomal alterations in *mgrB* (82.35%) were the most common genetic changes associated with colistin resistance followed by deleterious mutations in ArnT, PmrA, PmrB, PmrC, PhoQ, and ArnB along with the acquisition of *mcr-1.1* by a single isolate of ST525. In conclusion, Egyptian health authorities must implement more effective antibiotic stewardship protocols to preserve the efficacy of colistin. This study represents the first characterization of a complete sequence of *mcr-1.1*-bearing IncHI2/IncHI2A plasmid recovered from *K. pneumoniae* clinical isolate of the emerging high-risk clone ST525.

Keywords: Colistin resistance; Egypt; ICU; *Klebsiella pneumoniae*; Whole genome sequencing; Extensively drug-resistant; *mcr-1.1*; *mgrB*

PHS 806: *In silico* analysis of iron acquisition proteins of *Pseudomonas aeruginosa* as prospective vaccine targets and *in vivo* investigation of protective effectiveness of the hemophore HasAp

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Pseudomonas aeruginosa (PA) is a Gram-negative opportunistic pathogen, commonly responsible for deadly nosocomial infections worldwide. Iron is critical for Gram-negative bacteria to initiate an infection rendering iron acquisition proteins (IAPs) tempting vaccine targets. A "Reverse Vaccinology" approach was adopted by which 37 IAPs in various types of PA infections were analyzed, and the vaccine candidate was chosen depending on different criteria, such as high expression level, high antigenicity, conservation and solubility employing proper bioinformatics tools. After recombinant expression in *Escherichia coli* and purification, the selected IAP was assessed *in vivo* for protection efficacy, utilizing the novel immunoadjuvant, naloxone (NAL). The hemophore HasAp satisfied all the *in silico* selection criteria, being highly expressed, antigenic, soluble, and conserved. The expected protection was not obtained upon subcutaneous immunization with recombinant HasAp alone or recombinant HasAp plus NAL (HasAP-NAL) compared to controls. A low IgG2a/IgG1 ratio in immunized mice denoted a T-helper type 2-oriented immune response that provides suboptimal protection against PA infections. Unexpectedly, the bacterial count in livers of both NAL- and HasAp-NAL-immunized mice was significantly lower than that in the HasAp and saline groups. A similar finding was detected in lungs and kidneys obtained from these groups, even though the difference was not significant. Such protection could be assigned to the innate immunity enhancement by NAL. The current study provided a thorough *in silico* analysis of IAPs of PA followed by *in vivo* investigation of the best IAP, HasAp. In spite of the encouraging *in silico* results, the expected vaccine efficacy was not provided. HasAp should be further assessed as a vaccine candidate through varying the infection models, immunization regimens, and immunoadjuvants.

Keywords: *Pseudomonas aeruginosa*; vaccine; iron acquisition proteins; *in silico* analysis; HasAp; naloxone; *in vivo* investigation.

PHS 807: Synergistic metabiotic-antibiotic combinations as promising therapeutic options against antibiotic-resistant pathogens: *In vitro* approach using time-kill assay

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The size of the global market of probiotics dietary supplements is consistently expanding. Metabiotics are considered as a safer alternative to evade probiotics' health concerns. The current study explored synergistic metabiotic-antibiotic combinations for combating antibiotic-resistant pathogens to overcome the accelerating antimicrobial resistance. *In vitro* characterization of the probiotic potential of lactic acid bacteria (LAB) strains obtained from 3 dietary supplements was done. Time-kill assay was performed to assess the combinations of conventional antibiotics and the cell-free supernatants (CFS) of selected strains against *Escherichia coli* and *Staphylococcus aureus* clinical isolates. Four LAB strains were isolated from dietary supplements and identified by MALDI-TOF mass spectrometry. They were as follows: P2: *Lactobacillus acidophilus,* P3: *Lactiplantibacillus plantarum*, P4: *Lacticaseibacillus rhamnosus*, and P5: *Pediococcus acidilactici.* Excluding P3, this identification was in agreement with that annotated by the manufacturers. The tested strains could survive in an acidic environment at pH 3. Except for P2, the strains showed less than 1 log reduction in survivors upon adding reconstituted skimmed milk to pepsin at pH 2 and possessed proper tolerance to 0.3% ox-bile. All the strains could tolerate pancreatin. Autoaggregation and hydrophobicity capabilities ranged between 36-66% and 7-92%, respectively. P2 was excluded due to its inferior probiotic properties. The remaining strains showed proper growth at 0.2% phenol. However, growth was lower at higher concentrations. Time-kill assay showed auspicious synergistic activities of the combinations of CFS of P4 with ceftazidime against *S. aureus* and with either gentamicin or ceftazidime against *E. coli*, as well as CFS of P5 and ceftazidime against *S. aureus*. To ensure safety and efficacy, precise identification and evaluation of probiotic strains included in dietary supplements is pivotal. Probiotics' CFS could be exploited in formulating novel biotherapeutics targeting problematic pathogens. Further *in vivo* studies are still necessary to investigate the proper treatment regimen.

Keywords: Probiotic dietary supplements; metabiotics; MALDI-TOF mass spectrometry; Acid tolerance; ox-bile; pancreatin; Autoaggregation; Hydrophobicity; Phenol tolerance; Time-kill assay; Synergism.

PHS 808: Staphylococcal nasal carriage in the community: biofilm formation and macrolide resistance

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Problem: Nasal colonization with staphylococci is a risk factor for invasive infections, especially in hospitalized and immunocompromised patients. Objectives: To investigate the prevalence of *S. aureus* and staphylococci other than *S. aureus* (SOSA) nasal carriage, biofilm formation potential and resistance to the macrolides among the carriage isolates. Methods: Nasal swabs were collected from healthy pharmacy students who filled a survey about their personal hygiene habits. The isolates were identified using biochemical tests and VITEK 2 system. Antibiotic susceptibility was performed using disk diffusion and confirmed by minimum inhibitory concentration determination (MICs). Biofilm formation was quantified phenotypically using crystal violet method. Some macrolide resistance and biofilm formation genes were screened using polymerase chain reaction (PCR). Results: We collected 196 nasal swabs. The isolated staphylococci were found to be 34 *S. aureus,* 33 *S. haemolyticus*, 13 *S. hominis,* 12 *S. epidermidis,* 9 *S. warneri,* one *S. capitis* and 1 *S. lentus.* According to the survey, there was no significant correlation between gender, frequency of daily nose washing or weekly showering and carriage of a certain staphylococcal species. *S. haemolyticus* showed the highest percentage of muli-drug resistant (MDR) isolates (51.5%), while, *S. hominis* showed the lowest percentage (30.8%). Among the genes encoding macrolide resistance, *ermB* showed the highest prevalence among all species, whereas *ermA* showed the lowest prevalence. 75.7% of all isolates formed biofilms ranging in severity between strong and weak. The highest percentage of strong biofilm formers was shown among *S. aureus* isolates (76.5%), and *S. haemolyticus* showed the lowest percentage. *eno*, a biofilm encoding gene, showed the highest prevalence among all species, whereas *bbp* showed the lowest prevalence. Conclusions: the study showed that staphylococcal nasal colonization is a present danger. Increased antibiotic resistance among colonizers and their potential to form biofilm make it hard to treat infections resulting from these strains.

Keywords: Antimicrobial resistance, *S. aureus*, SOSA, Biofilm formation

PHS 809: Staphylococcus aureus virulence and host response; a dynamic relationship?

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Staphylococcus aureus is a gram-positive bacterium that can be commensal or pathogenic to humans and animals. The rising antibacterial resistance in this species, ascribed to the indiscriminate use of antibiotics, represents a critical challenge in treatment. Targeting the virulence factors employed by these bacteria to cause diseases is a promising alternative to treat resistant infections. We aim to determine the differential prevalence of virulence factors among different genotypes of staphylococcal clinical and commensal isolates, and to monitor the expression of inflammatory markers in cell lines following infection, linking host response to isolate pathogenesis. We used whole genome sequencing data to assess the presence of virulence factor genes at the Deoxyribonucleic acid (DNA) level. We investigated the pathogenic potential of the isolates to the host cells in terms of (a) bacterial adhesion in an A549 lung cell line, (b) cytotoxicity using the MTT and the LDH assays on the same cell line, (c) biofilm formation using the crystal violet assay. The RNA expression of different cytokines and chemokines was assessed using the qPCR technique. Commensal staphylococcal non-aureus isolates showed higher adhesion to A549 lung cancer cells than clinical ones. Using the MTT assay, commensal Methicillin Resistant S. aureus (MRSA) isolates showed the highest cytotoxicity potential on A549 lung cancer cells, while clinical MRSA showed the highest cytotoxic potential on the same cell line using the LDH assay. About 46% of clinical isolates versus 39% commensal ones are strong biofilm-formers. There was a significant increase in Interleukin-10 expression in A549 cells exposed to commensal isolates compared to those exposed to clinical ones indicating the immune-suppressive role of the commensal isolates to prevent the engagement of the immune system. Our data underscore the significance of investigating novel anti-virulence strategies as an alternative and emerging approach to treat drug resistant *S. aureus.*

Keywords: Staphylococcus aureus, Antibacterial resistance, Pathogenicity, Adhesion, Cytotoxicity, A549 cell line.

PHS 810: The antimicrobial activity of soil fungi from Alexandria, Egypt.

