ASSIUT 12TH IPSC

INTERNATIONAL PHARMACEUTICAL SCIENCES CONFERENCE

FACULTY OF PHARMACY, ASSIUT UNIVERSITY

PHARMACEUTICAL SCIENCES BETWEEN RESEARCH AND APPLICATION

ABSTRACT BOOK

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ASSIUT

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Vice Dean for Higher Studies and Research Affairs,
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CONTENTS

SPEAKERS

1. Hideyoshi Harashima

Laboratory for Molecular Design of Pharmaceutics and Laboratory of Innovative Nanomedicine, Faculty of Pharmaceutical Sciences, Hokkaido University, Sapporo City, Hokkaido, Japan

Hideyoshi Harashima is a Professor of Pharmaceutics and the chair of Laboratory of Molecular Design of Pharmaceutics, Faculty of Pharmaceutical Sciences, Hokkaido University. He received B.S., M. S. and Ph. D. from The University of Tokyo in 1981, 83 and 87, respectively. After a post-doctoral training in School of Medicine at Stanford University, he became an Associate Professor at Faculty of Pharmaceutical Sciences, The University of Tokushima. He was appointed a Full Professor of Laboratory for Molecular Design of Pharmaceutics at Hokkaido University in 1999. He was also appointed a Professor of the Laboratory of Innovative Nanomedicine in 2009.

He serves as an Associate Editor of the Journal of Controlled Release and Cancer Science and as an Executive Editor of Advanced Drug Delivery Reviews. He was a president of Academy of Pharmaceutical Science and Technology of Japan (APSTJ: 2012~2014). He received The Nagai Award from Japanese Society of Drug Delivery System in 2007, Distinguished Science Award from FIP in 2010, Fellow from Controlled Release Society in 2013, APSTJ award and 19th SONG EUM Med-Pharm Award from Song Eum Academy Foundation in 2016. He also received Presidential Award from Hokkaido University in 2015, 2016 and 2019. He published more than 400 original research articles, 52 invited reviews, and 12 Book Chapters.

2. Takeshi Tsubata

Department of Immunology, Medical Research Institute, Tokyo Medical and Dental University

Takeshi Tsubata is a full professor at Tokyo Medical and Dental University (TMDU) since 1996. He was the Dean, School of Biomedical Sciences, TMDU from 2003 to 2010. After receiving PhD from Kyoto University, he worked at University of Cologne and Max Planck Institute for Immunobiology (Freiburg) in Germany as an Alexander von Humboldt fellow, and then worked at Department of Medical Chemistry (Prof. Honjo), Kyoto University School of Medicine as an associate professor. He discovered multiple mechanisms for the regulation of immunity vs. immunological tolerance of B lymphocytes, which play crucial roles in regulation of antibody responses and development of autoimmune diseases. He received Philipp Franz von Siebold Prize from the President of Federal Republic of Germany in 2005, and Eugen und Ilse Seibold Prize from German Research Foundation in 2017.

3. Emmanuel Cornillot

Institut de Recherche en Cancérologie de Montpellier, IRCM – Institut du Cancer de Montpellier, ICM – Université de Montpellier, UM

Emmanuel Cornillot is professor of cell biology at the faculty of Pharmacy of the University of Montpellier since 2007. He held various executive positions at the faculty of Pharmacy and is now responsible for the specialization in Research of pharmacy students. He is a specialist of genome organization and relationship with physiology. He worked of bacteria, eukaryotic parasites and joined the cancer research institute in Montpellier in 2015. He develops new applications and new methods using RNAseq data.

4. Hussein I. El-Subbagh

Faculty of Pharmacy, Mansoura University, Mansoura, Egypt

Hussein I. El-Subbagh is a Professor of Medicinal Chemistry. In 2016, Dr. El-Subbagh received D.Sc. degree from University of Mansoura; 1988 he received his Ph.D. from University of Rhode Island, USA and University of Mansoura, Egypt. In 1996, he was awarded "Alexander von Humboldt" fellowship at University of Bonn, Germany. He received several recognitions including "Shoman Award" for the Young Arab Scientists in Chemistry - Amman, Jordan, 1994; the "State Prize for Encouragement of Science", Academy of Scientific Research and Technology, Egypt, in 1997; "WaleedKayali Prize for Scientific Research" Saudi Pharmaceutical Society, Riyadh, Saudi Arabia, 2008; FUE outstanding research award, 2012; "State Prize for Scientific Distinction", Academy of Scientific Research and Technology, Egypt, in 2015, Presidential Medal of Science and Arts 2017. Also He is on the list of expertise of EACEA-Erasmus+, European Commission. His scientific production is reported in more than 100 publications in leading International Journals and ten US & European patents. His "h-Index" reached 27 according to "SCOPUS" data base evaluation system.

5. Mostafa Kamel El Awady

National Research Center, Cairo, Egypt

Mostafa Kamel El Awady is an Emeritus Professor of Molecular Genetics at Faculty of Science, Ain Shams University, Cairo, Egypt. Dr. El Awady received B.Sc. (19720), M.Sc. (1976), and Ph.D. (1981) from Faculty of Science, Ain Shams University. He worked as President of Division of Genetic Engineering and Biotechnology, NRC (2005-2009); Chairman Department Biomedical Technology, NRC (2002-2009); and Dean of Genetic Engineering and Biotechnology Research Institute City of Research, Borg El Arab (Mubarak Science Park), Alexandria (2000 – 2001). He was awarded Nile Award in Basic Science (Highest in the country), 2014; State Award of Appreciation in Basic Science, 2008; State Award of scientific Superiority, 2003; and Rockefeller Award in Biotechnology Career, USA, 1990. He published more than 130 articles in peer reviewed journals and presented 10 patent applications on HCV Diagnostics, therapeutics and Vaccines.

6. Tamer Mostafa Sakr

Second Egyptian Nuclear Research Reactor Complex (ETRR-2 complex), Egyptian atomic Energy Authority (EAEA)

Dr Sakr, is an Associate Professor of Radiopharmaceutical Chemistry and Quality Control Director of Radioisotope Production Factory (RPF), ETRR-2 complex, EAEA. He was graduated 2000 from Pharmacy - Helwan University, M.Sc. 2006 Radiopharmaceutical chemistry - Helwan University and Ph.D. 2010 Radiopharmaceutical chemistry - Ain Shams University. As a QC director of Radioisotope Production Facility (RPF), he had succeeded with RPF team to produce and supply I-131 and Tc-99m generators to the Egyptian nuclear medicine market. He had started the implementation of nano-nuclear pharmcy research field in Egypt. He received 3 fellowships to USA, South Korea and Argentina and 1 scientific visit to Memorial Sloan Kettering Cancer Center (MSKCC) – USA. He was invited as an expert in 4 international coordinated research meetings in radiopharmaceutical field – United Nations (UN). He received 2 grants from International Atomic Energy Agency (IAEA) as Pi, 1 grant from Saudi Arabia as Co-Pi and 1 grant from USA as project member. He has 42 international publication and in scientific collaboration with institutes and universities in USA, Argentina, Italy, Austria, Brazil and South Korea. He supervises 19 Ph.D. & M.Sc. thesis and is a reviewer to several scientific journals. He is a consultant at IAEA – UN for in nuclear pharmacy field, an Invited Lecturer at World Nuclear University-UK (WNU) and a Scientific Committee member at International Symposium on Trends of Radiopharmaceutical (ISTR) – IAEA. He teaches pharmaceutical chemistry and nuclear pharmacy courses in different Egyptian universities. He is a member of The Egyptian Society of Nuclear Science and Applications (ESNSA), Egyptian Pharmacist Syndicate and WNU alumni.

7. Khojah, Hani Mahmoud J

Department of Clinical and Hospital Pharmacy, Taibah University, Madinah, KSA

Dr. Hani is the Vice dean of the College of Pharmacy, Taibah University, Madinah, KSA. He is an assistant professor in the Department of Clinical and Hospital Pharmacy, the head of the college Research Ethics Committee; and the Supervisor of the pharmacy student "Elixir Club". He was graduated 1993 from College of Pharmacy, King Saud University, Saudi Arabia. He obtained M.Sc. in Clinical Pharmacy from College of Pharmacy, King Saud University, Saudi Arabia (1999) and Ph.D. in Drug Management and Policy from Kanazawa University, Japan (2013). Vice dean for academic affairs, member of the university committee for local and international cooperation, College of Pharmacy, Taibah University, Madinah, KSA. He previously worked as Dean and head of foundation year department, Taif Junior College of Health Sciences, Ministry of Health, Vice dean of Jeddah Junior College of Health Sciences, Ministry of Health and Leader of the Supervisory Committee for Private Health Institutes in West Sector of KSA.

8. Hassan M. E. Azzazy

American University in Cairo (AUC)

Dr. Azzazy is a tenured full professor of Chemistry (2003-present) at the American University in Cairo (AUC). He serves as the Chairman of Chemistry Department and was the Associate Dean for Graduate Studies & Research at the School of Sciences & Engineering. He is the founder/director of the International Medical Laboratory Scientists training program at AUC. Dr. Azzazy was a postdoctoral fellow and assistant professor at the departments of Medical & Research Technology and Pathology, University of Maryland School of Medicine, Baltimore, MD (1995-2002).

Dr. Azzazy received his BSc and post-graduate diploma in Biochemistry from Alexandria University, Egypt. He received his PhD from the Graduate School of Biomedical Sciences, University of North Texas Health Science Center, Fort Worth, TX (1994) and was the recipient of the Faculty Merit Award as an Outstanding Graduate. He is certified as a Specialist in Chemistry by the Board of Certification, the American Society for Clinical Pathology in Chicago, IL. He also holds two board certifications in Clinical Chemistry and Molecular Diagnostics from the American Board of Clinical Chemistry, Washington, DC.

Dr. Azzazy has over 28 years of experience in biomedical research and he is the founder/director of Novel Diagnostics and Therapeutics

Research group. Dr. Azzazy authored 96 scientific publications in international peer reviewed journals, 80 conference presentations, and 25 book chapters. His current Scopus H-Index is 30 and his total citations are 2776. He has supervised over 37 graduate students who have obtained their MSc and/or PhD degrees in Chemistry, Biotechnology, or Nanotechnology. Dr. Azzazy is an inventor on 8 patent families several of which have been granted or at the national stage.

Dr. Azzazy is the recipient of over 60 awards including State Prize in Advanced Technological Sciences (Academy for Scientific Research & Technology, 2010), Excellence in Research Award (AUC, 2008), Global Innovator Award (Texas Christian University, TX; 2014), and Arab Innovation & Entrepreneurship Award (ASTF, UAE; 2015), Life Achievement Award (American Society for Clinical Pathology, 2018), and Shoman Prize for Arab Researchers in Medical Sciences (Shoman Foundation, Jordan, 2018).

9. Ikramy A. Khalil

Faculty of Pharmacy, Assiut University, Assiut, Egypt

Ikramy A. Khalil is an Associate Professor of Pharmaceutics at Faculty of Pharmacy, Assiut University, Assiut, Egypt. He earned his Bachelor of Pharmacy at Assiut University 1997. He obtained Master degree (2003) and Ph.D. degree (2006) from Hokkaido University, Japan. He spent a two-year post-doctor position in Hokkaido University, Japan (2007-2009) and served as a Specially Appointed Assistant Professor at Laboratory of Innovative Nanomedicine, Hokkaido University, Japan (2016-2019).

I.A. Khalil is specialized in the field of non-viral gene delivery. His research focuses on development of targeted drug and gene delivery systems suitable for systemic administration. He has published 40 research articles and contributed to 4 book chapters. He has 3 patent applications and presented 7 invited lectures. His h-index is 16 with a total citation of 3050 (Fab 2020, based on Google Scholar).

10. Alaa A. K. Mohamed Hayallah

Faculty of Pharmacy, Assiut University, Assiut, Egypt and Vice Provost for Education and Students Affairs, Faculty of Pharmacy, Deraya University, Minia, Egypt

Prof. Hayallah received a B.Sc. in Pharmaceutical Sciences from Assiut University, Asyut, Egypt in 1990, an M. Sc. in the Pharmaceutical Organic Chemistry from Assiut University in 1996, and a Ph.D. in the Pharmaceutical Organic Chemistry from Pharmaceutical Institute, Bonn University, Bonn, Germany in 2003. In 1992 he started his academic life as a demonstrator at Pharmaceutical Organic Chemistry Department in Assiut University, and then he served as a Teaching Assistant and later as a Lecturer. He served as a Lecturer of "Pharmaceutical Organic Chemistry, Medicinal Chemistry and Molecular Biology" for the undergraduate and postgraduate students, LIMES Program Unit Chemical Biology & Medicinal Chemistry, Bonn Uni. Germany (2005).

Prof. Hayallah has a unique expertise in Medicinal Chemistry and Drug Design as a Lecturer of "Instrumental tools for drug analysis and molecular biology" at Faculty of Pharmacy, Israa University, Jordan. Previous to his Deanship at Deraya University, Prof. Hayallah took the lead as the Head of Pharmaceutical Organic Chemistry at Asyut University. He is also Chairman of Assiut Pharmacists Syndicate and Vice president of operation smile committee in Egypt, in addition, he is a certified HR trainer. He supervised evaluated many of M. Sc & Ph. D thesis and published a lot of papers in the top journals of Organic and Medicinal chemistry, in addition to one paper in Nature Cell Biology. He also is reviewer in many international journals and inspector for many scientific research projects. In 2015, Prof. Hayallah received a prestigious Assiut University Award, as the best-ever scientific research in field of Pharmacy and Pharmaceutical Manufacturing.

11. Gamal Gamal Abdelraouf Badr

Zoology Department, Faculty of Science, Assiut University, Assiut – Egypt

Prof. Gamal Badr received a Bachelor of Science from Zoology Department, Faculty of Science, Menoufia University (1995). He received M.Sc. in Immunology from Faculty of Science, Paris Sud (Paris XI) University, France (July 2001) and PhD. in Immunology with the best distinction "Tres honorable" from Faculty of Medicine, Paris Sud (Paris XI) University, France (April 2005).

Prof. Gamal Badr was awarded the Best Arabic Researcher Award (2018) from the Association of Arab Universities, an award from Faculty of Science- Assiut University for the higher Impact Factor paper (2017), the State Encouragement Prize in Basic Science from the Academy of Scientific Research and Technology, Egypt (2012), an award from Assiut University for the scientific distinction (2009), and an award for the best oral presentation of Post-doctors in the 10th Annual Conference of CHUM, Montreal University, Canada (2007).

Prof. Gamal Badr is an editorial member in several peer-reviewed international journals including Scientific Reports (IF =4.01), BMC Immunology (IF =2.18), and BMC Complementary and Alternative Medicine (IF =2.48). He is currently supervising more than 10 MSc. & PhD. students at Faculty of Science, in different Universities. His Scopus H-index is 29 with Scopus total documents of 98.

12. Samir Anis Ross

Res. Prof. at NCNPR, Professor of Pharmacognosy, School of Pharmacy, University of Mississippi, MS

Prof. Samir was graduated from Faculty of Pharmacy, Assiut University, Assiut, Egypt (1966). He obtained MSC in from Assiut University, Assiut, Egypt (1972) and PhD from Kiev Medical Institute, USSR (1976). He expertise for over four decades is in the area of isolation, identification, structure elucidation, synthesis and evaluation of biologically active metabolites from natural sources including plants, mushrooms, fungi, algae, and marine organisms. He has published over 314 publications in peer-reviewed journals and own 12 patents. He served as PI on a research grant funded by National Institute of General Medical Sciences on "Center of Research Excellence in Natural Products Neuroscience". He also served as PI /consultant for several collaborative projects with Pakistan, Kazakhstan, and India, searching for new antimicrobial agents from natural sources. He successfully completed a project funded by National Institute of Drug Abuse (NIDA) (NO1DA-07707); Samir A. Ross, Co-PI, 1994-2005.

Prof. Samir has received several honors from University of Mississippi, School of Pharmacy, Faculty Research Award (2009), School of Pharmacy, Almaty, Kazakhstan, Gold Medal (2011), School of Pharmacy, Borno University, Czeck Republic, Silver Medal (2012), Kazack National Medical University, Almaty, Kazakhstan, Bronze Medal (2014), School of Pharmacy, Almaty, Kazakhstan, Silver Medal (2015), and Assiut University, Assiut, Egypt., Golden Shield (2016).

