His Majesty King Abdullah II Ibn Al Hussein

جلالة الملك عبدالله الثاني بن الحسين المعظم

His Royal Highness Crown Prince Al Hussein bin Abdullah II

صاحب السمو الملكي الأمير حسين بن عبدالله ولي العهد

Message from Chairman of the Conference

Dr Amjad Naji Abu Irmeileh, PhD

Associate Professor of Pharmacology
Dean of the Faculty of Pharmacy
Isra University

Dear Friends and Colleagues,

On behalf of our faculty members and executive committee, it is a great honor for me to warmly welcome you all to the 5th International Conference of the Jordanian Faculties of Pharmacy.

We foresee our conference as a golden opportunity to gather vast diverse disciplines of the pharmaceutical society in one place to discuss, interact and share ideas about many aspects in pharmacy fields. Most importantly, our conference provides researchers and academics to meet with professionals in the field of cancer management.

The organizing committee was keen on bringing international keynote speakers to give lectures to increase participants exposure to new advances in the field of cancer treatment. The lectures will cover a vast variety of topics related to cancer ranging from basic pharmaceutical sciences to industrial application and clinical practice. Moreover, poster sessions will provide an opportunity for discussion and exchange ideas. We aim at coming up with recommendations that will be considered a real addition to the field of pharmacy and a strong push toward better service for cancer patients.

I would like to express my appreciation to King Hussein Cancer Center for their cooperation and contribution to this event, their participation will surely enhance the overall experience for everyone involved in this scientific event. I would like to deeply thank our faculty members for participating in the organization of our conference and to my colleagues, the deans of the Arab faculties of pharmacy and the Jordanian faculties of pharmacy for their generously spent time and effort towards this reputable event. Many thanks to all participating Jordanian companies related to drug manufacturing, research, and health care for their generous contributions. Unlimited thanks to the general director of Isra University for his unconditional support to this conference.

Finally, we hope all our guests enjoy their stay in Jordan.

All the best.

Information

Registration Desk:

The registration and information desk will be located on the ground floor of the building of the Faculty of Engineering and will remain open throughout the conference from 8:00 am to 16:00 pm.

Badges:

For security reasons and catering purposes, kindly make sure that you wear your conference badge all the time throughout the conference.

Session Room Location:

All sessions will be held in Isra main hall (Building of the Faculty of Engineering).

Conference Fees Includes:

- Access to conference sessions
- Abstract Book
- Conference Bags
  Coffee break and lunch as scheduled in the conference program.

Students Folder includes:

- Access to the conference sessions
- Conference Badges
- Agenda
- Student Meal Ticket

Poster Sessions:

- Poster presenters should refer to the Registration Information desk to check which board number has been allocated to them.
- Authors may display their posters at the morning of presenting day.
- Poster presenters should kindly be available at the morning to assist in the layout of their posters then in the afternoon during the posters session .
- All posters should be removed by the end of the conference.
- The organizers are not responsible for posters left unattended.

Evaluation Form:

Your comments and views on the content and organization of the conference are highly valued. Hence we encourage you to complete the evaluation form that will be distributed by the end of conference. Please submit the form to the information desk.

About the Association of Jordanian Faculties of Pharmacy

Founded in 2014, the Jordanian Association of Faculties of Pharmacy Association of Jordanian Faculties of Pharmacy (JACP) is a national organization representing pharmacy education in Jordan. The mission of JACP is to help members in proceeding in pharmacy education and research. JACP comprises fourteen faculty of pharmacy that are accredited to offer a bachelor degree in pharmacy and/ or pharmaceutical sciences in Jordan. The secretary general of the JACP is usually the current dean of the Faculty of Pharmacy in the University of Jordan, and the members of the board are the exciting dean of the faculties of pharmacy in Jordan.

JACP has scientific objectives only that include:

- Offer assistance in developing the undergraduate studies and academic plans of faculties.
- Stimulate the development of resources that support the research and the graduate studies of faculties.
- Conducting continuous-learning lectures and workshops and a periodic conferences, and carrying out cyclic meetings for faculties' networking.
- Provides assistance in all pharmaceutical fields, including industrial pharmacy, pharmaceutics, drug quality control and community service.

About the Conference

The Faculty of Pharmacy at Isra University welcomes you all for the second Scientific Conference of the Faculty of Pharmacy at Isra University. This event coincides with the twentieth Congress of the Arab Association of the Faculties of Pharmacy and the fifth International Conference of the Jordanian Faculties of Pharmacy in participation with King Hussein Cancer Center.

The theme of the conference will highlight the pharmacist's role in the growing problem of cancer, given that it remains as the second most common cause of death worldwide.

This conference will provide a comprehensive and stimulating overview of the latest scientific advances and research developments in cancer research from a pharmacist's perspective. This will be attained through a rich program, including keynote and plenary sessions, oral and poster presentation.

All submitted abstracts have been evaluated by an accredited scientific committee. Participants will enjoy access to outstanding invited speakers as well as decision makers and will have the opportunity to develop long-term relationships with field leaders.

IU FACULTY OF PHARMACY
2ND INTERNATIONAL CONFERENCE OF THE FACULTY OF PHARMACY AT ISRA UNIVERSITY

5th INTERNATIONAL CONFERENCE OF THE JORDANIAN FACULTIES OF PHARMACY

20th CONGRESS OF THE ARAB ASSOCIATION OF THE FACULTIES OF PHARMACY

Welcome to Jordan

Welcome to the Hashemite Kingdom of Jordan, founded by King Abdullah I, and currently ruled by King Abdullah II son of the late King Hussein. Over the years, Jordan has grown into a stable, peaceful and modern country.
While Jordan is known for the ancient Nabatean city of Petra, carved from rock over 2000 years ago, it also offers much more for the modern traveler, from the Jordan valley, fertile and ever changing, to the remote desert canyons, immense and still.

The Government:
The Hashemite Kingdom of Jordan is a constitutional monarchy with representative government. The reigning monarch, His Majesty King Abdullah II, is the head of state, the chief executive and the commander-in-chief of the armed forces. The king exercises his executive authority through the prime minister and the Council of Ministers, or cabinet. The Cabinet is responsible before the elected House of Deputies which, along with the House of Notables (Senate), constitutes the legislative branch of the government. The judicial branch is an independent branch of the government. Since 1989, all elements of the Jordanian political spectrum have embarked together on a road to greater democracy, liberalization and consensus building. These reforms, which were guided by the late King Hussein, have placed Jordan on an irreversible road to democratization. The result has been greater empowerment and involvement of everyday citizens in Jordan's civil life, contributing

to increased stability and institutionalization which will benefit the country far into the future.

Population:
9.9 million

Location:
Jordan is located in the heart of the Middle East, Northwest of Saudi Arabia, south of Syria, Southwest of Iraq, and east of Palestine and the Occupied West Bank. Jordan has access to the Red Sea via the port city of Aqaba, located at the northern end of the Gulf of Aqaba.

Area:
Total: 89,213 sq. km (34, 445 sq. miles)

Language:
Arabic is the official language, though English is spoken widely

Climate and Geography :
Jordan has a combination of Mediterranean and arid desert climates, with Mediterranean prevailing in the north and west of the country, while the majority of the country is desert. Generally, the country has warm, dry summers and mild, wet winters, with annual average temperatures ranging from 12 to 25 °C (54 to 77 F) and summertime highs reaching the 40 °C (105-115 F) in the desert regions. Rainfall averages vary from 50 mm (1.97 inches) annually in the desert to as much as 800 mm (31.5 inches) in the northern hills, some of which falls as snow in some years.

Time:
Time is GMT + 2 (in winter, +3 in summer), or 7 hours ahead of US Eastern Standard Time. Summer time is evident from April through September.

Isra University

Isra University was established in 1991 in compliance with the decree 357 of Jordanian Higher Education Council in 1989. Through its progress, the University has obtained general accreditation since 1991 with a capacity of 1320 students; currently, this capacity has mounted to 7000 students.

The University is located on the road of Queen Alia International Airport. Its faculties, constructions, and facilities lie on an area of three square kilometers at Al-Tanib district, South of Amman.

The University awards Bachelor Degree in 25 specializations in addition to Master Degrees in 6 specializations, which are: law, Pharmacy, Management of Engineering Projects, Accounting, Software Engineering, and Kindergarten, affiliated with eight faculties. These specializations are recognized by the Ministry of Higher Education, authorized by the accreditation board of higher education institutions in Jordan, and granted many accreditation and appreciation certificates by national and international institutions. Twenty groups have so far graduated, amounting to more than 20000 students.

The University is a member of Association of Arab Universities, Assembly of Private higher education institutions in Arab countries, Arab Assembly for Training University students, International Association of Universities, and International Association of Training and Development organizations.

Agenda

Under the Patronage of His Excellency

Prof. Mahmoud Al-Sheyyab

Minister of Health

Agenda:

Day 1 (7 November 2017)

Hall: Main Auditorium

Day 2 (8 November 2017)

Hall: Main Auditorium

Day 3 (7 November 2017)

Hall: Main Auditorium

List of poster abstracts

No.	Abstarct Title	Authors
1	Application of Design of Experiment (DoE) Approach For Design And Optimization of Fast Orally Disintegrating Tablets (FODTs) For Geriatric Patients	Ramadan Al-shdefat, Mohamed Fayed and Bahaa .Ali
2	Awareness of Jordanian Population about Possible Risk Factors Associated to Cancer	Hanadi Adel and Rasha Abuthawabeh
3	Combined separation strategy for chiral method development of acidic and non-acidic pharmaceutical compounds in capillary electrochromatography (CEC) separation technique	Dima Albals, Ans Hendrickx, Debby Mangelings and Yvan Vander Heyden
4	Direct Medical Costs of Breast Cancer in the North of Jordan	Alaa Saadeh and Qais Al-Efan
5	Disparities in Access to Healthcare and Knowledge of Cervical Cancer Screening among Women in Jordan: Results from the 2012 Jordan Demographic Health Survey	Rasha Mahmoud Arabyat
6	Increasing food supplements registration in Palestine: Pharmacist knowledge and perception	Abdel Qader Qawasmeh, Beesan Yaghi and Alaa Khraiwesh
7	In Vitro Modulation of Metabolic Syndrome Enzymes and Proliferation of Obesity Related-Colorectal Cancer Cell Line Panel by Salvia Species from Jordan	Violet Kasabri, Fatma U. Afifi, Rana Abu-Dahab, Nizar Mhaidat, Yasser K. Bustanji, Ismail Abaza and Sundus Mashallah
8	Natural Killer (NK) Cells Activities Associated with Breast Cancer in Egyptian Women	Demian SR, Ahmed SA, Abdel- Rhman MA, Mersal BH, Abu-Siyam AA.