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Antibiotic-resistant bacteria are emerging at alarming rates. This makes it harder to treat infections using first-line antibiotics necessitating the use of second line options that are less tolerated and more expensive. This is particularly problematic in low and middle income countries as Egypt, making the discovery of alternative treatment options a must. Soil fungi are considered as a rich source of bioactive compounds and antibiotics. They are able to produce a great variety of secondary metabolites characterized by a broad spectrum of properties of bioactive compounds including antiviral, antibacterial, antifungal, and anticancer. The objective of this study is the isolation of soil fungi producing antimicrobial and bioactive metabolites. Soil samples were collected from Alexandria, Egypt and isolated on potato dextrose agar media, then screened for their antimicrobial activity against six standard strains (*S. aureu*s ATCC25923, *S. agalactiae* CCM6187, *E. faecali*s ATCC29212, *B. subtilis* ATCC6633, *P. aeruginos*a ATCC9027 and *E. coli* ATCC8739) using agar well diffusion method. The fungal isolate showing the highest inhibition zone against *S. aureus* ATCC25923 was selected for further investigation. This fungal isolate was identified as *Penicillium citrinum* and optimization of its fermentation conditions was done using single and multiple factorial experiments. Extraction of bioactive metabolites was done using different solvents and the antimicrobial effect of the extracts was determined, with butanol extract showing the highest effect. Minimum Inhibitory Concentration (MIC) of the butanolic extracts was determined against *S. aureus* standard strain and resistant isolates using the broth microdilution method, with MIC values ranging from 250-1000 µg/mL. The safety of the fungal extract will be tested using cytotoxicity assays in human cell lines. The checkerboard assay will test possible synergistic interactions between fungal extract and some antibiotics. The extract will serve as a cost-effective alternative treatment for antibiotic-resistant staphylococcal infections, saving lives decreasing morbidity and mortality.

Keywords: Secondary metabolites, Methicillin-Resistant *Staphylococcus aureus*, MIC, *Penicillium citrinum*, Fermentation.

PHS 812: Staphylococcus aureus vs host: an insight into bacterial-host interactions

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Staphylococcus aureus is a human commensal but also a versatile and resilient pathogen responsible for a wide array of infections, ranging from superficial skin infections to life-threatening conditions such as sepsis and endocarditis. It is unclear what factors control *S. aureus* interaction with the host as a pathogen or commensal entity. We are investigating the interaction between clinical and commensal *S. aureus* isolates and host immune cells, focusing on the differential capabilities of these isolates in evading phagocytosis, resisting intracellular killing and inducing an inflammatory response. Clinical *S. aureus* isolates were assessed for their susceptibility to phagocytosis by macrophages in THP-1 human monocytic cell lines. The isolates differed in their susceptibility to phagocytosis likely due to variations in surface proteins and capsule production. Intracellular killing and survival assays within the same cell line were evaluated. Certain isolates demonstrated an increased capacity to survive and replicate. The inflammatory response induced by each isolate was quantified by measuring cytokine production, including TNF-α and IL-6, from infected immune cells. S. aureus isolates varied in their ability to trigger an inflammatory response, with some isolates inducing a robust pro-inflammatory cytokine response, whereas others produced a more subdued reaction. The observed variation in isolate and host cell response is hypothesized to be linked to differences in virulence factors produced by each isolate. Future directions include assessing the cytotoxic activity of the isolates using LDH cytotoxicity assay. This project elucidated the complex interactions between *S. aureus* isolates and host immune cells, highlighting significant differences in phagocytosis, intracellular survival, and the induction of inflammation. The findings highlight the importance of considering isolate-specific traits in the development of therapeutic strategies and vaccines against *S. aureus*.

Keywords: Staphylococcus aureus, bacterial-host interactions, phagocytosis, Immunity, Virulence

PHS 813: Identifying novel pathogenic traits among staphylococcus aureus clinical isolates- potential targets for treatment.

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Staphylococcus aureus is a gram-positive commensal bacterium colonizing skin and nasal passages of humans and animals. However, under certain conditions, it can cause a wide range of infections. This is facilitated by its carriage of a large number of virulence factors such as toxins, adhesins, and enzymes that allow the bacterium to evade host defenses, colonize host tissues, and cause tissue damage. Moreover, S. aureus has evolved multiple pathogenic traits, making it an adaptable pathogen. Identifying and targeting these pathogenic traits is a promising alternative approach to treat resistant infections. We are determining the prevalence of different pathogenic traits among staphylococcal clinical isolates and their contribution to staphylococcal host pathogenicity. We analysed the whole genome sequencing data of 100 clinical *S. aureus* isolates using the "PathogenFinder" tool on the Center for genomic epidemiology (www.genomicepidemiology.org) to predict known and unknown pathogenic traits towards human hosts. We compiled the data from all the tested isolates, classified and arranged them using computer algorithms to detect the proteins that are more widely present among the isolates. We identified a list of the top10 most common pathogenic traits (proteins of known and unknown function). The pathogenic role of the identified proteins will be confirmed using a library of *S. aureus* mutants. This will serve as the basis for their subsequent targeting for novel individual or combined anti-virulence therapies.

Keywords: Virulence, Resistance, Whole genome sequencing, Illumina sequencing technology.

Student Posters

PHS 101: Review on Applications of a mobile mini-laboratory for counterfeit medicines detection: The TLC- based GPHF-Minilab

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A counterfeit medication is a medicine made by someone other than the genuine manufacturer, by copying or imitating an original product without authority or rights. Counterfeit medications are produced and sold to deceive the consumer about the origin, authenticity or efficacy of the product. The proliferation of Counterfeit medicines (substandard and falsified medicines) is a significant global concern, particularly in low and middle- income countries where supply chain security is limited. A lack of resources allocated to routine quality control (QC) amplifies the challenge of combating these products in developing countries where it is may be hard to enforce drug quality standards. A mini-laboratory developed by the German Pharma Health Fund (GPHF) helps low-income countries detect counterfeit and substandard quality medicines. GPHF is a charity organization established by research-based pharmaceutical companies in Germany. Within international development assistance, the GPHF aims to improve health care and supporting the fight against counterfeit medicines proliferation using the GPHF-Minilab. The TLC-based GPHF-Minilab™, a semi-quantitative Thin Layer Chromatography–based commercially available test kit, is widely used in drug quality surveillance globally. It was supported by WHO in countries with limited pharmaceutical product testing capacities. Ever since then, it successfully used in detecting counterfeit medicines and protecting the health of millions of people anywhere in developing countries. The proposed work will present mini review on applications of TLC-based GPHF-Minilab™ in detecting drugs of different therapeutic classes from 2019-2024. The review includes detection for each subjected drug either in single form or in combinations with other drugs.

Keywords: Counterfeit medicines; Mini-laboratory; TLC-based GPHF-Minilab; Review

PHS 102: Innovative Patient- Pharmacist Interaction: A Mobile Application to improve Healthcare

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Chronic diseases are increasing worldwide, demanding novel methods to improve healthcare accessibility. Research shows that the prevalence of medication errors including dose omission or wrong timing are high among patients which reflects inappropriate medication therapy. Non-adherence is another factor that contributes to treatment success, and it was reported low in some research. “Tamminy- طمنى” is a health mobile application which facilitates communication of patients with healthcare practitioners and aims to prioritize patients’ safety. “Tamminy-طمني " seeks to transform patient care by providing the following features: medication management where users can schedule medication reminders, monitor adherence, and obtain personalized dosage recommendations, adherence rewards system, medication history tracker in addition to health insights through delivering tailored health advice and early warning indications that results in improving lifestyle. Its approach is centered on user demands, resulting in an intuitive design that is easy to use. "طمني" is a positive step towards patient-centered healthcare where people can actively control their health.

Key words: Mobile application, medication errors, non-adherence, lifestyle

PHS 103: Embracing environmentally benign practices towards a sustainable pharmaceutical industry

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The healthcare sector is responsible for 4.4% of the total carbon emissions worldwide, 70% of which is attributed to the pharmaceutical industry. Carbon emissions from the pharmaceutical industry occur at various stages in the life cycle of a product. The ecological impact of the pharmaceutical industry starts from the synthesis of the active pharmaceutical ingredient (API), which includes high consumption of non-renewable energy and natural resources. In addition, the emission of greenhouse gases during drug development, manufacture, packaging, procurement, transportation and improper disposal of medications have a destructive effect on the environment. Several areas in the pharmaceutical manufacturing process require amendments to mitigate its carbon footprint. It is crucial to initiate greener carbon neutrality strategies to identify and fulfill significant environmental requirements, which will lessen the negative effects of the pharmaceutical industry on the environment. These strategies include scrapping coal by using renewable energy instead; this could reduce the carbon footprint by up to 45%. Green manufacturing and green chemistry, such as continuous production and biocatalysis, are two promising approaches used in curbing carbon emissions. Moreover, the use of sustainable biobased packaging materials and smart packaging technology will improve product integrity while lowering its environmental impact. Furthermore, considering alternatives to reduce the effect of anesthetic gases and inhalers is noteworthy. Finally, integrating sustainability principles through different approaches such as waste-to-energy technology, drug take-back programs, and the use of the free innovative medicine carbon footprint (MCF) formulary presents promising resolutions to achieve a net zero carbon emitting pharmaceutical industry. Adopting all these measures not only coincides with global sustainability goals but also helps to improve operational efficiency and long-term profitability in the pharmaceutical industry. Herein we present the different innovative solutions paving the way towards a more sustainable future for the pharmaceutical industry.

Keywords: Carbon footprint, Pharmaceutical Industry, Pharmaceutical Waste management, Renewable energy, Life cycle assessment, Sustainability.

