SIPHA 23

The Annual Meeting of SPS

اللقاء السنوي للجمعية الصيدلية السعودية

Dhahran Expo, Dammam 3-5 January 2023

SIPHA

Saudi Pharmaceutical Society
الجمعية الصيدلية السعودية

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THE SAUDI PHARMACEUTICAL SOCIETY

The Annual Meeting of SPS
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The Saudi Pharmaceutical Society:

The Saudi Pharmaceutical Society (SPS) is a non-profit professional organization that represents all pharmacists in Saudi Arabia. It was founded in 1988 and it contributes to the planning and development of the pharmacy profession. The Honorary President in his Royal Highness Prince Fahad Bin Sultan bin Abdul-Aziz.

The SPS was able to achieve several accomplishments including the establishment of the Saudi Board under the umbrella of the Saudi Commission for Health Specialties (SCFHS) as well as the Saudi Clinical Pharmacy and Hospital Pharmacy Clubs. Saudi Commission for Health Specialties & American Council for Pharmacy Education (ACPE) recognizes the SPS educational program.

Vision

Leadership in the development of pharmaceutical care, scientific research, and medical education in the field of pharmacy in the Kingdom of Saudi Arabia.

Mission

The development, the increased awareness, and the education of medical practitioners of pharmacy and health professions and the wider community.

02

SAUDI INTERNATIONAL PHARMACEUTICAL SCIENCES MEETING AND WORKSHOPS (SIPHA)

The Annual Meeting of SPS
———————— SIPHA 2023

Saudi International Pharmaceutical Sciences Meeting and Workshops (SIPHA):

Saudi International Pharmaceutical Sciences Meeting and Workshops (SIPHA) is a project aimed at bringing experts and those interested in the field pf pharmacy together for sharing and improving pharmaceutical and health-related practices.

Vision

To be the pioneer in the field of continues pharmacy education and pharmacists' professional development.

Mission

Advance the different pharmaceutical sectors, by discussing and evaluating our current practices, and developing new recommendations.

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PRESIDENT OF SPS WELCOMING MESSAGE

The Annual Meeting of SPS
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DEAR COLLEAGUES,

On Behalf of the Saudi Pharmaceutical Society (SPS) board members, I welcome all pharmacists and other health care professionals to our annual event, The Annual Meeting of SPS, SIPHA 2023 Conference and Exhibition in Dhahran, Kingdom of Saudi Arabia on January 2023 ,5-3.

SPS represents pharmacists all over the Kingdom of Saudi Arabia, and its main mission is relied on growth and development of pharmaceutical field in many aspects of practice including governmental institutions, hospitals, manufacturing companies, community pharmacies, etc. Therefore, scientific (and professional) roles of SPS are to fill the gap between strict divisions of academia, and all different forms of practice in institutions devoted to science, research, regulatory affairs, clinical and manufacturing. In addition, SIPHA is always an opportunity to enrich the communication between government and business sectors.

Building on the success of previous meetings, the theme for 2023 is composed of several topics that discuss plans and initiatives to advance pharmaceutical field toward the Saudi Arabian national vision 2030.

We look forward to sharing the latest updates from hospital pharmacy practitioners, industrial, government, and academic scientists on these topics and everything else that is presented. Therefore, we would welcome all of you to participate and attend the scientific sessions, research posters, and other activities in the exhibition hall (Dhahran Expo).

The scientific program, workshops, parallel and the networking sessions will be indeed excellent opportunity for all of us to learn from and connect to each other. Last but not the least, I would send my thanks to the sponsoring companies who always make our meeting successful.

We are looking forward to meeting with local and international pharmacists from different countries around the region to share new and exciting advances in pharmacy in our conference, which will be held in Dhahran, Saudi Arabia from January 2023 ,5-3.

DR. MOREQ ALOTAIBI
SPS President

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ORGANIZING COMMITTEE CHAIRMAN WELCOMING MESSAGE

FAISAL GONAYAH
Chairman, Organizing committee

We would like to welcome you all to the sixth version of SIPHA, for this year of SIPHA and since the beginning of our journey we were always challenging ourselves more than others by aiming for new SIPHA's records to break in both quality and quantity. In this year we worked toward achieving THE dream that once was the dream of SIPHA founders back in 2013 which is to have an international exhibition were we invite people from around the globe to see what the Saudi Pharmacists have to offer, for SIPHA to be the place where people can seek to gain knowledge, connect and finish their deals. To have students from different nationalities and backgrounds compete to win. To have visitors enjoy their time and learn at the same time. To enrich the experience of every person visiting SIPHA by having a journey to be remembered.

When I look back to the early days of preparing for this version, I can not see behind the fact that we assigned goals that were way too high at that time and seemed impossible to achieve. But I did that knowing that in SIPHA the Impossible means simply (I'm-Possible).

What you will see in the sixth version of SIPHA is a result of dedication, hard work and the actions of a visionary team that stops for nothing but the best.

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SCIENTIFIC COMMITTEE CHAIRMAN WELCOMING MESSAGE

The Annual Meeting of SPS
———————— SIPHA 2023

بسم الله والحمدلله والصلاة والسلام على رسول الله

On behalf of the Scientific Committee, I warmly welcome you to SIPHA23 Annual Conference in the beautiful city of Dhahran.

The conference scientific program, Impact and Vision; has been carefully chosen to mark another milestone of SIPHA journey. The scientific Committee and myself were privileged to design this year›s conference scientific program, where we made all efforts to reflect the tremendous research contributions, teaching, and practice by all respected experts, to hopefully result in good impact on many sectors of pharmacy practice. This conference will be one for us to share our thoughts and exchange ideas on how to chart our journey forward to reach new heights as pharmacy practitioners.

We have an exciting scientific program at this conference that will allow members to reflect upon achievements in pharmacy practice, discuss current challenges in localization of drug manufacturing, procurement, regulation, and pharmacy operations to embark on possible solutions that works well for all stakeholders. As well, explore the gene cell therapy clinical applications and needs. In addition, we dedicated a session to highlight the new pharmacy informatic applications and a similar session to shade lights on pharmacy education and training. We hope that you will have a productive and Knowledge-filled time at this very special conference.

To put a conference of this magnitude together is not a small task. To that end, I›d like to thank all the Scientific Committee members for their tireless efforts to put this program together and arrange all sessions and tracks and the Organising Committee for the careful scheduling of events. As well, I extend gratitude to the respected speakers who accepted our invitations and spared time to be with us in this conference to help with their expertise deliver the goals and objectives of the scientific program.

Also, I would like to offer a special thanks to Dr. Moureq Alotaibi, President of the Saudi Pharmaceutical Society, for his exemplary support to overcome all obstacles that we faced. Lastly, I would like to thank all the conference participants for their contributions which are the foundation of this conference. Hoping to see you all there and you will enjoy and benefit from this special experience.

On behalf of the Scientific Committee members :

HANI ALHAMDAN
Chairman, Scientific Committee

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ORGANIZING & SCIENTIFIC COMMITTEE

The Annual Meeting of SPS
SIPHA 2023

Organizing Committee

Faisal Gonayah
Chairman,
Organzing Committee

Turki Alduhaim
Co- Chairman
Organzing Committee

Mona Bin Anzan
SIPHA Project Manager

Mustafa Aljasser
SIPHA Advisor

Mohammad Alawagi
SIPHA Advisor

Hosam Alem
SIPHA Advisor

Hazzaa Alghamdi
SIPHA Advisor

Wejdan Alyousef
coordinator, Event
management Team

Abdullah Alanazi
coordinator,
Logistic Team

Ibrahim Alfaqih
coordinator, Public
Relation Team

Abdulrahman Almadi
coordinator,
Design Team

Maha AlOsaimi
coordinator, Residency
Showcase Team

Organizing Committee

Lama Bamunif
coordinator,
Marketing Team

Nouf Alyousef
coordinator, Media Team

Shahd AlNasser
coordinator, Research
Affairs Team

Turki Helabi
coordinator, Scientific
Affairs Team

Reema Alfehaid
coordinator, Student Clinical
skills Competition Team

Hala Alkhalaf
coordinator,
Registration Team

Moath Aldafas
coordinator, Interactive
Platform Team

Noura Alaifan
coordinator,
Exhibition Team

Aisha Alrajeh
coordinator,
1:1 Meeting Team

Hana Al Alshaykh
coordinator, SIPHA›s
Networking Hub Team

Scientific Committee

Dr. Hani Alhamdan
Chariman

Dr. Ghada Bawazeer
Member

Dr. Mansour Alhowimel
Member

Dr. Thamer Almangour
Chariman

Dr. Abdullah Alzeer
Member

Dr. Tariq Alfaqeeh
Member

Dr. Mohammad Alharbi
Chariman

Dr. Ghadeer Banasser
Member

Dr. Omar Alshaya
Member

Dr. Saleh Abahussain
Chariman

Dr. Nabil Kamas
Member

Dr. May Alnbaheen
Member

07

WORKSHOP SCIENTIFIC COMMITTEE

The Annual Meeting of SPS
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Dr. Tariq Alzahrani
Workshop scientific committee chair

Dr. Shatha Almuhaidib
Member

Dr. Afnan AlRasheed
Member

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SIPHA ACTIVITIES- STATISTICS

The Annual Meeting of SPS
SIPHA 2023

SIPHA 2023 Activities

- Lectures
- Workshops
- Poster Presentations
- Residency Showcase
- Interactive Platform
- Clinical Skills Competition
- 1:1 Meetings
- SIPHA's Networking Hub

SIPHA 2023 Activities

Attendees 4000	Lectures & Workshops 60	Research Posters 231
Speakers & Moderators 100	Universities 30	Hospitals 28
Sponsors & Exhibitors 90	Volunteers 350	

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SCIENTIFIC & WORKSHOP PROGRAM

The Annual Meeting of SPS
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SCIENTIFIC PROGRAM

DAY1 03 January 2023

Session 1

Pharmaceutical Field Journey in Economy Diversification, Technology Transfer, and Biomedical Research Development Towards Saudi Arabia 2030 Vision Realization

Moderators: Prof. Amer Alanazi, Dr. Nabil Alhakamy

Panel Discussion

Pharmaceutical Field Journey in Economy Diversification, Technology Transfer, and Biomedical Research Development Towards Saudi Arabia 2030 Vision Realization

Speakers

H. E. Prof Hisham Aljadhey
Dr. Tawfiq Alohali
Dr.Asharf Algrain
Dr. Abdulrahman Sabra
Prof. Ahmed Aljedai
Dr. Yasser Alobaida
Dr. Sara Althari
Dr. Ashraf Daoud

11:00 - 12:00

12:00 - 13:00 Prayer & Lunch Break

Session 2

Expert guide to Pharmacy residency training: Tips for success

Moderator: Dr. Doaa Al Jefri

Panel Discussion

Expert guide to Pharmacy residency training: Tips for success

Speakers

Dr. Majed Al Jeraisy
Dr. Amira Aldarwish
Dr. Maram Al Enazi
Dr. Abdullah Al Hammad
Dr. Majda Alattas

13:00 - 14:00

Establishing an ASHP-Accreditable PGY1 or PGY2 Pharmacy Residency Program

Speaker

Dr. David Warner

14:00 - 14:00

Session 2

Bring to the Light Saudi Food and Drug Authority Endeavor Impact on Drug Safety and Security within the

Moderator: Dr. Abdulrazaq Al-Jazairi

Panel Discussion

Saudi Food and Drug Authority (SFDA) and National Unified Procurement Company (NUPCO): Efforts in Shortage and Safety Management.