13. Yousef Bin Jardan

College of Pharmacy, King Saud University, Saudi Arabia

Yousef Bin Jardan, PhD in Pharmaceutical Sciences, is an assistant professor at College of Pharmacy, King Saud University, Saudi Arabia. He received PhD degree from University of Alberta, Edmonton, Alberta, Canada in 2017. During his graduate study, he was a member of pharmacokinetic and drug metabolism group at University of Alberta where he studied the effect of experimental hyperlipidemia on drug disposition. His current research interests include effect of diseases on drug disposition. He has published several peer-reviewed articles and conference papers.

14. Awwad Radwan

Faculty of Pharmacy, Assiut University, Egypt and King Saud University, Saudi Arabia

Awwad Abdoh Radwan Salama got his BSc and MSc from Faculty of Pharmacy, Assiut University, Egypt and PhD form Kitsato University, Tokyo, Japan and became a demonstrator 1990, assistant lecturer 1997, lecturer 2002, Associate professor 2008 and Professor 2013 at Pharmaceutical Organic Chemistry Department. His PhD was in Computer-Assisted Drug Design (2002, Japan). He had short visits to Department of Drug Design and Molecular Modeling, Kitasato University, Japan and to Medicinal Chemistry Institute of Pharmacy Martin-Luther-University, Germany.

He participated in the supervision of postgraduate students and in teaching under graduate students in the field of (Advanced) Organic Pharmaceutical Chemistry and in field of molecular modeling in Assiut and Al-Azhar Universities. In 2008 he joined College of Pharmacy, King Saud University, Saudi Arabia where he has been involved in many research projects financed by SABIC company (MED30-19),Center of Excellence Programs (03-CEREM-430),King Abdulaziz City (10-NAN1286-02), Deanship of Scientific Research and National Plan for Science, Technology and Innovations (14-MED622-02).

A. Salama is (co-)author of 60 papers, 25 conference contributions, 2 books and 4 US and EU patents. He got Silver Medal from Geneva Innovation Salon (Swizerland, 2-6 April 2014). His research interests cover several aspects across Organic Pharmaceutical Chemistry and Computer-Aided Drug Design using UNIX, LINUX and Windows platforms-supported software.

15. Mohamed Abbas Ibrahim

Al Azhar University, Assiut, Egypt and King Saud University, Riyadh, KSA

Dr. Mohamed Abbas Ibrahim is a professor of Department of Pharmaceutics and Industrial Pharmacy, Al Azhar University, Assiut. He earned a Ph.D. in Pharmaceutical Technology from the University of Regensburg, Germany, in collaboration with Al-Azhar University, Cairo, Egypt. His research interests include biomaterials as drug delivery systems, pelletization, nanotechnology and tablet technology. He supervised more than 10 master and Ph.D. students in Egypt and Saudi Arabia. Dr. Ibrahim has a good experience in the tablet technology, pelletization technology, biomaterials, nanotechnology and polymeric drug delivery systems. He published more than 90 research and review articles in these areas.

16. Mahmoud Elsabahy

Assiut University, Egypt

Dr. Mahmoud Elsabahy is the Assistant Director of the Laboratory for Synthetic-Biologic Interactions at Texas A&M University (Texas, USA), an Associate Professor at the Faculty of Pharmacy (Assiut University, Egypt), and the Director of the Egyptian Russian University Center for Educational and Research Development (Cairo, Egypt). He has completed M.Sc. and Ph.D. degrees from the Faculty of Pharmacy, University of Montreal "Pharmaceutical Nanotechnology" (Montreal, Canada). He contributed to ca. 65 publications, all in international top-profile peer-reviewed journals, book chapters and international patents, and he is the PI/senior investigator on several grant applications. The publications include those furthering the use of nanotechnology in the targeted delivery of therapeutic and diagnostic agents (e.g., corresponding author for several articles in Nature Communications, Chemical Reviews, Chemical Society Reviews, Journal of the American Chemical Society, Nano Letters, Journal of Controlled Release, Accounts of Chemical Research, etc.). Research interests include the rational design of Nanomedicine for various biomedical applications, for which he has received several national and international prestigious awards. On August 6, 2017, he received the Excellence Medal "First Class" from the Egyptian President. He has also established a new Nanomedicine Center

in Assiut University, and has been participating in the planning and management of science and technology in Egypt through a membership in the Egyptian Young Academy of Science (Academy of Scientific Research and Technology). His contributions have been highlighted (biography and personal photo) six times in prestigious global journals in the world. In addition, he was invited and sponsored by Luminex Co. (Texas, USA) and Bio-Rad Laboratories (California, USA) as a keynote speaker in a 2017 meeting. During his talk, "Immunogenicity Profiling of Pharmaceutical Nanocarriers", in the xMAP Connect US Multiplexing Symposium (Massachusetts, USA), he was among only nine experts from the USA.

17. Mohamed Kamel Hassan

Port Said University and Zewail City for Science and Technology, Egypt

Dr. Mohamed Hassan had obtained his B. Sc. in Biology at Assuit University, Egypt. He obtained his M.Sc. in physiology and biochemistry in 2001. He then studied biomedical science to get his PhD. (2008) in genetics and molecular biology at Graduate School of Medicine, Hokkaido University, Japan. He pursued his post-doctor training in biomedicine to extent his study on the same topic of molecular mechanism of microRNA in chemoresistance of cancer in Japan, Hokkaido University, 2013-2014. His study focuses on the novel role/s and mechanisms of non-coding RNA in carcinogenesis and chemo resistance development during cancer treatment on the transitional and preclinical levels.

Dr. Mohamed is working as a visiting researcher at the Centre for Genomics, Zewail City for Science and Tech since 2015 to continue his study on the molecular mechanism of genome stability during chemoresistance of cancer where he had extended his collaboration with the Japanese colleagues and they published their research products in different prestigious peer reviewed journals, including Oncogenesis, Oncoscience, Oncotarget, TumorBiology and Nature Neuroscience, focusing on the innovative molecular targeting therapy.

He won the state award for biological Science, 2016. He also acted as PI and Co-PI for several research grants, granted by the Egyptian Government (STDF). He also acted as a scientific advisor for the Armed Force Undergraduate Team during their participation in the international Genetic Engineering Competition (iGEM) for three years. Their team won the golden medal twice on their capacity for the innovative mechanism they discovered in different cancer. Moreover, he is focusing his study on the epigenetic control of circular RNA and long-non-coding RNA in cancer chemoresistance as a novel molecular method to overcome chemoresistance which is a major obstacle for cancer treatment.

18. Wael M. El-Sayed

Department of Zoology - Faculty of Science - University of Ain Shams

Dr. El-Sayed has got his Ph.D degree from College of Pharmacy, Utah University, USA under the Joint Supervision. He has been awarded; Postdoctoral Fellowship sponsored by the Department of Pharmacology and Toxicology, School of Pharmacy, University of Utah, USA for 30 months. He was awarded the State Incentive Award in Biological Sciences (Molecular Toxicology) in 2008, and the Egyptian Syndicate of Scientific Professions prize for distinguished Scientists, 2009. He has been awarded 14 research grants and he is a member in 8 scientific societies.

He has published 49 articles in international peer-reviewed journals (h index 11). He is a peer reviewer/associate editor for 15 international journals.

Dr. El-Sayed supervised 13 Ph.D. and 15 M.Sc. students and gave 29 presentations and lectures in international, regional and local conferences.

GENERAL LECTURES

Multifunctional Envelope-Type Nano Device for Gene/Nucleic Acid Delivery: Concept and Application to Nanomedicines

Hideyoshi Harashima

Laboratory for Molecular Design of Pharmaceutics & Laboratory of Innovative Nanomedicine, Faculty of Pharmaceutical Sciences, Hokkaido University, Japan

We are developing a multifunctional envelope-type nano device (MEND) as a novel non-viral gene delivery system based on a new packaging concept termed "Programmed Packaging". Cytosolic delivery: MEND was modified octaarginine (R8) to enhance cellular uptake and GALA peptide was also introduced to enhance endosomal escape. The R8/GALA-MEND can deliver siRNA successfully to dendritic cells (DC) to increase immune response, however, the antitumor activity was not sufficient. Then we introduced newly designed pH-sensitive cationic lipid YSKC12 and YSKC12-MEND can induce remarkable silencing effect in human NK cells as well as DC and T-cells.

We proposed a new concept of mitochondrial delivery, a MITO-Porter, a liposome-based carrier system that introduces macromolecular cargos into mitochondria via membrane fusions. An antisense RNA oligonucleotide (ASO) against cytochrome c oxidase subunit II was encapsulated into MITO-Porter to knockdown mitochondrial RNA. MITO-Porter can successfully knockdown the targeted mitochondria-encoded mRNA, protein and membrane potential in HeLa cells. D-arm, a mitochondrial import signal of tRNA to the matrix was chosen as ASO.

Mitochondrial gene therapy will also be discussed based on our recent data in mutated tRNA G625A cells.

In order to apply MEND via a systemic administration, we designed a pH-responsive cationic lipid to control biodistribution as well as intracellular trafficking. A newly designed YSK05 can respond to endosomal pH to induce efficient escape from endosome while maintaining neutral surface charge in blood circulation. The YSK-MEND can induce gene silencing in hepatocytes at a dose of 0.06 mg/kg. YSK-lipids were optimized based on chemical library which contains diversed chemical structures of YSK-lipids. We will discuss structure-activity relationship of newly synthesized YSK-library. We have made our own microfluidic system for MEND preparation in collaboration with Prof. M. Tokeshi in our University. The flow system has been designed so that efficient and homogenous mixing can make smaller nanoparticles. The factors of mixing will be discussed. Finally, I will introduce a recent successful achievement using GALA as a lung targeting ligand as well as YSK05 as an efficient endosomal escape device for siRNA delivery.

B Lymphocyte Inhibitory Receptors and Diseases

Takeshi Tsubata

Medical Research Institute, Tokyo Medical and Dental University, Tokyo, Japan

B lymphocytes (B cells) express various inhibitory co-receptors including CD22 (also known as Siglec-2), Siglec-10 (Siglec-G in mice) and CD72. These inhibitory co-receptors contain immunoreceptor tyrosine-based inhibition motifs (ITIMs) in the cytoplasmic region, and inhibit signaling through B cell antigen receptor (BCR) by recruiting SH2-containing protein tyrosine phosphatase 1 (SHP-1) to the phosphorylated ITIMs. These co-receptors regulate distinct functions of B cells by recognizing specific ligands. Siglec-10/G regulates expansion of B-1 cells, a B cell subset that are derived from fetal precursors and produce natural antibodies, by recognizing sialic acids abundantly expressed in B-1 cells. Lines of evidence suggest that CD72 prevents development of systemic lupus erythematosus (SLE). Genetic polymorphism in CD72 is associated with SLE in both human and mice, and mice deficient in CD72 develop relatively severe SLE-like disease. CD72 recognizes Sm/RNP, an RNA-containing self-antigen to which patients with SLE produce autoantibody, thereby inhibiting B cell responses to Sm/RNP. Both CD22 and CD72 negatively regulate expansion of regulatory B cells, a B cell subset functionally defined by production of inhibitory cytokines such as IL-10 and IL-35. CD72 augments development of type 1 diabetes probably by inhibiting expansion of regulatory B cells. Thus, inhibitory B cell co-receptors regulate various aspects of B cell function and autoimmune diseases, suggesting that these co-receptors are good targets for drug development. We have developed synthetic sialosides and antibodies that regulate B cell function by specifically perturbing ligand binding of CD22. These reagents may be useful in the regulation of antibody responses and autoimmune diseases.

Deciphering Interactions Among Tumor Microenvironement (TME) from Transcriptomic Data

Emmanuel Cornillot

Institut de Recherche en Cancérologie de Montpellier, IRCM – Institut du Cancer de Montpellier, ICM – Université de Montpellier, UM, France

Bulk RNAseq is now the most straightforward way to explore gene expression in a sample. It is relatively cheap and easy to generate. These data have been extensively used to study cancer. We will overview some of the major methods and resources applied on tumors and discuss their major output based on our experience. Transcriptomic data have proven to be reliable indicators of the composition of the Tumor microenvironement. Single-cell RNA sequencing (scRNA-seq) can dissect transcriptomic heterogeneity and reveal previously unknown cell types or cell states in a given complex tissue. There is now great efforts to combine RNAseq and scRNA-seq in deconvolution method to extract both qualitative and quantitative information about TME. The next step is the characterization of cell-cell interactions in the TME and their possible use for diagnosis and therapy.

Dihydrofolate Reductase as Antitumor Molecular Target

Hussein I. El-Subbagh

Department of Medicinal Chemistry, Faculty of Pharmacy, Mansoura University, Mansoura, Egypt

DHFR inhibition is an important molecular target to combat cancer. A new series of 6-substituted amido, azo or thioureido-quinazolin-4(3H)-onewas synthesized and tested for their in-vitro antitumor activity. Compounds 21, 53 and 60 showed broad spectrum antitumor activity with average IC_{50} values of 6.7, 7.6 and 9.1 µM, respectively compared with methotrexate (1, IC_{50} 19.26 µM). As an attempt to reveal the mechanism of the antitumor potency, cell cycle analysis and DHFR inhibition were performed. Compounds 59 and 61 induced their cytotoxicity in Hela (IC_{50} 10.6 µM) and HCT-116 (IC_{50} 15.5 µM) cell lines, respectively through Pre-G1 apoptosis, inhibiting cell growth at G2-M phase. Compounds 29, 33, 59 and 61 showed DHFR inhibitory potency at IC_{50} 0.2, 0.2, 0.3 and 0.3 µM, respectively. The active DHFR inhibitors showed high affinity binding toward theamino acid residues Thr56, Ser59 and Ser118. The active compounds obeyed Lipinski's rule of five and could be used as template model for further optimization.

Genome Editing Applications in Generation of Animal Models, Drug Discovery and Treatment of Rare and Difficult to Treat Liver Disorders

Mostafa K. El Awady

Department of Microbial Biotechnology, National Research Center, Cairo, Egypt

Certain genetic, metabolic and malignant GIT diseases have long been referred to as untreatable diseases. A major hurdle against development of effective therapeutics for these diseases, away from life style changes, is the lack of appropriate animal models mimicking the human disorder. Genome editing has revolutionized the drug industry for liver diseases such as Non Alcoholic Fatty Liver Disease, Wilson`s disease, hereditary tyrosinemia 1, urea cycle abnormalities and GIT malignancies. Genome editing technology has participated in treatment of these disorders via a couple of strategies; 1) construction ofperfect transgenic animal models as a key tool in effective drug development e.g. DUsp9, Nitisinone etc.. and 2) direct targeting of mutant genes associated with those rare disorders for the purpose of re-editing the mutations and restore the wild type sequence either at the embryonic or at the somatic cell levels, e.g. leukemia. Recently, NDS gene family encoding methyl transferases of Histone H3 has been found overexpressed in a number of human malignancies such as prostate, breast, leukemia, CRC, stomach adenocarcinoma etc.. There is also a laminating hope in treatment of Hepatocellular Carcinoma (HCC) via knocking out NSD1 expression in hepatocytes of HCC patients.

In conclusion genome editing is expected to be the focus of interest indiverse fields including drug discovery.

Nano-Radiopharmacy Approach for Tumor Theranosis

Tamer Mostafa Sakr

Department of Radiopharmaceutical Chemistry, Second Egyptian Nuclear Research Reactor Complex (ETRR-2 complex), Egyptian Atomic Energy Authority (EAEA)

This lecture will discuss the hypothesis of merging between the nanotechnology and nuclear pharmacy fields as a new approach for cancer management. By designing selective radiopharmaceuticals for tumor targeting, we can deliver high linear energy transfer to kill the tumor cells based on the high penetration ability of the emitted radiation. Using nanotechnology with nuclear technology, we can prepare nano-engineered radiopharmaceutical preparations that could succeed to deliver high payload of the radioactive material to the tumor areas that is based upon the enhanced permeability and retention phenomena of these areas. My scientific team is working on the preparation of different nano-radiopharmaceuticals using different metallic (Fe, Cu, Zn, Se, Au and Ag) and/or polymeric nanoparticles that loaded with different radioactive isotopes (I-131, Tc-99m and Au-198). The in-vivo evaluation of these preparations had showed high promising results in the experimental animals. These nano-radiopharmaceuticals represent new theranostic agents that merge between the advances of both nanotechnology and nuclear technology fields that can enlighten a new breakthrough of tumor management.

LQAS Employment in Surveys of the Quality of Medicine

Hani Mahmoud J Khojah

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Low-quality medicines include counterfeit, substandard and degraded products, and they represent a global threat because of their increasing prevalence and the serious consequences of their use. Studies with sound and reproducible surveillance methods on the quality of medicines in developing countries are very limited and convenience sampling is widely used for this purpose although bias is clearly introduced because only accessible pharmacies or outlets are selected. On the other hand, formal random sampling of the outlets requires larger samples, longer surveying time, and more resources. For these reasons, Lot Quality Assurance Sampling (LQAS) has been proposed by WHO as an economical technique to survey the quality of medicines sold in community pharmacies.