PHS 104: Integrating Sustainability into Pharmacy

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This poster explores the integration of sustainability principles into the pharmaceutical sector, focusing on plant-based drug production and environmental impact. The poster delves into sustainable sourcing of medicinal plants, emphasizing different practices like hydroponic cultivation and plant milking. Green extraction principles, including solvent selection, energy efficiency, and waste reduction, are discussed, with a particular focus on techniques like supercritical fluid extraction. We also dive into the world of synthesis, understanding the principles of green chemistry and biocatalysis. The concept of biorefineries is introduced as a strategy to maximize resource utilization and minimize waste. Additionally, the poster explores the role of phytoremediation in addressing pharmaceutical waste and the potential of green walls for education and awareness. By combining traditional knowledge with modern innovation, the pharmaceutical industry can adopt a more holistic and sustainable approach to drug development and production.

Keywords: green extraction, green chemistry, phytoremediation, green walls.

PHS 105: Drug Repurposing for Effective Obesity Management

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Obesity is a global issue that severely impacts quality of life and raises the risk of type 2 diabetes, heart disease, osteoporosis, reproductive issues, and certain cancers. While weight loss is essential, relying solely on diet and exercise may not be sufficient. An emerging strategy involves repurposing existing drugs, initially intended for other conditions, for weight management. Repurposing drugs for obesity control provide a valuable tool for weight management, utilizing medications with established safety profiles and potentially reducing the development time and costs associated with new drugs. The FDA has approved several such drugs, including Monjaro (tirzepatide), Saxenda (liraglutide), and Semaglutide (Wegovy). Notably, Monjaro has shown to reduce body weight by around 4% after one month and approximately 6% after two months. Similarly, Saxenda results in around 5% weight loss in 12 weeks, while Wegovy can achieve around 15% weight loss in six months. These medications were originally developed for type 2 diabetes but have proven effective in aiding weight loss for obese patients. The effectiveness of Monjaro, Saxenda, and Wegovy highlights the potential of repurposed medications to combat obesity, a complex and multifaceted condition. This poster aims to underscore the significance and benefits of drug repurposing for obesity control, focusing on the potential of approved medications to offer new, effective weight loss solutions and improve health outcomes. By examining the mechanisms, efficacy, and safety of these drugs, we seek to enhance the understanding of their role in obesity management and their potential to improve the quality of life for those affected by obesity.

Keywords: Metabolic disorders; Weight reduction; Drug repurposing; Modifiable risk factor.

PHS 106: Impact of nanotechnology-based drug delivery systems on treatment of brain tumors

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Treatment of brain tumor such as glioblastoma (GBM) faces significant challenges due to brain's complex and sensitive structure. Nanotechnology offers promising solutions since many drug delivery systems such as liposomes, polymeric nanoparticles, nanogels, dendrimers and exosomes can be engineered to cross blood-brain barrier (BBB), deliver chemotherapeutic agents directly to tumor cells and minimize damage to surrounding healthy tissue. A study was conducted to prepare itraconazole/hydroxypropyl-β-cyclodextrin (ITZ-CD) in the form of liposomes for treatment of GBM. ITZ-CD liposomes were prepared using cholesterol, and polyethylene glycol-2000-maleimide and it showed superior anti-proliferative effects on U87-MG-TL cells (human glioblastoma cell line) if compared to free itraconazole. Additionally, when combined with temozolomide, the liposomal formulation exhibited even greater anti-proliferative effects. Gliadel® wafers were the first FDA-approved system for a sustained-release delivery of chemotherapeutic agents to brain tumors and in combination with temozolomide and radiotherapy, Gliadel® wafers are now considered a part of the gold standard for treatment of GBM. Nanogels also offer many advantages such as a higher drug loading capacity and controlled release properties. Doxorubicin-loaded nanogels for the treatment of GBM have shown enhanced accumulation of doxorubicin inside the tumor tissue leading to significant inhibition of tumor growth. Moreover, dendrimers are considered as a promising tool for treatment of GBM. Some surface-engineered dendrimers have shown significant effectiveness in brain tumor diagnosis and treatment. Furthermore, exosomes can also enhance drug delivery across BBB and reduce tumor progression. Paclitaxel is loaded to exosomes by using incubation and sonication technique and these exosomes have shown a high potential for treatment of GBM. All these nano-carriers have proved an enhancement in effectiveness of treatment of GBM.

Keywords: Glioblastoma, Liposomes, Nanogels, Exosomes, Dendrimers

PHS 107: Aromatase Inhibitors as Targeted Endocrine Therapy for Breast Cancer

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According to WHO, breast cancer (BC) is considered as the highest prevalence of malignancy among women worldwide and is still the leading cause of mortality in developing countries. However, BC mortality rates have declined in the past few years owing to early diagnosis and advances in treatments. BC develops from breast tissue and its classification imparts an accurate diagnosis of the disease for oncologic decision and provides insights into new treatment strategies for BC management. Chemotherapeutic agents are considered as the most widely used therapy for cancer. However, they constitute a non-specific treatment and results in many unwanted side effects and resistance liability. Consequently, new treatments for BC improving survival and quality of life with reduced morbidity are greatly sought by investigators. Therefore, it is important to design and develop new anticancer candidates with higher selectivity and lower side effects. Approximately, two-thirds of the newly diagnosed BC is hormone dependent, requiring estrogen for tumor growth. Aromatase (ARO) is considered as a useful therapeutic target in the treatment and prevention of estrogen-dependent BC. Its activity has been demonstrated *in vitro* and increased ARO cytochrome P450arom expression has been observed in BC tissues. The concentration of E2 present in breast tumors of postmenopausal women is about 20-fold greater than that present in plasma. Search for new lead structures for the development of efficient anticancer candidates is of great significance that can be achieved by targeting various sites. Among them, Aromatase inhibitors (AIs) block the activity of ARO involved in estrogen biosynthesis and are useful in treatment of hormone-dependent BC. They target estrogen signaling pathways that have been previously investigated as treatments for BC. Different natural and synthetic compounds have been developed, studied, and evaluated for ARO inhibitory activity. Currently, three ARO inhibitors (AIs) are in clinical use, namely anastrozole, letrozole, and exemestane.

Keywords: Breast cancer; Estrogen; Chemotherapeutic agents; Aromatase enzyme; Aromatase Inhibitors

PHS 108: Nanotechnology-based drug delivery systems for treatment of Alzheimer's disease: A Review

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Alzheimer's disease (AD) is the most common type of dementia which has an estimated number of patients reaching 55 million in 2021 and it is expected to reach 78 million in 2030. There is currently no definitive cure for AD as current medications can only slow its progression, but they are suffering from limited absorption and difficulty in crossing Blood–Brain Barrier (BBB). However, lipid-based nanotechnology drug delivery systems have shown a considerable promise in treatment of AD by increasing therapeutic efficacy while decreasing toxicity. Donepezil free base (DPB), a choline esterase inhibitor, can be encapsulated in nanostructured lipid carriers (NLCs). DPB-loaded NLCs were prepared using micro-emulsification technique employing stearic acid as a solid lipid, oleic acid as a liquid lipid, lecithin as a surfactant, and sodium tauro-deoxycholate as a co-surfactant. DPB-loaded NLCs transdermal gel during *in-vitro* skin permeation tests has showed an enhanced drug flux, enhancement in treatment adherence and minimization of the negative effects associated with oral delivery. Donepezil oil-in-water nanoemulsion (NE) was also prepared for intranasal delivery using labrasol, cetyl pyridinium chloride, and glycerol. The NE demonstrated high drug release rate in several simulated body fluids as well as considerable brain uptake after *in-vivo* trials on rats. Similarly, a liposomal formulation of rivastigmine for nasal delivery was developed using the lipid layer hydration method with soybean lecithin and cholesterol and it showed a rapid onset of action, greater C_{max}, and longer half-life time if compared to oral traditional rivastigmine. Furthermore, memantine was encapsulated in polycaprolactone-based polymeric nanocapsules which were prepared via interfacial deposition of pre-formed polymer technique and it has demonstrated good stability over 40 days, with no changes in particle size or aggregation resulting in increased drug solubility, bioavailability and minimizing toxicity. These advancements emphasize the potential of nanotechnology-based drug delivery systems to improve AD treatment.

Keywords: Alzheimer’s disease, Donepezil, Nanocapsules, Nanoemulsion, Memantine, Rivastigmine.

PHS 109: Artificial Intelligence: Revolutionary Advances in Forensic Medicine

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The integration of artificial intelligence (AI) into forensic medicine marks a transformative shift in how investigations are conducted, enhancing both the accuracy and efficiency of forensic analysis. This study examines the innovative applications of AI technologies across various domains in forensic medicine. AI's capabilities extend to individual identification through DNA analysis to establish definitive connections between individuals and crime scenes. Facial recognition technology powered by sophisticated algorithms facilitates the momentary identification of individuals, dramatically accelerating investigative timelines. A notable advancement in forensic medicine is the application of AI in analyzing damaged craniofacial remains. By employing deep learning techniques, forensic specialists can reconstruct facial features from fragmented skulls, which is a valuable tool in identifying unknown individuals and solving mysterious cases by building familiar three-dimensional (3D) visualization methods and utilizing them to make 3D holographic meshes of skeletal fragments that can be manipulated. Additionally, handwriting analysis leverages machine learning to deliver more reliable results in document authentication. Altogether, age estimation methods harness AI to provide insights into the age of individuals, which is a crucial factor in diverse criminal investigations. The advent of microfluidic chip technology has further revolutionized trace sample analysis, enabling the detection of trace biological substances and thus enhancing evidence collection. Finally, in the framework of postmortem interval estimation (PMI), AI algorithms analyze a combination of biological and environmental factors for precise timeline assessments, significantly assisting in homicide investigations. These AI technologies will be discussed to highlight the profound implications of AI in forensic medicine and its potential to reshape the future of criminal justice.