Speakers

Dr. Tawfiq Alohali
Dr. Yahya Al-Nujaym
Dr. Khalid Alzahrani

14:15 - 15:15

Drug/Biological-Device Combination products: SFDA Approach for products evaluation and postmarketing surveillance

Dr. Mohammed Alkudsi

15:15 - 15:35

Drug Track and Trace System for pharmaceutical products (RSD)

Dr. Mohammed Alturki

15:35 - 15:55

Panel Discussion (Q&A)

All

15:55 - 16:15

SCIENTIFIC PROGRAM

DAY2 04 January 2023

Session 4

Contribution of National Unified Procurement Company (NUPCO) in delivering the highest standards of healthcare services in Saudi Arabia.

Moderators: Dr. Nabil Kamas

The impact of unified procurement on government spending efficiency - NUPCO's contribution on 2030 vision in healthcare sector.	9:00 - 9:20	Speakers Dr. Mansour H. AlHowimel
Supply chains challenges in healthcare – NUPCO experience.	9:20 - 9:40	Mr. AbdulRahman S. Bakhurji
Wasfaty business solution (achievement, challenges, and futuristic view).	9:40 - 10:00	Dr. Faisal Alharbi
Panel Discussion (Q&A)	10:00 - 10:15	All

10:15 - 10:40 Coffee Break

Session 5

Digital Transformation in healthcare system in Saudi Arabia

Moderator: Dr. Amar Hijazi

Digital Transformation in Healthcare: Eastern health cluster experience	10:40 - 11:00	Speakers Dr. Saad Alsharani
SEHA virtual Hospital and e-prescription system	11:00 - 11:20	Dr. Abdulaziz Alhmood
Panel Discussion (Institutional Transformation of healthcare facilities (ITHF)	11:20 - 12:00	Dr. Ibrahim Al Jaffali Dr. Saad Alsharani Dr. Abdulaziz Alhmood

12:00 - 13:00 Prayer & lunch break

SCIENTIFIC PROGRAM

DAY3 05 January 2023

Session 8

Pharmacy Leadership, challenges and opportunities.

Moderators: Dr. Abdulmohsen Marghalani

Panel Discussion Pharmacy Leadership Challenges (staff shortage).	09:00 - 10:00	Speakers Dr. Hani Al Hamdan, Dr. Nabil Kamas Dr.Bandar Alharbi, Dr. Abdulsalam Al Asseri Dr. Hussain Bakhsh, Dr. Nasser Alqahtani

10:00 - 10:15 Coffee Break

Session 9

Harnessing the Power of Education to Build the Future Saudi Pharmacists

Moderator: Dr. Ahmed Alalaiwe

Panel Discussion Pharmacy Graduates and the Job Market Needs: a Great Potential and a Strong Challenge	10:00 - 11:00	Speakers Prof. Abdulkareem Albekairy Dr. Lubna Aljuffali
The Role of the Unified Progress Test in Optimizing Pharmacy Education: The Saudi Experience.	11:00 - 11:20	Dr. Ahmed Aljabri
A New Journey into Academia: Tips for Junior Faculty.	11:20 - 11:40	Dr. Ghazwa Korayem
Panel Discussion (Q&A)	11:40 - 11:50	All

11:50 - 13:00 Prayer & lunch break

13:00 - 15:00 5th SIPHA Student Clinical Skills Competition

15:00 - 16:00 Closing Ceremony

SCIENTIFIC PROGRAM

DAY 2 — 04 January 2023

Session 6

Highlights on Community Pharmacy Practice

Moderators: Dr. Ahmed Bahaziq

Quality Accreditation standards in community pharmacy practice — Speakers: Dr. Mansour Almoqbil

13:00 - 13:20

Medication Therapy Management: Pearls from the first experience in a community pharmacy in KSA — Dr. Basma Albabtain

13:20 - 13:40

Panel Discussion (Q&A) — All

13:40 - 14:00

14:40 - 14:20 Coffee Break

Session 7

Role of Gene Therapy in Human Diseases.

Moderator: Dr. Abdulaziz Almatlaq

Role of RND on cell and gene therapy — Speakers: Dr. Farhatullah Syed

14:20 - 14:40

Risk-based Approach for Cell and Gene therapy — Dr. Abdulaziz Alsayyari

14:40 - 15:00

Clinical Applications of Gene Therapy — Prof. Majid Alfadhel

15:00 - 15:20

The role of Comprehensive Genomic Profiling in the advance diagnosis of Cancer — Dr. Boshra Al Yahya

15:20 - 15:40

Panel Discussion (Q&A) — All

15:40 - 15:50

Panel Discussion

"Status of pharmacogenomics in the Middle East: Where are we now?" "What comes next?"

Prof. Imed Gallouzi
Dr. Abdulelah Alhawsawi
Dr. Zeina N Al-Mahayri
Prof. Nathalie Zgheib
Dr. Mohamed Nagy

15:50 - 16:20

WORKSHOP PROGRAM

3 - 5 January 2023

DAY 1 | TUESDAY, 3 JANUARY, 2023

2:00 - 4:00 PM	Accreditation for Healthcare Organization: Where to focus Patient Care and/or Career Opportunities	Dr. Abdullatif Alokifi Moderator: Dr. Mashael Alsakar	50 SR
2:00 - 5:00 PM	Transforming the future of pharmacy practice in KSA, how to?	Dr. Abdulqader Almoeen Moderator: Dr. Amani Muharram	75 SR
2:00 - 4:00 PM	Access to Urgent Care: Empowering Community Pharmacies in Toxicology Management	Dr. Najla Khoja Dr. Abeer Mohamed Moderator: Dr. Shahd AlNasser	50 SR

DAY 2 | WEDNESDAY, 4 JANUARY, 2023

10:00 AM - 12:00 PM	Subgroup Analusis Power and Traps	Dr. Hanen Aljohani Dr. Shaher M. Bahakeem	75 SR
9:00 - 10:00 AM	How to Minimize Chances of Manuscript Rejection: A Guide for New Authors	Dr. Wajhul Qamar Idris Moderator: Dr. Sary Alsanea	50 SR
10:00 AM - 12:00 PM	Unleashing young leader potential	Dr. Ahmed Alshamrani Moderator: Dr. Tariq AL Zahrani	50 SR
2:00 - 4:00 PM	Network Meta-Analysis Workshop: A Guide to Clinical Research	Dr. Hadeel Alkofide	75 SR

DAY 3 | THURSDAY, 5 JANUARY, 2023

9:00 - 11:00 AM	Statistical and Pharmacoepidemiological tools in Research	Dr. Abdullah Alalwan Moderator: Dr. Solaiman Alhawas	75 SR
10:00 AM - 12:00 PM	Pharmacogenomics Clinical Applications	Dr. Kanan Alshammari Dr. Hana Alalshaykh	75 SR
10:00 AM - 12:00 PM	Lean in for Women in The Workplace	Dr. Maram Alotaibi Dr. Nouf Alshuemi Moderator: Dr. Afnan Alrasheed	50 SR

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ONE-TO-ONE MEETINGS

Individual meetings, with experts in the pharmaceutical field, that aims to provide a consultation service to those who need guidance in their current or future career

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SFDA

Prof. Hisham Aljadhey

Executive President of Saudi Food & Drug Authority (SFDA)

Dr. Adel Alharaf

Vice President for the Drug Sector at SFDA

Dr. Mohammed Alkudsi

«Director of products policy and classification department. Board member of an executive combination products policy council at SFDA»

Research

Dr. Majed Al Jeraisy

«Associat Professor and pediatric pharmacy Consultant. KSAU-HS Chairman, Research Office and Director of Clinical Trial Service, KAIMRC»

Prof. Hiba Aldawsari

Professor of Pharmaceutics at Faculty of Pharmacy- King Abdulaziz University

Dr. Abdullah Alturki

Associate Operations Director at KAIMRC

Hospitals

Dr. Mohammed Alshennawi

«General Director, General Administration of Pharmaceutical Care Ministry of Health»

Dr. Abdulmohsen Marghalani

Pharmacy Director at king Faisal specialist hospital and research center

Dr. Suliman Alzubairy

Consultant Clinical Pharmacist at Johns Hopkins Aramco Healthcare

Hospitals

Dr. Mohammed Alawagi

Outpatient pharmacy manager at king Faisal specialist hospital and research center

Dr. Maram Alenazi

«Drug Information Clinical Pharmacist. PGY1 Residency Program Director»

Dr. Mona Alanzan

«Medication Safety Specialist, KSUMC SIPHA co-founder and manager, SPS Board Member»

Academia

Prof. Abdulkareem Albekairy

«Dean and Professor of Pharmacy Practice, College of Pharmacy, KSAU-HS Consultant Clinical Pharmacist, Solid Organ Transplantation, KAMC-R»

Dr. Dhafer Alshayban

«Vice dean of clinical affairs and Chairman-pharmacy practice department. Associate professor at imam abdulrahman bin faisal university.»

Dr. Ghada Bawazeer

Associate Professor at the College of Pharmacy at King Saud University

Dr. Ghazwa Korayem

«Associate Professor at the College of Pharmacy at Princess Nourah bint Abdulrahman University . Consultant Internal Medicine Clinical Pharmacists, King Abdullah bin Abdulaziz University Hospital»

Companies

Dr. Yasser Alobaida

Chief Executive Officer and Founder at Sudair Pharmaceutical Company

Dr. Sattam Al Ghodyyr

Corporate Government Affairs Director at GSK

Dr. Saleh Abahussain

Market Access Head at AstraZeneca

Companies

Dr. Yasser Alahmari

Global Safety Manager at Amgen

Dr. Nasser Albedah

Government Sales Manager at SPIMACO

Factories

Prof. Amer Alanazi

«Professor at the college of pharmacy at King Saud university Industrial Consultant in Pharmaceutical Operations»

Community Pharmacy

Dr. Ahmed Bahaziq

Business Development Director

NUPCO

Dr. Mansour AlHowimelA

Pharmacoec-onomics manger at national unified procurement company

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INTERACTIVE PLATFORM

The Annual Meeting of SPS
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INTERACTIVE PLATFORM - STAGE PROGRAM

A creative platform where students and practitioners can share their skills, experience, and provide practical solutions to the most prominent challenges faced by pharmacists in order to ensure the work and life quality.

INTERACTIVE PLATFORM - INTERVIEWERS LIST

Interactive personal interviews are the foremost tool to live the experience of a personal interview, which helps judge the abilities of a person for every job and postgraduate application. In SIPHA23, we are giving participants the chance to live the experience of a personal interview!

Presentation Skills and Techniques

20/December, Online lecture (via Zoom) by: Abdulrahman Alenazi

- Strategic Workforce Planning Senior Consultant-STC.
- Strategic Workforce Planning Senior Associate Consultant -Korn Ferry Consulting Company.
- First Class Honour Master: Management Information Systems - Al Yamamah University
- More than 17 years of experience in managing HR strategies & workforce planning projects.
- KSA Toastmasters Champion: 1st place winner for public speaking Contests, SATAC 2019, SATAC 2018, and SATAC 2017.

Agenda:

- Learn to engage your audience with powerful presentations
- Structure presentations with a beginning, middle, and end

Deliver with confidence and get techniques to bring vitality, interest, and clarity to your presentation.

How to prepare yourself for future interviews.

29/December, Online lecture (via Zoom) by: Muhammad Al-Qanini

- Founder of Al-Qanini Recruitment
- Founder of CVKSA
- Founder of Asstinterview
- Specialist in employment and vocational training in career development.
- Trained more than 10,000 subscribers inside and outside the Kingdom of Saudi Arabia on how to succeed in the labour market.
- Contribute to attracting talents in more than 500 Saudi and international government agencies.

Agenda:

- How to build an outstanding CV.
- How to excel at the interview.