LQAS was developed in the 1920s to assess the quality of industrial products by inspecting small, randomly selected samples from each lot (or batch). The same concept can be applied for determining the sample size of pharmacies needed for inspecting the quality of medicines sold. So, the batch in this case is represented by the number of pharmacies in a geographic region, and the decision rule is represented by the number of pharmacies selling low-quality medicines. Another advantage of LQAS is that if the decision value is reached early, sampling can stop and the batch is "rejected", saving time and resources. It is important to define the upper and lower thresholds of acceptable pharmacies that sell low-quality medicines, and the consumer and provider risks that can be tolerated.

Biosensors for Detection of Disease Biomarkers

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Biosensors employ biological moieties for rapid and user-friendly detection and monitoring of disease markers in body fluids. Biosensors help patients in need of care to live a high quality life in their own environments. Consumer demand and rising healthcare costs are expected to further drive the generation of low cost, wearable, and less-invasive IoT biosensors connected to healthcare facilities. At the end of this presentation, participants will be able to (1) understand the basic structure of a biosensor, (2) list criteria of a successful biosensor, (3) become familiar with selected state-of-the art biosensors for detection of infectious agents (e.g., SARS CoV-2), and (4) draft a milestone chart for designing a biosensor for detection of a specific disease analyte.

Novel Biomaterials and Rational Design of Nanocarriers to Improve the Expression Efficiency of Plasmid DNA

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The use of nucleic acids such as DNA and RNA for therapy has considerable promise for the treatment of various incurable diseases. However, unlike low molecular weight drugs, nucleic acids encounter several intracellular and extracellular barriers, including in-vivo instability, low membrane permeability, inefficient intracellular trafficking and the elicitation of an immune response. Plasmid DNA (pDNA) vectors provide several advantages over RNA-based vectors including ease of preparation, low cost, and longer shelf life. However, pDNA-based therapy faces several limitations that reduce the expression efficiency of therapeutic genes, especially in non-dividing cells. Cellular uptake, endosomal escape, and nuclear delivery are the main cellular barriers to efficient transfection. There is a need for developing nanocarriers with a rational design to avoid these barriers to improve the expression efficiency of pDNA.

Novel biomaterials have been developed to improve the various steps involved in transfection. For example, cell-penetrating peptides are used for improving cellular uptake and various fusogenic peptides and lipids are synthesized for improving endosomal escape. To maximize transfection efficiency, there is a need to combine two or more of these

biomaterials in one system for synergistic action. Just mixing different biomaterials is not enough to get highly efficient systems. A novel design that allows each biomaterial to function at the proper time and place is needed.

In this presentation, new strategies will be described for preparing nanocarriers with a rationalized design that allows the use of multiple biomaterials synergistically. Tumor-targeted lipid nanoparticles (LNPs) with efficient transfection were developed based on synergism between the octaarginine (R8) peptide and the fusogenic peptide GALA. Furthermore, novel double-coated LNPs were prepared to improve nuclear delivery of pDNA vectors. The inner lipid coat has been modified with the R8 peptide while the outer coat mainly consists of the pH-sensitive lipid, YSK05. A mechanistic investigation indicated that the localization of YSK05 in the outer coat promoted the endosomal escape while the presence of R8 in the inner coat improved the nuclear delivery. Double coating design is indispensable for achieving a high level of gene expression, as the conventional single-coated system prepared with the same lipid composition failed to transfect cells efficiently. Double-coated R8/YSK05-LNPs injected into mice tail veins produced efficient and selective gene expression in the spleen and can be applied in cancer immunization. A strong anti-tumor effect was observed in mice immunized with double-coated LNPs encapsulating antigen-encoding pDNA. Furthermore, double-coated GALA-modified LNPs produced an efficient and selective gene expression in the lung. In general, the described systems hold great promise as a step forward towards the clinical applications of pDNA vectors.

Slit2–Robo4 Signalling Promotes Vascular Stability by Blocking Arf6 Activity Through SecinH3

(Identification of new therapeutic target for ameliorating diseases involving the vascular system)

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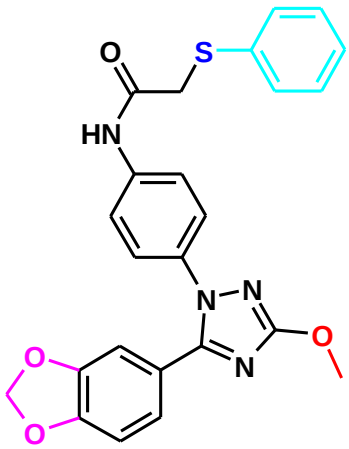
Recently, reported that Robo4 mediates Slit2-dependent inhibition of neovascular tuft formation and endothelial hyperpermeability, processes that are initiated and perpetuated by endothelial integrins and growth factor receptors. The ability of Slit2 to block Arf6 activation in response to fibronectin and VEGF-165 (which are ligands for these angiogenic and permeability-inducing receptors) led us to speculate that Arf6 is acritical nexus in signalling pathways regulating pathologic angiogenesis and vascular leak. In this study, we used cell biological and biochemical techniques to elucidate the molecular mechanism underlying the maintenance of vascular stability by Robo4.To test this hypothesis, we used a recently developed small-molecule inhibitor of cytohesin Arf–GEFs, SecinH3, which blocks insulin-induced Arf6 signalling. SecinH3, but not DMSO, prevented both VEGF-induced Arf6 activation and

VEGF-induced endothelial cell migration. Furthermore, injection of SecinH3 into the eyes of wild-type mice inhibited neovascular tuft formation in oxygen-induced retinopathy and choroidal neovascularization as well as retinal hyperpermeability caused by VEGF-165.Cumulatively, these data demonstrate the importance of paxillin andGIT1 in mediating Slit2–Robo4-dependent inhibition of endothelial cell protrusive activity, and suggest that blocking activation of Arf6 is a potential therapy for human diseases characterized by pathologic angiogenesis and vascular leak. Furthermore, results reveal that a Slit2–Robo4–paxillin–GIT1 network inhibits the cellular protrusive activity underlying neovascularization and vascular leak, and identify a new therapeutic target for ameliorating diseases involving the vascular system.



SecinH3

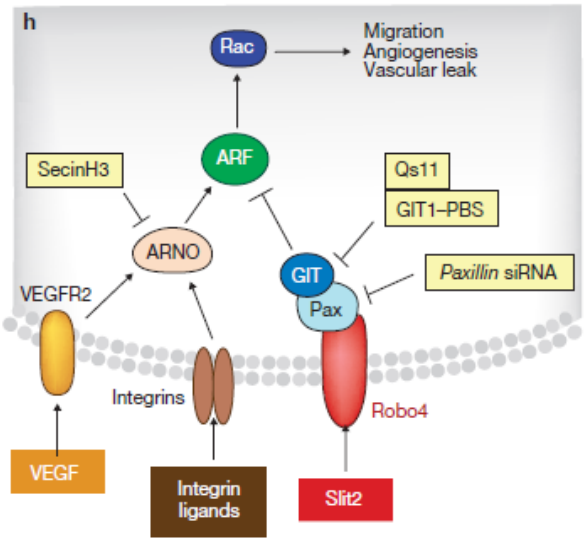


Fig.1

Induction of Liver Fibrosis by CCl_4 Mediates Pathological Alterations in the Spleen and Lymph Nodes: The Potential Therapeutic Effect of Propolis via Inhibiting the Expression of TGF-β/Smad2, Bcl2/BAX/, Nrf2, eNOS and COX-2 and the Phosphorylation of AKT/mTOR, P38 and ASK1

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Background: ***The liver is a vital organ that regulates homeostasis of the immune system. Liver fibrosis is an injury mending process that happens in response to chronic liver injury of an assortment of etiologies and eventually progresses to liver cirrhosis following constant inflammation and fibrogenesis. Propolis is one of the most promising natural products presenting not only therapeutic action, but also a prophylactic one. Propolis has several biological and pharmacological properties including hepatoprotective activities.*** ***Aims:*** ***The present study aimed to investigate the associated underlying molecular mechanisms of propolis against CCl_4-mediated liver fibrosis and other fibrotic complications.*** ***Methods:*** ***Three groups of male BALB/c mice were (n=15/ group) were used: group 1 included control mice; group 2 and 3 were injected with CCl_4 for***

induction of liver fibrosis. Group 3 was then orally supplemented with propolis (100 mg/kg body weight) for four weeks. Different techniques were used to monitor the anti-fibrotic effects of propolis including histo-pathological investigations using H&E, Masson's trichrome and Sirius red staining; Western blotting; flow cytometry and ELISA. Results: We found that induction of liver fibrosis by CCl_4 was associated with a significant increase in the hepatic collagen and α–smooth muscle actin (α-SMA) expression. Moreover, CCl_4-treated mice also exhibited histopathological alterations in the liver architecture. Additionally, the liver of CCl_4-treated mice revealed a marked increase in the pro-inflammatory signals such as increased expression of HSP70; increased levels of pro-inflammatory cytokines and ROS. Mechanistically, the liver of CCl_4-treated mice exhibited a significant increase in the phosphorylation of AKT and mTOR; up-regulation in the expression of BAX and cytochrome C; down-regulation in the expression of Bcl2; a significant elevation in the levels of TGF-β followed by increased phosphorylation of SMAD2; a marked increase in the expression of P53 and iNOS; as well as a marked increase in the expression of Nrf2, COX-2 and eNOS; upregulation of the phosphorylation of ASK1 and P38 in the spleen and lymph node. Interestingly, oral supplementation of CCl_4-treated mice with propolis significantly abolished the hepatic collagen deposition; abrogated the inflammatory signals and oxidative stress; restored CCl_4-mediated alterations in the signaling cascades; and hence repaired the architectures of liver, spleen and lymph node nearly to the normal architecture observed in the control mice. Conclusions: Our findings revealed the therapeutic potential and the underlying mechanisms of propolis against liver fibrosis and other fibrotic complications for also improving the architectures of secondary lymphoid organ.

Biologically Active Agents from Natural Sources

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Plants have formed the basis of sophisticated traditional medicine practices that have been used for thousands of years by people in many countries around the world. On of the goals of National Center For Natural Products Research, School of Pharmacy, University of Mississippi, USA is to search for new biologically active agents from plants, fungi, mushrooms, endophytes, bacteria, algae, and marine organisms. In this presentation certain antiinfective agents (antibacterial, antifungal and antileishmanial), Immunostimulants and selective monamine oxidase inhibitors had been isolated and identified from natural sources.

The Effects of Hyperlipidemia on the Disposition of Dronedarone in Rats

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Hyperlipidemia (HL) is a pathological state defined by an increase of lipoproteins in blood stream. Lipoproteins are large complexes that transport phospholipids, triglycerides and cholesterol in the plasma. They consist of a core of lipids surrounded by a shell of proteins and phosphotidyl glycerols. Lipoproteins are classified based on their density into very low density lipoproteins (VLDL), low density lipoproteins (LDL), and high density lipoproteins (HDL). Thus, hyperlipidemic patients suffered from a sustained increases in low density lipoprotein which has are a direct contribution to chronic cardiovascular diseases such as atherosclerosis and hypertension. In has been reported that experimentally-induced hyperlipidemia alter the disposition of lipophilic drugs in animal species by reducing unbound fraction and/or inhibiting the metabolism. Dronedarone (Multaq®) is a recently approved antiarrhythmic agent used mainly for the treatment of cardiac arrhythmias. In my talk, the effect of experimentally-induced hyperlipidemia on dronedarone disposition in rats will be presented and discussed.

Structure-And Ligand-Based Database Search for Antibacterial Inhibitors of Staphylococcus aureus Histidine Kinase

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Bacterial histidine kinases (HKs) is considered as attractive drug targets due to their ability to govern adaptive responses coupled with their ubiquity. The 3D structure of S. aureus HK was not isolated in high-resolution coordinates, precluding further disclosure of structure-dependent binding to the specific antibiotics. For more understanding of the structural-dependent binding, the 3D structure of S. aureus HK was constructed using homology modeling and utilized in molecular docking studies and molecular dynamics (MD) simulations. The binding free energies of the waldiomycin and its methyl ester analogue were calculated using Molecular Mechanics-Generalized Born Surface Area (MM-GBSA) scoring. The key residues for protein-ligand binding were postulated. The structural divergence responsible for the higher anti- S. aureus potency of waldiomycin than that of its ester analogue were clearly answered. The optimized 3D macromolecule-ligand binding modes shed light on the S. aureus HK ligand interactions that afford a means to assess binding affinity to design new HK inhibitors. The knowledge obtained from the optimized 3D macromolecule-bound ligand was used as query in database search to identify new anti-S. aureus agents.

Nanoparticles Based Drug Delivery Systems: Different Technologies and Potential Applications

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Nanotechnology became a widespread technology in recent years in several medical and pharmaceutical applications. The major goals in designing nanoparticles as a delivery system include enhancing bioavailability by enhancing solubility and dissolution rate, targeting the drug to specific organs and controlling drug release rate. This presentation discusses different classes of pharmaceutical nanoparticles including nanonized drug (API) particles, biodegradable polymeric nanoparticles, and hydrophobic nanoparticles. The nanonized drug (API) particles are mostly applied for enhancing drug solubility and dissolution rate, which, in turn, can improve its bioavailability. In addition, nanonization of drug particles can result in enhancing topical, transdermal and corneal delivery of several drugs The nanonized drugs (API) particles are prepared by either top-down or bottom-up techniques. The stability the nanoparticulate delivery systems is one of the important issues in the formulation of nanonized particles. Therefore, the use of

stabilzers to prevent the aggregation of nanoparticles is crucial for these delivery systems. In addition, formulation challenges facing incorporation of nanonized drug particles in oral pharmaceutical dosage forms will be discussed with examples. In addition, variable polymer classes utilized in polymeric nanoparticles, including hydrophilic, hydrophobic and biodegradable polymers. The presentation sheds a light on the nanonization techniques of the polymeric nanoparticles are based on physical methods including primary and multiple emulsion solvent evaporation methods, ionic gelation, spray-drying, supercritical fluid technology as well as precipitation with a compressed fluid techniques anti-solvent. Other polymeric nanoparticle manufacturing techniques based on chemical synthesis schemes such as silica nanoparticles of variable internal structures will be illustrated with example.

Engineering Advanced Hemostatic Devices by Exploiting Nanocarriers with Tunable Characteristics to Address Global Health Challenges

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Nanomedicine can be defined as the design of diagnostics and/or therapeutics on the nanoscale, which provides advantages due to the high degree of coincident transport and delivery of the active species with mediation of their navigation within the biological systems for the treatment, prevention and diagnosis of diseases. Polymeric nanoparticles-based therapeutics show great promise in the treatment of a wide range of diseases, due to the flexibility in which their structures can be modified, with intricate definition over their compositions, structures and properties. This talk will highlight the recent advances in the design of advanced hemostatic devices to control acute hemorrhage in tissue injury scenarios. Honeycomb-like nanofibrous mats of chitosan have been assembled onto a biodegradable cyclodextrin-based crosslinked sacrificial templates. In-vivo hemostatic efficiency, degradability and biocompatibility of the developed hemostatic dressing have been examined and demonstrated superior efficiency compared to commercially available hemostatic devices.

Role of MicroRNA-31 in Gynecological Cancer: One MicroRNA with Opposite Functions

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MicroRNAs (miRNAs) have reported to mediate cell growth, development and apoptosis. In cancer cells, microRNAs have also reported to play role/s in oncogenesis, cancer progression and tumor suppression as well. In an attempt to study the role of miR-31 in gynecological tumors, including endometrial and ovarian cancer, we first investigated whether miR-31 is an oncogene or a tumor suppressor in human endometrial cancer. We investigated the growth potentials of miR-31-overexpression in a representative endometrial cancer cell line in-vitro and in-vivo. The overexpression of miR-31 significantly promoted anchorage-independent growth in-vitro and significantly increased the tumor forming potential in-vivo. miR-31 significantly suppressed the luciferase activity of mRNA combined with the LATS2 3'-UTR and consequently promoted the translocation of YAP1, a key molecule in the Hippo pathway, into the nucleus. Meanwhile, the nuclear localization of YAP1 increased the transcription of CCND1. Furthermore, the expression levels of miR-31 were significantly increased (10.7-fold) in the patients (n= 27) with a high risk of recurrence compared to that observed in the low-risk patients (n= 7), and this higher expression correlated with a poor survival. Thus, we concluded that miR-31 functions as an oncogene in endometrial cancer by repressing the Hippo pathway. Such data introduce miR-31 as a potential new molecular marker for predicting the risk of recurrence and prognosis of endometrial cancer.