Keywords: Artificial intelligence, Forensic medicine, Facial recognition, Handwriting analysis, Age estimation, Microfluidic chip, Postmortem interval estimation.

PHS 110: Methicillin-Susceptible *Staphylococcus aureus* (MSSA) Infections in Africa: Epidemiology and Future Directions

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Problem: *Staphylococcus aureus* is a gram-positive bacterium, living on the skin and nose as a commensal microorganism. When S. aureus breaches these natural barriers, it can cause infections ranging from mild skin infections or life-threatening ones. In the 1060s, the β-lactamase resistant methicillin was introduced to treat *Staphylococcus aureus*. Yet, methicillin resistance developed soon afterward at various rates throughout the world. In this meta-analysis, we are assessing methicillin-susceptible *S. aureus* (MSSA) prevalence in different African countries, reporting their epidemiology and genotypes. Methodology: A literature survey was carried out to screen English publications from 2017 to2023 from Africa, using different databases including Pudmed, Scopus and Web of Science. Results: Some of the genes detected among MSSA isolates in Africa included tsst-1, encoding for toxic shock syndrome, pvl, encoding for Panton-Valentine leucocidin causing destruction of leukocytes and hla, encoding for alpha toxin lysing red blood cells. PVL's prevalence among MSSA in Egypt was lower than in Congo and Eritrea. The most prevalent *spa* types were t037, t084, and t064. In Nigeria, multiple MLST types were found , with ST152-MSSA being the dominant group. Conclusions: The studies collectively highlight the critical need for enhanced surveillance, targeted infection control measures, and comprehensive antimicrobial stewardship programs to combat the spread and impact of MSSA, in African healthcare and community settings.

Keywords: *spa*, PVL, MLST, meta analysis.

PHS 111: The Interrelationship between Climate Change and Pediatric Health; AI-driven Solutions to an Escalating Health Emergency

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The relationship between climate change and the quality of life on earth is not limited to heat waves, storms, droughts, and other environmental issues. The climate change crisis is continuing to grow affecting human health negatively in countless ways. According to the WHO, around 88% of the existing global burden of disease resulting from climate change occurs in children younger than 5 years old. These health adversities start with pregnant women, since heat waves have a strong connection to low birth weight, preterm births, stillbirths, and Neural Tube Defects (NTDs). Furthermore, children have less mature temperature regulation systems, higher body surface area relative to their mass, and a higher metabolic rate, which renders them more susceptible to heat waves risks than adults. Climate change impacts the central nervous system by triggering neuroinflammation. It also puts a strain on cardiovascular health by increasing circulatory demands. Additionally, it affects gastrointestinal health and the immune system by altering the ecology of parasites. Moreover, climate change threatens food and water security, which can lead to malnutrition. Numerous solutions are continuously being proposed to mitigate the overall influence of climate change including artificial intelligence (AI). AI-driven climate models offer a comprehensive representation of the complex climate systems of the globe. Additionally, machine learning algorithms can adjust existing climate models for the best climate projection of different greenhouse gas levels. This will enable better decision-making and more effective climate action strategies, whereupon, impacting global health. In addition to AI-based innovations, the UN highlighted the specific importance of switching to renewable energy resources and raising global awareness about the urgency of the issue. Herein we discuss the pediatric health adversities resulting from climate change, shedding the light on the current solutions including AI-based models.

Keywords: Climate change; Artificial intelligence, Pediatric Health; Malnutrition; Infections; Cardiovascular diseases; Gastrointestinal health.

PHS 112: Analysis of Chiral CNS acting drug

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Chirality plays a tremendous role in determining pharmacokinetic and pharmacodynamic profiles of Central Nervous System (CNS) acting drugs. Historically, many CNS drugs were developed and marketed as racemic mixtures, containing both enantiomers in equal proportions. However, advances in analytical and synthetic techniques have enabled the separation and individual assessment of enantiomers, leading to a greater emphasis on developing enantiomerically pure drugs. The benefits of using enantiomerically pure drugs include increased specificity with chiral biological targets such as receptors, enzymes, and transport proteins, improved therapeutic index. This specificity can lead to more predictable pharmacological responses and better patient outcomes. Analytical assessments enhance therapeutic precision, elucidate the mechanisms of action, optimize dosing regimens, and identify potential side effects or toxicities. This ensures that CNS drugs are not only effective in their therapeutic roles but also safe for long-term use by patients. The growing emphasis on chiral purity in CNS drug development underscores the need for advanced analytical methods and rigorous evaluation to optimize therapeutic benefits while minimizing adverse effects. This presentation provides a concise overview of the top analytical techniques widely recognized in literature for the sensitive and selective analysis of CNS chiral drugs.

keywords: CNS chiral drugs, analytical determination, enantiomeric drugs, analytical separations.

PHS 113: Evaluating the Role of Food Bloggers in Shaping Healthy and Unhealthy Eating Patterns in Gen Z

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Food bloggers and influencers wield significant influence over our eating habits, particularly among younger generations. Social media platforms inundate us with visually appealing images of perfectly presented meals. Our research aims to develop and validate an online questionnaire for examining the role of food bloggers in shaping food habits and health, emphasizing the need for the media to encourage healthy eating practices and raise awareness about nutritious food choices. We conducted a literature review to gather related questions used in earlier surveys to assess these outcomes. Descriptive analysis for this research was performed with the help of SPSS software. A survey of 92 responses highlighted the significant influence of food bloggers on dietary choices, with 87% female and 90.2% aged 12-27. Preferences split closely between healthy eating (51.1%) and fast food (48.9%). Daily exposure to food bloggers occurs for 76.1%, with 65.8% seeing them more than twice daily. A notable 65.2% reported that bloggers influence their food choices, and 79.3% preferred those who include nutritional information, highlighting a potential area for improvement in health habits. Despite this, only 32.6% noticed weight changes, with 63.6% of these seeing an increase. Obesity was reported by 34.8%. Cravings were induced in 78%, while 69.6% did not exercise regularly. Interestingly, 30.4% felt pressure to eat in a certain way due to food bloggers, reflecting their strong impact on eating habits. In conclusion, understanding the role of food bloggers in shaping Gen Z's eating patterns is crucial for promoting healthier choices and raising awareness about nutritious foods to avoid the incidence of obesity and non-communicable diseases (NCDs), fostering a culture of nutritious food choices, and improving overall well-being.

Keywords: food bloggers, Gen z, obesity, healthy eating

PHS 114: Antipsychotics Repurposing offers Novel Advances in Cancer Treatment

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Cancer is an important major health problem with high mortality rate around the world. By 2040, the number of new cancer cases per year is expected to rise to 29.9 million and the number of cancer-related deaths to 15.3 million, Therefore is an urgent need to develop new strategy of anticancer treatments to reduce mortality of patients and increase their life quality during treatment journey. Drug repurposing is a faster way to find new treatments for serious diseases like cancer. Through reusing drugs that have been already approved for other conditions and tested in clinical trials and data related to their pharmacokinetics is already described. Research suggests that antipsychotic drugs might be effective in treating cancer. This review examines studies on how different antipsychotics affect different types of cancer, including lung,breast,colon,liver,brain,leukemia,oral,ovarian and skin cancer. Results indicated that perphenazine and prochlorperazine have impact on cell viability, motility, and protein content (MITF and tyrosinase) in melanotic (COLO829) and amelanotic (C32) melanoma cells. In addition to chlorpromazine (CPZ) which has demonstrated significant anti-endometrial cancer activity with derivatives JX57 and JX66 showing even stronger effects with minimal side effects. CPZ is also being explored for glioblastoma (GBM) due to its inhibitory effects on cancer cell growth via dopamine receptor modulation. Epidemiological data support a reduced cancer risk in patients treated with CPZ. Furthermore, flupentixol has emerged as a potential anticancer agent for lung cancer by acting as a PI3K inhibitor, regulating the cell cycle, reducing cell proliferation and causing apoptosis in several types of cancer cells. It was also found that this drug is able to target cancer-related proteins, such as ABCB1 and P-glycoprotein as well as to regulate the Akt and Wnt signaling pathways. In conclusion, this summary imply that antipsychotics repurposing may be one of the best strategies to develop oncology therapy.

Keywords: Anticancer activity; Drug repurposing; Perphenazine; Prochlorperazine; chlorpromazine; Flupentixol.

PHS 115: Antiviral Potency of Antipsychotics: A New Therapeutic Strength

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The rationale behind alternative medicine is to repurpose existing medicines to meet unmet medical needs. Antipsychotics, originally developed to treat mental disorders such as schizophrenia and bipolar disorder, are now being evaluated for broader therapeutic potential. From safety data and known mechanisms of action, scientists are testing the effects of AP on viruses as a consequence to the lack of successful antivirals available. For example, some AP inhibit viral replication, prevent viral entry into host cells, or modulate immune responses. However, pre-experimental and clinical studies are needed to validate these findings. Drug repurposing has been a promising strategy after the devastating COVID-19 pandemic. We created this systematic review aiming to gather reliable scientific evidence to help examine the success of repurposing antipsychotics as possible candidates for COVID-19 treatment. As of August 2024, we carried out random effect meta-analysis on 17 clinical studies where 16 studies provided data supporting the beneficial effect of repurposing AP as antivirals for COVID-19 treatment. On the contrary, one study provided data showing that AP increased the risk of severe COVID-19 and mortality; even though, their use should be examined case by case and psychiatric patients should not be encouraged to discontinue their psychiatric treatment. Based on numerous studies, we observed that AP drugs of the phenothiazine class (promethazine, fluphenazine, chlorpromazine, and thiethylperazine) display a unique pharmacological profile to convergently inhibit SARS-CoV-2. Interestingly, only the phenothiazine class contained at least 10 drugs matching criteria for antiviral effects against SARS-CoV-2. In addition to their efficacy as antipsychotics (and antiemetics in certain cases), this class of agents has also shown antiviral, antibacterial, and anti-prion activities in previous in vitro studies. Therefore, drug repurposing of AP could be a great chance to combat several viral infections while bypassing long-term drug development and providing rapid solutions to emerging health challenges.