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INTERACTIVE PLATFORM - STAGE PROGRAM

The Annual Meeting of SPS
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Day2: Wednesday, Jan 4th 2023		
speaker	Topic	Time
Essa Aldulaym	Is Pharmapreneur A Real Thing?	9:00 – 9:20
Dr. Nada Almozain	Career Transition, From Clinical Pharmacy To Pharmaceutical Companies	9:20- 9:40
Dr. Abdullah Alfarhan	Pharmacist Vs Smart Pharmacy	9:40 – 10:00
Dr. Muhanad Al-Mutairi	Community Pharmacist Journey	10:00 – 10:20
Dr. Sarah Alotaibi	Is It Possible To Study Pharmacy In Arabic?	10:20 – 10:40
Dr. Mohammed Albati	Your Way To Pharmaceutical Industries.	10:40 – 11:00
Khalid Alhamad	A Designer Pharmacist's Journey	11:00 – 11:20
Dr. Fouad Bahamdain	Interview Tips And Job Offer Evaluation	11:20 – 11: 40
Dr. Nada Hussain	All Aspirations Are Possible If You Have A Pharmacy Degree And Creative Mind.	11:40 - 12:00
Dr. Saeed Alkorbi	What After Graduation?	13:00 – 13:20
Hasan Al Nahab	My Experience In Summer Training In Moh Hospitals	13:20 – 13:40
Amal Alkhulaif	What Extracurricular Activities Could Add To A College Student.	13:40 -14:00
Dr. Abdulaziz Alsaleh	Stories Between Quality, Skills And Creative Management	14:00 – 14:20
Dr. Seba Aljahdali	The Road To Stardom	14:20 – 14:40
Yara Alhamlan	How Passion Can Improve The Quality Of Your Life	14:40 - 15:00

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INTERACTIVE PLATFORM - INTERVIEWERS LIST

The Annual Meeting of SPS
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interviewers

Bashar Al Omari,
Sales Manager at Johnson & Johnson

Mobarak Alomerini,
Strategic Manager at Johnson & Johnson

Dr. Amani Al Shaban
RPh., M.Sc Pharm, MBA
Manager,Medication Safety and Quality
at Eastern Health cluster

Dr. Hadeel Fayez Anan
Director of Formulary Management
Affairs in the Eastern Health Cluster

Dr. Hisham Momattin
Corporate chief of pharmaceutical service, IRB
chairman and consultant clinical pharmacist
at Mouwasat medical services

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NETWORK HUB

It is a space that accommodates one-on-one sessions for interested audiences (clinical and research pharmacists, pharmacy colleges, faculty members, stakeholders, residents/fellows, etc) to interact with national and international experts and to learn from our experiences.

The Annual Meeting of SPS
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Interested audiences can book one or more of the pre-scheduled sessions with experts from the following categories.

A. ACADEMIA/TRAINING:

1- Prof. Yousef Asiri, PharmD
President of Taif University, ACPE international commission and ISPAG - member

2- Dr. Bandar Alkhyyal, BSPharm
General manager of programs accreditation at ETEC-National Center for Academic Accreditation and Evaluation (NCAAA), Riyadh, Saudi Arabia

3- David Warner, PharmD
Senior Director Consulting and Practice Development, American Society of Health-System Pharmacists (ASHP)

B. REGULATORY:

1- Dr Abdullatif Alokifi
Assistant of Director General for GD of Hospital Affairs at Ministry of Health, Saudi Central Board for Accreditation of Healthcare Institution (CBAHI), Saudi Arabia

2- Lujain Almallouh, PharmD
Investment Project Specialist, Saudi FDA

PRECISION MEDICINE:

1- Dr. Mohammad Nagy, RPh, MSc
Pharmacy Director, Personalized Medication Management Unit Founder, Children's Cancer Hospital Egypt 57357

Deputy chair Pharmacogenomics Research Network (PGRN) for Africa & Middle East

2- Dr. Nathalie Khoueiry-Zgheib, MD, Pharmacogenetics lab
American University of Beirut Faculty of Medicine (AUBFM)

3- Dr. Zeina N Al-Mahayri, PharmD, PhD,
Department of Genetics and Genomics
College of Medicine and Health Sciences, United Arab Emirates University, Al Ain, UAE

4- Prof Imed Gallouzi,
Associate Director of the Smart Health Initiative at King Abdullah University of Science and Technology (KAUST)

5- Dr. Adulelah Alhawsawi, MD,
CEO and Co-founder Novo Genetics

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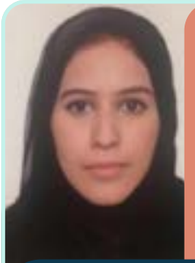
ABSTRACTS

The Annual Meeting of SPS
SIPHA 2023

Posters Evaluation Committee Members

Dr. Khalid Bin Saleh
BSc. Pharm, PharmD, BCPS

Assistant Professor, Department of Pharmacy Practice, College of Pharmacy, King Saud Bin Abdulaziz University for Health Sciences
Infectious Diseases Clinical Pharmacist, National Guard Health Affairs, Riyadh, Saudi Arabia



Dr. Bashayer AlShehail
PharmD, BCIDP

Infectious Diseases Clinical Pharmacist, King Fahad Hospital of the University, Khobar, Saudi Arabia

Dr. Sultan AlGhadeer
BSc. Pharm, PharmD, BCPS

Associate Professor, Clinical Pharmacy Department, College of Pharmacy, King Saud University
Vice Dean of Postgraduate Studies and Scientific Research, Prince Sultan College for EMS, KSU
Emergency Clinical Pharmacist, KSUMC, Riyadh, Saudi Arabia

Dr. Omar AlShaya
BSc. Pharm, PharmD, BCPS

Assistant Professor, Department of Pharmacy Practice, College of Pharmacy, King Saud Bin Abdulaziz University for Health Sciences
Internal Medicine Clinical Pharmacist, King Abdulaziz Medical City, Riyadh, Saudi Arabia

Dr. Saeed AlQahtani
PharmD, Ph.D

Associate Professor, Clinical Pharmacy Department, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia

Dr. Abdulaziz AlMulhim
PharmD, BCPS

Clinical Assistant Professor
Department Head, Pharmacy Practice, College of Pharmacy
Chairman, KFU Faculty and Staff Wellness Center
King Faisal University, Al Hofuf, Saudi Arabia

Posters Evaluation Committee Members

King Saud bin Abdulaziz University for Health Sciences College of Pharmacy, King Abdullah International Medical Research Center (KAIMRC), Riyadh, Saudi Arabia

Dr. Tariq AlQahtani
B.Pharm, MSc, Ph.D

Assistant Professor
Department of Pharmaceutical Sciences, Princess Nourah Bint Abdul Rahman University
University, Riyadh, Saudi Arabia

Dr. Fatemah Alherz
Ph.D

Assistant Professor, Department of Pharmaceutics, College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal, Dammam, Saudi Arabia

Dr. Rayan Mushtaq
B.Pharm, MSc, PhD

Assistant Professor and Consultant of Pharmacognosy and Herbal Medicine
Associate Editor of Saudi Pharmaceutical Journal
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Dr. Omer Fantoukh
B.Pharm, RPh, PhD

Assistant Professor, Imam Abdulrahman bin Faisal University, Dammam, Saudi Arabia

Dr. Dania Hussein
BSc., MSc, PhD

Department of Pharmaceutical Sciences, College of Clinical Pharmacy, King Faisal University, Al-Ahsa, Saudi Arabia

Dr. Abdulaziz AlMouslem
PharmD, Ph.D

Posters Evaluation Committee Members

Assistant Professor of Pharmaceutical Analysis
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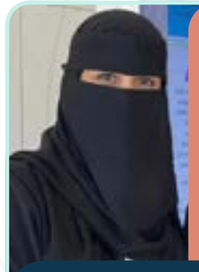

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201903

Attitude and knowledge of healthcare practitioners towards the role of clinical pharmacists at governmental hospitals in Albaha region; Saudi Arabia: cross-sectional study.

Ali Alghamdi, Haya Almalaq, Mohammed Saleem.

Background
Clinical pharmacists' role is vital in optimizing health outcomes. They play an important role in medication therapy management, medication reconciliation, providing therapeutic recommendations to health professionals (HCP), and coordinating the timing and collection of drug concentration samples in order to interpret lab results correctly. However, clinical pharmacy services are still not implemented in Albaha governmental hospitals. Therefore, the aim of this study was to assess the attitude and knowledge of HCP in the hospitals at Albaha region of Saudi Arabia towards the role of clinical pharmacists and to investigate the perception of pharmacy specialists towards the perceived role of clinical pharmacists.

Method
In September 2021, a cross-sectional study among HCP was
conducted at nine governmental hospitals across Albaha region. a self-administered questionnaire was distributed to all HCP working in Albaha hospitals.
Data were analyzed using SPSS (version27). Chi-square (X2) test was performed to check for the significant relationships.

Result
Among 294 participants from different professional majors, 58.8% were male and the majority of the sample were Saudis. This study revealed that 71.8% of the HCP had good knowledge while 68.4% of the HCPs had a positive attitude about clinical pharmacists' role. Most of the sample (88.8%) agreed that the clinical pharmacy is an integral part of the medical team. The majority of pharmacists and physicians (80.6%, and 80.4% respectively) thought that the Clinical Pharmacy can maximize cost-effectiveness and improve patient outcomes.

Conclusion
The result of this study showed that the HCP in Albaha hospitals had good knowledge and a positive attitude towards the role of clinical pharmacist. Interprofessional communication between pharmacists and other HCP is important to benefit from clinical pharmacy services. This study recommended the necessity of conducting educational sessions for HCP on the role of clinical pharmacists and boosted the necessity of sending current pharmacists to complete their education so that they can perform clinical pharmacy services to the fullest.

201871

Understanding Prescription Patterns Paracetamol

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Background
The World Health Organization included paracetamol in Model List of Essintial Medicines in 2021.Yet , there were reports of a worldwide paracetamol shortage; for example, the Saudi FDA has listed multiple forms of paracetamol in its drug shortage list. This study seeks to add to the existing knowledge about the shortage of such a treatment. The studies main objectives involve estimating the patterns of paracetamol utilization and costs from a single center in Riyadh from 2010 to 2019 .

Method
This study uses a retrospective longitudinal design based on medical records from Security Force Hospital, Riyadh, Saudi Arabia . International review board approval was granted in 2022. The unit on analysis was medical prescriptions that contain paracetamol. All costs for studied years were adjusted to the last year of the analysis (2019) .The price adjustment method adapted recommendations from the Agency of Health Research and Quality, which uses gross domestic product (GDP). The trends of utilization and costs were analyzed using linear regression. Furthermore, a comparison between 2010 to 2019 for the cost of the treatment and utilization was conducted using a student test with a p value of 0.05.

Result
The utilization of paracetamol from 2010 to 2019 increased about threefold from 809 to 2700 prescriptions. In contrast, the price per tablet decreased by 75% over ten years, where the major price discount was seen between 2010 to 2011 (decreased by 0.8 SAR),followed by 2014 to 2015 (decreased by 0.18 SAR).

Conclusion
Paracetamol remains an essential medication in the KSA. The findings suggest that the utilization of such a treatment is increasing. Further research is needed to compare paracetamol prescriptions with other analgesics.

201835

Healthcare Providers' Knowledge and Practices about the Diagnosis and Treatment of Clostridioides difficile Infection in Saudi Arabia

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Background
Clostridioides difficile infection (CDI) diagnosis and treatment have developed over the last decades. CDI diagnostic methods differ in their sensitivity and specificity. The aim of this study was to assess the current knowledge and practices of diagnostic testing and treatment of CDI among clinicians in Saudi Arabia.

Method
This is a cross-sectional, multi-center, questionnaire-based descriptive study. The data were collected between November 2021 and July 2022, and the Saudi Commission for Health Specialties assisted in distributing the online survey among clinicians in Saudi Arabia. The questionnaire assessed demographic characteristics of the respondents, current practices, and knowledge. Participants' level of knowledge was assumed to be sufficient if they responded correctly to at least 70% of the knowledge items. The questionnaire was adopted from published papers with modifications and validated by clinicians in Saudi Arabia.