On the other hand, we studied the role of the same gene, miR-31, in ovarian cancer model with focus on its role in the development of

chemoresistance.We could detect miR-31 as one of the most dowregulated microRNAs in the ovarian cancer epithelial cells, which acquired resistance to taxane, a standard therapeutic agent for ovarian cancer. Re-introduction of miR-31 re-sensitized cells to taxane both in-vitro and in-vivo. miR-31 was found to bind to the 3'-UTR of mRNA of receptor tyrosine kinase, MET, and the decrease in MET correlated to higher sensitivity to taxane. Furthermore, co-treatment of taxane resistant ovarian cancer cells with MET inhibitors sensitized the tumor cells to taxane both in-vitro and in-vivo. In addition, lower levels of miR-31 and higher expression of MET in human ovarian cancer specimens were significantly correlated with taxanechemoresistance and poor prognosis. These data not only demonstrated the tumor suppressor function of miR31, which regulate MET during chemoresistance of ovarian cancer, but also raised the possibility that combination therapy with a MET inhibitor may help to overcome ovarian cancer chemoresistance. Moreover, we found that miR-31 also target Stathmin 1 (STMN1) in the taxane resistant cells as confirmed by luciferase reporter assay. This STMN1 is a microtubule-depolymerizing molecule, involved in chemoresponse. Overexpression of miR-31 in the chemoresistant ovarian cancer cells,which significantly restored chemoresponse also reduced STMN1 expression as well. Functionally, STMN1 reduction-associated cellular characteristics such as enhanced microtubule polymerization and stability, as indicated by acetylated tubulin quantification, confocal visualization, and G2 phase delay, were observed. Clinically, the immunohistochemical study indicated significant upregulation of the STMN1 in the ovarian cancer tissues defined as resistant tumors compared with those defined as responsive tumors. We concluded that miR-31 has therapeutic potency when introduced into ovarian cancer, in combination with taxane, too. We finally, designed a model for chimeric aptamer of MUC1 conjugated with miR-31 and studied its potential therapeutic role to sensitize chemoresistant ovarian cancer cells to taxane. We introduced aline of evidences that the aptamer in internalized into cancer cells and increase chemoresponse.

Development of Anticancer Drugs

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In an incessant effort to discover novel chemopreventive / chemotherapeutic agents, we have synthesized many compounds and analogues and tested the biological activities of these novel agents. Many of these agents have antimutagenic activity against both direct and indirect mutagens. In addition to showing an extraordinary anticancer/cytostatic activity against cell lines belonging to nine different organs at nanomolar concentrations, these agents showed a favorable selectivity being most active against tumor cells and safe towards normal fibroblasts and erythrocytes. The ability of these compounds to inhibit key enzymes involved in the cell cycle such as tyrosine kinase, MAPK, and topoisomerase and induce apoptosis in cancer cells make them potential candidates worthy of praiseworthy for further investigations. Some of these compounds were shown to bind the DNA at minor grooves. Many of these compounds are now being tested in animal models of chemical carcinogenesis including (but not confined to) lung, colon, breast, and liver cancers. These compounds abridged the tumor multiplicity and incidence and reduced the tumor size significantly. This was manifested in the biochemistry and histological architecture of the affected organs.

ORAL PRESENTATIONS OF RESEARCH ARTICLES

Carbon Nanostructures as Delivery Systems of Anticancer And Non-Anticancer Drugs

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Cancer therapies are currently limited to surgery, radiation, and chemotherapy. All three methods risk damage to normal tissues. Nanotechnology offers the means to target chemotherapies directly and selectively to cancerous cells. Carbon nanostructures have attracted attention as a promising site-targeted drug delivery system, due to their outstanding structural, and high surface area, besides the various functionalization options. The Orange peel was employed as a novel precursor for the formation of high surface area activated carbons (ACs) by utilizing $ZnCl_2$ as an activating agent followed by pyrolysis in a flow of N_2 gas. Orange peel activated carbons (OPAC) could be formed with high carbon contents, large specific surface areas and nanostructured in graphene-like layers of 5–6 nm in thickness. Over the past 30 years, no consistent survival benefits have been recorded for anticancer agents of hepatocellular carcinoma (HCC), except for the multikinase inhibitor sorafenib, which clinically achieves only ~3 months overall survival benefit. This modest benefit is attributed to limited aqueous solubility, and consequently, limited absorption from the gastrointestinal tract. Thus, novel formulation modalities are in demand to improve the bioavailability of the drug to attack HCC more efficiently. Sorafenib was loaded on functionalized CNTs through physical adsorption, and microencapsulated

in an alginate polymer using external gelation methodology to formulate the drug-loaded CNTs (CNTs-SFN). The therapeutic efficacy of the new formula was estimated and compared to that of conventional sorafenib. The in-vitro MTT anti-proliferative assay revealed that the drug-loaded CNTs formula was at least two-fold more cytotoxic towards HepG2 cells than was sorafenib itself. Moreover, the in-vivo animal experiments proved that our innovative formula was superior to conventional sorafenib at all assessed endpoints.

Metabolomic Profiling and Green Synthesized Silver Nanoparticles to Study Cytotoxic Activity of Ammi visnaga Roots Using Different Cell Lines

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The total ethanol extract of Ammi visnaga roots (TEAVR) displayed marked inhibition on different cell lines viz., hepatocellular carcinoma Hep6-2 (28.84%), breast cancer Mcf-7 (43.58%), colon cancer Caco-2(76.91%). It showed MIC 18.38, 12.36 and 3.19 µg/ml on Hep6-2, Mcf-7 and Caco-2, respectively. While, the most active fraction of (TEAVR) with the least IC_{50} was EtOAc followed by DCM. Moreover, green synthesized silver nanoparticles of TEAVR reduced IC_{50} from 3.19 to 0.24 µg/ml on Caco-2 cell line. Consequently, TEAVR was subjected to LC-HR-ESI-MS metabolomic profiling to discover the constituents that possibly underlie their cytotoxicity. The metabolomic profiling displayed different secondary metabolites, which belong to various chemical classes viz., phenyl propanoids, isobenzofuranone, furochromones, flavonoids and coumarins. Angelicain was the major compound, which belongs to furanochromones. Furthermore, among the dereplicated constituents, viz.,(2-(3,4-dihydroxyphenyl)-1,3-propanediol;3'-Me ether, 4'-O-β-D-glucopyranoside) (1), apiumetin; (R)-form, O-β-D-glucopyranoside (6) and osthenol (12) exhibited the highest docking scores as EGFR kinase enzyme inhibitors.

An Efficient One-Pot, Two-component, Modular Synthesis of 3,5-Disubstituted Pyrazoles

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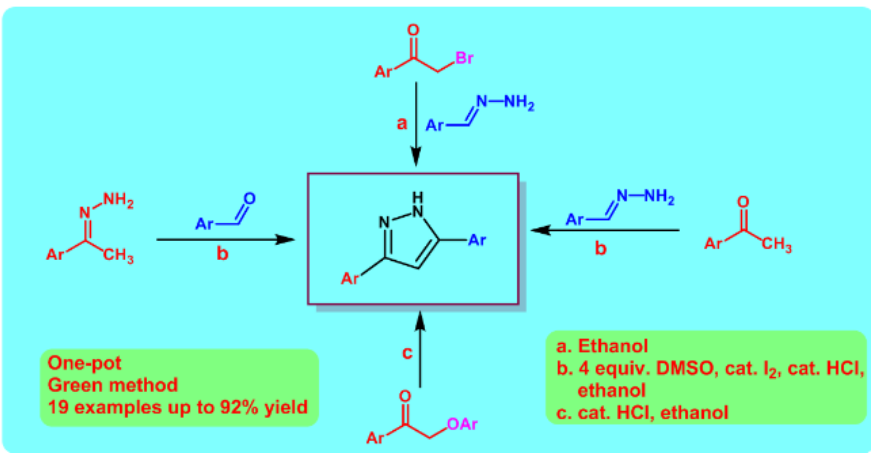
The pyrazole scaffold is one of the most prevalent and important in medicinal chemistry. Here we report a method for preparing 3,5-diarylpyrazoles in good to excellent yield by reacting the hydrazones of aryl aldehydes with substituted acetophenones in ethanol in the presence of DMSO/cat.I2/cat.HCl. The reverse process, reacting the hydrazones of substituted acetophenones with aryl aldehydes under the same conditions, also provides 3,5-diarylpyrazoles in good to excellent yields. Reaction of hydrazones of aldehydes with 2'-aryloxy ketones in presence of cat. HCl in ethanol, and the catalyst-free reaction of phenacyl bromides with hydrazones of aldehydes in ethanol also gave good to excellent yields of 3,5-diarylpyrazoles.



Design and Synthesis of Certain New Substituted 1,2,4-Triazoles of Potential Immunological Activity

Naglaa Mohamad Kamel[1], Ola M. Fahmy Abou-Ghadir[1], Samia G. Abdel Moty[1], Abdel-Hamid N. Kafafy[1], Mohamed A. El-Mokhtar[2], Abu-Baker M. Abdel-Aal[1]

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1,2,4-Triazole derivatives represent a promising class of bioactive heterocyclic compounds with reported antimicrobial, antifungal, antiviral, antitumor and anti-inflammatory activities. The current work involves design and synthesis of novel 1,2,4-triazole derivatives and their immunological evaluation as TLR2 agonists. Nineteen new compounds were evaluated for their TNF-α and IL-1β mRNA expression levels as well as their ability to elicit iNOS.

Kinetics of the Thermal Decomposition of Atenolol

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Kinetic analysis for the non-isothermal decomposition of atenolol as a anti-hypertensive drug was carried out in air atmosphere. Thermal decomposition of atenolol proceeds in three overlapped steps in the temperature range of (220-550°C). The molecule shows thermal stability up to 202°C with an endothermic peak maximized at 154°C due to melting process.

The non-isothermal data was analyzed using both model free isoconversional and model fitting approaches. The results of the application of the linear (FWO, T, KAS) and non-linear (Vyazovkin) isoconversional methods on the present kinetic data showed global dependency of the activation energy on the degree of conversion. Master plots analysis of the kinetic data indicates that R3 (phase boundary controlled reaction with tridimensional particle shape) for the first step, D3 (diffusion controlled reaction with tridimensional particle shape) for the second step and A2 (nucleation controlled reaction with two dimensional growth) for the third step and ensure by Coats-Redfern method and Kennedy-Clark method. Kinetics data enables us to calculate thermodynamic parameters of the decomposition process.

POSTER PRESENTATIONS OF RESEARCH ARTICLES

Pharmaceutical Technology

Triamcinolone Acetonide-Loaded Microemulsion for Treatment of Uveitis: Formulation and Evaluation

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Triamcinolone acetonide has been widely employed to treat uveitis in the form of ocular injection. Uveitis is a major cause of vision loss. The purpose of this study is to investigate the potential of triamcinolone acetonide-loaded microemulsion as an ocular delivery system for treatment of uveitis. The pseudo-ternary phase diagrams were developed by aqueous titration method and various microemulsions were prepared using oleic acid as oil, Cremophor EL as surfactant and propylene glycol as co-surfactant. Among all prepared microemulsions, six formulations were found to be stable thus, they were selected for further characterization according to physicochemical parameters (droplet size, zeta potential, pH, viscosity and conductivity) and in-vitro release. The developed microemulsions exhibited acceptable physicochemical behaviour and sustained drug release. However, formulation F3, which is composed of oil: S_{mix} : water (15:35:50) in ratio (1:1) surfactant to co-surfactant, showed the optimal physicochemical characteristics (i.e. droplet size 211 nm, PDI 0.2 and zeta potential -25 mv). Hence, the

superior biopharmaceutical behaviour of F3 was evaluated in-vivo in white New Zealand rabbits. The in-vivo performance of the selected formulation was compared to that of triamcinolone acetonide suspension in experimentally induced uveitis in rabbit model. Intra-ocular inflammation was evaluated by clinical examination for 7 days post-disease induction and was confirmed by histopathological examination at the end of study. White blood cells and protein content were measured in the aqueous humour. The results revealed that, uveitis is successfully induced in rabbit model. The selected microemulsion formulation showed a superior in-vivo performance in treatment of uveitis as compared to triamcinolone acetonide suspension. Thus, the developed sustained release triamcinolone acetonide microemulsion could be considered as a potential new topical treatment option that can provide better patient compliance in treatment of uveitis.

Development and Evaluation of Isoconazole Nitrate Topical Antifungal Spray

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Objective: ***Currently, there are challenges in the treatment of dermatophytosis associated with side effects including low skin penetration and frequent application of topical antifungals such as isoconazole nitrate (ISN). Film-forming sprays have advantages of providing a unit dose, improving drug delivery, applied easily to large skin areas and give sustained release pattern decreasing frequency of application.***

Methods: ***Film-forming spray formulations were prepared by dissolving different polymers (Eudragit RS100, Eudragit RLPO, PVP) at 5%ratio and (ethyl cellulose 2%) in ethanol/acetone mixture (80:20). Polyethylene glycol 400 as plasticizer was added drop wise under slow stirring. Then ISN solution was added to the prepared polymeric solution and was immediately transferred to a spray bottle to avoid evaporation of solvents. The compatibility between ISN and different polymers was evaluated using FT-IR and DSC. The pH, viscosity, volume of solution delivered upon each actuation, spray angle, ex–vivo physical evaluation and in-vitro drug release of the formulated products were evaluated.***

Results: ***All the formulations showed results within acceptable range for various tests. pH of all formulations was adjusted to be within the range of the skin pH (5.5-6.5). The optimized formulation (PVP 5%) showed short drying time (34±10 sec), uniform spherical spray pattern, uniform volume of solution after each actuation (119±24 µl), with formation of good mucoadhesive, flexible film on the human skin. It also had drug release of (89%±1.096) over 24 hr. ISN was compatible with the used polymers through IR and DSC studies.***

Conclusion: ***Film-forming spray as a novel ISN formulation is expected to provide improved skin penetration, excellent patient compliance and also an easy method of drug delivery. In-vivo studies will be performed to ensure product efficiency.***

Evaluation of Nanosized Curcumin Niosomes as Anti-Inflammatory Topical Delivery System

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Curcumin (CUR) is one of the most versatile natural products; it shows effective response against many disorders. It has been classified as a poorly soluble and poorly permeable drug. Low aqueous solubility of CUR is the major problem for its use in the treatment of some skin disorders. The aim of this study was to enhance CUR therapeutic activity as anti-inflammatory product using nanosized drug delivery system. Niosomes are non-ionic surfactant vesicles used as drug nanocarriers for encapsulation both hydrophilic and hydrophobic drugs. CUR loaded niosome formulations were prepared using thin film hydration method. Physicochemical characteristics of CUR niosomes such as size, polydispersity index (PDI) and zeta potential were investigated. Also, in-vitro release studies of the drug from different formulations were carried out in phosphate buffer pH 5.5. The selected formulations of CUR loaded niosome were incorporated into hydroxy propyl methyl cellulose

(HPMC15000) gel. Transdermal permeation efficiency was also evaluated through rat skin. The results showed that the particle size of CUR loaded niosomes is ranged between 317.5±1.9 and 558.3±8.5 nm. Niosomes that prepared from Span®60 and Tween®60 showed the highest EE%. Release of drug from the prepared formulations was best fitted with diffusion model (Higuchi's equation).Skin permeation studies demonstrated that CUR permeability through rat kin was significantly higher than that of the drug alone. The in-vitro anti-inflammatory studies proved that gel formulations of CUR niosomes exhibited significantly higher inhibition of Carrageenan induced rat paw edema when compared to pure curcumin. So, this study suggests that curcumin nanosized niosomes have the potential to be used as a promising anti-inflammatory delivery system for topical application.