9	Patients characteristics associated with virological response in patients with chronic hepatitis C infection receiving peginterferon alfa-2a and ribavirin combination	Suhad Bani Melhim and Mohammad Issa Saleh
10	Phytochemical Investigation, Antimicrobial and Antioxidant Studies on Ephedra alata growing in East of Libya	Salmin Alshalmani
11	Prediction of Drug-Related Problems in Diabetic Outpatients in a Number of Hospitals, Using a Modeling Approach	Ghaith Al-Taani, Sayer Al-Azzam, Karem Alzoubi, Feras Darwish Elhajji, Michael Scott, Hamzah Alfahel and Mamoon Aldeyab
12	The use of Saliva instead of Plasma as a Surrogate in Drug Bioavailability and Bioequivalence Studies in Humans	Nasir M. Idkaidek
13	Traditional medicinal plants used as anticancer in the Hashemite Kingdom of Jordan	Nisrein Jaber and Talal Aburjai

Deans of the Jordanian Association of Faculties of Pharmacy	
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Keynote Speaker

Prof. Naser Alsharif

- Professor, School of Pharmacy and Health Professions, Creighton University, Omaha, NE, USA

Dr. Alsharif received his Ph.D. from Creighton University Medical Center (CUMC) in Toxicology, 1992; M.S. degree in pharmaceutical Sciences from University of Nebraska Medical Center (UNMC), 1988 and Pharm.D. from UNMC, 1987.

- He joined CUMC in 1994. Dr. Alsharif is currently a full Professor of Pharmacy Sciences and coordinator for international programs in the Middle East.
- He served as the Associate Director of the Web-Based Pharmacy Pathway (2001-2006).
- Dr. Alsharif was acknowledged by his students in winning outstanding teacher award and by his colleagues in the school of pharmacy and health professions by winning scholarly, teaching and service awards.
- He is also the recipient of Creighton University John P. Schlegel Diversity Award for Excellence and Innovation (2013) and the Distinguished Educator in Teaching as Scholarship (2014).
- In 2016, he received the inaugural Distinguished Teaching Scholar Award from the American Association of Colleges of Pharmacy (AACP)
- Dr. Alsharif is a certified immunizer and an immunization trainer.
- He has 20 plus years-experience as an on-call pharmacist at five different hospitals in Omaha, Nebraska and has worked extensively in chemotherapy at all the hospitals and an outpatient clinic
- Dr. Alsharif has been a member of the Society of Toxicology and the American Association of Colleges of Pharmacy (AACP) since 1995.

Keynote Speaker

Prof. Naser Alsharif

- Professor, School of Pharmacy and Health Professions, Creighton University, Omaha, NE, USA

continued

- He is a winner of the Innovation in Teaching Award Competition, 2000, 2006 and received an honorable mention for the same Award in 2002 and 2004 from AACP.
- Dr. Alsharif research is in the area of acute and chronic toxicity of polyaromatic hydrocarbons and have published extensively in this area.
- He has also published several manuscripts in the area of scholarship of teaching and learning and presented nationally and internationally on topics ranging from providing clinical relevance to the teaching of medicinal chemistry and other science courses; distance education, instructional methodologies, provider bias and delivering services to a diverse population, provider bias and healthcare disparities and factors that influence health and healing practices for the Muslim Patient.
- Dr. Alsharif has served as a visiting professor, curriculum consultant, strategic planning consultant and an assessor at several universities in the Arab World including Jordan, Egypt, Oman, Palestine, Qatar, UAE.

Keynote Speaker

Prof. Gary Yee

- Professor and Associate Dean for Academic Affairs, College of Pharmacy, University of Nebraska Medical Center, University of Nebraska, Nebraska, USA

Dr. Gary Yee is Professor of Pharmacy Practice and Associate Dean for Academic Affairs at the College of Pharmacy, University of Nebraska Medical Center in Omaha, Nebraska. He completed his B.S. in Pharmacy at the University of Washington, his Pharm.D. at the Philadelphia College of Pharmacy and Science, and post-doctoral training at St. Jude Children's Research Hospital. He is a fellow of the American College of Clinical Pharmacy and a board-certified oncology pharmacist. Before accepting his current position, he held positions at the Fred Hutchinson Cancer Research Center and the University of Florida. He also completed a sabbatical at the Leonard Davis Institute of Health Economics at the University of Pennsylvania. Dr. Yee has been involved in oncology practice, education, and research for more than 30 years. He first became interested in oncology while working in a research laboratory at the University of Washington. Dr. Yee has published more than 90 publications in peer-reviewed journals and his research findings have been published in several prominent journals, including the *New England Journal of Medicine* and the *Lancet*. Dr. Yee is also one of the editors of Pharmacotherapy: A Pathophysiologic Approach, a textbook used in most schools of pharmacy. His research has been supported by numerous sources, including the National Institutes of Health. He has served as a member of guideline panels of several professional oncology groups, including the American Society of Clinical Oncology and National Comprehensive Cancer Network. Dr. Yee has served as an elected officer in numerous professional organizations and is a Past President of the American College of Clinical Pharmacy.

Keynote Speaker

Prof. Charlie Laughton

- Professor of Computational Pharmaceutical Science, Faculty of Science, The University of Nottingham, Nottingham, UK.

Charlie Laughton is Professor of Computational Pharmaceutical Science in the School of Pharmacy, University of Nottingham, UK. His research is concerned with the development and application of computational modelling methods for drug and medicines design. After completing his DPhil at the University of Oxford in synthetic organic chemistry, Charlie spent three years with the Experimental Cancer Chemotherapy research group at Aston University, Birmingham, before moving to the Institute of Cancer Research in London where he moved from 'wet' chemistry research to computational modelling. During seven years at the ICR he was part of the team that developed Abiraterone, now is use world-wide for the treatment of prostate cancer. He took up a lectureship position at the University of Nottingham in 1996, was promoted to Reader and Associate Professor in 2001, and to full Professor at the beginning of this year.

Keynote Speaker

Dr. Tracey Bradshaw

- Assistant Professor, Faculty of Science, The University of Nottingham, Nottingham, UK

After graduation from Birmingham University in 1986, Tracey Bradshaw worked as a research scientist in The Dept. Oncology at Charing Cross Hospital consolidating her interest in Cancer Research. Her PhD research, under the supervision of Professor Andreas Gescher, within the Experimental Cancer Chemotherapy Group at Aston University,investigated the antitumour activity of Bryostatins and investigated the mechanistic role of protein kinase C. In 1993, Dr.Tracey Bradshawjoined the Cancer Research Laboratories, University of Nottingham, under the direction of Professor Malcolm Stevens.Now an assistant professor within the School of Pharmacy, her specific research interests lie in the discovery and development ofnovel anticancer therapeutics embracing NCEs, natural products, nano-medicines and gelators. Research activities within the field ofcancer pharmacology include determination of anticancer activity and elucidation of molecular targets and mechanisms of action of novel preclinical antitumouragents. Such research led to clinical evaluation of Phortress and ~100 publications. She is a member of the Children`s brain tumour research group, the DrugDiscovery Group of the EORTC and EACR.

Keynote Speaker

Dr. Imad Treish

- Chief Operating Officer at King Hussein Cancer Center, Amman, Jordan.

Keynote Speaker

Dr. Omar Shamieh

- Consultant, Palliative Care Medicine and Charman, Department of Palliative Care at King Hussein Cancer Center, Amman, Jordan

Dr. Omar Shamieh, MD MBA is the Chairman of the Department of Palliative Medicine and the Director of psychosocial Program at King Hussein Cancer Center; he holds three American boards in Hospice & Palliative Medicine, Geriatric Medicine and Internal Medicine in addition to the Jordanian Board Internal Medicineand the first Jordanian Boards of Palliative Medicine. He obtained a Master degree in Business Administration (MBA) – with a major in Health ServicesManagement from Keller Graduate School of Management at DeVry University in the United States. Dr Shamieh also serves as the Chairman, of the National Palliative Care Committee at the Ministry of Health in Jordan, the Director of the National Home Care Initiative and the National Home Care Project partially funded by USAID and KHCC grant. Dr Shamieh is an established physician, researcher and educator. He has been active in palliative care education for undergraduate and postgraduate health care professionals. He established the first post graduate palliative medicine fellowship program at KHCC and the first palliative & home care diploma at KHCC jointly with the JUand he published a several peer reviewed articles in palliative care and he is the Principal investigator for several national and international research projects

Abstracts of Keynote Lectures

Best practices in Chemotherapy/Hazardous Drugs Precautions, Preparation and Patient Orders

Naser Alsharif

Creighton University, USA

This presentation will define hazardous drugs, identify healthcare areas where hazardous drugs are encountered, Identify personal who may be exposed to hazardous drugs, discuss the different types of exposure, identify activities that may result in exposure, discuss guidelines for handling hazardous drugs and patient ordering. Implications for Jordan will be addressed.

Are New Cancer Drugs Worth the Cost?

Gary C. Yee

University of Nebraska, USA

Advances in cancer treatment have been driven largely by the approval of new cancer therapies, including molecularly targeted drugs and novel immunotherapies. The high cost of these new therapies has raised concerns about the economic burden to governments, private payers (employers), and patients. The term “financial toxicity” was created to describe the economic burden to patients and their families. This presentation will discuss the economic burden of new cancer therapies and some of the health policy approaches used to evaluate the value of these expensive therapies.

Targeting the Telomere for Cancer Chemotherapy

Charlie Laughton

University of Nottingham, UK

Limitless replicative potential is one of the “Hallmarks” of cancer. The Nobel Prize-winning work of Blackburn, Greider and Szostack, supported by many others, has revealed the critical role played by telomeres – the specialised DNA-protein complexes found at the tips of eukaryotic chromosomes – in giving cancer cells this ability. I will review the current state of knowledge regarding telomere structure and function, and the methods which have been used to attempt to interfere with the process of telomere maintenance, and so make cancer cells mortal again. As part of this, I will describe work from our own laboratory, investigating the potential for selective inhibitors of key protein-protein, and protein-DNA, interactions in the telomere complex as novel anticancer agents.

Discovery and Development of Antitumour Benzothiazoles

Tracey Bradshaw

University of Nottingham, UK

Antitumour 2-phenyl-5-fluorobenzothiazoles (e.g. 5F 203, GW 610) elicit potent and selective antitumour activity *via* mechanisms of action that are distinct from those of clinically-approved chemotherapeutic agents. Potent arylhydrocarbon receptor (AhR) lgnads, these agents induce expression of cytochrome P450 (CYP) 1A1. 5F 203 and GW 610 are substrates for CYPs 1A1- and 2W1-catalysed bioactivation, producing electrophilic species that lethally damage DNA – exclusively in sensitive tumour phenotypes.