Result
A total of 251 participants were surveyed (183 clinicians and 68 microbiologists), among the clinicians, internalists represented 37.7% of them and 40.4% of them were consultants. About one-half of the participants were from the central region. In regards to the CDI diagnostic tests, 35.0% reported being "not sure" while only 10.9% selected nucleic acid amplification testing (NAAT) test. Interestingly, 50.3% of the clinicians never ordered CDI testing. The overall level of knowledge about CDI was

poor; only 27.9% had sufficient knowledge; among those, consultants were the highest knowledgeable clinicians. Among the microbiologists, 25% were not sure about CDI diagnostic tests. Moreover, one-third 38.8% of the microbiologists reported no barriers to conducting CDI at their institution followed by physicians not ordering the test and limited funding (30.8%, and 25%, respectively).

Conclusion
The study revealed a limited level of knowledge among healthcare providers about CDI diagnosis and treatment. Thus, there is an urgent need to educate practitioners and standardize the practice of testing and treatment among healthcare systems in Saudi Arabia.

201802

Evaluation of the critical care nurses› knowledge of sedation and the dosing approach: A Multi-institutional Cross-Sectional study

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Background
Dosing strategies for sedative agents are varied worldwide. The guidelines for the prevention and management of pain, agitation/sedation, delirium (PADIS) 2018 do not provide a specific recommendation about the standard dosing weight for sedative agents. Therefore, we aim to identify the sedative agents dosing approaches used in critically ill patients, and to assess the practice and knowledge of sedative agents dosing among ICU nurses.

Method
A multi-institutional, cross-sectional study that included registered nurses who practiced in the ICUs from all regions in Saudi Arabia over a 3-month period in 2022. A modified version of a validated questionnaire that consisted of 26 questions was distributed electronically in 12 tertiary hospitals in Saudi Arabia. The primary outcome was to assess the type of weight used for dosing sedative in critically ill patients. The secondary outcomes include sedation practice and knowledge of sedation assessment for registered ICUs nurses.

Result
A total of 712 registered nurses participated in the questionnaire. The majority of the nurses (72.8%) reported the use actual body weight (ABW) for sedative agents dosing, and (20.2%) reported the use of the ideal body weight (IBW). The overall weight score of the practice assessment showed that (45.08%) of nurses had a good practice level while (54.92%) of them had a poor practice level. Additionally, the overall weight score of the knowledge assessment showed that most of the nurses (41%) got a moderate knowledge level, followed by a poor knowledge level (31.46%).

Conclusion
The use of (ABW) as a dosing weight for sedative agents is a common practice for ICU nurses in Saudi Arabia. Multiple factors influencing the sedation practice were identified and should be considered when sedation protocols and quality improvement efforts are being formulated.

201756

The Impact of pharmacist Counseling on hospitalized patient taking Warfarin Upon Discharge On The Rate Of Hospital Readmission And Sustaining Therapeutic INR Levels

Reem Alsumait, Maram Abuzaid, Ola marriki

Background
Pharmacists are the mainstay of patient education regarding medication use. Enhancing patients' knowledge about their medication will help decrease adverse drug events. This study aims to evaluate the impact of pharmacist counselling on patients taking warfarin upon discharge on the rate of hospital readmission and sustaining therapeutic INR (international normalized ratio) levels.

Method
A retrospective cohort study, comparing patients newly started on warfarin, who received counseling upon discharge by nurses versus pharmacists. The primary outcome is evaluating the impact of pharmacist counseling on patients' adherence and hospital readmission within 30 days after discharge. The secondary outcome is evaluating the impact on sustaining therapeutic INR levels. We include all patients aged ≥18, following up in the anticoagulant clinic, with a recorded INR level upon discharge and on the day of follow-up. Data was analyzed using simple descriptive statistics, chi-square test for categorical variables, and independent student t-test for the means.

Result
A total of 230 patients received warfarin therapy, male to female ratio was 1.32, mean age 51.42±17.34 years. The ratio between patients who received counseling by nurses(Group I) versus pharmacists(Group II) was 1.32. No significant difference between the two groups in terms of drug-drug interactions. The smoking rate was Group I(78%) versus Group II(22%). Adherence to fixed quantities of vitamin K containing vegetables was in Group I(27.3%) versus Group II(72.7%). There was no statistically significant difference in the INR levels between the two groups at the time of discharge. However, readmitted to the hospital within 30 days was Group I(70.2%) versus Group II(29.8%). Also, patients› sustain therapeutic INR levels post-discharge was Group I(21.1%) versus Group II(78.9%).

Conclusion
Patients who received Warfarin and counseling by pharmacists at time of discharge had a significantly improved adherence rate, maximized the benefits of therapy, and minimized the adverse drug reaction also the rate of hospital readmission.

201726

Healthcare Workers' Mental Health and Perception towards Vaccination during the COVID-19 Pandemic in a Pediatric Cancer Hospital

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Background
The consistent increase of Coronavirus disease 2019 (COVID-19) cases parallel with the rate of deaths and the controversial response regarding the vaccines caused an increase in the burden of psychological diseases. The aim of the study is to evaluate the psychological condition of healthcare workers (HCWs) in a pediatric cancer hospital and to identify the knowledge, attitude, and perception (KAP) of HCWs toward COVID-19 vaccination.

Method
A cross-sectional study was conducted between April 2021 to May 2021. The study population was all licensed HCWs in Children's Cancer Hospital 57357 (CCHE). A

validated confidential survey was employed and consisted of two validated scales; generalized anxiety disorder 7-item GAD-7 scale, patient health questionnaire PHQ-9, and a third section included general questions assessing the KAP toward COVID-19 vaccines. The primary outcome was the extent of depression and anxiety. Other outcomes of interest were the factors associated with depression and anxiety and the acceptance of COVID-19 vaccination.

Result
The total responses were 395, of which 11.4% were physicians, 18.5 % were pharmacists, and 70.1% were nurses. Sixty-six percent of HCWs had different degrees of anxiety and depression. Nurses significantly accounted for the highest anxiety levels (P=0.003), while the cumulative anxiety score was significantly higher in HCWs who had a positive history of COVID-19 infection (P=0.026). Although 67.6% of HCWs believe that “vaccines are essential for us” the vaccination rate was 21.3%.
The Factors associated with not receiving the vaccine were younger ages (P=0.014), nurses (P=3.6987 x 10-7), negative history of COVID-19 infection (P=0.043) and believing that infections can happen after taking the vaccine (P=1.5833x10-7).

Conclusion
Healthcare organizations must take serious interventions to decrease the mental load on HCWs and facilitate the vaccination process.

201490

The overriding of CPOE drug safety alerts; evaluation of appropriate responses and alert fatigue solutions

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Background
Most Computerized physician order entry (CPOE) software come with clinical decision-support components (CDS) that provide prescribers assistance and notify them about adverse drug reactions. The excessive number of alerts in repeated and non-relevant manner leads to alert fatigue and enforces the physicians and pharmacists to alert overrides. King Abdulaziz medical city (KAMC) in Jeddah still reports a higher percentage of drug alerts overrode by clinicians and pharmacists. Thus, study was conducted to evaluate the CDS alerts overriding and determine which alerts are clinically irrelevant and need modifications.

Method
The study was carried out in the inpatient setting at KAMC in Jeddah, from 1st September 2020 to 31st December 2020. It was designed as a retrospective chart review study that included all red alerts required comments and overridden by a physician and pharmacist.

Result
Among 11350 red alerts, pDDI, dose, and allergy alerts represent 57%, 41%, and 2% respectively of the total alerts. The most common DDIs in category X were proton pump inhibitors and clopidogrel (9.9%). The appropriate response by prescribers and pharmacists toward allergy alerts was associated with the highest odds compared with the other alerts ($p < 0.05$). While there is a significant decrease in odds of appropriate action being taken by both prescribers and pharmacists in the dose screen alerts ($p < 0.05$). Among all clinical specialties, there is an increased odds of appropriate action being taken by residents and fellows for allergy and dose alerts respectively compared to other groups ($p < 0.05$). For diminishing the unnecessary alerts, we provided 14 alert refinements strategies and, advised turning off 4 alerts. Applying this will terminate 32 % of irrelevant alerts.

Conclusion
Our study›s findings indicated that a substantial number of alerts are ignored, and the rate of appropriateness varies significantly by alert type and prescriber level.

201897

Assessment of Nurses Knowledge and Behavior Towards Electronic Missing Medication Request in a Tertiary Care Hospital in Riyadh, Saudi Arabia

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Background
Missing doses and delayed medication administration are frequently reported as medication errors that present a significant concern for patient safety. Our study aims to evaluate electronic medication requests, nurses' knowledge of it, and the associated factors with missing requests.

Method
Phase I: Retrospective review of electronic medication requests at King Abdulaziz Medical City- Central Region. Data were collected over three months, including all types of requests (Missing, PRN, Refill). Phase II: An electronic questionnaire was distributed for all inpatient nurses using multiple questions employing scenarios to assess nurses’ knowledge of requests utilization. Chi-square test was used to compare categorical data and a multivariable logistic regression to assess the predictors for missing requests.

Result
Out of 97663 electronic requests, 4817 (4.9%) were missing, antimicrobials being the most common category with 2232 requests (46.34%). Requests during the day and evening shifts were 1.68 (95% CI: 1.55- 1.82, p=0.022) and 1.51 (95% CI: 1.38- 1.74, p=0.012) times more likely to be missing compared to the night shift. Batch and compounding medications were 0.43 times less likely to be missing than non-formulary medications (95% CI: 0.39- 0.68, p=0.021). Out of 362 nurses surveyed, 328 (90.6%) were females, mean age of 37.7±8.1 years, and 223 (61%) had more than five years of experience. Of all participants, 208 (57.5%) had good knowledge of electronic requests. Fewer participants identified the two appropriate scenarios for missing request, 221 (61.0%) and 192 (53.0%), compared to Refill 299 (82.6%) and PRN 273 (75.4%) requests.

Conclusion
The high percentage of missing requests in our study could be correlated with nursing knowledge. Factors associated with increased risk of missing requests were working shifts, type of the supply and non-formulary items. This study will serve to guide the identification of the source of system defects in the workflow.

201633

Pharmaco-epidemiological research in Saudi Arabia. A systematic review of publications of active and passive surveillance from 2018 until 2022.

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Background
Monitoring the safety of medications occurs continuously and changes as medicine progress through its life cycle. Pharmacoepidemiology is a concept that is used to assess the effects of medications on a sizable population after they have been put on the market. The importance of it is

growing to define a drug's safety profile more accurately in a real-world situation and close the knowledge gap left by pre-marketing studies. This study aims at reviewing the state of pharmacoepidemiology and post-marketing surveillance in Saudi Arabia from the year 2018 until 2022, as an update of our previously published review in 2018, that found 13 relevant papers.

Method
The literature review consisted of a web search of electron databases of PubMed and Google scholar electronic databases with Medical Subject Headings (MeSH) terms and free-text terms related to "pharmacoepidemiology", "pharmacovigilance", "post-marketing surveillance", "ADRs"," real-world studies" and "Saudi Arabia", from 2018 till 2022.

Result
A total of 23 studies fulfilling the inclusion criteria were categorized into Passive surveillance (7 studies), Active surveillance (8 studies), and COVID-19-related ADRs (8 studies). Reports covered a much wider variety of medicines. ADRs were considered serious for up-to 53% of some marketed medications. Approximately 11% of ADRs were considered avoidable while 24% were deemed possibly avoidable. ADRs were mainly reported by nurses (88%). The most reported ADRs for COVID-19 vaccines were fever (51%), headache (32%) and hypotension (14%).