Keywords: Drug repurposing, Antipsychotics, Antivirals, COVID-19, Phenothiazines, Drug development

PHS 116: Emotional eating: evaluating the risk factors through the scope of gender difference and BMI

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Emotional eating (EE) is the tendency to overeat as a reaction to stress. This pattern has been linked to non-clinical anxiety and depressive symptoms. EE is one of the most significant predictors of higher BMIs and binge eating symptoms. Gender difference affects EE where females are more susceptible to stress-related mental illness, pregnancy-related stress, and higher progesterone and estradiol levels (ovarian hormones) which have been linked to the etiology of eating disorders in women. So, this study aimed to evaluate the different factors impacting stress and its role in emotional eating in university students from the perspective of gender difference and BMI. A cross-sectional observational study was conducted via a structured questionnaire of 35 questions distributed among university students in Alexandria. Questions were directed to collect data on stress and its relation with eating habits, food, self-image, and other health conditions. A sample of 384 students responded. After analyzing the data through an AI model we concluded that; from all the risk factors, failing to stick to a healthy diet, feeling of guilt, and food obsession were the most significant indicators for higher BMI and EE. Females are more susceptible to emotional eating as they have a lower ability to manage stress than males. Stress resulting from self-image was affected mainly by BMI rather than Gender. Also, underweight males showed higher stress patterns, which may be due to "Toxic Masculinity" related beliefs. Individuals with high BMIs showed psychological misconceptions (such as negative self-image, self-starvation, and feeling of guilt after eating).

Keywords: Nutrition, Emotional Eating, Gender Difference, Stress Eating, BMI, Eating Disorders.

PHS 117: Synergistic Impact of Polyherbal Formulations on Metabolic Syndrome: A Comprehensive Review of Mechanisms and Therapeutic Potential

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Metabolic syndrome, characterized by a cluster of conditions including obesity, dyslipidemia, hypertension, and insulin resistance, significantly increases the risk of cardiovascular diseases and type 2 diabetes. Conventional pharmacological treatments often have limited efficacy and can produce adverse effects, highlighting the need for alternative therapeutic approaches. This mini-review explores the potential of polyherbal formulations as effective interventions for managing metabolic syndrome. Drawing from recent studies, we analyze the mechanisms by which these formulations exert anti-obesity, antihyperglycemic, and hypolipidemic effects. The synergistic action of bioactive compounds in herbs such as *Citrus reticulata*, *Momordica charantia*, and *Glycine max* contributes to improved lipid metabolism, reduced adipogenesis, and enhanced antioxidant defense. Additionally, we discuss the safety profiles of these formulations and their potential to mitigate the multifaceted symptoms of metabolic syndrome. This review underscores the promise of herbal medicine as a holistic and integrative approach to managing metabolic syndrome, paving the way for future clinical trials and the development of standardized herbal therapies.

Keywords: Metabolic syndrome, polyherbal formulations, anti-obesity, antihyperglycemic, hypolipidemic, bioactive compounds, herbal medicine, lipid metabolism, antioxidant defense, integrative therapy.

PHS 118: Vitatrack: Mobile Application for Personalized Health Decisions and Better Outcomes

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When it comes to vitamins and supplements, many people are uncertain about what to take and when. This often leads to self-medicating based on light research or hearsay about the benefits of certain vitamins, without fully understanding their effects or potential side effects. Contrary to popular belief, vitamins and supplements are not a one-size-fits-all solution. In fact, vitamin toxicity is a real concern that is not widely understood. The lack of awareness about this, along with issues like forgetfulness and lack of adherence to supplement routines, can undermine the effectiveness of supplementation. Vitatrack application is designed to address these challenges by providing personalized, evidence-based recommendations and support to help users make informed decisions about their health. Using a detailed, easy-to-use questionnaire, Vitatrack gathers detailed information about each user's unique health concerns and goals, ensuring tailored recommendations that go beyond the generalized advice often obtained from casual research, it also guides users on when to seek medical advice for their symptoms. It includes a reminder feature to help users stay consistent with their supplement intake, leading to better health outcomes. Additionally, the application offers essential educational content, covering proper storage conditions, administration guidelines, and possible side effects of supplements to address often-overlooked aspects of supplement use. Furthermore, the app provides valuable insights on gym supplements, explaining their benefits and proper usage. To facilitate users' journey to better health, Vitatrack plans to partner with pharmacies, allowing for immediate purchase of recommended supplements. By offering a comprehensive and personalized approach, Vitatrack helps users take control of their health, improve their well-being, and make informed decisions about their supplement and healthcare needs.

Keywords: Vitamins, Supplements, Self-Medication, Health App, Vitamin Toxicity, Health Goals, Personalized Recommendations.

PHS 119: Beyond Boundaries: The Evolution of 3D and 4D Bioprinting in Medicine and Technology

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The challenge of replicating the intricate structures and functionalities of biological tissues has long been a significant barrier in regenerative medicine. Traditional tissue engineering methods are often limited in their ability to produce complex, multi-layered tissues that can integrate seamlessly with the human body. 3D bioprinting addresses this issue by enabling the precise, layer-by-layer construction of biological structures using bioinks composed of living cells and biocompatible materials. This technology allows for the creation of tissues with complex geometries and cellular compositions, offering a promising solution to the limitations of conventional methods. However, while 3D bioprinting has revolutionized tissue engineering, it remains constrained in its ability to mimic the dynamic, time-dependent behaviors of living tissues. To overcome this, 4D bioprinting has emerged, introducing the concept of time as a fourth dimension. By incorporating smart materials that respond to external stimuli such as temperature, humidity, or pH levels. 4D bioprinting enables the creation of tissues that can change shape, function, or properties over time. This innovative approach opens new avenues for developing adaptive, self-healing tissues and organs that better replicate the dynamic nature of biological systems. Research and early applications of 4D bioprinting have demonstrated significant potential, particularly in the fields of regenerative medicine, personalized healthcare, and drug testing. These advancements not only offer the possibility of creating more accurate and functional tissue models but also represent a major leap forward in the quest to produce fully functional, transplantable organs. In conclusion, the evolution from 3D to 4D bioprinting is poised to overcome many of the current challenges in tissue engineering, offering new possibilities for medical and technological advancements that were previously unimaginable. We are going to demonstrate in our poster both the significant differences and applications of 3D and 4D bioprinting in tissue engineering.

Keywords: 3D bioprinting ; 4D bioprinting ; Tissue engineering; biological tissues

PHS 120: From Surviving to Thriving: Can Supportive Care Make the Difference?

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Receiving a cancer diagnosis can be an extremely difficult and life-changing experience for patients, The psychological impact of such news frequently leaves people overwhelmed, scared, and worried about their future. As The number of cancer cases increases annually, the challenges related to treatment increase for both physicians and patients. According to the World Health Organization (WHO), cancer is the second leading cause of death globally. Patients with cancer face two critical pathways; one is the progression of the disease and its metastasis, while the other is the severe consequences of side effects. By prioritizing supportive care strategies, we can help mitigate these side effects, enhance the quality of life of patients, and ultimately improve their chances of survival. Supportive care includes the management of severe nausea and vomiting, serious infection, pain, mucositis and extravasation among others. One of the most common side effects is nausea and vomiting (N&V) where they involve a variety of strategies for management, starting from using ginger to the use of combinations of medications such as NK-1 antagonists, 5-HT3 receptor antagonists, dexamethasone, and olanzapine. Continuing therapy on subsequent days after the initial treatment is also crucial for maintaining control of symptoms. This review aims at exploring different preventive and treatment options to decrease patients' sufferings where the National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in Oncology have published the latest updates on the management of cancer and the supportive care.

Keywords: Supportive care, cancer, infection, mucositis, nausea & vomiting.

PHS 121: Green nanocosmeceutical formulations: A promising nanoplatform counteracting UV induced skin aging

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Aging is the crucial factor that leads to the physical appearance of skin collagen in various ways, such as decreased oil production, decreased elasticity, dry skin, loss of texture, and age spots. Diverse elements that nurture skin aging can be either internal or external factors. The internal factors comprise the irreversible process of aging by time or due to hereditary factors, while the external factors can exacerbate the internal factors through exposure to hazardous solar ultraviolet radiation, an unhealthy lifestyle, and stress. Aim and methodology: Investigate the impact of green nano-cosmeceutical formulations as an effective antiaging nanoplatform, enhancing skin penetration and drug deposition, leading to photoprotection against UVB radiation. The authors performed a computerized systemic literature review of studies related to the impact of nanocosmeceutical formulations loaded with natural ingredients as anti-aging platforms from electronic databases PubMed, Scopus, and Google Scholar from 2000 to 2023. Results and recommendation: The study highlights the potential of incorporating natural ingredients like gallic acids, catechins, epicatechins, luteolin, curcumin, quercetin, ascorbic acids, alpha- and beta-carotene, as well as caffeine, into various nanodelivery systems, including liposomes, niosomes, ethosomes, transferosomes, cubosomes, phytosomes, nanoemulsions, nanocrystals, polymeric nanoparticles, solid lipid nanoparticles, and nanostructured lipid carriers. The integration of nanotechnology with natural components has led to more targeted and effective treatments, enhanced drug loading, controlled drug release, and improved drug stability. However, safety concerns, high costs, and regulatory complexities should be considered. Conclusion: Green nanocosmeceutical formulations are gaining popularity due to their therapeutic potential and fewer limitations compared to synthetic drugs. However, concerns about the safety and toxicity of these materials remain unresolved. Therefore, continued research is crucial for optimizing their safety and fully harnessing their potential as anti-aging treatments.