Putative biomarkers of activity and tumour response, revealed by mechanistic elucidation, will be discussed.

Attempts to develop benzothiazole formulations amenable to clinical applications, including apoferritin-encapsulation andpreparation of self-assembling 5F 203 prodrug gelators, will be described.

Abstracts of Oral Presentations

Pharmacogenomics in oncology: the new frontier of personalized cancer medicine

Dalal Hammoudi

Lebanese International University, Beirut, Lebanon

Pharmacogenomics, the study of the impact of genetic variations on drug response, has become an integral part of drug development as an innovative approach to predict safety and efficacy, individualize dose, and exclude undesirable therapy.In oncology, pharmacogenomics utilizes genomic information of the patient's tumor, as well as the inherited genetic profile to predict response to anticancer agents. Among other drugs, anticancer agents are appealing to study in terms of pharmcogenomics, due to the narrow therapeutic indices, vast number of therapeutic options available, high rate of acquisition of resistance to chemotherapy,as well as the need to study both tumor and normal genomes to improve outcomes and reduce toxicity. As the pipelines of developing anticancer agents have been really active, equal has been the implementation of pharmacogenomics in cancer therapy, with the US FDA updating the package inserts of more than 30 anticancer agents to include pharmacogenomic information and testing. Such testing offers personalized, genomic-guided therapy selection rather than trial and error, to provide therapy in a dose that is most active and with least possible adverse effects. In the last couple of years, pharmacogenomics have revolutionized treatments for subsets of lung, colorectal, and breast cancer, as well as certain categories of melanoma and leukemia.

The objectives of this presentation are to:

1. Highlight genomics as a promising frontier for cancer treatment, andbriefly describe heritability and mutation occurring in cancers
2. Define principles of pharmacogenomic testing for possible diagnosis as well as therapy selection in cancer
3. Elaborate examples on pharmacogenomics-driven anticancer drugs and their proper use
4. Overview the role of the pharmacist in cancer pharmacogenomics.

Pharmacogenomics: A New Frontier for Precision (Personalized) Medicine.

Abdelghani Tbakhi

King Hussein Cancer Center, Amman, Jordan

Genetic variations among individuals plays a pivotal role in response of patients to drug treatments, affecting the choice of therapy, dose, timing, safety and efficacy. Pharmacogenomics is a field of medicine and science that originated in the late 1950s, when the term Pharmacogenetics was coined. Pharmacogenomics is defined as the study of variability in pharmacokinetics and pharmacodynamics in relation to inherited and acquired genetic variations. While Pharmacogeneticsattends to individual candidates genes, the focus of Pharmacogenomics encompass genome wide associations. To date, there are currently more than 140 Food and Drug Administration (FDA) drug labels that refer to pharmacogenomics biomarkers of drug safety and efficacy. These labels either mandate pharmacogenomics testing, recommend it or only provide information. The applications of pharmacogenomics testing cover a wide range of health disciplines including –but not limited to- cardiovascular disease, diabetes, autoimmune disorders, infectious disease, mental health disorders and cancer.

Precision medicine, on the other hand, is "an emerging approach for disease treatment and prevention that takes into account individual variability in genes, environment, and lifestyle for each person."

The field of Cancer Pharmacogenomics and Precision medicine is further complicated by virtue of two genomes are involved: the germline genome of the patient, that influences drug exposure and toxicity; and the tumor (somatic) genome that predominantly decrees the effectiveness of therapy. Few examples of Cancer Pharmacogenomics biomarkers are Her2, BRCA, EGFR, Alk, KRAS, ABL, C-Kit, TPMT and UGT1A1.

Pharmacogenomics comes with its own challenges and barriers: the full integration into clinical practice, cost, guidelines and acceptance by stakeholders are few examples.

Genetic characterization of BRCA1/BRCA2 mutations among unselected women with breast cancer in Jordan

Luay Abu-Qatouseh, Mona Bustami MohannadYacoub, Eiad Atwa, Israr Sabri, Abdel-ElahShudaifat, Tawfiq Arafat and Adnan Badran

University of Petra ,Amman, Jordan

Breast cancer is the most commonly diagnosed cancer after nonmelanoma skin cancer among women, and it is the second leading cause of cancer deaths after lung cancer. It has been estimated that the incidence of breast cancer in 2015, would reach 234,190 new diagnosed cases with approximately 40,730 deaths. In Jordan, there are few reports on the distribution of the founder mutations and the data are very limited.In the current study, using a robust and sensitive in vitro DNA sequencing protocols are implemented for the characterization of the novel mutations discovered in Jordan, the five most pathogenic mutations in the BRCA will be studied. Archived Blood specimens from patients referred to prince Hamzah Hospital were collected for the first phase of genotyping analysis will be used in this study.

A total of 220 women, with age ranged between 25-55 years,diagnosed with breast cancer were enrolled in this study. BRCA1-187delAG, BRCA1-5385insC and BRCA2-6174del were not found in any of the tested samples. However, new novel SNPs were found in the majority of the tested samples. Most of the mutations were of deletions in BRCA1 gene.

conclusion: the genetic background of patients with breast cancer in Jordan showed the occurence of new uncharacterized mutations. This might play a role in the clinical consequences and the prognosis of this type of malignancies.

Keywords: breast cancer, BRCA1/BRCA2, NGS

7-O-Methylpunctatin Suppresses Migration, Invasion, and Adhesion of Human Breast Cancer Cells through MAPK, Akt, and NF-κB Pathways

Feras Alali [(a)], Alaaeldin Saleh[(a)], Tamam El-Elimat[(b)] and Ali Eid[(C)]

[(a)] Qatar University, Doha, Qatar
[(b)] Jordan University of Science and Technology, Irbid, Jordan
[(c)] American University of Beirut, Beirut, Lebanon

7-*O*-Methylpunctatin, a recently in-house discovered homoisoflavonoid from the bulbs of *Bellevaliaeigii*Feinbrun (Asparagaceae), was studied for their effects on the proliferation, migration, invasion, metastasis, and tumor growth of triple negative MDA-MB-231 breast cancer cells. 7-*O*-methylpunctatin at 20 μM was found to inhibit proliferation, migration, and adhesion of breast cancer cells and to attenuate invasion. 7-*O*-methylpunctatin inhibitory action against migration and invasion could be attributed to induction of cell aggregation, upregulation of occludin, and downregulation of uPA. However, cell adhesion was inhibited via NF-kB downregulation. Additionally, cellular senescence, autophagy, cell cycle arrest, and reactive oxygen species were induced by 7-*O*-methylpunctatin treatment indicating that 7-*O*-methylpunctatin exerts its anti-proliferative activity by G0/G1 cell cycle arrest, and caspase pathway activation. MAPK, PI3K/Akt pathways were suppressed upon treating MDA-MB-231 cells, indicating their role in 7-*O*-methylpunctatin inhibition of migration and invasion. The results obtained in the current study identified 7-*O*-methylpunctatin as a potential novel therapeutic treatment of breast cancer metastasis that warrants further studies and development.

Clinical application of mass spectrometry in oncology; diagnostic and prognostic significance of Proteomics

Hamza Abumansour, Patricia Cooper, Steve Shnyder, Chris Sutton and Laurence Patterson

Zarqa University, Zarqa, Jordan

The heterogeneity of breast cancer (disease stage and phenotype) makes it challenging to differentiate between each subtype; luminal A, luminal B, HER2, basal-like and claudin-low, based on a single gene or protein. Therefore, a collection of markers is required that can serve as a signature for diagnosing different types of breast cancer.

Pharmacoproteomics is beginning to take a central role in studying changes in protein expression corresponding to drug administration, the results of which, inform about mode of action, toxicity and resistance in pre-clinical and clinical stages of drug development. Therefore,we have conducted highly validated comparative proteomics studies on matched normal and tumor tissues from patients with different stages of the disease, as well as, on untreated and treatedmice liver tissue with major anti-cancer drugs (5-flourouracil, paclitaxel, cisplatin and doxorubicin).

Ideally, proteomics workflow starts by extracting proteins from the target samples (Breast and Liver). The extracts were digested with Trypsin digestions, and the resulting peptides were labeled with iTRAQ reagents to enable quantitative comparison of protein expression levels. The labelled peptides were subjected for separation in two-dimensions by iso-electric focusing (IEF) and RP-HPLC techniques before analysis by mass spectrometry and database searching for protein identification. Various validation approaches such as, Western blotting, Multiple reaction monitoring mass spectrometry (MRM-MS) were involved for biomarkers validation.

More than 3000 proteins were identified and quantified from each sample. Those proteins with significant up- or down-regulation were included for further investigations to evaluate their impact on cancer progress and on the effectiveness and potential toxicity of anti-cancer drugs.

Overall, the results provide a strong paradigm to develop a clinical assay for the early detection of breast cancer and supplementary to established toxicology of chemotherapy.

Immunotherapy versus Targeted Therapy

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The terms immunotherapies and targeted therapies represent two of the most researched types of therapy under investigation for the treatment cancer. But what are the similarities and differences between both?

Both modalities can essentially be considered “targeted” therapies. In targeted therapy, the cancer cells are directlytargeted through trying to block actionable mutations in the cancer cells. In immunotherapy, however, cancer is indirectly targeted, as immunotherapy tries to effectively boost the body's own immune system to eliminate the cancer.

In targeted therapy, tyrosine kinase inhibitors (TKIs) that target specific mutations in one or more oncogenic driversare the most common example. Many of the targeted therapies are approved along with a specific molecular test or companion diagnostic kit, making the precision molecular diagnostics a mandatory prerequisite for the cost-effective use of targeted treatment.Amongst the most used are HER2 in breast cancer (trastuzumab), KRAS/NRAS in colorectal cancer (cetuximab and panitumumab), EGFR and ALK in non-small cell lung cancer(NSCLC) (gefitinib/erlotinib and crizotinib), BRAF in melanoma (vemurafenib) and chronic myelogenousleukaemia (imatinib). Although targeted therapy offers a robust response rates in patients with a driver mutation, resistance is often inevitable like in NSCLC, which leaves limited options for patients with acquired resistance. Thus far it has not resulted in cure for patients with NSCLC.