Development and In-vitro Evaluation of Letrozole-Loaded Hyaluronic Acid/Chitosan-Coated Poly(Lactic-co-glycolic acid) Nanoparticles for Breast Cancer Therapy

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Letrozole (LTZ), an aromatase inhibitor, is poor aqueous solubility, and used as the first-line of treatment for hormonal-sensitive breast cancer in postmenopausal women. The purpose of the current study is to develop hyaluronic acid (HA)/chitosan (Cs)-coated poly(lactic-co-glycolic acid) (PLGA) nanoparticles to improve therapeutic efficiency, control the release and minimize side effects of the loaded cargo (i.e. LTZ). PLGA nanoparticles were prepared and the effects of various parameters on particle size, surface charge and encapsulation efficiency were extensively studied. PLGA nanoparticles exhibited nanosized (464.3±2.1 nm) spherical morphology, negative surface charge (zeta potential of -10.5±0.4

mV), high drug encapsulation efficiency (63.9±3.7%), and sustained drug release pattern. Surface coating of PLGA with Cs enhances the opportunity for conjugating targeting ligands onto the free amino groups of Cs. Furthermore, decoration of the delivery system with HA might be a promising strategy for targeted delivery due to high affinity of HA to CD44 receptors which are overexpressed in breast cancer cells. Modification of PLGA nanoparticles with Cs increased the zeta potential (16.7±1.9 mV), whereas coating with HA reversed the effect as demonstrated by the measured zeta potential of the HA/Cs-coated PLGA nanoparticles (-11.6±0.5 mV), due to electrostatic interactions between positively charged amino groups of Cs and negatively charged carboxylate groups of HA.HA/Cs-coated PLGA nanoparticles that combine the mucoadhesive and targeting characteristics of Cs and HA might provide a promising vehicle for LTZ delivery with improved efficiency in breast cancer therapy.

Solubility and Dissolution Enhancement of Curcumin Using Solid Dispersion

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As a natural phenolic compound, curcumin (CR) has shown different health benefits such as antioxidant, anti-inflammatory, antimicrobial, anticancer, anti-Alzheimer activities, and wound healing properties. The low aqueous solubility had greatly limited bioavailability and therapeutic efficacy of CR. Therefore, improving aqueous solubility of CR is a great challenge in the development of effective drug delivery system. Recently, solid dispersion is one of the most widely used and successful techniques in formulation development. The objective of this work was to improve CR water solubility and dissolution rate using solid dispersion. Curcumin solid dispersions were prepared by co-precipitation and freeze drying techniques using various polymers, such as β-CD, HPβ-CD, polyvinylpyrrolidone (PVP K30), polyethylene glycol 6000 (PEG6000) and PluronicF-127 (PluF-127). The formulated solid dispersions and physical mixtures were characterized using different

approaches such as DSC, FTIR and XRD. Also, the solubility and dissolution rate of CR in different systems were evaluated. Solubility studies illustrated that the highest CR solubility (~0.6 mM) was obtained with freeze dried PluF-127 and HPβ-CD solid dispersions. Further, dissolution studies of CR solid dispersions showed that the highest drug dissolution rate was achieved at CR/ PluF-127 weight ratio of 1:3. Complete drug dissolution (100%) was observed for CR/PluF-127 solid dispersion after 30 minutes as compared with free CR (only 35%) after the same time. The formation of amorphous CR solid dispersions with PluF-127 and HPβ-CD was indicated by XRD studies. These results confirm that, the preparation of PluF-127 and HPβ-CD solid dispersions by freeze drying method is a promising approach to overcome CR limitations through enhancing its aqueous solubility and dissolution rate.

Enhanced Oral Bioavailability and Decreased Intestinal Mucositis of 5-Fluorouracil by Formulation of Orally Administered Microsponges

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5-Fluorouracil is widely used for treatment of colorectal cancer and is provided as intravenous bolus or infusion because it has erratic oral bioavailability. Diarrhea and myelosuppression are potential and the major side effects of the intravenous administration route. This work was aimed to develop colon-targeted delivery of 5-fluorouracil microsponges so that, the oral bioavailability enhanced and the side effects could be potentially reduced. Quassi-emulsion solvent diffusion method was used to prepare 5-fluorouracil microsponges using polyethylene glycol as an emulsifier. Different formulae were prepared with different composition and processing factors. The entrapment efficiency 5-fluorouracil in these formulae ranged from 17.81 to 78.61%, the particle size of the prepared microsponges ranged from 87 to 229 µm and the % cumulative drug released after 24 hours ranged from 47.7 to 98.58%. The prepared microsponges were subjected to compatibility studies as Fourier transform infrared spectroscopy (FTIR) and differential scanning calorimetry (DSC). Thus 5-fluorouracil microsponges considered as a promising system for the colon-specific delivery that has potential for future use as an anticancer therapy for colorectal cancer.

Impact of oil Type on the Emulsification Efficiency of Simvastatin Loaded Self-Emulsifying Drug Delivery Systems

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Formulation of lipid-based nanocarriers, such as self-nanoemulsifying drug delivery systems (SNEDDS) and self-microemulsifying drug delivery systems (SMEDDS) have received a lot of attention in recent years as an approach for enhancing oral absorption. The aim of the current work is to develop self-emulsifying drug delivery systems (SEDDS) of simvastatin, BCS II drug, using long chain triglycerides (LCT's) and essential oils. Equilibrium solubility studies and emulsifying ability indicated the choice of Cinnamon oil, Clove oil and Ethyl oleate as lipids, Tween 80 as emulgent and Labrasol, Transcutol-P and Propylene glycol as co-surfactants. Three ternary phase diagrams were constructed to select the region of self-nanoemulsification. Thermodynamic stability studies ascertained the stability of selected formulations. Twenty-seven formulations were evaluated for robustness to dilution and self-emulsification efficiency. The selected formulations showed a very short emulsification time of less than 1 min. Nine formulations were selected for further characterization according to cloud point measurement; mean droplet size, poly dispersed index (PDI) and zeta potential determination in addition to in-vitro drug release study. All selected formulations showed very high cloud points (57–94°C), small mean droplet size (less than 200 nm) and high % drug release.

Preparation and Evaluation of Ketotifen Suppositories

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Ketotifen KT is one of antiallergic drugs, due to its first-pass effect, the bioavailability of the drug is only 50%. The objective of this study was to formulate and evaluate suppositories containing KT and/or KT solid dispersion. The in-vitro release of KT from suppositories was done using the dialysis membrane method in phosphate buffer at pH 7.4. The release of KT from water-soluble suppository bases was higher than that from fatty or emulsion suppositories bases. Among all PEGs bases (F4 : PEG 6000 : PG (20:80)) showed a relatively higher release of KT. Formulations prepared with glycerin bases gave more or less identical release pattern; relatively formula (F17: Gelatin: Glycerin: Propylene glycol: Water) gave the highest release pattern. Formula (F20 : Suppocire AM) exhibited the highest release rate among fatty bases. Within all emulsion bases (F23 : W15 : W75 : Tween 20 : Span 60 : PEG 1500 : Propylene glycol) showed the highest release rate. KT solid dispersion led to a higher release rate of the drug from selected bases. A histological comparison between the control group of rabbits (didn't take suppository), another group took plain suppositories and group that received

suppositories containing solid dispersion of KT was carried out. The tested plain and medicated bases didn't injure the rectal mucosa of rabbits. In conclusion, the incorporation of solid dispersion in formula (F4) complied with the pharmacopeial limits for hardness, dissolution time, content uniformity and weight variation. Also, it showed a relatively higher in-vitro release of KT and considered as a safe and useful formulation for clinical use.

Permeation-Enhancing Nanoparticle Formulation to Enable Oral Absorption of Enoxaparin

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This study tests the hypothesis that association complexes formed between enoxaparin and cetyltrimethylammonium bromide (CTAB) augment permeation across the gastrointestinal mucosa due to improved encapsulation of this hydrophilic macromolecule within biocompatible poly (lactide-co-glycolide, PLGA RG 503) nanoparticles. When compared with free enoxaparin, association with CTAB increased drug encapsulation efficiency within PLGA nanoparticles from 40.3±3.4 to 99.1±1.0%. Drug release from enoxaparin/CTAB PLGA nanoparticles was assessed in HBSS, pH 7.4 and FASSIFV2, pH 6.5, suggesting effective protection of PLGA-encapsulated enoxaparin from unfavorable intestinal conditions. The stability of the enoxaparin/CTAB ion-pair complex was pH dependent, resulting in more rapid dissociation under simulated plasma conditions (i.e., pH 7.4) than in the presence of a mild acidic gastrointestinal environment (i.e., pH 6.5). The intestinal flux of enoxaparin complexes across in-vitro Caco-2 cell monolayers was greater when encapsulated within PLGA nanoparticles. Limited changes in transepithelial transport of PLGA-encapsulated enoxaparin complexes in the presence of increasing CTAB concentrations suggest a significant contribution of size-dependent passive diffusion as the predominant transport mechanism facilitating intestinal absorption.

Formulation and Evaluation of Solid Dispersions of Carvedilol Using Different Polymers

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The objective of the study was to formulate and evaluate as well as to improve the aqueous solubility and dissolution of carvedilol, a poorly water soluble antihypertensive drug by solid dispersion technique. Polyvinylpyrolidone (PVP), Polyethylene glycol (PEG 4000 & 12000), pluronicF68 and Eudrajet were used as carrier polymers. Solid dispersion of carvedilol was prepared by both fusion and solvent evaporation method. Drug release was studied by the USP basket method at 75 rpm and 37±0.5°C by using phosphate buffer solution as dissolution medium. % drug release was measured from the UV absorbance at 242 nm. The study shows that all the polymers enhanced the release profile of carvedilol. The drug release data were fitted to different kinetic models and formulations followed the Higuchi model. FT-IR spectra of carvedilol and solid dispersion indicated no interaction between carvedilol and polymers. Solid dispersion technique may be used to enhance the dissolution as well as absorption of poorly water soluble drug carvedilol.

Pluronic F-127/ Chitosan In-situ Gel Loaded with Doxycycline Hydrochloride Microparticles as Intra-Pocket Drug Delivery System for Periodontal Diseases

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Periodontal disease is an inflammatory disease of the supporting tissue of teeth initiated by aerobic and anaerobic bacteria leading to destruction of the periodontal ligament with pocket formation as well as loss of alveolar bone and the tooth. The pocket provides an ideal environment for anaerobic bacteria that present deep and recolonize the cavity results in reoccurrence of the disease. Doxycycline hydrochloride (HCl) is a broad spectrum tetracycline antibiotic effective against periodontal pathogens and inhibits the activity of the destructive enzyme matrix metalloproteinase thus, enhancing bone regeneration after periodontal disease. The objective of this work was to prepare intra-pocket sustained release drug delivery system (DDS) of doxycycline HCl. This might eliminate bacteria present deep inside the pocket, maintaining effective drug concentration while minimizing the systemic adverse effects. Pluronic F-127/chitosan in-situ gel was prepared and loaded with chitosan microparticles (CS-MPs) containing doxycycline HCl. The in-situ gel showed accepted pH, gelation temperature near the body temperature with a gelling capacity for extended period of time and also, it was syringeable indicating the ease of administration. In-vitro release

studies provided sustained release of doxycycline HCl with only50% released over 24 h. MPs in-situ gel showed higher mucoadhesion than free doxycycline in-situ gel indicating more retention of the formulation within the periodontal pocket. MPs in-situ gel showed antibacterial activity against Escherichia coli (ATCC 8739), Staphylococcus aureus (ATCC 6538p) and Pseudomonas aeruginosa (ATCC 9027) reference strains. The MPs in-situ gel was more stable than free drug in-situ gel for 3 months. The intra-pocket administration to rats with periodontal diseases was able to control the inflammation and suppress the loss of epithelial attachment and alveolar bone resorption at lower doses than oral doxycycline HCl solution.These findings demonstrated that pluronic F-127 / chitosan in-situ gel can be a promising sustained-release local DDS for periodontal diseases.

Hydrophobic Ion Pairing as a Strategy to Improve Oral Administration of Metformin Hydrochloride Loaded Calcium Alginate Beads

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Purpose: ***Unfavorable physicochemical properties of metformin hydrochloride restrict the effective encapsulation of this hydrophilic drug within suitable carrier system. To augment oral absorption of this therapeutic biguanide, this study tests the hypothesis that association complexes formed between metformin hydrochloride and carbopol® 940 will increase drug loading within calcium alginate beads thus allowing better protection and formation of sustained release oral formulation.***

Methods: ***Carbopol®940 / metformin hydrochloride interactions were assessed at pH 8.0 using different charge ratios ranging from 0.5:1 to 2:1. Complexation efficiency percentage was quantified using indirect method. Complex loaded calcium alginate beads was prepared using ionotropic gelation method. Drug release was assessed in simulated gastric fluid (SGF) and simulated intestinal fluid (SIF). Antidiabetic efficacy was evaluated using streptazocin animal model and compared with marketed extended release tablets.***

Results: ***Significant increase in complexation efficiency percentage from 42% to 68% was recorded upon increasing Carbopol®940 / metformin hydrochloride charge ratio from 0.5:1 to 2:1, respectively. When compared with free metformin, association with Carbopol®940 augment drug encapsulation efficiency within calcium alginate beads from 11% to 99%. In-vitro release study carried out in SGF confirmed the rapid leaching of metformin from free drug loaded beads (40%, within 2 hours) compared to only 2% drug release from complex loaded beads. The same trend was recorded in SIF whereas 88% of metformin released after 4 hours from beads loaded with free drug compared to only 32% drug release from complex loaded beads. Moreover, Complex loaded beads expressed superior controlled and sustained drug release compared to extended release marketed tablets formulation. Antidiabetic efficacy of Carbopol®940 / metformin hydrochloride loaded calcium alginate beads were evaluated using streptazocin animal model and showed effective reduction in blood glucose level percentage (% BGL= 51 %) compared to extended release marketed tablets formulation (% BGL= 63 %) after 3 hours which is maintained till 24 hours due to the mucoadhesive and protective effect of alginate beads. Furthermore, histopathological examination confirmed that complex loaded calcium alginate beads are biocompatible.***

Conclusion: ***The results from this study confirmed that electrostatic binding between positively charged metformin and negatively charged Carbopol®940 leads to better drug loading within alginate carrier system and consequently enhance oral bioavailability of this antidiabetic drug and thus improve patient compliance to therapy.***

Development and Evaluation of Sustained Release Metronidazole Loaded Microsponge

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Polymeric microsponges are tiny, sponge like spherical particles with a large porous surface. The porous surface helps to entrap larger drug amount, modifies the drug release, minimizes the dose and consequently reduces the side effects of the drug. Metronidazole (MTZ), is abroad spectrum antimicrobial agent for anaerobic infections. Its oral administration often accompanied with gastrointestinal intolerance, leading to patient incompliance. Therefore, the aim of this study was to develop and optimize MTZ loaded microsponge to control its release. Microsponges were prepared by oil in oil emulsion solvent diffusion method using Eudragit RS 100 as a polymer and acetone as a solvent at different ratios. Different variables such as polymer ratio and stirring rate were studied. The encapsulation efficiency was increased with increasing the polymer content of the microsponges. Particle size of microsponges was affected by the stirring rate and the polymer ratio. Fourier transform infrared spectroscopy (FTIR) and differential scanning calorimetry (DSC) showed absence of incompatibility between MTZ and the excipients. The spherical porous particles, which were revealed by scanning electron microscopy (SEM), showed gradual release of MTZ (70% within 12 hours). In conclusion, MTZ loaded microsponges could be considered as a promising system to gradually deliver the drug locally or orally instead of the conventional MTZ oral formulations. In-vivo evaluation of the prepared formulation still under investigation.

Mixing Time Controls the Formation of Polymeric Nanoparticles in Microfluidic Channels

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Nanoparticles (NPs) have been established as an essential and adaptable tool for different therapeutic and diagnostic applications. However, traditional polymeric NP preparation methods, including nanoprecipitation, suffer from size-heterogeneity and polydispersity due to slow uncontrolled mixing time of different solvents. Microfluidics, which allows for controlling liquid flow on the microscale and nanoscale, emerged as a valuable tool for NP synthesis compared to bulk methods. Our study demonstrated how different aspects of microchannel's geometry and flow parameters can be manipulated to influence the size and homogeneity of polymeric poly (lactic-co-glycolic) acid (PLGA) NPs prepared by nanoprecipitation. Changing microchannel geometry in a manner that affects mixing time (τ_{mixing}), diffusion area and speed were shown to help control nanoprecipitation process and NP size. We fabricated different simple rectangular microchannels using soft lithography inside the clean room of Assiut University. Microchannel

design was rationally altered to adjust the mixing of water and PLGA-containing dimethylformamide streams in the microchannel. Unlike reports using complicated designs and fabrication techniques, we used simple structures that can be feasibly fabricated. Size and polydispersity of synthesized NPs were measured via dynamic light scattering, and NPs morphology was examined using Transmission Electron Microscopy (TEM).Our results show that FRR had the extremely considerable effect on NP size and homogeneity, whereas increasing channel length further >1 cm did not have any significant impact. Increasing channel aspect ratio, number of solvent streams, and channels' curvature resulted in smaller NPs. The effects of microchannel design are mediated by changes in mixing time. Fine-tuning of microchannel structure and flow parameters allowed the formation of NPs with diameter down to 55 nm. We believe our results will facilitate the selection of the proper channel design and flow parameters to achieve desired NP size, which is essential for the usage of NPs as a versatile tool.