Keywords: Green cosmeceuticals; Nanoformulations; UV damage; Antiaging

PHS 122: AI Driven Personalized Medicine: Revolutionizing Cancer Treatment with Machine Learning

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Cancer has been and still is one of the scariest threats to human life as it is the second cause of death worldwide though all the continuous medical advances. This is mainly because of its heterogeneity, the complexity of the drug development process, side effects of the conventional treatment, drug resistance**,** and late-stage diagnosis. Personalized medicine is currently proving to be the perfect solution. It is revolutionizing cancer treatment by addressing many of the challenges outlined above. Analyzing a patient's unique genetic makeup and identifying specific molecular targets within the tumor leads to more precise treatments that helps in predicting which patients are likely to develop drug resistance, allowing for timely treatment adjustments. It also reduces side effects by tailoring treatments to individual patients. Early detection genetic testing can identify individuals at higher risk for certain cancers, enabling earlier interventions and potentially preventing disease progression. Consequently, doctors can select the most effective treatment options, and tailoring treatments to individual patients based on their unique biological makeup by integrating multi-omics data such as (genomics, proteomics, metabolomics), physiological, environmental exposure and behavioral factors. However, the complexity of the data makes it challengeable to apply personalized medicine as it relies on vast amounts of genetic and health data, which can be difficult to collect, analyze, and interpret. Thanks to machine learning and artificial intelligence (AI), a powerful approach to achieving this goal has emerged. Our poster explores the promising potential and applications of AI and machine learning algorithms in extracting valuable insights from multi-omics data to predict disease risk, classify disease subtypes, identify therapeutic targets, and optimize treatment regimens and drug discovery Also, the challenges associated with data integration, algorithm development, and the ethical considerations is discussed.

Keywords: AI; Machine learning; Multi-omics data; Cancer; Personalized medicine; Precision Medicine

PHS 123: Fungal genomic DNA extraction for molecular biology applications

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Fungal DNA extraction is a critical initial step in various molecular biology, genetics, and recombinant DNA applications. It serves as the foundational step for studying genomes, identifying gene sequences, and conducting downstream bioinformatic analyses. In molecular biology, DNA extraction is particularly vital for investigating genetic causes of diseases and for developing diagnostics, and therapeutics. In this book chapter, we are discussing the unique challenges facing the extraction of fungal DNA due to the strength of the fungal cell wall and the different techniques to overcome these challenges. This includes using mechanical disruption methods such as grinding with liquid nitrogen or glass beads. Following cell lysis, chemical treatment with detergents like sodium dodecyl sulfate (SDS) or cetyl trimethyl ammonium bromide (CTAB) are typically employed to further break down the cell components. The extraction process usually involves purification steps using phenol-chloroform and alcohol precipitation to obtain high-quality DNA. Commercial kits, while more expensive, are often preferred for their efficiency and safer chemical profiles. The quality of the extracted DNA can be evaluated using agarose gel electrophoresis, where the presence of high molecular weight DNA confirms successful extraction, while smearing or multiple bands may indicate degradation or contamination with RNA or proteins.

Keywords: Agarose gel electrophoresis, PCR, mechanical lysis, DNA quality.

PHS 124: From Natural Products to 3D loaded Scaffolds: A systematic Review of Skin Wound Healing Research Using Nanotechnology

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Skin wound healing is a complex multi-stage process involving hemostasis, inflammation, proliferation, and remodeling. While complications such as infections and dehiscence can hinder this process, nanotechnology offers promising solutions. The authors performed a computerized systemic literature review of research studies related to skin wound healing from the electronic databases Scopus and PubMed in a 5 years' interval from 2020 to 2024 using relevant search terms. The review highlights the increasing use of natural products, biopolymers, nano-formulations, and novel delivery systems. Natural products specifically essential oils and flavonoids offer potential advantages due to their antioxidant and anti-inflammatory properties, preventing chronic inflammation and promoting wound closure. Biopolymers, principally chitosan, collagen, gelatin, and hyaluronic acid, are favored due to their biocompatibility, cell adhesion properties, structural similarity to extracellular matrix and biodegradability. This trend is further augmented by the use of nanotechnology. Polymeric nanoparticles, offer controlled drug release and bioadhesive properties. Vesicles, especially liposomes, are also being utilized for their ability to fuse in the lipid lamellae of the stratum corneum. Likewise, lipid-based formulations and drug-loaded dressings are gaining prominence as delivery systems. Hydrogel scaffolds, particularly 3D-printed ones, are increasingly being explored for their unmet before and favorable mechanical and biological characteristics. Efficacy testing relies primarily on animal models, assessing healing time, wound contraction, and hydroxyproline content. Human fibroblast- based cell culture tests are becoming increasingly popular. In conclusion, the past five years have witnessed significant advancements in skin wound healing research, driven by a deeper understanding of wound healing molecular mechanisms and the development of nanotechnology-based formulations designed to optimize therapeutic outcomes.

Keywords: wound healing, natural products, biopolymers, nano drug delivery, scaffolds, efficacy testing.

PHS 125: The Effect of GLP-1 and GSK-3β Inhibitors Drugs on Alzheimer's and Parkinson's Disease Prognosis in Diabetic Patients

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Based on research papers in the literature, we found Diabetes mellitus (DM) is associated with an increased risk of neurodegenerative diseases, including Alzheimer's disease (AD) and Parkinson's disease (PD), due to its impact on insulin signaling and neuronal health. These studies investigate the effects of glucagon-like peptide-1 (GLP-1) receptor agonists and glycogen synthase kinase-3 beta (GSK-3β) inhibitors on the prognosis of AD and PD in diabetic patients. Diabetic individuals exhibit a 27% higher risk of developing PD, and a 48% increased incidence of AD compared to non-diabetic individuals. Insulin resistance in diabetes disrupts brain function by promoting β-amyloid deposition and tau hyperphosphorylation, which exacerbates cognitive decline through neuronal damage and synaptic dysfunction. GSK-3β, a key enzyme in tau phosphorylation and insulin signaling, represents a potential therapeutic target and has emerged as a crucial factor linking diabetes to AD and PD. This leads us to see the effect GLP-1 analogs, which have shown promise in ameliorating AD pathology by reducing β-amyloid levels and tau hyperphosphorylation, while also improving cognitive function. through regulation of GSK-3β signaling. Similarly, GSK-3β inhibitors may offer neuroprotective benefits in AD and PD by mitigating oxidative stress and inflammation. This review article highlights the therapeutic potential of GLP-1 receptor agonists and GSK-3β inhibitors to address the dual challenges of diabetes and neurodegenerative diseases, suggesting that such strategies may delay the progression of dementia and enhance overall brain health in diabetic populations.

Keywords: Neurological, Dementia, Obesity and Tau phosphorylation.

PHS 126: Fungal Oxidases with bioremediation potential

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The wonders of enzymes, particularly those produced by fungi, are increasingly recognized for their potential in cleaning up environmental pollution. Bioremediation, the use of microorganisms to degrade hazardous waste, is one area where these enzymes shine. Laccases, a type of enzyme, have garnered significant attention due to their ability to break down a wide range of substances, from wood and plastic to pollutants. These enzymes can transform harmful compounds into harmless ones, making them valuable tools in treating industrial wastewater. Another enzyme, polyphenol oxidase (PPO), is often associated with the browning of fruits and vegetables. However, it also possesses the ability to oxidize harmful phenolic compounds. While PPOs are more commonly studied in plants, research is now focusing on the potential of Fungal PPOs for bioremediation. By harnessing the power of enzymes like laccases and PPOs. This review article is focusing on highlighting developing innovative solutions to environmental challenges. These biological catalysts offer a promising approach to cleaning up pollution while minimizing the environmental impact of the remediation process.

Keywords: Laccases, Polyphenol oxidase, Biological catalyst and Sustainable Environment

PHS 127: Dosage Form Technology of Almotriptan: a film-coating Mechanism

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Acute migraines are treated and managed with the medication almotriptan, a highly selective serotonin 5-HT(1B/1D) receptor agonist that is effective in the acute treatment of moderate to severe migraine attacks. It is the first medication approved by the FDA specifically for adult migraine headaches. The medication has an oral bioavailability of 69.1% and a comparatively short half-life of three hours, due to its low water solubility. Several trials with a large number of migraine sufferers have verified its efficacy and tolerance profile. Almotriptan was proven to be one of the most effective triptans in terms of pain alleviation and p ain-free time at 2 hours. Almotriptan with film-coated tablets that break down with agitation and significant amounts of moisture (saliva or stomach acid) and therefore does not significantly affect how the drug is absorbed into the body. Different dosages of this medication vary from one patient to another with or without renal, or hepatic impairment. This review explores strategies to improve bioavailability, such as using prodrugs and pharmaceutical excipients that also can modify almotriptan's metabolism, affecting bioavailability.