Conclusion
In Saudi Arabia, the focus on Pharmaco-epidemiological research has increased during the past 4 years and made use of the newly developed active and passive surveillance systems. However, there is still a need to expand such research to cover all medications in the market. This can be achieved by monitoring the existing post-marketing surveillance systems and investing more resources to improve and widen its implementation in the kingdom.

201811

Perceived prescription and non-prescription drug abuse/misuse among patients: A community pharmacists' perspective

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Background
Abuse and misuse of medications is a global health concern. The increased accessibility to prescription and non-prescription (over-the-counter) drugs at community pharmacies has led to increase in abuse and/or misuse. We investigated abuse and misuse of prescription and non-prescription drugs in community pharmacies of Saudi Arabia.

Method
Data in the present study was collected using a self-report questionnaire among community pharmacists. Participants were asked to report the drugs they suspected of being abused or misused. For each drug entry, the frequency of abuse or misuse, typical age and gender of the suspected abusers/misusers were asked. Pharmacists were also asked to mention the action taken to limit abuse and misuse at their pharmacy.

Result
A total of 397 community pharmacists completed the questionnaire (86.9 % response rate). 86.4% of the pharmacists suspected some level of abuse or misuse to have occurred. In the past three months, abuse or misuse was reported 1069 times (prescription drugs – 530; non-prescription drugs – 539). Most suspicious requests for prescription-drug categories were for gabapentinoids (22.5%), antipsychotics (17.5%), topical corticosteroids (12.1%), antidepressants (11.7%) and codeine-containing analgesics (10.9%). Among non-prescription drugs, cough products (33.2%) ranked first, followed by cold and flu products (29.5%), first generation antihistamines (10.8%), paracetamol-containing analgesics (10.2%) and topical preparations (6.7%). The drug classes that were significantly associated with the age group of 26-50 years and with males were antipsychotics, antidepressants, gabapentinoids, cough products and first-generation antihistamines (p<0.001). Overall, the top 5 suspicious requests for prescription and non-prescription products abused or misused were 1) diphenhydramine-dextromethorphan-pseudoephedrine cough syrup (Mentex®), 2) Gabapentin (brand name: Not specified), 3) Paracetamol-diphenhydramine (Panadol Night®), 4) Quetiapine (Seroquel®), 5) Dextromethorphan syrup (Kafosed®).

Conclusion
Our study is the first to identify the most common prescription and non-prescription drugs suspected to be abused/misused as reported by community pharmacists in Saudi Arabia.

201771

Knowledge, attitude and clinical Practice of therapeutic drug monitoring among Saudi hospital pharmacists

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Background
Therapeutic drug monitoring (TDM) optimal application are required for effective drug monitoring of specific therapeutic drugs which includes clinical pharmacokinetics, appropriate interpretation, and dose adjustments of the drug concentrations. The most qualified healthcare professionals to apply and monitor TDM are pharmacists. Therefore, they are required to be fully aware of TDM application to avoid adverse drug reactions (ADR) and drug toxicity. Therefore, the aim of this study is to conduct a knowledge, attitude, and practice (KAP) study to assess TDM-KAP among hospital pharmacists in Saudi Arabia (SA).

Method
The study was approved by the IRB committee in King Abdullah medical city (KAMC). This is a cross-sectional study which was conducted among 414 (242 males and 172 Females) hospital pharmacists in Makkah region with a valid pharmacy license. Correct responses among KAP assessment of more than 50% was considered as good assessment, and below 50% was considered poor. Categorical data expressed as frequencies and percentages. Correlations were measured by Pearson Correlation coefficient (r) value. Significance was detected P value of ≥ 0.05.

Result
The TDM-KAP levels among participants was knowledge 50%, attitude 80% and practice 62%. In addition, there were significant positive linear correlations between knowledge and attitude (r=0.17, P<0.001), knowledge and practice (r=0.10, P<0.05), attitude and practice (r=0.105, P<0.01), knowledge and classification (r=0.25, P<0.01), practice and classification (r=0.099, P<0.001), practice and experience (r=0.10, P<0.05), while there were significant negative linear correlations between knowledge and experience (r= – 0.11, P<0.05).

Conclusion
The participants reported acceptable levels of knowledge and practice towards TDM with elevated attitude level. The lack of TDM knowledge contributed directly to reduced practice levels. It is recommended to increase the TDM knowledge level via introducing more intensive pharmaceutical programs illustrating TDM clinical application in hospitals which will provoke hospital pharmacists to integrate with to increase their TDM knowledge hence their practice.

201742

Cost-effectiveness analysis of adding omega-3 or vitamin D supplementation to standard therapy in treating painful crises of pediatric sickle cell disease patients

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Background
Painful crises represents a predominant complication of sickle cell disease (SCD). The only approved treatments for painful crises in many countries are hydroxyurea plus potent analgesics. Our earlier clinical trial concluded that omega-3 and vitamin D had a potential therapeutic impact on painful crises. However, there is limited research evaluating their therapeutic applications and cost-effectiveness. This paper aims at comparing the cost-effectiveness of omega-3 and vitamin D supplementation to the standard therapy in treating painful crises among children with SCD.

Method
Cost-effectiveness analyses of daily supplementation of omega-3 and vitamin D were performed. The economic evaluation was based on data derived from a prospective 10-month randomized clinical trial (n = 165 patients; 15 patients dropped). 50 patients were recruited into the omega-3 + standard therapy group (hydroxyurea and folic acid daily with ibuprofen as needed), 50 patients into the vitamin D + standard therapy group, and 50 patients receiving standard therapy alone served as a control group. Outcome measures from the randomized clinical trial were used to determine incremental effectiveness. Cost estimates were calculated from the healthcare payer's perspective. The analysis considered the improvement in various outcome measures and are presented here as percent change from baseline to determine the incremental effectiveness and the incremental cost for the treatment of both interventions.

Result
Adding omega-3 or vitamin D to the standard therapy was more cost-effective than standard treatment alone. Vitamin D was a cheaper but less cost-effective alternative for most outcomes between the two treatments, including LDL-C and HDL-C. It was also more cost-effective but less clinically effective in reducing vaso-occlusive crisis episodes and pain severity. Omega-3 supplementation was significantly more cost-effective than vitamin D supplementation and the standard treatment for those measures.

Conclusion
The present study showed that using vitamin D and omega-3 as add-on treatments for a painful crisis in pediatric sickle cell disease could have overall cost-saving and clinical benefits. However, further studies with a longer treatment duration are needed to establish more significant effects of the interventions for better policy and clinical decision-making.

201672

Validation of General Medication Adherence Scale (GMAS) Arabic version in a Saudi sample of patients with Type 2 Diabetes

Amani Khardali, Nabeel Kashan Syed, Saad Alqahtani

Background
The worldwide cost burden of Type 2 Diabetes Mellitus (T2DM) has been increasing drastically. A key contributor to the remarkably high rates of morbidity and mortality is poor glycemic control, potentially associated with medication non-adherence. Therefore, a valid and reliable medication adherence scale in Arabic can be extremely beneficial in assisting clinicians in assessing patients with chronic diseases. Therefore, the objective of the study is to validate the Arabic version General Medication Adherence Scale (GMAS) in a Saudi sample of patients with T2DM.

Method
Data collection in the present study was carried out by a 31-item self-report questionnaire. A total of 171 patients having T2DM participated in a cross-sectional survey over a period of 3 months (August to October 2022). The study participants comprised 50.3% (females) and 49.7% (males), with a mean age of 46.16 years (SD ± 12.16).

Result
The Arabic version of GMAS showed excellent internal consistency with a Cronbach's Alpha (α =.86). The reliability was also confirmed using the split-half method. The Cronbach's Alpha of part 1 (Items 1-6) (α =.81) and part 2 (Items 7-11) (α =.74) were good. The spearman-Brown coefficient was found to be excellent (0.79). Guttman split-half coefficient was also noticed to be excellent (0.79). Thus, demonstrating excellent reliability as well as internal consistency of the translated scale.

Conclusion
The Arabic version of GMAS was found to be valid among Saudi patients with T2DM. The availability of a culturally and socially economically appropriate medication adherence scale for public use can be extremely beneficial in assisting clinicians in assessing patients with chronic diseases such as T2DM. Therefore, this translated version of GMAS is recommended to be validated in Saudi patients and can be used to assess medication adherence in patients with T2DM.

201653

Developing new roles for Saudi community pharmacists in Cardiovascular health: multistakeholder engagement

Hadi Almansour, Nouf Aloudah, T ariq Alhawassi, Betty Chaar, Ines Krass, Bandana Saini.

Background
In Saudi Arabia, as elsewhere, the rising prevalence of cardiovascular disease (CVD) imposes a high level of morbidity and mortality. Early prevention of CVD and complications could be appropriately addressed in primary healthcare settings. As community pharmacists are an accessible and integral part of the primary healthcare system globally, they can enact key roles in identifying people with CVD risk, advising about risk reduction or treatment approaches, and/or referring to physicians. Aim. To build the foundations for a pharmacist-led CVD risk screening and management service model in Saudi community pharmacies through stakeholder engagement.

Method
Stakeholder engagement steps involved in this research were: 1) key stakeholder identification, and 2) engaging with identified stakeholders to glean an understanding of key factors that would influence the implementation of CVD risk services in Saudi pharmacies. The views, experiences, and recommendations of identified stakeholders were then explored using qualitative semi-structured interviews. Theoretical/implementation frameworks were used to map emergent themes and to standardise the reporting of factors influencing implementation of these novel services. The frameworks used included the Capability, Opportunity, Motivation and Behaviour (COM-B) model, the Socio-Ecological Model (SEM) and the Behaviour Change Wheel (BCW).

Result
Of the 124 participants recruited, 25 were health consumers, 50 pharmacists (24 community and 26 hospital pharmacists), 26 physicians, and 23 policymakers/ opinion leaders. Findings were generally supportive of pharmacist provided CVD risk assessment and management services, with most participants believing such services in Saudi Arabia to be acceptable, feasible and beneficial. However, there were factors (such as systemic issues, public and

physicians' acceptance, sociocultural issues and pharmacy professional or organisational need for governmental support) that would likely influence the uptake of such services. The COM-B and SEM models allowed mapping of these factors at different levels from all stakeholders. The BCW framework was then used to construct matching strategies and interventions that could be applied to address stakeholder-identified issues to enable future implementation.

Conclusion
This study provides a framework for the future development, implementation and evaluation of Saudi community pharmacist-provided CVD risk assessment and management services.

201481

Exploring Community Pharmacists› Attitudes toward the use of Wasfaty service (e-prescribing) in Jazan Province, Saudi Arabia

Amani Khardali, Marwa Qadri, Saad Al-Qahtani

Background
The Ministry of Health (MOH) in Saudi Arabia was digitizing healthcare, including pharmaceutical care services. Wasfaty service was introduced and launched across Saudi Arabia with the aim of transferring pharmaceutical care services from primary healthcare centers (PHCs) to community pharmacies. The MOH implemented this service as part of measures to facilitate medication-dispensing services. This study explored the community Pharmacist perceptions toward the current transition of pharmaceutical care service from PHCs to the Wasfaty service.

Method
Qualitative, semi-structured interviews were conducted with community pharmacists in the Jazan region. The interviews were audio-recorded, transcribed verbatim, translated into English, and then thematically analyzed.

Result
Nine community pharmacists with a mean of fifteen months› experience as community pharmacists were interviewed between January to March 2022. Three main themes were generated: Knowledge about Wasfaty service, attitude toward Wasfaty services, and logistics and implications. The attitudes of community pharmacists were primarily negative for reasons such as workload and lack of pharmacists-prescribers communication. However, pharmacists described several benefits of Wasfaty service, such as improving prescribing process and reducing medication dispensing errors.