Formulation and Evaluation of Metoclopramide Hydrochloride Sustained Release Tablets

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Objective: ***Metoclopramide hydrochloride (MCP) is the hydrochloride salt of the substituted benzamide metoclopramide with prokinetic and antiemetic activities. It is used in the treatment of nausea and vomiting associated with migraine, cancer therapy and pregnancy. It is highly water-soluble and is rapidly absorbed after oral administration. Its biological half-life is 5 hours and is usually administered in a dose of 10 to 15 mg four times daily. The objective of this work was to formulate MCP in sustained release tablets to achieve steady state blood level with minimum side effects and reduce the frequency of drug administration to improve patient compliance.***

Methods: ***Different hydrophilic polymers namely; hydroxypropylmethyl cellulose, sodium carboxylmethyl cellulose and methylcellulose in addition to hydrophobic polymers as Eudragit RS100, Eudragit RL100, Eudragit RSPM and Eudragit RLPO were used in the preparation of the***

MCP sustained release tablets. Differential scanning calorimetry (DSC) and FT-IR spectroscopy were utilized to investigate the possibility of MCP interaction with the excipients. The tablets were made by direct compression. The physical properties of the tablets were evaluated. The in-vitro release profiles of MCP were constructed using pH shift method.

Results: ***FT-IR and DSC studies revealed that there is no interaction between the drug and the investigated excipients. The release rate of MCP was decreased by increasing the amount of the studied polymers. Sustaining release of the drug from tablets containing hydrophilic polymers was found to be in the following descending order: HPMC15000>NaCMC>MC. Among the studied Eudragits, the maximum sustaining effect was obtained from tablets containing Eudragit RSPM. Tablets formulae containing HPMC15000 and Eudragit RSPM were selected for further bioavailability study.***

Preparation and Evaluation of Decorated Silver Nanoparticles Containing Anticancer Drug

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Purpose: ***Nanoparticles preparation is an important type of drug delivery systems. Selective delivery of chemotherapeutic agents to the affected site would minimize the associated side effects of anticancer drugs. It depends on delivery system and the mode of drug loading within this system. This work aims to chemically prepare of AgNPs coated with different molecular weights of PEG and loading of DOX.HCl to AgNPs and also aims to specific release of the loaded DOX.HCl at certain tissue.***

Method: ***Chemical synthesis of AgNPs and coating with PEG (2KD, 6KD and 10KD) via using different conditions. Then DOX.HCl was loaded into the coated-AgNPs. Finally, the prepared systems were characterized and optimized with respect to size, shape and drug release in phosphate buffer (pH 7.4, pH 5).***

Results: ***The prepared AgNPs were spherical in shape, nano range and monodisperse. The molecular weight of polymer did not significantly***

affect the size and shape of the prepared AgNPs. The release rate of loaded drug in acidic pH 5.0 was higher than that obtained in pH 7.4. Moreover, the prepared system shows a sustained release profile compared to unloaded drug.

Conclusion: ***The prepared system shows selective and sustained delivery of drug to the affected sites which leads to reducing the undesired effects of the drug in the non-affected tissues.***

Enhancement of Lornoxicam Solubility Using Different Hydrophilic Polymers and Cyclodextrins

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Lornoxicam is a non steroidal anti-inflammatory drug (NSAID) of the oxicam class with analgesic, anti-inflammatory and antipyretic properties. It is water insoluble drug. The present study was an attempt to improve the solubility and dissolution rate of Lornoxicam in phosphate buffer pH 6.8 by solid dispersion method and to compare effectiveness of hydrophilic polymers and cyclodextrins.

Method: ***Preparation of loaded mixtures of lornoxicam with certain techniques (physical mixtures, ground mixtures and solid dispersion) using cyclodextrins and some hydrophilic polymers as PEG (4000 and 6000) and PVP (25k and 90k). Differential scanning calorimetry (DSC) and FT-IR spectroscopy were utilized to investigate the possibility of the drug interaction with the used excipients. This loaded mixtures were characterized for their in-vitro drug release studies in phosphate buffer of pH 6.8.***

Results: ***All the prepared mixtures showed improvement in lornoxicam solubility. Maximum solubility and dissolution rate were attained with co-ground mixtures with PVP K25 in 1:3 weight ratio.***

Conclusion: ***Solid dispersion technique was suitable for increasing the solubility and dissolution rate of poorly soluble drugs like lornoxicam.***

Enhancement of Simvastatin Dissolution Using Certain Polymeric System

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Simvastatin belongs to the statins which is lipid lowering group. They act by inhibiting the 3-hydroxy3-methylglutryl coenzyme A. It was shown to reduce vascular inflammation, attenuate myocardial injury, decrease the incidence of Alzheimer's disease and dementia, limit the progression of inflammatory diseases, and treat chronic periodontitis. Simvastatin is water insoluble crystalline powder .It undergoes extensive first pass metabolism in the liver which results in very low and variable oral bioavailability.

Objectives: ***The present study was an attempt to improve the solubility and dissolution rate of Simvastatin at pH 6.8 by solid dispersion technique, to compare effectiveness of hydrophilic polymers, and to formulate it into buccal dosage form.***

Method: ***Solubility studies of SMV with various hydrophilic carriers including sorbitol, mannitol, PEG 4000, PEG 6000, pluronic F-68 and***

pluronic F-127 were performed. Pluronic F-68 and pluronic F-127 showed the highest solubilizing effect on SMV and therefore; they were selected for the preparation of solid dispersions in different weight ratios by using the fusion method. The solid dispersions were characterized using Fourier-Transform infrared spectroscopy (FT-IR), Differential Scanning Calorimetry (DSC), Powder X-ray Diffractometry (P-XRD), solubility determination and in-vitro dissolution rate studies.

Results: ***FT-IR and DSC studies confirmed the absence of incompatibilities between SMV and the used carriers. DSC and P-XRD studies proved the transformation of drug from crystalline to amorphous state in the prepared solid dispersions. The results showed marked improvement of SMV solubility and dissolution rate from the solid dispersions compared with the pure drug and indicated the superiority of solid dispersions prepared with pluronic F-68 over those prepared with pluronic F-127.***

Conclusion: ***It can be concluded that solid dispersion technology was an effective tool in the solubilization of SMV and the prepared solid dispersions could be promising for further incorporation into many dosage forms including those intended for buccal or sublingual administration.***

Formulation and Evaluation of Orodispersible Tablets of Gliclazide

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Gliclazide (GLZ) is an oral hypoglycemic drug belongs to biopharmaceutics classification system class II (BSC-II). The aim of the current study is to investigate the possibility of obtaining orodispersible tablets of GLZ with fast disintegration and enhanced dissolution properties. The rapid drug release from the orodispersible tablets could be beneficial in obtaining rapid absorption and hence rapid onset of hypoglycemic action.

Methods: ***The solubility of GLZ was enhanced using solid dispersion technique. Various hydrophilic carriers were employed such as: PEGs (PEG 4000, 6000 and 10,000), PVPs (PVPK 25 and PVPK90) and Pluronics (PLU68 and PLU127) at different w/w ratios. The best solid dispersion was formulated into the GLZ orodispersible tablets. Orodispersible tablets were developed using different superdisinitigrants including: crosspovidone (CP), cross carmellose sodium (CCS) and sodium starch glycolate (SSG) for achieving the fast disintegration characteristics. The obtained GLZ orodispersible tablets were evaluated***

for their weight, thickness, hardness, friability, disinitigration time, wetting time, drug content and in-vitro dissolution properties.

Results: ***Enhanced dissolution properties of GLZ was obtained using ternary solid dispersion of GLZ: PVP K25: PLU 127 at 1:1:0.5 w/w ratios respectively. The mean disintigeration times were within or less than 95 secs for the GLZ orodispersible tablets developed using CP and CCS as superdisintegrants. The optimized GLZ orodispersible tablets gave 100% release within 10 mins. The prepared orodispersible tablets showed good physical properties and comply with the pharmacopoeial limits.***

Conclusion: ***This study concluded that the optimized solid dispersion improved the dissolution rate of GLZ. Moreover, the orodispersible tablets of GLZ containing the optimized solid dispersion showed good physical properties.***

Externally Triggered Novel Rapid-Released Sonosensitive Folate-Modified Liposomes for Gemcitabine: Development and Characteristics

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Purpose: ***To develop externally triggered rapid-release targeted system for treating ovarian cancer, gemcitabine (GMT) was entrapped into sonosensitive folate-modified liposomes.***

Method: ***GMT-loaded liposomes (GMT-LP), GMT-loaded folate-targeted liposomes GMT-Fo/LP and GMT-loaded folate-targeted sonosensitive liposomes (GMT- SoS. Fo/LP) were prepared utilizing a thin film hydration technique and evaluated based on measuring particle size, zeta potential, and percent drug entrapped. The cellular uptake of the florescent containing delivery systems in the folate expressing ovarian cancer cells was quantified using flow cytometry. In-vitro cytotoxicity was***

evaluated by using colony forming assay, Western blot and MTT assay. Finally, evaluation of tumor targeting ability, in-vivo evaluation and pharmacokinetic studies were performed.

Results: ***GMT-LP, GMT-Fo/LP and GMT- SoS. Fo/LP were successfully prepared, at size approximately less than170 nm, -26.2-39.7 mV zeta potential and 56% percent drug entrapped. The cellular uptake of GMT-Fo/LP or GMT- SoS. Fo/LP was improved 4.7-fold than that of (GMT-LP). In-vitro cytotoxicity study proved that dose-dependently increased. As compared to GMT-LP, in-vivo, GMT-Fo/LP and GMT- SoS. Fo/LP had clear fluorescence intensity in ovarian cancer, confirming that (GMT-Fo/LP), in-vivo, (GMT- SoS. Fo/LP) had obvious tumor targeting efficiency. In-vivo, (GMT- SoS. Fo/LP) showed the highest antiproliferative and antitumor action on ovarian cancer as compared to (GMT-LP), (GMT-Fo/LP).***

Conclusion: ***These findings showed that externally triggered rapid-released sonosensitive folate-modified liposomes were promising system for delivering rapid release drug into the tumor.***

Enhanced Release Meloxicam Formulations Using Self-Nanoemulsifying Drug Delivery Systems

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Introduction: ***Meloxicam (MLX) is an oxicam dervative non-steroidal anti-inflammatory drug (NSAID). It belongs to class II (poorly soluble, highly permeable drug) in the biopharmaceutics classification system (BCS).***

Aim: ***The aim of this study was to compare the in-vitro release of MLX from different optimized self-nanoemulsifying drug delivery systems (SNEDDSs) to that obtained by the capsules available in the Egyptian market "Anticox II® 7.5 mg (Adwia)".***

Methods: ***In-vitro MLX release from prepared SNEDDSs and Anticox II® 7.5 mg were investigated at different pH values including 0.1N HCl and phosphate buffer of pH 6.1 with and without 0.1% SLS as specified by the FDA for optimized in-vitro dissolution testing of marketed capsules. The release profiles were also investigated for the system in phosphate buffer of pH 7.5. The in-vitro release study was conducted***

using USP dissolution apparatus I (basket), Sotax smart AT7 (Sotax Corporation, Netherland) in 900 ml volume, at 100 rpm and 37±0.5°C. In-vitro MLX release profiles from different SNEDDSs and Anticox II® 7.5 mg were fitted to different kinetic models of drug release. Release profiles comparisons were carried out using model-dependent and model-independent approaches.

Results: ***MLX-loaded SNEDDSs showed 3- to 4-folds improvement in the in-vitro MLX release in 0.1 N HCl in comparison to marketed capsules. More enhancement of MLX release from SNEDDSs in phosphate buffer of pH 6.1 was observed. Furthermore, the release was not dependent on the presence of 0.1% SLS in the media in contrast to marketed capsules. The release in phosphate buffer of pH 7.5 in 5 minutes was (90.17%) from SNEDDS in comparison to Anticox II® 7.5 mg (18.98%). The best fitted mathematical models were the empirical models; Weibull and Probit.***

Conclusion: ***SNEDDSs showed to be a promising approach for the enhancement of in-vitro MLX release characteristics. Since MLX is class II drug, it would be expected that its in-vivo absorption is dissolution dependent.***

Formulation of Glipizide into Gastroretentive Tablets with Enhancement its Dissolution Rate

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Glipizide is a potent oral hypoglycemic agent of the second generation sulphonylureas group. It is a poorly soluble drug with narrow absorption window. The aim of this work was to enhance the dissolution rate of Glipizide by solid dispersion (SD) technique with optimum formulation being developed as floating tablets. Binary SDs of drug and poloxamer 127 were prepared at different weight ratios. Furthermore, Ternary dispersion was prepared by the addition of sodium bicarbonate as third component to the binary solid dispersion. For floating tablets, a series of floating formulations was prepared using different weights of HPMC k4 and ternary solid dispersion as the drug matrix. All SDs increased drug dissolution rate, with ternary mixture showing the highest dissolution profile reflecting synergism between poloxamer and sodium bicarbonate. Glipizide floating tablets have shown floating lag time ranged from 11-50 seconds and remained buoyant for 8 hours. These floating tablets gave 94-88% drug released after 8 hours when they contain 20% and 30% HPMC4000, respectively.

Enhancement of Loratadine Dissolution Using Certain Binary and Ternary Systems

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Loratadine is a long acting antihistamine which has a high selectivity for peripheral histamine H1-receptors and lacks the central nervous system depressant effects. Loratadine exhibits poor water solubility (0.00303 mg/mL^{-1}) and high permeability (log P of 5), has pH dependent solubility, and the solubility decreases with pH increasing. It undergoes extensive first pass metabolism in the liver.

Objectives: ***The present study was an attempt to improve the solubility and dissolution rate of Loratadine at pH 6.8 by solid dispersion method and to compare effectiveness of different polymers, to formulate it into dosage form.***

Method: ***Solid dispersions of loratadine and various polymers in different weight ratios were performed by solvent co-evaporation, co-ground and fusion methods in binary, ternary and quaternary systems. The solid dispersions were characterized using Fourier-transform infrared spectroscopy (FT-IR), Differential Scanning Calorimetry (DSC)and in-vitro dissolution rate studies.***

Results: ***FT-IR and DSC studies confirmed the absence of incompatibilities between Loratadine and the used carriers. The results showed marked improvement of Loratadine solubility and dissolution rate from the solid dispersions compared with the pure drug and indicated the superiority of solid dispersions prepared with Loratadine, pluronic F127 and hydroxy propyl β cyclodextrin in ternary systemand solid dispersion prepared with Loratadine, PVP 40000 and citric acid in ternary system over those prepared with other polymers.***

Conclusion: ***Solid dispersion technology was an effective tool in the solubilization of Loratadine and the prepared solid dispersions could be promising for further incorporation into dosage form.***

Natural Products

Antimicrobial Activity of Vitex agnus-castus Essential Oil and Molecular Docking Study of Its Major Constituents

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Antimicrobial resistance represents a public health problem worldwide that is associated with high morbidity and mortality which rose up the need for natural products as being an effective alternative. This study aims to evaluate the antimicrobial activity of the Vitex agnus-cactus L. essential oil (EO) towards bacterial and fungal strains of economic importance, besides, correlating its chemical constituents to the observed antimicrobial and antifungal activity using molecular docking. The chemical composition of essential oil was analyzed by gas chromatography-mass spectroscopy (GC-MS), where oxygenated monoterpenes (44.98%) and monoterpenes (32.2%) represented the major

classes. Molecular docking study was carried out for the major identified essential oil constituents against bacterial protein targets, where, sabinene, 1,8 cineole, and linalool (the major oil constituents) acted on multi targets and reflected the effective antibacterial activity. Additionally, caryophyllene and verticiol showed a high binding affinity to Candida Farnesyl pyrophosphate synthase, a critical enzyme responsible for cell membrane integrity. V. agnus-cactus L. oil demonstrated itself as a powerful anticandidal agent providing a possible candidate in the pharmaceutical formulations.

Phytochemical and Biological Studies of Gardenia latifolia Ait. Family Rubiaceae

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G. latifolia Ait. Is an important traditional medicinal plant used in the treatment of various ailments like rheumatism, diarrhea and dysentery. It is a small deciduous tree or large shrub. The common names of G. latifolia are the Indian Box-wood or Ceylon Boxwood.