Keywords: Almotriptan, triptans, migraine, dosages, excipients, treatment

PHS 128: Semaglutide attenuates hepatic ischemia/reperfusion injury in rats via modulating GLP1/NF-κB/Nrf2 signaling trajectory

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Hepatic ischemia/reperfusion (HIR) injury is an inevitable issue during liver transplantation and tumor resection and is exacerbated by the subsequent inflammatory response and oxidative stress. Semgalutide, a glucagon-like peptide 1 (GLP1) agonist, is used for the treatment of type 2 diabetes mellitus and possesses anti-inflammatory and antioxidant effects in several paradigms. However, its impact on HIR injury remains unclear. Hence, the objective of this study was to evaluate the hepatoprotective effect of semgalutide, along with elucidating the potential underpinning mechanisms. Rats were randomly divided into three groups as follows: sham-operated, HIR group (30 min ischemia followed by 1 h reperfusion), and semaglutide-treated group (0.3 mg/kg 30 min before ischemia). Following reperfusion, rats were dissected for histopathological examination and biochemical analysis. Pretreatment with semaglutide considerably enhanced hepatic functions and structural integrity when compared to the HIR group, as manifested by a reduction in the levels of alanine transaminase (ALT) and aspartate transaminase (AST) and an improvement in lesion score. Mechanistically, semaglutide effectively hampered the high mobility group box 1 (HMGB1) level and subsequently prohibited the toll-like receptor 4 (TLR4), nuclear factor kappa B (NF-κB), and tumor necrosis factor α (TNF-α) trajectory relative to the HIR group. Furthermore, administration of semaglutide resulted in an upsurge in nuclear factor erythroid 2-related factor 2, leading to an increase in the expression of heme oxygenase 1 (HO-1) and repression of oxidative stress, as shown by an increase in total antioxidant capacity and a decrease in malondialdehyde (MDA) levels. Meanwhile, semaglutide increased the glucagon-like peptide-1 receptor (GLP-1R) when compared to the insult group. Our finding indicated that semaglutide has a hepatoprotective effect against HIR injury, which can be attributed to its ability to reduce inflammation and oxidative stress via modulation of the GLP-1R/NF-κB and GLP-1R/Nrf2 pathways.

Key words: Hepatic ischemia/reperfusion, Semaglutide, GLP-1, Inflammation, Oxidative stress.

PHS 129: Evaluating the Efficacy of Ceftaroline Against Biofilm-Forming *Staphylococcus aureus*

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Biofilm-forming *Staphylococcus aureus* poses a significant challenge in clinical settings due to its enhanced resistance to conventional antibiotics and its role in persistent infections. Ceftaroline, a novel cephalosporin with activity against methicillin-resistant *S. aureus* (MRSA), has demonstrated promise in treating severe infections, but its efficacy against *S. aureus* biofilms remains underexplored. **Aim*:*** This study aims to evaluate the efficacy of ceftaroline in disrupting and inhibiting biofilm formation by *Staphylococcus aureus*, and to compare its effectiveness with other standard antibiotics. **Methods:** Data was collected through a comparative analysis of ceftaroline impact on biofilm-forming *S. aureus* strains, including MRSA. The study involved examining the degree of biofilm formation and disruption by ceftaroline, vancomycin, and daptomycin. Key parameters such as biofilm density, metabolic activity, and bacterial viability were measured using a combination of crystal violet assays, XTT assays, and colony-forming unit (CFU) counts. Data were statistically analysed to evaluate and compare the efficacy of these antibiotics. **Results:** The analysis revealed that ceftaroline significantly reduced biofilm density and bacterial viability in a dose-dependent manner. Compared to vancomycin and daptomycin, ceftaroline exhibited superior performance in disrupting biofilms, especially those formed by MRSA strains. **Conclusion:** Ceftaroline demonstrates notable effectiveness in managing biofilm-associated infections caused by *Staphylococcus aureus*, including MRSA, showing a clear advantage over traditional antibiotics. These findings suggest that ceftaroline could be a valuable addition to the arsenal against biofilm-related infections, warranting further clinical exploration.

Keywords: Ceftaroline, *Staphylococcus aureus*, Biofilm, MRSA, Antibiotic efficacy, Comparative analysis

PHS 130: Perceptions and Challenges of Pharmacy Students in Egypt Regarding Community Pharmacy: A Cross-Sectional Study

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Community pharmacy serves as a cornerstone in healthcare, where pharmacists are responsible for dispensing prescription and over the counter (OTC) medicines, reviewing prescriptions for accuracy and suitability, ensuring correct dosages, and checking for drug interactions. However, there has been a growing shortage of pharmacists in this sector, which has negatively impacted the overall delivery and effectiveness of community pharmacy services. Understanding what drives pharmacy students and recent graduates from pursuing community pharmacy careers is essential to address this issue. This study aimed to assess the perceptions of undergraduate and postgraduate pharmacy students in Egypt regarding careers in community pharmacy. Additionally, we sought to identify obstacles influencing their decisions and provide potential solutions by involving a key decision-maker in the sector. We conducted a cross-sectional study using an online questionnaire distributed among pharmacy students and recent graduates from various Egyptian universities. The survey explored their attitudes, career goals, and perceived challenges related to community pharmacy. The study revealed several key factors affecting students' and graduates' decisions to work in community pharmacy and provided actionable recommendations to make community pharmacy more appealing as a career choice.

Keywords: Community pharmacist; Pharmacist representation; Pharmacist retention; Attitude.

PHS 131: Therapeutic Targeting of Long Non-Coding RNAs in Lung Cancer: New Horizons in Treatment

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Long non-coding RNAs (LncRNAs) are RNA molecules longer than 200 nucleotides that do not code for proteins but represent a significant portion of the human transcriptome. Due to their ability to exhibit cell-, tissue-, or tumor-specific expression, LncRNAs have emerged as promising candidates for therapeutic applications. These molecules play essential roles in normal cellular functions and organismal development. However, when their activities are deregulated, they can contribute to various diseases, including cancer. Lung cancer remains the leading cause of cancer-related deaths globally, largely due to its late-stage diagnosis, widespread metastasis, and frequent therapeutic resistance. In this context, LncRNAs have gained attention for their roles in lung cancer, where they may function as either oncogenes or tumor suppressors. Notably, LncRNAs are highly stable in circulation, offering the potential for non-invasive and early-stage cancer diagnosis. In this study, we present a summary of recent *in vivo* studies that highlight the roles of LncRNAs in lung cancer development, therapy resistance, and their potential as biomarkers for diagnosis and prognosis. Additionally, we explore current therapeutic strategies aimed at targeting LncRNAs, underscoring their potential to transform lung cancer treatment.

Keywords: Precision Medicine; Oncogenesis; RNA therapeutics; Cancer biomarkers.

PHS 132: Impact of Exam-Related Stress on Hair Loss Among College Students: A Cross-Sectional Study

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Hair loss is a common condition, affecting approximately 80% of men and nearly 50% of women worldwide. This condition disrupts the normal hair growth cycle, which consists of three phases: anagen, catagen, and telogen. During the anagen phase, hair follicles actively produce new hair fibers. In contrast, the catagen phase represents a transitional period where the hair follicle undergoes apoptosis-driven regression and reduces in diameter. The cycle then concludes with the telogen phase, where the hair follicle becomes dormant and halts further hair growth. At any given time, about 10% to 15% of hair follicles are in this resting stage. Hair loss can be caused from various factors, including alopecia, lupus, thyroid disorders, and tinea capitis. However, stress is notably prevalent and particularly associated with a condition known as Telogen Effluvium. When stressed, up to 70% of hair follicles in the anagen phase can prematurely transition to the telogen phase, resulting in significant hair shedding. Given the widespread nature of stress—whether from work, academic pressures, anxiety, or personal relationships—the impact on hair loss is considerable. To address this issue, our study aimed to assess the impact of exam-related stress on hair loss among college students and to compare these effects across different academic faculties. We sought to determine whether a targeted stress management campaign is necessary to alleviate stress during exam periods. To explore this relationship, we conducted a cross-sectional study focusing on Telogen Effluvium among college students. Data was collected through an online questionnaire, which gathered information on demographic characteristics, dietary habits, health status, lifestyle factors, and stress levels, using the Perceived Stress Scale.

Keywords: Hair loss; Academic stress; Stress management; telogen effluvium.

PHS 133: Evaluating the Impact of quality sleep on academic achievement among university students

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Sleep is a naturally occurring state of unconsciousness where the brain is largely inactive and primarily reacts to internal signals. Individuals often sacrifice sleep to meet other obligations. Insufficient sleep affects various aspects of health, including the immune system, insulin resistance, breathing, blood pressure, and numerous medical conditions. Additionally, certain illnesses can contribute to poor sleep. While many people naturally produce enough melatonin to help them sleep, some students may struggle with falling asleep or experience poor sleep quality. In such cases, an external melatonin supplement can be considered to help regulate sleep patterns. This study aims to show how sleep patterns among university students influence their academic performance. A cross-sectional observational study was conducted on students from Alexandria University and other. A structured questionnaire was distributed online. The questionnaire comprises 5 sections to gather data on lifestyle, health conditions, sleeping duration, quality and it priority. A sample of 345 students responded, of them 32.7% Males and 67.3% Females. Nearly 50.19% of 263 students who consider their sleep as acceptable and of very good quality have Grade Point Average (GPA) ranging between 3.1 and 3.7. Although 68.44% of them sleep less than 5 hours in their daily routine. The perception of university students varies towards the duration and quality of sleep they should get to maintain their academic performance, especially before exams.