Immunotherpy on the other hand can help fight cancer either by monocloncal antibodies that target a checkpoint molecule (a checkpoint inhibitor) like nivolumab and pembrolizumab, which is approved with its companion test for the PD-L1, or by re-engineering the patient’s own T-cells in-vitro to specifically target the cancer cells. The two important features of immunotherapy; the immunological memory and selective cancer targeting, account for the durable responses seen in a subset of patients, which is hoped to result in prolonged survivals and even cure.

Immunotherapy Related Toxicities and their Management: What the Oncology Pharmacist Needs to Know ..

Rana Jaber

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Immunotherapy is increasingly identified as the best option for a growing number of cancers, many of which were previously intractable. Therapeutic antibodies that block the programmed cell death protein-1 (PD-1) and cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) immune checkpoint pathways prevent T-cell downregulation and promote immune responses against a number of cancer types .

The greatest success so far has been with these immune checkpoint inhibitors and the U.S. Food and Drug Administration (FDA) has approved many indications for these agents over the last five years , therefore, an increasing number of patients will be exposed to these drugs with a chance of developing toxicities from these treatments.

Depending on the immune checkpoint that is targeted, the incidence of toxicity varies.

The side effects of immunotherapy are generally mild and infrequent, but when they do occur, they can be serious and even life threatening if not identified and treated in a timely manner. The most frequently occurring side effects affect skin, colon, endocrine organs, liver and lungs. Others are very infrequent, but may be very serious, even lethal, such as neurological disorders and myocarditis.

Clinical oncology pharmacists play a vital role inmonitoring patients' responses to immunotherapies , early detection of signs and symptoms of adverse events associated with cancer immunotherapeutic agents, and the initiation of appropriate early interventions to avoid the consequences of toxicities and noncompliance for their patients.

Differential growth and responsiveness to cancer therapy of tumor cells in different environments

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Tumor metastasis often confers poor prognosis for cancer patients due to lack of comprehensive strategy in dealing with cells growing in different environment. Current anticancer therapies have incomplete effectiveness because they were designed assuming metastatic tumors behave similarly in different organs. We hypothesize that tumors growing in different sites are biologically heterogeneous in growth potential, as well as in tumor response to anti-cancer therapies. To test this hypothesis, we have developed a multi-organ tumor growth model using the hydrodynamic cell delivery method to establish simultaneous and quantifiable tumor growth in the liver, lungs and kidneys of mice. We demonstrated that growth rate of melanoma tumor in the liver is higher than that of the lungs and kidneys. Tumors in the lungs and kidneys grew minimally at the early stage and aggressively thereafter. Tumors in different organs were also heterogeneous in response to chemotherapy and immune gene therapy using dacarbazine and interferon beta gene, respectively. Lung tumors responded to chemotherapy better than tumors in the liver, but showed minimal response to interferon beta gene therapy, compared to tumors in the liver and kidneys. We also confirmed differential tumor growth of the metastatic colon cancer in mice. Our results point out the importance of a better understanding of the differences in tumor growing in diverse environments. The biological heterogeneity of metastatic tumors demonstrated in this study necessitates establishing new drug screening strategies that take into account the environmental difference at the sites of tumor growth.

Keywords: Tumor Microenvironment, Melanoma, Colon Carcinoma, Metastasis, Hydrodynamic delivery, gene therapy, chemotherapy, immunotherapy.

Immunophenotypic Comparison between Reactive Bone Marrow B-Lymphocyte Precursor (Hematogones) and B-Neoplastic Lymphoblast Leukaemia Using CD 34, CD 123 by Flowcytometry

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Background: Flow cytometric study found that lymphoblasts of B acute lymphoblastic leukemia exhibited multiple aberrant antigens by which they can be distinguished from hematogones. These antigens are CD34 and CD123. Objective: To determine the immunophenotypic pattern of CD34 and CD123 expression in hematogone of reactive bone marrow and in neoplastic lymphoblast in B-acute lymphoblastic leukemia (ALL) patients and to evaluate the impact of that pattern in the residual disease detection after chemotherapy.
Methods: This is a case control study to determine the expression of CD34 and CD123 in 30 patients newly diagnosed with B-ALL. Re-assessment was done for 20 patients of them after 4-6 weeks of chemotherapy; in addition to 10 patients with reactive bone marrow to assess hematogones. Results: In (93.4%) of the newly diagnosed B-ALL cases, leukemic blasts expressed both CD34 and CD123, Conversely, in (6.6%) cases, neither antigen was expressed. In hematogones; the immature hematogones (dim CD45, CD34 +) did not express CD123 while the mature hematogones (moderate CD45+, CD34-) expressed CD123. The strategy of concordant and discordant patterns of CD34/CD123 expression on B-ALL blasts and hematogones respectively in post chemotherapy patients remain stable.
Conclusion: The distinct pattern of CD34 and CD123 expression on hematogones (discordant) and B-ALL blasts (concordant) is useful in correctly classifying immature B cells as residual leukemic blasts or hematogones in the bone marrow of patients treated for B-ALL.
Keywords: B-Acute Lymphoblastic leukemia, Flow cytometry, Immunophenotypic aberrancy, Hematogones, CD34 and CD123.

Adherence to 6-Mercaptopurine in children and adolescents with Acute Lymphoblastic Leukemia

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Objective: Studies on children with Acute Lymphoblastic Leukemia (ALL) reported non-adherence in 2-54% of cases. The primary objective of this study was to assess rates of adherence to 6-MP using two different methods in children and adolescents with ALL. Secondary aim was to identify factors that influence adherence to 6-MP in children with ALL.
Methods: All eligible children with ALL who are (≤ 19) years old and receive 6-MP therapy for at least 1 month were approached to participate in the study. A total of 52 children with ALL and their primary caregivers were recruited. Adherence measures included an objective method (measuring 6-MP metabolites in packed Red Blood Cells (RBCs)) and a subjective method (using parent and child self-report via the Medication Adherence Report Scale; MARS; Adherence was defined as 90% or greater).
Results: Rates of adherence varied across the measurement methods. Packed RBCs sample analysis indicated forty-four patients (84.6%) to be adherent. Using the MARS questionnaires, a total of 49 children (94.2%) were classified as being adherent according to the parental MARS questionnaire scores, while all the 15 children (100%) who answered the MARS (child) questionnaire were classified as adherent. Overall adherence rate was 80.8% within the studied population.
Conclusion: MARS scale was shown to overestimate adherence compared to measurement of 6-MP metabolites in the blood. A combination of both methods led to increased detection of non-adherence to thiopurine in children with ALL.
Keywords: Acute Lymphoblastic Leukemia, adherence, Medication Adherence Report Scale, Children.

Advancing Pharmacy Practice through Research

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Research within health-care settings is essential to enhance our understanding about disease management and outcomes as well as drug therapy. Clinical research facilitates evidence-based practice and improves the quality of care we provide to our patients. The Pharmacy Department at King Hussein Cancer Centerhas conducted numerous research projects that helped provide answers on how to advance the quality of care that we and others provide to cancer patients in several settings. The goal of this presentation is to demonstrate the importance of clinical research through examples of research projects that helped improve the quality of care and the safe use of medications in patients with cancer.

Clinical pharmacy services in oncology-King Hussein cancer Center (KHCC) experience.

Sewar Al Salmany

King Hussein Cancer Center, Amman, Jordan

Clinical pharmacy services at KHCC started in 2005, at that time we had only 2 clinical pharmacists who were covering the medical oncology and hospice and palliative care services. After that we expanded to cover all the inpatient services and the majority of the outpatient services. The model that we use at KHCC is the one month rotation between clinical service and clinical operation. Our clinical pharmacists are essential part of the multidisciplinary teams and are involved directly in patients care by attending daily rounds, reviewing medical profiles, developing pharmaceutical care plans, providing a thorough understanding of chemotherapy and other medications, toxicities, drug-drug interactions, monitoring and pharmacoeconomics to the multidisciplinary teams, conducting medication reconciliation, bedside patient education at discharge and for patients starting new chemotherapy, adverse drug reactions evaluation and reporting and documentation of clinical interventions in patient's charts. Among other activities that our clinical pharmacistsresponsible for are research and publications, wide range of educational activities for other health care providers, being members of the hospital committees, participating in the development and updating of the clinical practice guidelines and developing chemotherapy preprinted protocols.The clinical pharmacists at KHCC are seeking their continuous professional development by obtaining the board certification in different specialties, currently we have 2 board certified oncology pharmacy (BCOP) specialists and 5 board certified pharmacotherapy (BCPS) specialists. Finally, we are still providing training for our pharmacists to expand our services to cover the entire outpatient setting, as well as the oncology multidisciplinary clinics.

Pharmacy internship program at KHCC

Rasha Abu Blan

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Pre-graduate pharmacy training in Jordan faces the same challenges experienced worldwide in providing comprehensive, hands-on patient-centered training. Recognizing the need, King Hussein Cancer Center developed a 2-year internship program for pharmacy students in Jordanian universities. This presentation will describe the program development over 10 years, which went from a pilot phase with 3 interns and a simple training structure, to a maximum capacity of 12 interns in a 2-year plan

The program'sgoal was to develop the professional, clinical and technical skills of pharmacy pre-graduates, utilizing the principles they gain through academic knowledge and investing in their passion for the profession, with a major focus on patient centered care, .The program included training in operational and clinical settings during the academic year and school holidays.

Hospital Pharmacy: KHCC Experience

Nour Awad

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The department of pharmacy at King Hussein Cancer Center (KHCC) was established with a mission of providing comprehensive and cost-effective pharmaceutical care to patients and to serve as a model for true pharmaceutical care in Jordan. This presentation shows how the pharmacists' role evolved over years and how the practice was transformed from the mere provision and dispensing of medications to a collaborativerole with other health care providers to deliver comprehensive medication management that optimizes patient outcomes. Many challenges have been faced along the way while new services were provided. Among others, pharmacy has taken on the responsibility of preparing sterile ready to administer IV and chemotherapeutic medications. Clinical pharmacy services are provided to cover all inpatients in addition to some outpatient clinics. Also playing an important role in the current pharmacy department are the sections for quality management, procurement, research and the center for drug, technology and policy assessment.

The Role of CAM in theTreatment of Cancer

Talal Aburjai

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Complementary and alternative medicine (CAM) has recently attracted international attention all over the world because of its widespread use and associated cost. CAM covers a broad spectrum of healing philosophies and approaches. Despite its widespread use, little is known about its safety, efficacy, cost effectiveness, and mechanism of action.