Phytochemical investigation of methanolic extract of aerial parts of G. latifolia resulted in the isolation of a new compound (-) 1-acetyl 4,5-di-O-caffeoyl quinic acid (1) in addition to eight known compounds: β-amyrin (2), stigmasterol (3), P-hydroxy benzoic acid (4), protocatechuic acid (5), 1-O-[6-O-(5-O-vanilloyl-β-D-apiofuranosyl)-β-D-glucopyrano-syl]-3,4,5-trimethoxybenzene (6), chlorogenic acid methyl ester (7), quercetin 3-O-β-galactoside (8), methyl-4,5-dicaffeoylquinate (9). The structural elucidation of the isolates was based on the analysis of spectroscopic data (UV, ^{1}H and ^{13}C-NMR, HSQC, HMBC). The cytotoxic and anti-diabetic (α-glucosidase inhibition) activities were examined for total methanolic extract and three fractions (hexane, DCM and ethyl acetate). Hexane and ethyl acetate fractions showed significant cytotoxic activity againstcolon and lung cancer cells (HCT116 -A549 cell lines), while DCM fraction has the highest α-glucosidase inhibitory potential.

In Silico Docking Studies of Phenolic Constituents Isolated from Rhododendron yunnanense Flowers as COX-1 and COX-2 Inhibitors

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The genus Rhododendron is a rich source of phenolic compounds that possess a wide range of biological activities. Phytochemical investigation of the methanolic extract of the flowers of Rhododendron yunnanense Franch. has led to the isolation and characterization of thirteen phenolic compounds isolated for the first time from the plant. These compounds were identified as quercetin (1), quercitrin (2), avicularin (3), dihydroquercetin-3-O-β-L-arabinofuranoside (4), azalein (5), kampferol-3-O-rhamnoside (6), kampferol-4'-methoxy-3-O-rhamnoside (7), kampferol-3-α-D-glucopyranoside (8), 3,3',4',5,7-pentahydroxyflavan (9), 3,3',5,5',7-pentahydroxyflavan (10), 3-gallocatechin (11), 5-O-p-coumaroylquinic acid methyl ester (12), 5-O-p-caffoeylquinic acid methyl ester (13). The structures of compounds 1-13 were determined by 1D and 2D NMR, and comparison with reported data. A molecular simulation study on the binding mode of isolated compounds as cyclooxygenase 1 (COX-1) and cyclooxygenase 2 (COX-2) inhibitor was evaluated for anti-inflammatory activities. The docking results of all isolated compounds revealed promising binding affinities to examined enzymes ranging between -20.2094 and -14.4316 kcal/mol for COX-1 while ranging between -21.2206 and -14.0195 for COX-2.

Organic and Pharmaceutical Chemistry

Design, Synthesis, Biological Activities of New 2-(5-Cyano-1,6-dihydro-6-oxo-4-phenylpyrimidin-2-ylthio)-N-(4-phenylthiazol-2-yl)acetamides

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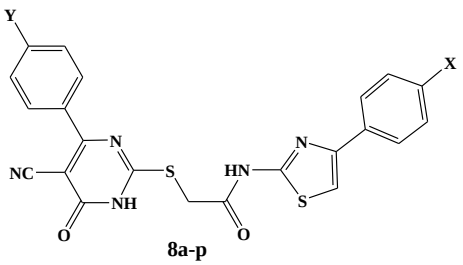
A series of novel of 2-(4-phenylpyrimidin-2-ylthio)-N-(4-phenylthiazol-2-yl)acetamides have been synthesized through reaction of 2-chloro-N-(4-phenylthiazol-2-yl)acetamide intermediates with 5-cyano-1,6-dihydro-6-oxo-4-phenyl-2-thioxopyrimidines. The purity of the new compounds was checked by TLC and elucidation of their chemical structures was confirmed by ^{1}H-NMR, ^{13}C-NMR and high resolution mass spectrometry. All the target compounds will screen for their anti-inflammatory and anticancer activities.



8a-p

X, Y = H, Cl, CH_3, CH_3O.

Synthesis of Sulfated Lactosamine-Containing Tetrasaccharides: The Contribution of Sulfate to the Binding Affinity of Galectins

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Galectins are β-galactoside-binding proteins. They participate in intracellular trafficking, cell adhesion, and cell–cell signaling. Accumulating evidence indicates that they play a pivotal role in numerous physiological and pathological activities, such as the regulation on cancer progression, inflammation, immune response, bacterial and viral infections. Galectins have drawn much attention as targets for therapeutic interventions. Several molecules have been developed as galectin inhibitors.2 Recent results from this group showed that the number of LacNAc units and position of sulfation affect both binding affinity and selectivity with Galectins. To complete an ongoing study; the synthesis of the tetrasaccharide (diLacNAc) that is selectively sulfated at the two six positions of Glu units is described.

Synthesis, Crystal Structure, Fluorescence Properties and Anti-Cancer Activities of Some New Poly Substituted 5,6,7,8-Tetrahydroisoquinolines

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Reaction of 7-acetyl-1,6-dimethyl-4-cyano-6-hydroxy-5,6,7,8-tetra-hydroisoquinoline-3(2H)-thione (2) with ethyl chloroacetate, N-(aryl)-2-chloroacetamides or N-(benzo[d]thiazol-2-yl)-2-chloroacetamide, in the presence of sodium acetate, gave the corresponding 3-substituted sulfanyl-5,6,7,8-tetrahydroisoquinolines 3, 5a-e or 7. When the latter compounds were subjected to Thorpe-Ziegler reaction conditions, they converted into 2-substituted 1-amino-6,7,8,9-tetrahydrothieno[2,3-c]iso-quinolines 4, 6a-e or 8. Structural formulas of all newly synthesized compounds were elucidated and confirmed on the basis of their elemental and spectral analyses and single crystal X-Ray. The compounds 3,5a,5c, and 7 have more cytotoxicity than other synthesized compounds. The compound 3 give significant cytotoxicity with IC_{50} (0.15 μM/mL).

Design, Synthesis and Biological Evaluation of New Ciprofloxacin Piperazinyl N-4 Carbamoyl Functionalized Derivatives

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Different new piperazinyl N-4 carbamoyl functionalized ciprofloxacin analogues 3a-i and 4a-c have been synthesized and characterized using various spectral techniques. The synthesized compounds were evaluated for antibacterial, antitumor and urease inhibitory activities. Antibacterial potential towards the urease producing Gram-negative bacteria, Klebsiella pneumoniae and Proteus mirabilis was less than the parent drug, ciprofloxacin in general. However, the test compound 4a showed better activity than chloramphenicol against Klebsiella pneumoniae (MIC= 100.64 and 217.08 µM, respectively).

Regarding antitumor activity, both compounds 3f and 3g showed a potent antiproliferative activity against the breast cancer BT-549 cell line (growth percent inhibition of 71.32 and 93.82%, respectively). Moreover, compound 3g showed a remarkable anticancer activity against colon cancer HCT-116 cells (growth percent inhibition of 85.24%). Meanwhile, the majority of the synthesized compounds experienced a promising urease inhibitory activity. Several derivatives were more active than their parent quinolone, where compounds 3i and 4a were the most potent urease inhibitors, with activity better than the standard inhibitor, thiourea (IC_{50} = 58.92, 73.40 and 78.89 µM, respectively).

Design and Synthesis of Some 1,3,5 Tri-Substituted Oxindole Derivatives as Potential CDK Inhibitors

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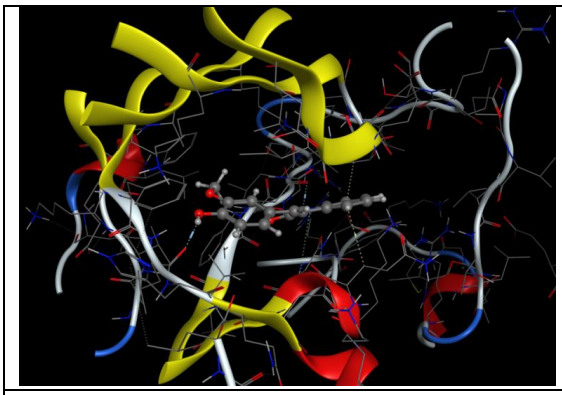
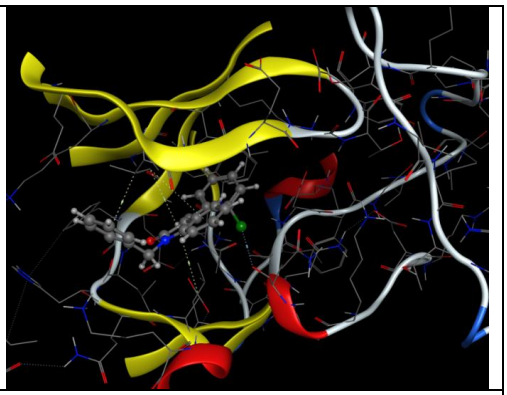
Cyclin-Dependent Kinases (CDKs), specially, CDK 1-4 & 6-9 have a vital role in cell cycle progression and in transcription process. Activity of these enzymes is usually 4- to 20-fold higher in mammary carcinomas compared to normal tissues, so, they are good target for the design of anticancer agents. The design of the targeted compounds was based on their molecular modeling of each compound at the active site of Cyclin-dependent kinase enzyme (CDK2) in complex with SUNITINIB (PDB ID: 3TI1) using MOE 2019.01 software. In our present study a series of tri-substituted-2-oxindole derivatives are synthesized, Most of the synthesized compounds were obtained as E/Z mixture, resolution of the obtained E/Z diastereomer was performed by column chromatography technique. The configuration of the purified single diastereomer was confirmed with NOSEY 2D-1HNMR. Biological screening of the synthesized compounds were evaluated to obtain their in-vitro anticancer activity against two cancer cell lines, namely, breast cancer cell line (MCF-7), human liver cancer cell line (HepG2), Cervix carcinoma cell line (HeLa) and colon cancer cell line (HCT116). Also the synthesized compounds were screened

on diploid human normal cell line (F180) to obtain their selectivity on cancer cells. All the tested compounds shown good selectivity on cancer cell lines than the control drug (doxorubicin). The most potent one is compound 6e with Percentage of inhibition on HeLa cell line = 75.03% and compound 7f with Percentage of inhibition = 57.95, 56.86 and 54.95% on MCF-7, HepG2 and HCT116, respectively.



Compound 6e 3D interactions



Compound 7f 3D interactions

Fig. 1: 3D ligand interactions of the most potent compounds.

Pharmaceutical Analytical Chemistry

Optimization of A Sensitive and Robust Strategy for Micellar Electrokinetic Chromatographic Analysis of Sofosbuvir in Combination with its Co-Formulated Hepatitis C Antiviral Drugs

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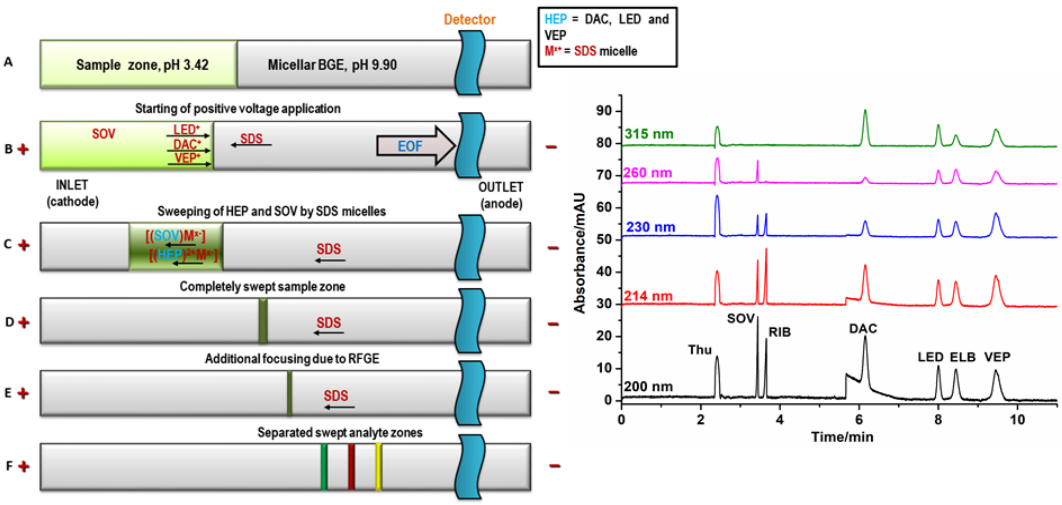
In this study "pseudostationary-ion exchanger sweeping", was employed to develop a sensitive, reliable and robust method for analysis of the newly-FDA approved hepatitis C antiviral drugs namely; sofosbuvir (SOV), daclatasvir (DAC), ledipasvir (LED) and velpatasvir (VEP) in their pure form and co-formulated pharmaceutical dosage forms using micellar electrokinetic chromatography (MEKC) as separation method. For the first time, a successful separation of all the investigated compounds was achieved in less than 8 min using a basic background electrolyte (BGE) composed of 25 mmol L^{-1} SDS + 20% (v/v) ACN (acetonitrile) in 10 mmol L^{-1} disodium tetraborate buffer (final apparent pH is 9.90). A special focus was given to optimize the composition of the sample matrix to maintain the solubility of the analytes within the sample zone while gaining additional benefits regarding analyte zone focusing. It was found that replacing phosphoric acid (as a sample matrix) with a zwitterionic/isoelectric buffering compound (L-glutamic acid) has a substantial positive impact on the enrichment efficiency. The interplay of other enrichment principles such as the retention factor gradient effect

(RFGE) is also discussed. A full validation study is performed based on the pharmacopeial and ICH guidelines. The obtained limits of detection and quantitation are 0.63 and 1.3 µg mL^{-1}; respectively for SOV and DAC and 1.3 and 2.5 µg mL^{-1}; respectively for LED and VEP using UV-DAD as a detection method. The selectivity of the developed method for determination of the studied compounds in their pharmaceutical dosage forms or in the presence of ribavirin (RIB) or elbasvir (ELB), which are other prescribed medications in the treatment regimen of patients with hepatitis C virus infection, is demonstrated. It is shown that with acidic sample matrix and basic BGE, an efficient and precise approach was designed in which analyte adsorption on the capillary wall was minimized while keeping repeatable peak height, peak area and migration time together with the highest possible enrichment efficiency.



Is it necessary to Desalt Plasma Samples Before Analysis by Capillary Electrophoresis (CE)? A Step Towards Simplification of Sample Preparation

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The present work concerns the development of a simple, rapid and sensitive analytical methodology for the analysis of imatinib mesylate (a tyrosine kinase inhibitor (TKI)) in plasma samples by capillary electrophoresis (CE). The CE methodology has been optimized by taking into account the high amount of salts (≈ 1% (m / v) normally present in human plasma. Different analytical conditions such as ionic strength (I), electrolyte pH (BGE) and capillary dimensions were studied. Simul software developed by the ECHMET group (Pavel Dubsky and Michal

Malý) was used to describe the effect of salts on the electrophoretic analysis of imatinib. An excellent match between the experimental and simulation results was observed confirming the interest of the Simul software for the description of electrophoretic phenomena found inside the capillary. Good linearity was obtained for imatinib mesylate in a concentration range between 191 and 5000 ng / ml (r2> 0.997). The LOD and LOQ in human plasma were determined to be 48 and 153 ng/mL for imatinib mesylate. These concentration levels are much lower than the plasma concentrations observed for imatinib mesylate (estimated at 1000 ng/mL). Excellent repeatability (n = 6) was observed for the migration times (CV< 1.68%) and the peak areas (CV< 2.6%) confirming the applicability of the proposed methodology for analysis of imatinib mesylate in human plasma.

Rapid and Non-Invasive Determination of Certain Metronidazole Combinations by FTIR Spectroscopy

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A simple green chemistry and non-invasive FTIR method was used to determine two binary mixtures: metronidazole-ciprofloxacin hydrochloride and metronidazole - spiramycin in the solid-state for the first time. The quantitation of studied drugs and their binary mixtures were performed by integrating the peak areas of the characteristic well resolved FTIR bands, C-N stretching band at 1075 cm^{-1} for metronidazole, stretching band of carbonyl group (C=O) at 1709 cm^{-1} for ciprofloxacinhydrochloride, and NO_2 stretching at 1535 cm^{-1} for metronidazole, stretching band of carbonyl group (C=O) at 1723cm^{-1} for spiramycin, respectively. The method was validated according to ICH-guidelines. A linear relationship was obtained in a concentration range of 1.0-50 µg/mg with excellent correlation coefficient of 0.9996-0.9997 for metronidazole and ciprofloxacin HCl in their binary mixture. The linearity range for metronidazole and spiramycin in their binary mixture were 1.0-40 µg/mg and 2.0-80 µg/mg with excellent correlation coefficient of 0.9997-0.9992, respectively. Limits of detection were found to be 0.29 and 0.26 µg/mg for metronidazole and ciprofloxacin HCl, respectively and 0.20 and 0.65 µg/mg for metronidazole and spiramycin, respectively. The proposed method was applied successfully and non-destructively on their determination in pharmaceutical dosage forms.