Keywords: Sleeping duration, Sleeping quality, Academic performance, Sleeping aids

PHS 134: Reviewing the Toxicological Aspect of Using Female Hormones to Support Pregnancy in Clinical Practice

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During gestation, hormones including progesterone and estrogen play crucial role facilitating the progression of pregnancy. Due to lack of sufficient data, the consequences of administering these hormones – or their derivatives – in order to support pregnancy and prevent miscarriage are still unclear; data show major controversies in literature between human and animal data. The current review aims to investigate about the impact of maternal exposure to progesterone or estrogen on fetal development. The review of literature examined the studies that reported the adverse effects of using progesterone or estrogen on the offspring development. Both animal and clinical studies are included putting into considerations the dose regimen, the administered drug, period of administration and the corresponding outcomes. Data regarding the developmental effect of progesterone are different when comparing animal and human reports. The findings show that hydroxyprogesterone caproate is not teratogenic in monkeys. In rodents, high progesterone levels have been linked to neural tube defects and limb abnormalities. In humans, it was linked to increased risk of certain birth defects, such as hypospadias. Progesterone's teratogenic effects are thought to be mediated through several mechanisms by which the severity and type of birth defects can be explained. On the other hand, there is increased risk of congenital anomalies associated with estrogen exposure- Diethylstilbesterol (DES) particularly- in both clinical and animal studies. Some of these anomalies are hypospadia, cryptochidism in male offspring while epithelial changes in the vagina associated with increased risk of future vaginal adenocarcinoma in female offspring are reported. Estrogen cannot be considered as safe agent for use during pregnancy being associated with birth defects. Further research is needed to delineate the precise mechanisms involved and establish safe levels of progesterone exposure during pregnancy that will help guide clinical practice.

Keywords: Estrogen, progesterone, anomalies, developmental toxicity, pregnancy.

PHS 135: Composition and Bronchodilator activity of the fruits of *Trachyspermum ammi* L. Essential oil and Extract

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Trachyspermum ammi has Traditional use for respiratory problems including bronchoconstriction. The total extract and essential oil prepared from the fruits of *T. ammi* were subjected to biologically directed phytochemical study and GC-MS analysis whereas its bronchodilator potential was explored using isolated guinea-pig trachea in *ex-vivo* organ bath setup. Analysis of the extract and essential oil indicated that "Thymol" is the main active component. Two other active monoterpenes were isolated from the chloroform fraction. Compounds were identified via spectroscopic and chemical evidences. The mechanism of action of the essential oil and pure Thymol was studied in details. *T. ammi* oil induced the relaxant effect via inhibition of Ca^{++} channel. Thymol induced its marked bronchodilator effect via non-specific type of K^+ channels activation. The current results provide scientific evidence for the Traditional use of T. *ammi* to manage respiratory problems.

Keywords: *Trachyspermum ammi*, bronchodilator, guinea-pig trachea, *ex-vivo*, GC-MS.

PHS 136: Hymenocallis littoralis plant as an Anti-diabetic

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Hymenocallis littoralis is a plant known for its medicinal potential including wound healing and anti-neoplastic activity. It was investigated for its ability to inhibit the Dipeptidyl Peptidase-4 (DPP-4) receptor, a target in diabetes treatment. In this study, we attempted to investigate the ability of bioactive compounds from various parts of this ornamental plant including the roots, bulbs, flowers, and leaves. Plant materials, were immersed in 70% ethanol for the extraction, filtrated, and concentrated using rotary evaporator. The concentrated extracts were then screened for DPP-4 inhibitory activity. In silico and in vitro studies showed the ability of the extract and some specific alkaloids to inhibit DPP-4 activity suggesting the potential of this plant as an expanded natural resource for antidiabetic lead discovery.

Keywords: Hyminocalis littoralis, Diabetes, plant, DDP-4

PHS 137: Computational screening of Remdesivir analogues as potential dual acting SARS-CoV-2 protease inhibitors

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COVID-19 pandemic has emerged as public health issue led to a serious health-socio-economic disaster. Due to urgency of the pandemic, drug repurposing is considered the best approach to find out suitable therapeutic agents against SARS-CoV-2 which is the causative agent of COVID-19. The viral main proteases: the major protease (Mpro) and the papain-like protease (PLpro) are essential for viral replication representing precious targets for potential therapeutics. Remdesivir is an antiviral medication that WHO has issued a conditional recommendation against its use in hospitalized patients. In this research we aim to find out remdesivir analogues with potential dual acting SARS-CoV-2 protease inhibition using virtual screening. In the present study, we described a step by step in silico design of a small library of compounds as dual acting SARS-CoV-2 protease inhibitors based on remdesivir analogue of indole- peptidomimetic structure with Mpro (IC_{50} = 1.72 μM) and PLpro (IC_{50}= 67 μM..Subjecting 1000 analogues to ADME filtration to evaluate their drug-like properties using two mathematical models, namely human intestinal absorption (HIA) and blood-brain barrier (BBB) penetration resulted in 299 compounds. The interaction of protein targets and 299 ligands was performed using BIOVIA-Discovery Studio 2020. Ligands exhibiting the most negative binding docking scores and significant protein interactions were selected for further in silico assays. We subsequently identified 4 hits for Mpro and 3 hits for PLpro. Compounds 227, 39, 99 and 37 inhibited Mpro with a docking score of -66.1825, -62.9514, - 61.5672 and - 58.5028 kcal/mol, respectively superior to that seen by the reference compound (-55.5291 kcal/mol). The docking data demonstrate that there are two main interactions between the CYS 145 and HIS 41 (from the protease active sites) and these compounds. Compounds 37,36 and 86 inhibited PLpro with a docking score of -67.8746, -65.7311 and -61.7746, respectively housing the catalytic triad Cys111, His272 and Asp28. In addition, we have determined the three-dimensional structures of this enzyme and its complex with compounds 37, 96 and 190 as they show superior binding affinity for both proteases. From the manually curated database, we found compound 37 to potentially serve as dual inhibitor of PLpro and Mpro.

Keywords: SARS-CoV-2, Remdesivir, In silico assay, Molecular docking.

PHS 138: 2D and 3D-QSAR Analysis of Camptothecin Derivatives Targeting Topoisomerase 1 for Enhanced Anticancer Therapy

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Cancer remains one of the leading causes of death worldwide. It is a process in which abnormal cells grow out of control all over the body. One of the complexities of cancer is its ability to bypass normal cellular growth controls, leading to metastasis and resistance to conventional therapies. Although cancer treatment has come a long way, further research is required for the discovery of newer therapeutic agents with better efficacy. Plant-derived alkaloids have been instrumental in the development of new antitumor drugs, with camptothecin being a particularly notable example. Topoisomerase 1 (TOP1) is a nuclear enzyme that transiently breaks the double helix form of genomic DNA to allow various DNA metabolic processes, such as transcription, recombination, and replication. It has been very well known that TOP1 inhibition blocks the above-mentioned processes, leading to DNA damages and eventually cell death, especially for cancerous cells. Camptothecin, isolated from the *Camptotheca acuminata* tree, is a very potent inhibitor of TOP1 that has been used in various applications as a lead compound to develop clinically approved anticancer drug agents including Topotecan and Irinotecan. In order to gain insight into the structural features that determine the potency of camptothecin derivatives as TOP1 inhibitors, 2D and 3D QSAR analyses have been conducted on 55 structure. The molecular descriptors were calculated with a view to correlating the structure of the chemicals with their biological activity, pinning down substituents that would enhance TOP1 inhibition. The 3D-QSAR analysis further pointed out that certain spatial dispositions in the molecules were important. Results of the present study provided a rationale for the design of new camptothecin derivatives with enhanced activity and specificity against cancer.

Keywords: Cancer treatment, Topoisomerase 1 inhibitors, Camptothecin, 2D-QSAR, 3D-QSAR, Anticancer agents.

PHS 139: PDL-1 as a target for immunotherapy in breast cancer

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Breast cancer is the commonest detected in women and it ranks second as a cause of death worldwide which estimates further 2.3 million new cases every year in GLOBOCAN 2020 Breast cancer is the most common malignancy in women and exists with an incidence rate of 48.8 per 100,000 populations in Egypt. By 2050, this is expected to lead to approximately 46,000 new cases. Egypt, most of the quartet are low incidence countries although Egypt exceeds in TB mortality rate. Early detection is necessary for curative intervention, which can be carried out by clinical examinations and various imaging modalities as well as biopsies. The American Joint Committee on Cancer (AJCC) staging system classifies breast cancer stages by T, N, and M. It is an updated model, and not mentioned among six original subtypes like that incorporates molecular markers such as ER, PR, HER2 leading the classification of breast cancer or four types: luminal A, luminal B, HER2 positive, triple-negative. Treatment choice is based on grade, stage and molecular subtype of the cancer. Common therapies are surgery, which may be curative in early stage non-small cell lung cancer (NSCLC), and radiotherapy: systemic therapy including chemotherapy with cytotoxic drugs or molecularly targeted agents, hormone based therapy, immunotherapy. The development of checkpoint inhibitors has revolutionized cancer therapy by blocking the PD-1/PD-L1 interaction, thereby reactivating the immune system. PDL-1 as one of targets for immunotherapy in cancer, it was found to affect various types of signaling pathways such as JAK/STAT-3, PI3K/m-TOR and RAF/Erk pathways. so, as a conclusion; PDL-1 could serve as a viable as a target for breast cancer.

Keywords: Breast cancer, PDL1, Signaling pathway, Immunotherapy.

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