The role of CAM in the management of cancer is becoming more apparent with its rise in use among patients who are suffering from cancer. This trend is patient-driven and reflects the change in values perceived by patients toward conventional medical treatment. In this lecture, several complementary therapies that can be used for prevention and treatment of cancer will be discussed. These therapies were selected because they are supported by scientific evidence. The popularity of CAM continues to grow and CAM is here to stay. Health care professionals can no longer afford to ignore or to treat CAM as an entity outside of conventional science. To acknowledge and to monitor its use among our patients may in the future help evaluate the safety and efficacy of CAM. Our current challenge is to move the field of CAM forward scientifically and systematically with wisdom and reasoning.

Pim-1 kinase as anti cancer target

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Targeting Proviral integration-site of murine Moloney leukemia virus 1 kinase, hereafter called Pim-1 kinase, is a promising strategy for treating different kinds of human cancer. Headed for this a total list of 328 formerly reported Pim-1 kinase inhibitors has been explored and divided based on the pharmacophoric features of the most active molecules into 10 subsets projected to represent potential active binding manners accessible to ligands within the binding pocket of Pim-1 kinase. Discovery Studio 4.1 (DS 4.1) was employed to detect potential pharmacophoric active binding manners anticipated by Pim-1 Kinase inhibitors. The pharmacophoric models were then allowed to compete within Quantitative Structure Activity Relationship (QSAR) framework with other 2D descriptors. Accordingly Genetic algorithm and multiple linear regression investigation were engaged to find the finest QSAR equation that has the best predictive power r262(2) = 0.70, F = 119.14, rLOO(2) = 0.693, rPRESS(2) against 66 external test inhibitors = 0.71 q(2) = 0.55. Three different pharmacophores appeared in the successful QSAR equation this represents three different binding modes for inhibitors within the Pim-1 kinase binding pocket. Pharmacophoric models were later used to screen compounds within the National Cancer Institute database. Several low micromolar Pim-1 Kinase inhibitors were captured. The most potent hits show IC50 values of 0.77 and 1.03 ÂµM. Also, upon analyzing the successful QSAR Equation we found that some polycyclic aromatic electron-rich structures namely 6-Chloro-2-methoxy-acridine can be considered as putative hits for Pim-1 kinase inhibition.

Keywords: Discovery studio; Ligand base; Pharmacophore modelling; Pim 1 kinase; QSAR.

Natures nanoparticles – Using viruses as anticancer drug carriers

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In recent years there has been increasing interest in the exploitation of naturally occurring nanoparticles for drug delivery. Virus nanoparticles (VNPs) are the self-assembled highly organized architect of multiple copies of virus capsid proteins. These virus-based nanotemplates are bearing the characteristics of ideal nano-carriers for medical imaging and drug delivery: their monodispersity, polyvalency, and biodegradability make them ideal targeted drug delivery platforms. These VNPs are also amenable to site-selective functionalization by genetic or chemical modification to impart new novel functionalities. VNPs have been used as carriers for bioactive molecules including DNA, proteins, and anticancer drugs. The efficiency, particles distribution and controlled release of anticancer hold great potential in developing VNPs as drug carriers. VNPs can be selectively modified to target their cargo to specific cancer or diseased cells with high precision and accuracy.

Keywords: Viral nanoparticles; Targeted drug delivery; Nanomedicine

Search For New Platelet-Derived Growth Factor Beta Receptor Inhibitors For Potential Anti-Angiogenesis Therapy Via Computer Aided Molecular Modeling Followed By Bioasay

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Angiogenesis is the formation of new blood vessels from existing vasculature. It is a multistep process balanced by positive and negative endogenous regulators occurs in both normal and pathological conditions, such as solid tumors, age-related macular degeneration, and diabetic complication. Platelet derived growth factor beta receptor (PDGFR- β) plays an important role in angiogenesis. PDGFR- β expression is correlated with increased vascularity and maturation of blood vessels. Accordingly, in this study we combined pharmacophore modeling and quantitative structure-activity relationship (QSAR) analysis to explore the structural requirements for PDGFR- β inhibitors, employing 107 known PDGFR- β ligands. Genetic function algorithm (GFA) coupled to k nearest neighbor (kNN) and multiple linear regression (MLR) analysis was employed to generate predictive QSAR models based on optimal combinations of pharmacophores and physicochemical descriptors. The successful pharmacophores were complemented with exclusion spheres to optimize their receiver operating characteristic curve (ROC) profiles. The QSAR models and their associated pharmacophore hypotheses were validated by identification and experimental evaluation of new promising PDGFR- β inhibitory leads retrieved from the National Cancer Institute (NCI) structural database. Two potent hits were captured 5 and 24 with IC50 of 1.07 and 2.63 μM on rat aortic rings assay and of 3.6 and 2.2 μM against PANC-1 cell line, respectively.

Keywords: Angiogenesis, PDGFR- β, pharmacophore, QSAR, virtual screening, PANC-1, rat aortic rings assay, ROC

Metformin: Determinants of its Beneficial Role in ER-positive Breast Carcinoma Growth Inhibition

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Metformin (1,1-dimethylbiguanide hydrochloride) is currently the most widely used drug in the treatment of type-2 diabetes. Recently, In vitro studies demonstrate that Metformin exhibits steady and persistent anti-proliferative activities against wide range of cancerous cell lines derived from breast, colon, ovaries, pancreas, lung and prostate. In preclinical studies, compared to other anti-diabetic drugs (sulfonylurea, insulin), Metformin has been shown to reduce cancer risk, enhance survival, and increase the effectiveness of chemotherapy. In a recent retrospective analysis that investigated the effects of Metformin on potentiation of chemotherapy in breast cancer patients, it was revealed that diabetic women, with breast cancer, receiving Metformin and neoadjuvant chemotherapy experienced a more significant increase in the pathologic complete response rate relative to patients receiving neoadjuvant chemotherapy solely. Additionally, emerging evidence propose that Metformin may have additive effects to several anti-tumor agents, particularly endocrine drugs, through its inhibition of mTOR signaling and activation of the AMPK pathway. With this retrospective data, the current challenge is to elucidate the cellular mechanisms of Metformin action to better understand the molecular determinants of its anti-proliferative activity. The goal of this study is to assess the direct anticancer effects of Metformin on breast cancer cells expressing the estrogen receptor, ER-positive cells, under pharmacological concentration in the presence of different levels of cell growth factors, such as glucose and metals. In addition, synergism between Metformin and Raloxifene, a selective estrogen receptor modulator (SERM), will be investigated.
Keywords: Metformin- Biguinides-Anticancer- breast cancer- metastasis.

Antiproliferative Effects of Paronychia Argentea Lam. and Tamarix Aphylla (L.) H.Karst. Grown In Jordan and Evaluation of Their Volatile Oils Composition

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Backgrounds and aims: Medicinal plants can predominantly be a valuable source for safe anticancer phytopharmaceuticals. Paronychia argentea Lam. and Tamarix aphylla (L.) H.Karst., grown wild in Jordan, are used traditionally for many ailments. This study aimed to screen the in-vitro cytotoxic potentials of P. argentea and T. aphylla and to figure out their essential oils chemical composition.
Methods: Essential oils obtained by hydro-distillation from dried flowering tops of P. argentea and aerial parts of T. aphylla were analyzed by GC-MS. Biologically, in-vitro cytotoxicity potentials of the aqueous (AE) and ethanol (EE) extracts of both plants were screened against (MCF-7), (Caco-2) and (Panc-1) cell lines using MTT assay.
Results: Forty one components were identified in P. argentea EO and found to be rich in sesquiterpenes (60.96%). On the other hand, 33 compounds identified from T. aphylla oil with predominant non-aromatic hydrocarbons (53.06%), with 6,10,14-trimethyl-2-pentadecanone, as the principal compound in both oils.
Most extracts exerted appreciable dose dependent antiproliferative activity in the panel of cancer cell lines. No antiproliferative potential against Caco-2 or Panc-1 cancer cell were detected at concentrations less than 30 µg/mL. Exceptionally T. aphylla AE and EE showed potent cytotoxic effects against MCF-7 cells, with IC50 values (2.17±0.10 and 26.65±3.09; µg/mL) respectively. T. aphylla AE demonstrated a comparable cytotoxic activity to cisplatin's (IC50 value of 1.17±0.13 µg/mL), with selectively less cytotoxic effects against normal fibroblast.
Conclusion: 6,10,14-trimethyl-2-pentadecanone was found to be the predominant principle in EO of both of P. argentea and T. aphylla. Being potent cytotoxic against MCF-7 cells, T. aphylla extracts could be a valuable source for cytotoxic agents against cancer cells with high safety and selective cytotoxicity profile.
Keywords: Paronychia argentea; Tamarix aphylla; Jordan; Volatile oils composition; Antiproliferative activity

Evaluation of Volatile Oil Composition and antiproliferative Effects of Majorana syriaca (L. Rafi) and Ecballium elaterium (L.)

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Aims: This study aimed to analyze the chemical composition of essential oils of dried aerial parts of *Ecballium elaterium* L. and five different specimens of *Majorana syriaca* (L. Rafi) grown in Jordan. *Their in vitro* antiproliferative activity against MCF-7, Caco-2 and Panc-1 cancer cell lines was examined.
Methods: GC-FID and GC-MS analysis of the essential oil obtained by hydro-distillation using Clevenger apparatus as well as *in vitro* antiproliferative investigations using MTT assay were undertaken.
Results: *E. elaterium* hydrodistilled oil yielded thirty one components, accounting for 76.3% of the total oil content. High contents of nonterpenoidal compounds, sesquiterpenes, and monoterpene, characterized the volatile fractions with hinesol (17.2%), benzaldehyde (12.3%) and E-Î²-ionone (7.8%) among the major constituents. Thirty three components were detected in the oil hydrodistilled oils from the tested specimens of *M. syriaca* amounting for an average of 94.0% of oil content. Oxygenated monoterpenes predominated the volatile fractions. Carvacrol (0.6-88.2%) and/or thymol (0.9-70.3%), *p*-cymene (2.1-14.5%) and Î³-terpinene (2.6-15.4%) were among major constituents. *M. syriaca* essential oils exhibited substantial *in vitro* antiproliferative activity against all tested cancer cell lines. *E. elaterium* ethanol extract showed appreciable activity against MCF-7 and Caco-2 cells (IC_{50} values=29. 7 Î¼g/mL and 17.6 Î¼g/mL, respectively). *M. syriaca* ethanol extract exerted marked activity only against MCF-7 (IC_{50} value=6.96 Î¼g/mL); none of them showed activity against Panc-1 cells. Moreover, all extracts were safe on normal fibroblasts.
Conclusion: Evaluation of *E. elaterium* volatile oil and comparing volatile oil profiles of *M. syriaca* different specimens have been conducted for the first time in Jordan. Also various extracts of both plants were tested for the first time against Panc-1 pancreatic cancer cells. Furthermore, *E. elaterium* and *M. syriaca* ethanol extracts as well as *M. syriaca* EOs may be advocated as candidates for breast, colorectal and pancreatic cancers management.
Keywords: Majorana syriaca; Ecballium elaterium; volatile oil chemical composition; MCF7; Panc1; Caco2; PDL

Anticancer properties of Jerantinines – novel natural product alkaloids

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Jerantinines A and B represent novel *Aspidosperma* indole alkaloids isolated from *Tabernaemontanacorymbosa*. They possess broad-spectrum antitumour activity eliciting nanomolar potency against breast, colorectal, lung and pancreatic carcinoma cell lines. Cell cycle analyses revealed stark G2/M phase arrest injerantinine-treated cells, a consequence of tubulin polymerisation inhibition. Microtubule dynamicity, as well as polo-like kinase activity were dose-dependently inhibited by jerantinine. Multidimensional protein identification techniques (MUDPIT) identified perturbation of spliceosome protein expression in breast cancer cells exposed tojerantinine. Detection of annexin V+ cell populations, caspase activity, Mcl-1 depletion and cleaved PARP corroboratively indicate an apoptotic fate of jerantinine-treated cells. Elucidation of molecular targets and mechanisms pertinent to tumourigenesis and cancer cell survival advocate continued development of jerantinines as potential antitumour agents.