Towards Understanding of Different Solid Forms of Formoterol Fumarate: Combined Computational and Experimental Approach

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In this study, specimens of formetrol fumeratewere investigated using IR and Raman vibrational spectroscopy as well as quantum chemical calculations. The structure of formetrol fumerate was optimised using density functional theory calculations and the geometry optimization has been carried out on three different solvate crystal forms; di-hydrate, di-ethanolate, and di-isopropanolate in addition to the anhydrate form with and without intramolecular hydrogen bonding. Molecular assignments are proposed on the basis of ab initio B3LYP DFT calculations with a 6-31 G* basis set and vibrational wavenumbers. Crystallographic investigation has been carried out to formetrol anions and protonated anions arising from crystal structures of the studied conformers and it was evidenced that the di-hydrate form has the highest

energy probably due to the greater possibility of intramolecular hydrogen bonding. Infrared and Raman spectra were calculated from the optimised structures. Many modes in the calculated spectra could be matched with the experimental spectra and a description of the modes is given. By analysis of the theoretical vibrational modes, it was proved that formetrol fumerate specimens are likely to be dihydrate form with and without intramolecular hydrogen bonding. Additionally, several spectral features and band intensities in the stretching and bending regions are explained. Quantum mechanical calculations allowed better understanding of formetrol fumerate and its vibrational spectra as an important β_2 antagonistic compound in various pharmaceutical formulations. The obtained data could provide useful information about its interactions with excipients and other pharmaceutical components.

Clinical and Hospital Pharmacy

A Randomized Interventional Study Assessing the Efficacy of Vitamin B Complex plus Alpha-Lipoic Acid as Neuroprotective Prophylaxis in Reducing the Development of Oxaliplatin-Induced Peripheral Neuropathy

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Introduction: ***Oxaliplatin (OXN), a third-generation platinum-based agent, is the principal chemotherapeutic agent for the treatment of colorectal cancer and also for other cancer types. Oxaliplatin-Induced Peripheral Neuropathy (OIPN) remains the main dose-limiting factor for its use. The degree of neuropathy may be either acute, reversible, or cumulative, chronic peripheral neuropathy.***

Aim: ***Investigation of the prophylactic effect of vitamin B complex plus alpha-lipoic acid as neuroprotective agents on reducing the severity of Oxaliplatin induced peripheral neuropathy in cancer patients.***

Method: ***A randomized interventional study was conducted on 136 patients attended at the Oncology Department, Assiut University Hospital. Patients randomized into group A (68 patients control, take OXN chemotherapy regimen only) and group B (68 patients prophylactic, take OXN chemotherapy regimen plus neuroprotective prophylaxis). The primary outcome measure was the effect of prophylaxis on the degree of neuropathy assessed by nerve conduction study and clinical neurological examination according to The National Cancer Institute (NCI) Common Terminology Criteria for Adverse Events (CTCAE). Outcome measures were assessed at baseline, after 12 weeks and after 24 weeks of treatment.***

Results: ***The mean age of studied patients was 46.82±10.82 years, 55.9% were female. Compared to the baseline measurements, there was a clinically significant difference as group B showed improvement of neuropathy (according to NCI-CTCAE) compared to group B. Also, according to nerve conduction study values (motor and sensory), group A showed significantly abnormal values compared to group B.***

Conclusion: ***This study of using IM vitamin B complex plus oral alpha-lipoic acid as neuroprotective prophylaxis appeared to be effective in reducing OIPN in cancer patients and was well tolerated.***

An Approach to Improve the Quality of the Activities of a Sterilization Unit in University Hospital Center: A New Approach by LEAN Management

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Introduction: ***Operating rooms (OR), and care units of CHU of Montpellier are constantly growing in activity. This affects the activity of the sterilization unit and consequently forces the team to work under time pressure and increasing efficiency.***

LEAN is a management method that aims to improve the performance of the company through the development of all employees. The method makes it possible to search for the ideal operating conditions by making personal work, equipment and sites work together so as to add value with the least waste possible.

We can consider the sterilization process as a production line, on which we want to try to set up a LEAN management in the form of KANBAN.

The objective is to schedule the recomposition flow, redistribute recomposition resources, pool skills, optimize flow and prioritize emergencies.

Materials and methods: ***An observational phase of the production chain was first carried out, in order to identify the steps that can be qualified as a bottleneck.***

The sterilization team was then trained in a LEAN philosophy. These training sessions consist of bracelets manufacturing workshops from elastic bands, mimicking the sterilization production chain.

The recomposition zone was arranged in 5 islets of 1 to 2 benches, corresponding to the 6 operating rooms supported in the Sterilization Unit of the site of Gui De Chauliac (CTCV, Gynecology, ENT-CMF-Odontology, Ophthalmology, Neurosurgery-PMOT, Digestive).

Thanks to the T-DOC software, it is possible to extract the figures of the production of the Sterilization Unit by specialty. During the month of June 2018, the number of recomposed operating trays (OT) was 1467 for Neurosurgery, 1472 for Digestif, 1063 for ENT, 538 for CMF, 283 for Odontology, 776 for Ophthalmology, 1930 for the CTCV, and 1026 for Gynecology.

A management engineer was assigned to help the management team implement this project.

Numbered KANBAN identification tags were purchased from the STERILMED laboratory.

Results: ***The configuration of the recomposition zone allowed us to create 3 production lines, thus replacing the 5 islands and 7 streams. In order to create 3 equivalent flows: we analyzed the activity of June 2018 and grouped the specialties according to the complexity of the operating plateaus and the volumetry of each surgical specialty. This results in 3 flows: Flow 1 composed of Neurosurgery-PMOT and Digestive (totaling an activity of 2939 OT in June 2018, 34% of production); Flow 2 composed of the ENT, CMF, Odontology, Ophthalmology (with a production of 2660 OT in June 2018, or 31% of total production), and***

Flux 3 including CTCV and Gynecology, an activity of 2956 OT in June 2018, or 35% of the activity.

The KANBAN labels are deposited on the operating trays during their management in the washing zone and will thus be taken care of in the packing area in the order of arrival according to the principle of FIFO (First-In, First- out).

The number of recomposed operating trays in 2015, 2016 and 2017 was respectively 87,781, 87,329 and 88,887 per year, with an average of 87,999±801. 91,586 OT were recomposed and sterilized in 2019.

Discussion and Conclusion: ***The reorganization of the Sterilization Unit of the Gui De Chauliac site was set up on July 16, 2019 and is continuously requesting some readjustments. We can already conclude on an improvement in productivity in terms of scheduling, fluidity and availability, a reduction of the production pressure, a redefinition of the true urgency, a development of the notion of self-help and an increase in versatility through training.***

The implementation of LEAN has allowed absorption of the increase in operating room activity, without increasing the number of staff or deteriorating working conditions.

Several presentations were offered at the CHS-CT in September 2018 and at the CTE in October 2018, January 2019 and 2020, each time with the support of the audience, as well as that of production agents and operating room managers.

KAYZEN workshops are held regularly with the entire sterilization team to ensure continuous improvement of the reorganization.

Microbiology

How Qunilones Antibotic Resistance Develop?

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The quinolone antibiotics arose in the early 1960s, with the first synthetic example having a narrow spectrum of activity with unfavourable pharmacokinetics. Over time, the development of new quinolone antibiotics has led to improved analogues with an expanded spectrum and high efficacy. Nowadays, quinolones are broad-spectrum antibiotics that are active against both Gram-positive and Gram-negative bacteria, including mycobacteria, and anaerobes. They exert their actions by inhibiting bacterial nucleic acid synthesis through disrupting the enzymes topoisomerase IV and DNA gyrase, and by causing damage of bacterial chromosomes. Acquired bacterial resistance to quinolones develops due to the abuse of these drugs. Mechanisms contributing to quinolone resistance are mediated by chromosomal mutations and/or plasmid gene uptake that modify topoisomerase targets, modify the quinolone, and/or reduce drug accumulation by either decreased uptake or increased efflux. This poster summarises the history of development of this class of antibiotics, different generations, mechanism of action, along with the resistance mechanisms which reduce the quinolones' activities against different microorganisms.

Students Session

Synthesis Optimization of 1,2,4-Triazole Derivatives

Marina Gamal Shohdy[1], Osman Mohamed Hassan-Refaat[1], Andrew N. Boshra[2], Abu-Bakr M. Abdel-Aal[1,2]

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The current work presents an efficient, environment-friendly procedure for synthesis of substituted 1,2,4-triazoles. The reaction involves fusion of thiocarbohydrazide with different acid derivatives. Reaction conditions such as temperature, time, scale, reactant ratio, and order of addition were optimized. The optimum conditions improved the time and yield of the reaction without the use of any solvent.

One-pot Three-Step Synthesis of Substituted 1,2,4-Triazole

Kerolos Y. Zaky[1], Osman Mohamed Hassan-Refaat[1], Andrew N. Boshra[2], Abu-Bakr M. Abdel-Aal[1,2]

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A new methodology has been developed incorporating three synthetic steps for introduction of different structural variables at position 3,4 and 5 of 1,2,4-triazole. Structure variables were introduced at different order to give 3,5-disubstituted, 4,5-disubstituted and 3,4,5-trisubstited 1,2,4-triazole derivatives. All procedures were carried out as one-pot reaction followed by simple work-up and avoiding the use of any organic solvent. The current method was used to synthesize various new compounds.

Synthesis and Molecular Modeling of Benzimidazole-Based Casein Kinase 2 Inhibitors as Anticancer Agents

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Casein kinase 2 (CK2) is a serine/threonine selective protein kinase that has been implicated in cell cycle control. Inhibition of CK2 enzyme may play an important role in the treatment of cancer. Polyhalogenated benzimidazole derivatives have been reported as inhibitors of CK2 enzyme. In our work, different new halogenated and non-halogenated benzimidazole derivatives were designed using molecular modeling software. Certain benzimidazole derivatives were synthesized and tested using CK2 enzyme and different cancer cell lines.

Quality Control of Some Weight Reducing Herbal Tea Preparations in the Egyptian Market

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The medicinal plant products have been widely used by approximately 80% of the world population for their primary healthcare needs due to the safety value of herbs. In recent decades, the demand of herbal medicines and plant products in the market has increased dramatically. This increasing demand leads to shortage of raw material which ultimately resulted in unauthenticated practices of adulteration or substitution. Therefore, the importance of quality control and standardization for single raw drug as well as combined formulation(s) is of utmost concern. Microscopic inspection and performing chemical tests of herbal materials are utilized to identify broken or powdered herbal medicines. The present study aimed to perform microscopical identification and chemical tests of two weight reducing herbal drug preparations in the Egyptian market.

Determination of Total Phenolic and Total Flavonoidal Content of Calotropis procera (Ait.) R.Br. Leaves, Stems and Fruits

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Phenols and flavonoids present in medicinal plants are considered to be among the most important bioactive components. Calotropis procera (Ait.) R.Br. (Family, Apocynaceae) is a medicinal plant with a wide range of bioactivity. The plant is anthelmintic, cures ulcers and acts as an expectorant. It shows anticoagulant, diuretic activities and cardiac as well as respiratory stimulating effects. The plant was also known to be used in the treatment of jaundice and has cardio-protective property in myocardial infarction. The present study was aimed to evaluate the effect of solvent concentration on total phenolic content (TPC) and total flavonoid content (TFC) in different extracts of leaves, stems and flowers of C. procera. TPC and TFC were estimated by Follin Ciocalteu colorimetric assay and aluminum chloride method using tannic acid and quercetin as standards, respectively. Significant variation in TFC and TPC levels was observed in between the different samples. C. procera presented highest both TPC and TFC in leaves extracted with 80% MeOH. In conclusion, the present investigation demonstrates that there is significant effect of solvent concentration used for extraction of C. procera on their TPC and TFC contents.

Preparation of Steviosides from Stevia Leaves and its Uses Pattern in Egypt

Mariam W. Sedky[1], Reham M. Alaa[1], Mai G. Mohamed[1], Mohamed S. Ahmed[1], Shaymaa M. M. Mohamed[2], Sahar B. Hassan[2], Soad Al Bayoumi[2]

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Stevia rebaudiana Bertoni is a small perennial shrub belonging to the sunflower family (Asteraceae). It is native to South America (Paraguay and Brazil). Stevia leaves and its extract are used as natural non-cariogenic sweeteners. The major constituents of Stevia are diterpene glycosides, mainly stevioside and rebaudioside A, which are the main sweet components from the leaves of Stevia (about 200-300 times as sweet as the table sugar). It is suited for diabetics, PKU patients, and for obese persons intending to lose weight by avoiding sugar supplements in their diet. There are many Stevia products commercially utilized as sucrose substitutes in addition to the dried leaves available in the Egyptian market. Therefore, this study conducted a questionnaire aimed to

investigate the use of Stevia in Egypt. The questionnaire was sent by mail to diabetic and obese patients groups and was responded by 96 participants from the targeted groups. 77% of respondents were females and majority of the respondents were in the age range of 15-24 years. 36.5% were overweight or obese and 5.2% had diabetes. Stevia dried leaves were used by 9.4% of respondents. Regarding Stevia prepared products, 26% were used Stevia sugar to reduce body weight, maintain body or reduce blood sugar level. Over two-thirds of the respondents believed that the use of Stevia is safe. In addition, stevioside glycosides mixture is prepared from the aqueous fraction of the 70% ethanolic extract using polyamide column chromatography; fractions were monitored by TLC, followed by purification by crystallization.

CIT Protocols and Hospital Training: Experience and Recommendation

Sarah Fekry Rashad

Clinical Integrated Team (CIT), Faculty of Pharmacy, Assiut University, Assiut, Egypt

1- History of the team.

2- Structure of the team.

3- Main goals of the team.

4- Projects of the team with some details.

5- Protocols of the team.

6- How to join to us.

Pharmacist Fields of Work: A Focus on the Job Description of Clinical Pharmacist

Mohamed Ahmed Bahaa El-Din

Clinical Integrated Team (CIT), Faculty of Pharmacy, Assiut University, Assiut, Egypt

1- History of pharmacy.

2- Career pathways of pharmacist: community - veterinary - comppunding - R&D - hospital - nuclear – academic.

3- Evolution of clinical pharmacy.

4- Benefits of clinical pharmacy.

5- Specialty of clinical pharmacy.

6- Clinical pharmacy application reduces mortality rates in hospital.

Shefaa Al Orman Hospital Training: Experience and Recommendation

Osama Mohamed

Clinical Integrated Team (CIT), Faculty of Pharmacy, Assiut University, Assiut, Egypt

1- How do I get training in SHefaa Al Orman Hospital?

2- As general, the different parts in the hospital I had visited and trained in.

3- Some details on every part and connections bet. different parts of the hospital.

4- Then, clarifying some points on the nature of pharmacists work in the hospital.

5- Finally, answering questions of the attendants.

Moalmeen Hospital Training: Experience and Recommendation

Mohmmed Kamal Badry

Clinical Integrated Team (CIT), Faculty of Pharmacy, Assiut University, Assiut, Egypt

1- Brief information about almoalmeen hospital.

2- Nature and role of clinical pharmacy in the hospital.

3- Training Protocol.

4- Nature and benefit of training.

5- How can you get a chance of training.

6- Some notes and photos.

مؤتمر جامعــة أســيوط الدولي الثاني عشر للعلــوم الصيدليــة

أســيوط – مصــر

4-5 نوفمبر 2020

تنظمه كلية الصيدلة – جامعة أسيوط

تحت رعايـــــــة

السيد اللواء/ عصـام سعـد إبراهيم

محافظ أسيوط

الأستاذ الدكتور/ طارق الجمــال

رئيس جامعة أسيوط

الرئيس الفخري

الأستاذ الدكتور/ أحمـد المنشاوي

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رئيس المؤتمر

الأستاذ الدكتور/ محمود شيحه

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وكيل كلية الصيدلة لشئون الدراسات العليا والبحوث

مؤتمر جامعة أسيوط الدولي الثاني عشر

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"العلوم الصيدلية بين البحث والتطبيق"

أسيوط، ٤ - ٥ نوفمبر ٢٠٢٠