Conclusion
The identified barriers and benefits have provided valuable information on what community pharmacists face in using Wasfaty service in their routine practice. This provides a way to enhance the Wasfaty service to meet the community pharmacist›s needs and satisfy their concerns. Pharmacists suggest several potential solutions to support the successful use of Wasfaty service (e-prescribing systems) in community pharmacies.

Social and Behavioral Sciences

Students

201870

Knowledge, Perception, and, Willingness of Saudi Population towards Stem Cell Banking

Rahaf Alanazi, Nouf Almustafa , Jumanah Alhumood, Zainab Alobaid, Nousheen Hamid

Background
Background: Stem cell therapy is a viable treatment option in today's world for a number of genetic, chronic, and rare medical conditions. This study aimed to determine the knowledge of the Saudi population about stem cell therapy and donation and centers for stem cell banking in KSA, their perception, and their willingness towards stem cell banking.

Method
Methodology: It is a descriptive cross-sectional study that was conducted through a bilingual (English, Arabic), structured, self-administered questionnaire. The questionnaire was administered online through various social media platforms on a national scale. The sample size was calculated to be 384 (Raosoft). The statistical analysis was performed using SPSS (V.23)

Result
Results: We recruited 440 complete responses. 57% were young females (18-24 years), and 47.5% were college graduates. 43.9% of respondents were single/never married. 87.7% were Saudi nationals, 33.9% were expecting a child. The prevalence of genetic, chronic, or rare disease was 51.6% in family, 67.5% in children of respondents and 79.3% in respondents .86.47% had correct knowledge about the source of stem cells, 74.3% knew the use of stem cells, however, only 23.5% of respondents had a good knowledge of stem cell banking and half of them (55.3%) think that it is a safe procedure. 40.7% were willing to store their newborn's stem cells, 71.8% were willing to donate the stem cells of their child to his/her sibling if required and 53% of respondents would prefer to store and donate their stem cells. However, only 19.2% knew about any stem cell banking centers in Saudi Arabia.

Conclusion
Conclusion: This study found a strong willingness of the Saudi population towards stem cell banking. However, there is a need of educational and awareness programs for the public to improve their knowledge and perception regarding stem cell banking and the centers in Saudi Arabia.

201773

Health-Care Providers' Knowledge, Attitudes and Practice in Relation to Drug Hypersensitivity Reactions at King Abdulaziz Medical City in Riyadh

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Background
Drug hypersensitivity reactions (DHRs) are a group of reactions that are mediated by the immune system after exposure to a drug. DHRs accounted for severe adverse

drug reactions (ADRs) and considered the fifth leading cause of death. Thus, this study aims to assess and evaluate the knowledge, practice, and attitude of healthcare providers toward DHRs.

Method
This cross-sectional study was completed at King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia. A convenient sample of healthcare providers including pharmacists, physicians, and nurses completed this survey. The survey is divided into three categories: knowledge (14 items), attitudes (5 items), and practices (6 items). Data were obtained from respondents using a standardized self-administered questionnaire. Statistical analyses were performed using the Spearman›s rank correlation, Mann-Whitney U test, or Kruskal-Wallis test, as appropriate.

Result
A total of 344 Health Care Providers (HCPs) completed the survey and were evaluated for statistical analysis. Female respondents are 72.1% while male respondents are 28%. The mean age of the respondents was 33.8 ± 7.8 years. Of the 344 respondents, 64% were nurses, 25% were pharmacists, and 11.3% were physicians. Among them, 53% had a bachelor›s degree, 22% had an associate degree, and 25% had a master's or above. Results showed that the median (interquartile range, IQR) score reflecting knowledge (out of 100) was 48(19– 67). Knowledge level was not statistically significant by gender [48 (25 – 73) for males vs. 47 (17– 64) for females]. 33% of respondents were satisfied with their knowledge of DHR and 42% thought that HCPs should receive advanced training on DHR. Interestingly, only 22% of our respondents would take the history of drug allergy before the drug administration.

Conclusion
HCPs demonstrated a relatively low level of knowledge regarding DHRs. Education is considerably needed for improving and filling the gaps that exist in knowledge and clinical practice.

201655

Quality of Life and well-being among Breast Cancer patients Lahore Pakistan

Fiza Ayub, Tahir Mehmood Khan

Background
Breast cancer has a high incidence rate, emphasizing the necessity of enhanced information of the health-related quality of life (HRQoL) in this population of patients. The aim of this study was to identify the factors influencing the QOL and the patients suffering in Pakistan.

Method
A cross-sectional study was conducted on females diagnosed with breast cancer, and three instruments were used: FACT-B Version 4 questionnaire, WHO causality assessment scale, Naranjo's algorithm, and a demographic/clinical characteristics section, and given to a random sample of 130 Pakistani women. Data analysis included descriptive analysis, independent sample t-test, and ANOVA test.

Result
The patients' mean age was 49.10. The mean score for physical well-being was 18.34(SD 5.92), for social/family well-being was 16.33(SD 6.3), for emotional well-being was 13.6 (SD 3.55), for functional well-being was 17.13 (SD 3.73) and for breast cancer subscale was 24.86 (SD 3.64). The study found that the age, entitlement, recurrence, marital status, salary, number of doses, duration of cancer treatment and chemotherapy sessions were significantly related to QOL terms in the assessment of FACT-B scale. The WHO causality evaluation scale determined that 78.1 percent of the responses were "probable" and 20.1 percent were "possible." According to the Naranjo's algorithm assessment scale, 80 percent of ADRs were "probable", whereas 18.4 percent were declared "possible". Chemotherapy Induced Anemia was the most often reported ADR in 64.6% of patients. Cyclophosphamide was received by most of the patients at 94.61%.

Conclusion
Health care practitioners must acknowledge and take into account the significance of QOL in addition to therapy for breast cancer patients in order to enhance their health. The findings of this study will aid in filling gaps in current unknown knowledge and identifying sites where patients require additional assistance. Because cancer and chemotherapy clearly have a negative impact on individuals' QOL.

201840

Assessment of the healthcare students and professionals' Knowledge and intention to educate the public regarding monkeypox

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Background
Monkeypox is a viral disease that known to affect animals, however, it was transmitted to humans by various ways of human/animal contact in several regions around the globe. The public might rely on the healthcare students and professionals seeking advice on how they can protect themselves from contagious diseases. Therefore, this study was conducted to evaluate the knowledge of healthcare students and professionals, and their intention to educate the public regarding monkeypox.

Method
The study is a professional-based cross-sectional web-based survey type. Participants were resident in Al-Jouf region, Saudi Arabia. The questionnaire was developed by modifying the earlier ones with prior permission and validated by subject experts for its content and relevance and pretested to a small sample of thirty participants and the reliability scale was applied to determine the alpha value of pretested sample. The responses of questionnaires were coded and analyzed using the Statistical Package for Social Science (SPSS) version 21.0.0.

Result
Of the total 350 participants, 199 responses were analyzed. Overall knowledge score is 25. There are 17.1% among participants with excellent knowledge (>17 out of 25), 40.2% with average knowledge (13-17 out of 25), and 42.7% with poor knowledge (<13 out of 25. Participant's overall intention score is 30. We found that there are 37.2% with high intention to educate the public regarding monkeypox (>24), 41.7% with moderate intention (16-23), and 21.1% with low intention (<15). The male gender was significantly associated with knowledge; however, the female was associated with intention to educate the public. Likewise, there are significant associations between age groups, marital status, educational level and field of education.

Conclusion
Findings of the current study underscore the dire need of several continues professional development systems and educational interventions not only for students, but also healthcare workers to combat the emerging and re-emerging infectious diseases and outbreaks.

201728

Awareness, practice, and views of Pediatricians, General physicians, and pharmacists about prescribing of Off-label medication in Pediatric patients in Eastern Province, Saudi Arabia

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Background
All medicines in Saudi Arabia must be approved by SFDA – Saudi Food and Drug Authority to guarantee drug efficacy and safety. Off-label medication prescribing is the approved drug being used for an unapproved indication, population, route of administration, or dosage. Off-label drug usage is extensive in pediatrics, this study is aimed to assess the knowledge, views, and practice of Health professionals about off-label prescribing, in the pediatrics category in Saudi Arabia.

Method
A cross-sectional study was run among the pediatricians, general physicians, and pharmacists (clinical and community) in Eastern Province, Saudi Arabia using a questionnaire. Analysis was done using SPSS version 26.0.

Result
151 completed survey results showed 22.51% of health professionals admit prescribing or dispensing pediatric patients with off-label drugs, due to the unavailability of the dosage form (51.65%), converting to solution form (55.30%). An appreciable number (68.21%) from the study group declared a lack of proper training. 43.70% of the study participants showed the incorrect definition of the word "off-label". Furthermore, a major portion agrees that Off label usage might cause ADR (Adverse Drug Reaction) (56.95%) and are unsafe (40%). Less than 10% of the health professionals practiced off-label use of drugs with evidence, and 58.94% stated about the unavailability of resources for information. The most often used drugs are Paracetamol (21.68%), and Phenobarbital (14%).68.21% believe that excipients in adult medications could be unsafe in children and 50.99% of the participants emphasized informing the parents/guardians when drugs from the off-label category are prescribed to their kids.

Conclusion
Healthcare care professionals showed concern about off-label drug efficacy and its safety in children keeping in view the unavailability of resources and absence of any training and information about drug excipients. Therefore, it is vital to conduct training programs and introduce official regulations in prescribing off-label drugs in the pediatric population, thus promoting safety and awareness.

201869

Readiness and attitude of healthcare professions students towards interprofessional education: a pre-post study in a large health sciences university in Saudi Arabia

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Background
Interprofessional education (IPE) is an integral part of health professions education and a key component in refining students' knowledge and skills to work effectively in a multidisciplinary team. Data to describe students' readiness for IPE is scarce, especially in Saudi Arabia (SA), which we aim to improve through this evaluation.

Method
This is a pre-post quasi-experimental study that utilized Readiness for Interprofessional Learning Scale (RIPLS) to evaluate senior students from various health colleges, including medicine (COM), pharmacy (COP), nursing (CON), and applied medical sciences (CAMS) at King Saud bin Abdulaziz University for Health Sciences in Riyadh and Jeddah. Students experienced two hours of IPE sessions composed of two stages: a team-based learning tackling an asthma exacerbation case (first hour) and a simulation-based learning tackling a pediatric trauma case (second hour). RIPLS was completed pre- and post-IPE sessions.

Mann–Whitney U test with an alpha of <0.05 was used for analysis as the data was not normally distributed per the Shapiro–Wilk test.

Result
222 students completed the pre-IPE RIPLS (167 in Riyadh and 55 in Jeddah), and 174 students completed the post-IPE RIPLS (133 in Riyadh and 41 in Jeddah) with 68% female participants. Students were distributed as: 57 from COM, 76 from COP, 138 from CON, and 125 from CAMS. Significant improvements were seen between the pre-IPE and post-IPE groups in two RIPLS domains: teamwork and collaboration (mean score: 4.58 vs. 4.72, p= <0.001) and the positive professional identity (4.45 vs. 4.62, p= 0.029). No improvements were seen in two RIPLS domains: the negative professional identity (3.53 vs. 3.5, p= 0.7) and the roles and responsibilities (3.05 vs. 3.08, p= 1).

Conclusion
The findings encourage the implementation of IPE in health professions colleges to equip students with the skills and knowledge needed to work collaboratively in multidisciplinary teams.

201813

Assessment the level of knowledge and attitude among non-professional caregivers towards Parkinson's Disease and evaluation the factors that impact their knowledge and quality of life: A study from a Tertiary Hospital in Riyadh, Saudi Arabia.