Application of Pharmacoeconomics in formulary management

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Medication assessment criteria have been evolving over the years. Regulatory authorities focus on medications' safety and efficacy based on clinical trials in controlled conditions. However, the improved risk benefit ratio is not without cost, especially for high tech and specialty medications. Therefore, the medication value is currently an important factor for reimbursement and formulary adoption decisions. Pharmacoeconomics represents the economic dimension of outcomes research. It identifies measures and values the cost and outcomes of two or more treatment alternatives from the society, provider or payers perspective to identify the most valuable cost effective option. It is part of the broader health technology assessment framework. Pharmacoeconomics studies' results are utilized by decision makers at both the national and facility level in formulary management decisions, pricing negotiation, and development of standard treatment guidelines.

This presentation will highlight the use of Pharmacoeconomics in improving medicines selection and formulary management from a health service provider perspective. Furthermore, it will highlight challenges and lessons learned from different countries including low-middle income countries.

Strategies to prevent medication errors in pediatric patients

Abdullah Amireh

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The National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use.

Pediatric patients are more vulnerable to medication error due to several factors including developmental pharmacokinetics, weight-based dosing, off-label use of medications, communication barriers and lack of standardized drug formulations.

The Institute for Safe Medication Practices recommend a rank order in term of effectiveness for creating lasting system changes for safe medication use. These error-prevention strategies including forcing functions and constraints which is the most powerful and effective error-prevention strategies, automation and computerization of medication-use processes and tasks, standardization and protocols that create a uniform model to adhere to when performing various functions and it tends to reduce the complexity and variation of a specific process., double check systems, rules and policies to guide staff toward an intended positive outcome, and education and information.

Pharmaceutical procurement and supply chain management

Suzan Hammoudeh

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Procurement is an important part of efficient drug management and supply, it is a complex process that involves different procedures and different stakeholders, all governed with national and international laws and regulations , in addition to internal policies. An effective procurement process ensures the availability of the right drugs in the right quantities, available at the right time, for the right patient at a reasonable price and at recognizable standards of quality.

In this introductory presentation to medication procurement, we will discuss common terms that describe aspects of procurement and supply, identify the five rights of procurement, and discuss some of the guidelines that may help in risk management and demonstrate benefits of effective procurement.

Adverse Drug Reactions in Cancer Patients

Rula Najjar

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Management of cancer patients is a multimodal approach that involves highly complex chemotherapeutic regimens and hence accounts to high susceptibility toward adverse drug reactions (ADRs). Advances in the management of cancer patients by increased use of immunotherapy and targeted therapies increases the like hood of ADRs in this population as well.
Adverse drug reaction (ADR) is defined by World Health Organization (WHO) as 'Any response to a drug which is noxious, unintended and occurs at doses used in man for prophylaxis, diagnosis or therapy'.
ADRs associated with cancer chemotherapy and immunotherapy are common and predictable with the probability of having preventable ADRS in cancer patients. Certain ADRs have large magnitude in cancer patients since they can lead to admissions and increase of level of care such as ICU admissions. Use of appropriate supportive care medications supports in reducing the severity of ADRs and preventing some of them
Awareness about ADRsincidence, severity and preventability in cancer patients among health care providers is essential to help in developing strategies that can reduce the incidence and severity of ADRs. This aids in improving the outcomes of this patient populationand helps in decreasing the burden of theADRssequelae in cancer patients.

The Economic Impact of Smoking on Health Care Resources in Patients with Chronic Diseases in Jordan

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Background: Tobacco smoking is a widely spread phenomenon around the world. Jordan, has a high prevalence of cigarette and waterpipe smoking among Middle Eastern countries and an increasing rate of smoking-related diseases. The burden of chronic diseases in terms of health care expenditures and death is increasing worldwide. Evaluating how smoking impacts health care utilization and expenditures among patients with chronic diseases in Jordan as a developing country with modest economy and resources will assist in conducting economic evaluations for supporting tobacco control in Jordan.
Objective: This study aimed to estimate and analyze the impact of smoking on the direct medical expenditures of chronic diseases' management in Jordan.
Methods: A retrospective analysis of a cohort of patients with chronic diseases conducted during August 2016 to November 2016 in KAUH. Socio-Demographic, clinical, smoking status, economic and visits' data were collected. Statistical analysis was performed using SPSS™ for Windows and a *p* value of 0.05 isdefined as statistically significant.
Results and Conclusion: Data were collected from 845 patients having at least one chronic disease (mean age of 61 ± 10.7 years). Smokers formed 22% of total patients. The total expenditure for the sample was 1,895,197 JD. The median total expenditure per patient of smokers, former smokers and non-smokers was JD 845, JD 911 and JD 714, respectively. Drugs were the most expensive healthcare resource used, accounting for 43% of total expenditure, followed by inpatient and outpatient related services (19%). Smokers and former smokers were associated with the highest inpatient expenditures and inpatient and outpatient related services expenditures. However, smokers were associated with the lowest outpatient expenditures and drugs expenditures. This study suggests that smoking has a notable economic impact associated with chronic disease management and is a useful tool to promote tobacco control.
Keywords: Smoking, Chronic diseases, Cancer, Direct medical expenditures, Jordan.

Ethical Issues in Palliative Care and End of Life

Naser Alsharif

Creighton University, USA

The presentation will provide insights into ethical issues and dilemmas that may arise in palliative care and at the end of life. The pharmacist role in ethical decision-making will be addressed. Implications for Jordan will be addressed

The pharmacist's role in palliative and hospice care

Sewar Al Salmany

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The WHO defines palliative care as an approach that improves the quality of life of patients and their families facing the problem of life threatening illness, through the prevention and relief of suffering by means of early identification, assessment and treatment of pain and other physical, psychosocial and spiritual symptoms.The pharmacist's role to the delivery of palliative care and supportive care services beyond the traditional role of medication dispensing and compounding has gained growing recognition across various practice settings. PHCpharmacist may support PHC services in an administrative role (policy and procedure, formulary management), in a consultative role (order set development, treatment algorithm development) in advanced clinical practice (medication therapy management services, pain and symptoms management consultations and interdisciplinary team participation) and in education and training of pharmacists, students and other clinicians. Potential practice sites for PHC pharmacist are various hospice settings, hospitals, outpatient clinics, outpatient community pharmacies, home care or long-term care (LTC) facilities and consulting and managed care settings. Finally, PHC pharmacists should enhance their training in palliative and supportive care via web-based narrated lectures, journals, books and websites for professional development of the PHC pharmacist.

Treating Tobacco Use in Cancer Patients

Hiba Ayub

Tobacco Dependence Treatment Private Practice

Introduction: Cancer patients who continue to use tobacco after the diagnosis of cancer or while receiving treatment for cancer are more susceptible to having a variety of detrimental effects.
Rationale: Using tobacco while having cancer increases the risk of new malignancies (as in lung, and head and neck cancer survivors), and recurrence (as in lung, prostate and bladder cancer survivors). Smoking during cancer treatment has been associated with higher risk of pulmonary infections, post-operative complications, and longer hospitalization days, besides, radiation toxicity. Furthermore, smoking also affects quality of life, leading tounmanageable pain and fatigue, and increased depressive symptoms and anxiety.
Results: Tobacco dependence (TD) and its related withdrawal syndromes are classified as substance use disorders, nevertheless, there are scientific, evidence-based and effective interventions used to treat it; Smoking cessation support or Tobacco Dependence Treatment (TDT) is increasingly recognized as critical component of cancer care, and is being strongly endorsed by many oncology societies; Combining counselling (behavioral therapy) with pharmacotherapies (cessation medications as varenicline, bupropion and nicotine replacement therapy)is necessary for success; Pharmacists, being one of the first-encounter health providers, have an essential role in initiating and offeringTDT to tobacco users; Using the brief advice in TDT with its 5A's model (Ask, Advise, Assess, Assist, Arrange), has been known to increase quitting attempts among smokers, and consequently, quitting rates.
Conclusions: continued tobacco use after cancer diagnosis affects negatively cancer treatment, prognosis and survival. Despite being a chronic relapsing brain disease, effective treatments for TD exist. Finally, pharmacists, as health professionals, have a major role in helping cancer patients who smoke to quit. Therefore, they should possess the knowledge, skills, and training to provide the appropriate TDT intervention.

Abstracts of Poster Presentations

Application of Design of Experiment (DoE) Approach For Design And Optimization of Fast Orally Disintegrating Tablets (FODTs) For Geriatric Patients

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Development of Fast orally disintegrating tablets of high mechanical properties and low disintegration time is a big challenge. The aim of the present study was to design and optimize fast orally disintegrating tablets (FODTs) of albuterol sulphate using design of experiment (DoE) approach. A two factor, three levels (32), full factorial design was carried out to investigate the main and interaction effects of independent variables, sodium starch glycolate level (X1) (2 -6 %) and microcrystalline cellulose level (X2) (10 - 30%) on the properties of the produced tablets. FODTs were prepared using direct compression technique under standardized conditions at compression force of 10 KN and 7mm punch tooling. The produced tablets were tested for, weight variation, breaking force/ crushing strength, friability, disintegration time and drug dissolution. Regression analysis results of multiple linear models showed a high correlation between the adjusted R-squared and predicted R-squared for all tablets characteristics, the difference is less than 0.2. All dependent responses of tablets were found to be impacted significantly ($p < 0.05$) by the two independent variables. Numerical optimization using desirability function was performed to optimize the variables under study to provide FODTs within the USP limit with respect of mechanical properties and disintegration time. It was found that the higher desirability (0.954) could be attained at the high level of sodium starch glycolate (6 %) and microcrystalline cellulose (30 %).