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Background
Parkinson›s disease (PD) is a neurodegenerative disease manifested by a continuous decline in cognitive and physical abilities of patients until they become dependent on caregivers. To provide optimal assistance and life for PD patients, knowledge and attitude about the disease and its treatment among family caregivers and understanding the impact of the disease on their lives is crucial.

Method
This questionnaire-based study was conducted to assess level of knowledge of family caregivers of PD patients, determine the factors affecting their knowledge level and evaluate variables resulting from caregiving and impacting their quality of life (QOL). SPSS software, version 26, was used for data analysis and results with p-value of <0.05 were considered statistically significant.

Result
69 patients and their corresponding family caregivers were included in the study. Overall, caregivers had low knowledge level reflected by a mean score of 3.45 of 8. However, 62.3% knew all medications used for their patients. A significant association was observed between knowledge level and gender of caregivers (p = 0.038), where 59% of males while 57.1% of females' caregivers had low and medium level of knowledge, respectively. Additionally, a significant association was noted between level of knowledge and hours of caregiving (p = 0.024) as 55.5% of caregivers providing the least time of caregiving had low-level of knowledge, while 52.4% of those providing the longest time of caregiving had medium and high-level knowledge. Regarding the impact of caregiving on the quality of life, the majority (78.2%) confirmed experiencing ≥ 5 factors that negatively impact their QOL.

Conclusion
Caregivers of PD patients had low level of knowledge. Increase the awareness and knowledge level among them is necessary in order to warrant better treatment outcomes, improve the quality of care of their patients and enhance the quality of life of both patients and their caregivers.

201812

Pharmacist counseling measures and its associated impact on medication-related fall risk awareness among older adults: A Saudi community-based study

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Background
Among the community dwelling older adults (aged 65 or older), over 30% fall each year, causing disability and early death. Earlier studies have shown the inability of the respondents to identify the high-risk medications related to falls. Therefore, the knowledge assessment of medication-related fall risk in older adults was determined with the following objectives: 1) To determine the risk of falling among community dwelling older adults. 2) To assess the knowledge of older adults related to medications with fall risk. 3) To evaluate the impact of pharmacist counseling on knowledge of medication related fall risk.

Method
This study was a questionnaire-guided, interview-based, cross-sectional survey using convenient sampling among community dwelling older adults (≥ 60 years) in Saudi Arabia. The questionnaire included 12 questions to assess fall risk (STEADI tool, CDC, USA) and 9 items to assess medication related fall risk awareness adapted from Falls Risk Awareness Questionnaire.

Result
A total of 391 respondents consented to participate, of which 58.8% indicated receiving pharmacist counseling related to fall risk medications in the past six months. The fall risk assessment showed that 57% were at risk of falling with 38.6% falling at least once in the past year. Alarmingly, two thirds of the respondents (66.8%) were worried about falling again. Receiving pharmacist counseling was significantly associated with good knowledge of fall risk prescription medications ($\chi2=36.76$, $p<0.001$). Also, receiving pharmacist counseling was significantly associated with the willingness to change fall risk medication on pharmacist advice ($\chi2=20.66$, $p<0.001$).

Conclusion
The study highlights a pressing concern of knowledge gap related to fall risk medications. Importantly, the increased willingness to change fall risk medication by those who had been counseled by a pharmacist supports the role of the pharmacist in medication-focused fall prevention efforts.

201798

Predictors of Saudi Arabian Pharmacists ‹ Intent to Provide Medication Counseling

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Background
Despite recent advances in pharmacy, some medications still fail because of a lack of patient knowledge. Patient misunderstanding of instructions may lead to less effective treatment and medication errors. Thus, providing information to patients is a vital element of treatment. The objective of this study was to identify factors associated with the intention to provide medication counseling to Saudi pharmacists.

Method
A non-experimental, observational, cross-sectional study was conducted among Saudi Arabian pharmacists using convenience sampling. Variables from the theory of planned behavior and other characteristics linked to the intention to provide medication counseling were included. A pre-tested, validated questionnaire was used to identify variables contributing to pharmacists' counseling intent. Descriptive and regression analyzes were conducted using STATA16.

Result
A total of 172 pharmacists completed the survey. The average age of participants was 35.1 (±8.6) years old; the average years of experience was 9.3 (±7.7), and the average monthly income was 14591.2 (±9627.2) SAR. Two-thirds (66.3%) of the participants were males, and most (80.8%) held a bachelor's degree. A significant correlation was found between attitude and the pharmacist's intention to provide information ($\beta=0.269$, $p<0.001$), along with their subjective norms and intention ($\beta=0.236$, $p<0.001$).

Conclusion
The study found that pharmacist attitudes, subjective norms, and behaviors are relevant to their intention to provide patient counseling. Targeting pharmacists and their surrounding individuals with educational programs could improve proper medication use. Improving counseling should strengthen the relationship between pharmacists and patients and positively impact the control and treatment of disease, which, in turn, is expected to improve patients' quality of life and decrease the burden on healthcare systems.

201788

Dupilumab Utilization evaluation at King Abdul-Aziz Medical City: An Observational, Retrospective study

Sumayyah Mashraqi, Madhawi Mahdali, Hana Al-Abdulkarim, Jehan Barakat.

Background
Dupilumab is approved as an add-on maintenance treatment for inadequately controlled type 2 severe asthma and atopic dermatitis (AD). Real-world data shows that Dupilumab demonstrated high efficacy, high effectiveness, and a favorable safety profile. Drug Utilization Evaluation studies are designed to evaluate the rational use of medications. This present review aims to focus on the prescribing pattern of Dupilumab at our institution under the hospital guidelines

Method
In this observational, retrospective drug utilization study 145 patients were included. Data were collected from the hospital's information system (BestCare) between January 2021- September 2022. Demographic data, shows was no significant difference between the patients in terms of gender, 54.4% were female and 45.5% were males. Around forty-one percent were ≥ 18 years. While 5% are above 70 years.

Result
The drug was mainly prescribed by Dermatology department (57.9%) for AD and Pulmonology department (33.7%) to treat moderate to severe asthma. Additionally, around (4.1%) received Dupilumab for nasal polyposis by the ENT department. Moreover, the doses were accurately prescribed and most of the patients showed good improvement after 16 weeks of therapy. Our data revealed that about 18.6 % of the patients received the drug as either a first-line therapy or after using topical steroids which do not match with the hospital guidelines.

Conclusion
A review of these prescribing patterns and guidelines-based use can give better insights into the concept of personalized cost-effective treatment and optimize the use of health resources and the efficiency of the health system as a whole.

201723

Evaluation of Technical Efficiency of Pharmaceutical Services in Al-Jouf Region: An Application of Data Envelopment Analysis

Talal Alanzi, Menwer Mubark Alsharari, Ahmed Alatawi

Background
The growing healthcare expenditures and growing demand for healthcare services have placed the obligation for developing an effective, equitable and efficient healthcare system in most nations worldwide, including the KSA. Pharmacies play very important roles in the proper and efficient use of drugs. They are involved in providing lifesaving pharmacotherapeutic agents, providing health advice, and treating minor illnesses. The aims are to evaluate the technical efficiency of the pharmacies located in Al-Jouf region and to Enrich the analysis by employing information about the type of pharmacies and the target levels required for inefficient pharmacies.

Method
The technical efficiency of pharmacies were measured by applying non-parametric Data Envelopment Analysis (DEA) based on concept of Farrell, 1957. The online survey for the pharmacies management teams in Al-Jouf region employed as data collection tool. The survey designed to collect information and statistics about health resources (inputs) used by the pharmacy to produce health services (outputs).

Result
The data were collected from 41 pharmacies. 58.5% of pharmacies were technically inefficient with average score that was (0.64) which means these pharmacies can provide current level of services with 36% of inputs reduction. Outpatient pharmacies are relatively more efficient than other types of pharmacies, were inpatient ones were least efficient. Pharmacies that serve more children and populations with higher percentages of infectious diseases were relatively more efficient.

Conclusion
In this study, inefficiency existed in most pharmacies, and these could reduce their inputs by 36% without any reduction in the service provision. Performance analysis shows the surplus of the pharmacy workers and a shortage of pharmacy services to be major causes of inefficiency, implying that health regulators might redeploy their labour forces for effective utilisation of medical capacity.

201683

Early-Career Choice of Pharmacists in Saudi Arabia: A Longitudinal Assessment

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Background
In recent years, the pharmacy profession in Saudi Arabia has evolved, and more career opportunities have been introduced. This study aims to explore the changes in early-career choice among Saudi pharmacists over time.

Method
This is a cross-sectional, descriptive study that surveyed Saudi pharmacists who graduated between 1990 – 2021 using self-administered electronic questionnaires. The data were collected between March 15 to November 5, 2022. The questionnaire comprised multiple sections that assessed demographic characteristics of the participants, career-choice preferences, and other career-related questions. We performed descriptive analysis to assess the respondents' demographic characteristics and 5-point Likert Scale to collect the information on career-related questions.

Result
A total of 184 participants were surveyed and 6 participants (3%) did not meet the inclusion criteria. There was an alignment between the career goals before graduation, where (61.4%) preferred hospital pharmacy over other career options, with the first job obtained after graduation where the majority worked in hospital pharmacy (44.6%). Community pharmacy was the least preferred career goal before graduation (1.1%); however, it ranked the second as the first job obtained after graduation (25.5%). Among those who graduated before 2011, none of the respondents have worked in community pharmacy in their first job, while (34.8%) of graduates after 2011 worked in community pharmacy. Based on the Likert Scale, more than two-thirds of the respondents stated that the presence of the job in the same geographical area of residence was an important reason for accepting the jobs.

Conclusion
Hospital pharmacy remains the most preferred early-career choice for most pharmacy graduates. Although there has been a shift towards accepting community pharmacy jobs recently, community pharmacy and pharmaceutical industry were the least preferred career choice. Several factors influenced career choice including the exitance of the job in same geographic area, employer's reputation, salary, and work-environment.

201575

Healthcare Providers› Perceptions of Healthcare Services Provided Virtually (Telemedicine)

Ranim AlMatar, Israa Abdelghany, Asmaa Al-Haqan , Israa Abdullah , Salah Waheedi

Background
The swift technological development in the past decades led to a concurrent telemedicine advancement, resulting in a sophisticated targeted service used in homes, hospitals, and other healthcare facilities. Besides the digital revolution, the challenge of the consistently growing numbers of COVID-19 cases and deaths warranted the use of an alternative method of care delivery and disease control, namely telemedicine. This study aims to evaluate perceptions of healthcare services provided virtually among healthcare providers (HCPs) working in Kuwait and to assess their acceptance and intention to implement such services.

Method
An explanatory sequential mixed methods design was used, where HCPs› perception towards telemedicine was explored using a quantitative online questionnaire study (phase 1). The findings from the questionnaire were further explored by conducting semi-structured interviews (phase 2) with participants who voluntarily provided their contact details in phase 1. quantitative data were analyzed using SPSS and qualitative data were analyzed thematically.

Result
In phase one, 421 answered the questionnaire. In terms of telehealth knowledge, 15.4% of HCP have used telemedicine technology before and 39% already know about it. Additionally, 42.3% prefer to use telemedicine, and 88.5% had a moderate to high usefulness score. Investigating telemedicine›s perceived ease of use showed an overall positive perception. Attitude median score was 73 with an IQR of 16 (63-79), and 51.1% highly intend to use telemedicine.
In phase two, the results of 22 interviews identified six themes: 1- acceptance of telemedicine; 2- Facilitators and motives for telemedicine implementation; 3- Skills and training required to conduct televisits; 4- Barriers limiting the use of telemedicine; 5- Strategies to overcome the barriers; 6- Benefits of telemedicine. Consistent with phase 1, HCPs stressed the importance of privacy and confidentiality maintenance to guarantee acceptance.

Conclusion
Perceptions of telehealth were overall positive, paving the way to develop implementation strategies.