Keywords: Design of Experiment, Fast Orally Disintegrating Tablets, albuterol sulphate,sodium starch glycolate, microcrystalline cellulose

Awareness of Jordanian Population about Possible Risk Factors Associated to Cancer

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Background: According to Jordanian ministry of health report in(2013), the total number of cases registered during that year (2013) was 8744 cases from them 5416 were Jordanian (61.9%) and 3328 were non Jordanian (38.1%). The cancer incidence in Jordan supposed to be increased due to several reasons include low population awareness of risk factor that related to cancer which could be modifiable. The present study aimed to assess awareness of cancer risk factors among adult Jordanian.
Method: online survey composed of 30 close-ended questions was distributed to Jordanian population.
Results: A total of 692 Jordanian (82.2% women) completed the survey. The (21-30 years old) category was the majority with 54.3% (n=376). The bachelor degree was the education level for 63.3% (n=438) of participants. However, 65.8%(n=455) have non-medical specialization. The most common source for reading about cancers was via internet and social media based on our participants. High percentage of participants 91.3% (n=632) believed that cancer incidence in Jordan was increased in last decades. Concerning to risk factors, 94.4% (n=653) agreed that smoking may cause cancer, but only 36.1% (n=250) was aware that age is a risk factor. However, 78.2% (n=541) and 62.0%(n=429) of population think that preservatives and artificial sweeteners could increase the risk of cancer, respectively. About half of participants 54.9%(n=380) were aware that sunlight exposure increases the risk. Unfortunately, 67.8%(n=469) was wrongly believed that cell phone rays increase cancer risk. Moreover, only 42.8% (n=269) and 35.6%(n=246) knew that obesity and some contraceptives increase the risk, respectively. The majority 66.8% said that alcohol is a risk factor. 65.6% (n=454) of participant believed that cancer inherited. 45.7% (n=316) and 72.7% (n=503) of population thought that antiperspirants and plastic products increase cancer risk, respectively. The majority 98.7%(n=683) were aware that cancer is not a contagious disease.
Conclusion: These findings demonstrated that awareness of cancer risk factors among Jordanian population is relatively low, while unapproved factors include antiperspirants, artificial sweeteners, preservatives and plastic products were endorsed by the majority. Health education is needed to improve public understanding about how lifestyle risk factors influence the chances of developing cancer and to rectify cancer-related myths, preferably via social media.

Combined separation strategy for chiral method development of acidic and non-acidic pharmaceutical compounds in capillary electrochromatography (CEC) separation technique

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Chiral drug molecules consist of two or more enantiomers; the eutomer is responsible for the therapeutic effect and the distomer for the unwanted- or even toxic side effects. Chiral drugs when administrated as racemate, may have many serious consequences. In order to minimize the problems associated with the distomer, pure enantiomers should be incorporated in the marketed medicines, and hence analysis methods must be developed to separate chiral pharmaceutical compounds [1]. To facilitate chiral method development in any separation technique, a generic separation strategy can be applied in a short time at a relatively low cost. The strategy is usually composed of two steps; screening and optimization. These steps aim obtaining fast an idea about the enantioselectivity of the screened CSPs (chiral stationary phase or chiral selector), improving in the (quality of) separations and/or decreasing in analysis time (AT) [2]. The strategy should generic, *i.e*. it can be applied on structurally and chemically diverse compounds.

Capillary electrochromatography (CEC) is a hybrid technique that combines the advantages of both HPLC and CE. It has already proven its applicability in the field of chiral separation. Two chiral separation strategies were previously defined in CEC [3,4] to screen acidic pharmaceutical compounds on the one hand and non-acidic (basic, amphoteric, neutral) on the other. These strategies used only one type of CSPs *i.e.* non-chlorinated polysaccharide-based CSPs. The strategies were updated [5,6] by incorporating the chlorinated version of the CSPs. Using chlorinated CSPs in the CEC strategies for both non-acidic and acidic compounds resulted in improved success rates of both numbers: total and baseline separations, higher enantioselectivity and complementary results. Polysaccharide-based CSPs were chosen in the strategy because of their broad enantioselectivity.

In this poster presentation, an overview of the updated versions of the screening and optimization steps for both acidic and non-acidic pharmaceutical compounds in the CEC strategies was made and they were combined into one generic strategy. Recent modifications in both steps for the two strategies were highlighted. These strategies were evaluated and found applicable on structurally diverse molecules, showing their generic character.

Keywords: Chiral separation, Separation strategy, Chiral drugs, Capillary electrochromatography (CEC), Chiral stationary phase (CSP), Chlorinated/non-chlorinated CSP.

Direct Medical Costs of Breast Cancer in the North of Jordan

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Background: Breast cancer (BC) is the most common cancer and a major cause of morbidity and mortality in women worldwide. In Jordan, BC is the most common cancer in women, it accounted for 20.1% of all cancers in 2012. It represents a huge burden to healthcare systems and economic resources. Estimating the cost associated with BC management is essential for evaluating the burden it imposes as well as conducting economic evaluations for prevention, detection or treating strategies of BC.
Objective: This study aimed to estimate and analyze the direct treatment costs of BC patients in Jordan.
Methods: A retrospective analysis of a cohort of patients with BC treated for 12 months in2015 in KAUH. Demographic, clinical and economic data were collected. Statistical analysis was performed using SPSS™ for Windows and a *p* value of 0.05 isdefined as statistically significant.
Results: 119 female patients with BC were identified. The mean age was 50.82 ±10.22 years. The total cost for the sample was JD 1,393,325. Mean cost per patient from stage I to IV was JD 6,696, 9,183, 11,970 and 15,073, respectively. Medications were the most expensive healthcare resource used, accounting for 75% of total cost, followed by laboratory and diagnostic test.
Keywords: Breast cancer, cost.

Disparities in Access to Healthcare and Knowledge of Cervical Cancer Screening among Women in Jordan: Results from the 2012 Jordan Demographic Health Survey

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In Jordan, although the incidence of cervical cancer is low, the morbidity and mortality is high as most women presented at advance stages of the disease. Poor knowledge of cervical cancer screening may be one of the reasons for low screening rates.

Objective: To examine the impact of barriers to health care access on knowledge of cervical cancer screening among women in Jordan.

Methods: Knowledge of Pap smear testing (for cervical cancer screening) was assessed for 11,352 women aged 15–49 years in the 2012 Jordan Demographic and Health Survey. The association between access to healthcare and knowledge of Pap smear was tested in a multivariate regression model adjusted for education, age, and residence.

Results: 29% of the surveyed women have never heard of Pap smear. Women who ever heard of Pap smear were significantly older (mean: 35.5 vs. 31.6 years, p 0.001), more likely to live in urban areas (72.6% vs. 66.2%, p 0.001), have higher education (34.0% vs. 24.5%, p 0.001), an in the highest wealh quintile (11.8% vs 4.8%, p 0.001). In the adjusted model, knowing where to go to get edical advice significantly increases the chances of ever hearing about Pap smear (Odds Ratio (OR): 0.76, 95% Confidence Interval (CI): 0.67 – 0.87). Women who reported that they have concerns about not getting permission to go for medical advice (OR: 0.74, 95% CI: 0.62-0.88), not being able to get money needed for treatment (OR: 0.82, 95% CI: 0.73-0.92), and those not wanting to go alone (OR: 0.81, 95% CI: 0.72-0.9) were less likely to ever heard of Pap smear. Reporting concerns about distance to health facility, using means of transportation, or having no female providers were not significant predictors.

Conclusion: Poor knowledge of Pap smear among Jordanian women may be attributed to socio-economic disparities and problems in accessing heath care. Promoting awareness about cervical cancer screening can be achieved by reducing these inequalities

Keywords: Pap smear, Cervical cancer screening, National data, Demographic and Health Survey, Access to healthcare.

Increasing food supplements registration in Palestine: Pharmacist knowledge and perception

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Food supplement registration by the Ministry of Health (MOH) in Palestine is an ongoing process with a dramatic increase in the number of registered products over the past few years. The information related to newly registered products appears to be limited and insufficient. Such a lack of information may negatively impact on pharmacist's counseling and dispensing. The aims of this study were to evaluate pharmacist's knowledge and perception with regards the increased numbers of registered food supplements. A questionnaire was designed to assess pharmacist's knowledge and perception. Pharmacist's knowledge was high with almost 80% of the pharmacists have recorded the right answer. Approximately 67% of the pharmacists think that what available in the market is enough and there is no need for more supplements to be registered. almost half pf the pharmacists think that the the information provided regarding newly registered food supplements is in adequate while almost 30% of the pharmacists thinks are adequate. Over than 70% of the pharmacists never or rarely accessed the MOH web site to obtain information about registered food supplements. The ongoing process of food supplements registration by the MOH requires revision in term of the variety to be registered. MOH should further promote its web site as a key source for information.

Keywords: supplements, pharmacist knowledge, perception, ministry of health

In Vitro Modulation of Metabolic Syndrome Enzymes and Proliferation of Obesity Related-Colorectal Cancer Cell Line Panel by Salvia Species from Jordan

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Pancreatic triacylglycerol lipase (PL), α-amylase and α-glucosidase are appealing pharmacological targets for the management of dyslipidemia, atherosclerosis, obesity and diabetes. Presently, in vitro screening for considerable inhibition of these digestive hydrolases by crude aqueous extracts (AEs) of eleven Salvia spp. grown and sold in Jordan (Lamiaceae) was undertaken. Similar to orlistat, eleven endemic species of Salvias exerted pronounced dose dependent PL inhibition. PL- IC50 values (within a range of 0.14±0.02 – 1.51±0.17 mg/mL) in an ascending order were: S. triloba L. < S. palaestina Benth.< S. ceratophylla L. < S. spinosa Linn. S. eigii Zohary < S. aegyptiaca L. < S. syriaca L. < S. hierosolymitana Boiss. < S. lanigera Poir. S. horminum L.S. dominica L. While 1,8-cineol was found inactive; PL- IC50 values (%) (V/V) of Salvia volatile oils' principles in an ascending order were: eugenol < α-thujone α-terpinene. Comparable to acarbose, Salvia spp. AEs were identified as in vitro potent and efficacious dual inhibitors of α-amylase and α-glucosidase with IC50 values (within a range of 0.14±0.01 - 9.53±1.22 mg/mL) in an ascending order of: S. horminum S. lanigea S. syriaca S. trilob S. spinos S. hieroslymitana S. eigii S. certohylla S. palaestina S. aegyptiac < S. dominica. Using SRB assay, except for S. ceratophylla and S. eigii, none of the tested Salvia spp. extracts for general cytotoxicity against a panel of colorectal cancer cell lines (HT29, HCT116, SW620 and Caco2) was found to possess cisplatin- or doxorobocin-like antiproliferative capacities in comparison to non induced basal incubations. Taken together, Jordan indigenous Salvia spp., modulating gastrointestinal carbohydrate and lipid digestion and absorption, maybe advocated as potential candidates for combinatorial obesity-diabetes (diabesity) prevention and phytotherapy.

Keywords: colorectal cancer cell line panel; dual inhibition of amylase/glucosidase; pancreatic lipase modulation

Natural Killer (NK) Cells Activities Associated with Breast Cancer in Egyptian Women

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Breast cancer (BC) represents the most common cancer among women, and its rates are increasing in developing countries, including Egypt. The American Cancer Society estimates that 234,190 Americans will be diagnosed with invasive breast cancer and 10,730 will die of the disease in the United States in 2015. In Egypt, breast cancer is the most common cancer among women, representing 33.5% of newly diagnosed cancer cases. In Alexandria, it accounts for 45.4% of all malignancies in females during the year 2012. We aimed in this study to investigate whether the Natural Killer (NK) cells activities are associated with breast cancer in Egyptian women, and correlated to different clinicopathological features of the disease. The study was conducted on forty five females; thirty women with different stages of breast cancer, and fifteen normal healthy females were included as a control group. All patients under study were subjected to full history taking and clinical examination. Fresh blood samples were obtained from all subjects, whole blood was collected for NK cells activity by flow cytometry assays. Our finding indicated that human NK cell subsets were increased in the peripheral blood of patients with breast cancers compared with normal healthy females. Other investigators demonstrated that there was a substantial and significant reduction in the absolute numbers of NK (CD56+) cells in the circulation of women with BCs, compared with healthy female donor. But they stated that, it is not clear as to why there is this difference in the percentage of NK cells between their findings and the results of the other studies.

Keywords: Natural killer, Breast cancer, Egyptian women

Patients characteristics associated with virological response in patients with chronic hepatitis C infection receiving peginterferon alfa-2a and ribavirin combination

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Background and aims: The achievement of sustained virologic response (SVR) is a major determinant of successful treatment of hepatitis C virus (HCV) infection. The objective of the present project was to identify patient characterstics associated with SVR in patients with chronic HCV infection. A second objective was to quantify the effect of various predictors on the probabilty of having undetectable HCV RNA following pegylated interferon alfa-2a (PEG-IFN alfa-2a) and ribavirn therapy.
Method: Data from 715 patients with chronic HCV infection treated with PEG-IFN alfa-2a and ribavirin were analyzed. In part 1, the association between various patients' characteristics and achieving SVR was examined. A univariate analysis followed by logistic regression was preformed. In part 2, time to event modeling was applied to describe the probability of having undetectable HCV RNA following antiviral therapy.
Results: In part I: HCV genotype 1, low baseline alanine transaminase (ALT), increased age, pre-treatment viral load of > 2,000,000 copies/ml, increased weight, and liver cirrhosis were identified as predictors of poor SVR. In part 2, identified predictors of prolonged time to achieve undetectable HCV RNA include: HCV genotype 1, low pre-treatment ALT level, older age, or with elevated baseline hemoglobin level.
Conclusion: Cohort of patients with low probability of achieving SVR can be identified. This project is expected to improve patient care by identifying patients with low risk of responding to PEG-IFN alfa-2a and ribavirin combination. This allows early intervention such as modifying dosing regimen or changing antiviral therapy.
Keywords: Hepatitis C virus, sustained virologic response, pegylated interferon.

Phytochemical Investigation, Antimicrobial and Antioxidant Studies on Ephedra alata growing in East of Libya

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The plant Ephedra alata belongs to the Ephederiaceae family. These plants distributed in North Africa, Palestine, Libya, Egypt, Saudi Arabia and Iraq. Ephedra alata has been commonly used in folk medicine in Libya and most of the Arabian countries. Ephedra alata has been used for treatment of asthma, hay fever, and the common cold. This study aim to investigate the phyto-constituents from methanolic extract of the aerial part of Ephedra alata and assess its anti-microbial and antioxidant activities. The phytochemical investigation of the methanolic extract of Ephedra alata revealed the presence alkaloids, carbohydrates, flavonoides, steroids, tannins and phenolic compounds. The anti-microbial activity of methanolic extract of E.alata. was assessed using the disc diffusion method. Results revealed that there was a significant antibacterial activity of studied Ephedra alata against representatives of Gram positive (Staphylococcus aureus, Bacillus subtilis) and Gram-negative (Escherichia coli, Pseudomonas aeruginosa), but no antifungal activity against Aspergillus flavus and Candida albicans. The antioxidant activity was assessed using a modified quantitative 2, 2-diphenyl-1 picrylhydrazyl (DPPH) assay. The results showed that extract of Ephedra alata had significant scavenging effects on the DPPH radical compared to gallic acid.

Keywords: Ephedra, Phytochemical screening, Flavonoids, antimicrobial activities, antioxidant activities, DPPH

Prediction of Drug-Related Problems in Diabetic Outpatients in a Number of Hospitals, Using a Modeling Approach

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Objective: Drug-related problems (DRPs) are considered a serious, expensive, and important undesirable complication of health care. However, as current health care resources are limited, pharmacist DRP services cannot be provided to all patients. Using a modeling approach, we aimed to identify risk factors for DRPs so that patients for DRP-reduction services can be better identified.

Methods: Patients with diabetes from outpatient clinics from five key university-affiliated and public hospitals in Jordan were assessed for DRPs (drug without an indication, untreated indication, and drug efficacy problems). Potential risk factors for DRPs were assessed. A logistic regression model was used to identify risk factors using a randomly selected, independent, non-overlapping development (75%) subsample from full dataset. The remaining validation subsample (25%) was reserved to assess the discriminative ability of the model.

Results: A total of 1,494 patients were recruited. Of them, 81.2% had at least one DRP. Using the development subsample (n=1,085), independent risk factors for DRPs identified were male gender, number of medications, prescribed gastrointestinal medication, and nonadherence to self-care and non-pharmacological recommendations. Validation results (n=403) showed an area under the receiver operating characteristic curve of 0.679 (95% confidence interval=0.629–0.720); the model sensitivity and specificity values were 65.4% and 63.0%, respectively 96. Normal 0 false false false EN-US X-NONE AR-SA /* Style Definitions */ table.MsoNormalTable {mso-style-name:"Table Normal"; mso-tstyle-rowband-size:0; mso-tstyle-colband-size:0; mso-style-noshow:yes; mso-style-priority:99; mso-style-parent:""; mso-padding-alt:0in 5.4pt 0in 5.4pt; mso-para-margin:0in; mso-para-margin-bottom:.0001pt; mso-pagination:widow-orphan; font-size:12.0pt; font-family:Calibri; mso-ascii-font-family:Calibri; mso-ascii-theme-font:minor-latin; mso-hansi-font-family:Calibri; mso-hansi-theme-font:minor-latin{;

Conclusion: Within the outpatient setting, the results of this study predicted DRPs with acceptable accuracy and validity. Such an approach will help in identifying patients needing pharmacist DRP services, which is an important first step in appropriate intervention to address DRPs.

Keywords: Medication-related problems, drug-related problems, pharmaceutical care, outpatient, diabetes.

The use of Saliva instead of Plasma as a Surrogate in Drug Bioavailability and Bioequivalence Studies in Humans

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Introduction: Salivary excretion of some drugs has been reported previously as a good indicator for drug bioavailability, therapeutic drug monitoring, and pharmacokinetics and drug abuse because saliva sampling offers simple, non-invasive and cheap method as compared with plasma sampling with no contamination risk. The rules of drug protein binding and membrane permeability on salivary excretion were previously investigated for several drugs, where a Salivary Excretion Classification System (SECS) was proposed. The research purpose is to study and compare the pharmacokinetics of selected drugs in plasma and saliva matrixes in healthy human volunteers, and to suggest using non-invasive saliva sampling instead of plasma as a surrogate in bioavailability and bioequivalence (BA/BE) studies.

Methods: five different pilot BA/BE studies were done in 12- 18 healthy humans. Saliva and plasma samples were collected for metformin, tolterodine, rosuvastatin, paracetamol and azithromycin after oral dosing. Saliva and plasma samples were assayed using LC-MSMS, then pharmacokinetic parameters were calculated by non-compartmental analysis using Kinetica program. Effective intestinal permeability (Peff) values were also optimized to predict the actual average plasma profile of each drug by Nelder-Mead algorithm using SimCYP & PK-Sim programs.

Discussion: all studied drugs showed salivary excretion with strong correlation coefficients between saliva and plasma concentrations. The optimized Peff ranged 1.44 – 68.3 X10-4 cm/sec for the drugs under investigation. Saliva/plasma concentrations ratios ranged 0.17 – 13.4. Inter and intra individual variability of primary pharmacokinetic parameters in saliva matrix were either close to or higher than plasma matrix. This requires larger sample size in saliva studies for some drugs. Our results suggests that there is a potential in BA/BE studies for saliva to be considered as a surrogate for plasma concentration, which goes along with drug regulations. The use of saliva instead of plasma in such studies makes them non-invasive, easy and with a lower clinical burden.

Keywords: SECS, BE, BA, Pharmacokinetics, Permeability, Protein binding.

Traditional medicinal plants used as anticancer in the Hashemite Kingdom of Jordan

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Ethno medicine has been on the forefront whenever we talk about anticancer remedies. Herbal medicines have a major role in the prevention and treatment of cancer. This study covered the medicinal herbs used as anticancer remedies in different regions of Hashemite Kingdom of Jordan (Ajloun, Mujib, Tafila, Showbak and Badia). Some of the herbal medicines are randomly distributed over all the country. Our results revealed that 48 medicinal plant species are used by local traditional medicine for the treatment of cancer. We concluded that Olea europaea scored the highest use value.
Keywords: Anticancer; Medicinal herbs; Jordan; Use value; Ethno medicine.