201554

Assessment the prevalence of electronic cigarettes and vapes use and the levels of awareness towards their health hazards among KSU students.

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Background
A paucity of research on the prevalence and awareness of e-cigarettes and vapes in Saudi Arabia. This study aimed to determine the prevalence of smoking habits among a cohort of students at KSU, the factors contributing to their use, and the awareness level of students.

Method
A cross-sectional, survey-based study was conducted on students enrolled at KSU. The questionnaire was developed through an extensive review of available literature. Data were collected using an online self-administered questionnaire in the period between September-December 2021. Descriptive analysis, Chi-square, and Mann-Whitney tests were applied using SPSS (version 26.0), and a p-value of <0.05 was considered statistically significant.

Result
A total of the 998 students, 58.6% were males and 41.4% were females. 212 (21%) were found to be current smokers and males had a higher proportion than females (30.1% vs 8.7%, p=0.001). majority of the students (65%) were considered heavy smokers as they smoked >10 cigarettes or smoked a hookah per day. Students from health colleges were significantly less likely to smoke than students in other colleges (p=0.001). 55% of smokers in a study believe that smoking alleviates the pressure of their work. 46.6% of the smokers used e-cigarettes and vapes over regular cigarettes and hookah, 45.3% preferred e-cigarettes over regular cigarettes since they don›t contain any undesirable odors and 72% believe they cause less harm compared to regular cigarettes.

Conclusion
a clear increase in the use of new smoking devices with the assumption that their harm is less than traditional methods. Implementation of programs that educate students and increase their awareness is urgent to enhance overall health.

201552

The Extent of Acceptance of COVID-19 Booster Doses Among the Population In Saudi Arabia: A National Cross-Sectional Study.

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Background
In the Kingdom of Saudi Arabia, more than 66.7 million doses of COVID-19 vaccine have been given within the past 2 years, followed by booster doses to maintain the population›s immunity. However, according to the recent statistics done by the ministry of health in Saudi Arabia, there is a reduction of 10.17 million between the second dose and the booster doses. We aim to measure the extent of acceptance of COVID-19 booster vaccination among Saudi society and try to come up with some reasons that might explain that reduction.

Method
A web-based, cross-sectional study was conducted among individuals who received and did not receive the booster COVID-19 vaccine doses.

Result
In the present investigation, a total of 707 participants were included. Only 1.3% received the fourth dose, 73.6% participants received the third dose. The reason for taking the vaccine were different. 56.7% participants [OR= 6.70 (3.88-11.58), P=0.001] received it as it was mandatory for travel, work, study etc. Other reasons for receiving booster doses, 26.1% believed that prevention is better than cure [OR= 2.10 (0.97-4.55), P=0.050], furthermore, 21.2% received it as a part of an agreement of the procedures [OR= 2.56 (1.07-6.13), P=0.035]. The results also show that, 49.6% think that first two doses are enough to enhance the immunity,44.1% consider that booster doses are not essential, 30.9% experienced side effects after initial two doses, [OR= 0.34 (0.19-0.63), P=0.001], 22.5% contracted the virus despite receiving the first doses [OR= 0.51 (0.27-0.99), P=0.045]. In terms of acceptance, only 28.2% of the participants have higher acceptance toward booster doses over first ones.

Conclusion
The most common reasons for the reduction are, participants' beliefs booster doses are not important and receiving first doses are enough, experiencing side effects and contracting the virus despite receiving the first doses.

201546

Study on Awareness and Attitude of Saudi Population Towards Organ Donation: A Survey Based Study

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Background
Organ transplantation has become an essential therapy option for various disorders in the contemporary era. The most difficult aspect of transplantation is finding a compatible organ. Continuous efforts and strategic planning are essential to increase organ supply. The study›s goal was to analyze Saudi citizens› knowledge and attitudes on OD, as well as students at a health science college and healthcare workers.

Method
Methods: This cross-sectional study is a survey based study which was conducted for 6 months and surveyed 2030 participants. The questionnaire was developed with 43 questions covering various types of questions.

Result
This current survey found an encouraging attitude among the participants. It revealed that 51.08% (1037 participants) of the participants have shown interest to donate organ, 37.53% (762 participants) of their family members have expressed interest in donating organs after death, 52.46% (1065 participants) have no knowledge whether Islam religion accepts organ donation and 40.99% (832 participants) of the participants have confirmed that organ donation is allowed in Islam. Also, 43.10% (875 participants) of the participants know the process of registering themselves for organ donation and 37.43% (760 participants) of them are willing to register themselves through handheld devices. Finally the study revealed that there is signficant correlation between age group and attitude towards organ donation as younger age groups are more intended to donate organs as compared to older age group.

Conclusion
All these significant findings reveal that the attitude of the younger generation has taken turn towards participating in organ donation programme. The study has concluded that people of younger age groups are more interested in participating in organ donation, younger people are more aware about

the laws governing the subject of organ donation, the young people also believe that the concept of organ donation should be promoted effectively.

201534

The prevalence of Panadol Night use and factors associated with its use in the Eastern region of Saudi Arabia

Sara Aldaej, Dimah Almuayli , Khalid Alhussain

Background
Diphenhydramine, either alone or in combination with pain relievers, is one of the widely used over-the-counter sleep aids. The prevalence of using diphenhydramine-containing products has been assessed in several countries including the United States and South Korea. However, few studies have evaluated the use of diphenhydramine-containing products, such as Panadol Night, in Saudi Arabia. Therefore, the objectives of the current study were to assess the prevalence of Panadol Night use and to identify factors associated with its use in the Eastern region of Saudi Arabia.

Method
A cross-sectional study was conducted among adults aged 18 years or older in the Eastern region of Saudi Arabia. Data were collected through an online self-administered questionnaire. Chi-square tests were used to examine the unadjusted associations between Panadol Night use in the past month and independent variables. Multivariable logistic regression models were performed to examine the associations between Panadol Night use in the past month and independent variables.

Result
A total of 1244 adults participated in the survey. Approximately, 42.3% reported that they have used Panadol Night during their lives; 12.1% used Panadol Night in the past month. The majority of the Panadol Night users (62.4%) reported that their use was based on their family/friends' recommendations, while 23.6% used Panadol Night based on healthcare providers' recommendations. The multivariable logistic regression showed statistically significant associations between Panadol Night use in the past month and gender, study field, perceived safety and effectiveness of Panadol Night, history of insomnia, trouble sleeping because of pain, and sleep quality.

Conclusion
Our findings indicated that those in non-health fields were more likely to use Panadol Night. Also, adults' perceptions of the safety and effectiveness of Panadol Night were significantly associated with its use. Educational programs raising awareness about the appropriate use of Panadol Night (e.g., patient education by pharmacist) might be helpful.

201523

Acceptability of online assessment in health sciences during COVID-19: Students' perspective in Qassim University

Rand Aldakheeli, Mugahid Abdelrhman Mobark

Background
COVID-19 as a pandemic disease has caused the temporary closure of Schools and Universities with cessation of face-to-face education. This closure stimulated the expansion of online educational activities via the internet so that the continuity of educational is preserved. Online assessment, often known as technology-based assessment, is a time saving method used for evaluating students› academic performance as well as tracking their academic attainment and progress throughout the learning process in an online setting.
Purpose: This study assessed the students› acceptance of online assessment in health sciences with the aim of exploring the strengths and weaknesses of online assessment.

Method
A cross-sectional, survey based study was held at the colleges of health sciences at Qassim University. A validated questionnaire was reused from a previous study and was distributed via online social media. Descriptive statistics and one way (ANOVA) test were used in the analysis of data.

Result
Most participants were females (67.9%) and the mean age was 21 years old. The majority of participants were from the Faculty of Pharmacy (44.2%), while the others were from the Faculties of Dentistry (8.8 %), Nursing (13.6%), and Medicine (33.4%). Most of them are from the fifth year (29.5%), their IT skills were moderate (57.8%). Most of participants showed positive responses of accepting the online assessment with statistically significant difference ($P<0.05$) of acceptability between health colleges.

Conclusion
This survey-based study clearly addressed the viewpoint of learners on online assessment during COVID-19 period. With respect to the positive responses of the majority, the advantages of having an online examination outweigh its drawbacks.

201486

The Phenomenon of Giving Hypnotic Medications to Children Without a Therapeutic Purpose

Heba Khaloofi, Mhdia Osman

Background
The antihistamines like chlorpheniramine malate, triprolidine, and pseudoephedrine cause sedation and are prescribed for insomnia as a first-line drug. Some mothers in Saudi Arabia reported using these medications for their children to induce, and regulate sleep, without prescription. This unnecessary and dangerous practice can cause serious side effects. The research aims to discover the prevalence of sedative medication use among children in Saudi Arabia and evaluation of the mother›s awareness of the seriousness of these medications' effects. This research also aimed to provide natural alternatives.

Method
A cross-sectional study has been conducted using a structured online questionnaire. The survey has been performed to identify the views of mothers on the subject and the reasons for their use of medicines and the most widely used drugs, dosage, and side effects. 50 responses were collected from mothers and evaluated using Statistical Package for Social Sciences (SPSS) software.

Result
The majority of participants use sedative drugs to keep their children calm and in a deep sleep with ignorance and with a lack of awareness of their serious side effects. We strongly encourage the initiation of awareness campaigns using pamphlets and other platforms including messages.

Conclusion
Mothers, mainly working women tend to use hypnotic medication for their children without therapeutic indication. This practice needs to be stopped by awareness campaigns using both traditional and electronic formats.

201458

Assessment of Knowledge About Patient Safety Concepts Among Medical and Pharmacy Students

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Background
Patient safety is a central principle of healthcare professional practice that requires a significant
consideration within the teaching curricula; however, there is a lack of special courses that focus on patient safety concepts in an integrated way in many countries. This study aims to assess the knowledge of medical and pharmacy students regarding patient safety concepts.

Method
A cross-sectional study was conducted at Alfaisal University during the 2018-2019 school year. A survey consisting of 15 questions was designed with the help of the quality and patient safety department at King Faisal Specialist Hospital and Research Centre, Riyadh (KFSHRC). The survey was validated and then electronically distributed to all students enrolled in the College of Medicine and College of Pharmacy.

Result
A total of 304 (22%) of 1368 students completed the survey. The survey revealed that 51% of
students had an acceptable understanding of the types of human error; however, 53% of students had little knowledge about the factors that lead to these errors and 61% did not know how to report an error. Many students (41%) reported being directly involved in an unsafe situation that may cause patient harm, such as a healthcare-related error, adverse event, or inconsistent care. Most students (90%) agreed that hiding errors to avoid further implications is unethical and reporting errors is the responsibility of every healthcare provider.

Conclusion
Most Alfaisal University students understand the significance of patient safety education and understand the types of human errors, yet the causes of errors and the protocols for reporting them were not well understood by most students.

201453

The covid-19 vaccine in children aged 5-12 years: Acceptability and concerns of parents in Saudi Arabia

Khulud Alharbi, Muhammad Rasheed, Areej Alnajem

Background
Many cases and fatalities have been directly resulting from COVID-19 virus worldwide distribution and a spike in severe cases. Vaccination had a critical role in limiting the spread of COVID-19 globally. After FDA clearance of the COVID-19 vaccine in children, immunization of children 5-12 years old in the USA has been started in November 2021. Subsequently, the Saudi Ministry of Health also announced immunizing children aged 5 to 12 years old from January 2022. Although the government did not make the vaccine mandatory for children, they encouraged parents to help in decrease the spread of the infection by vaccinating their children. Despite the proven safety and effectiveness of COVID-19 vaccines, parents› readiness to inoculate children with the vaccine is a concern for government. This research aims to assess parents› willingness and concerns about the COVID-19 vaccine in children aged 5-12 years in Saudi Arabia.

Method
A cross-sectional survey designed using google form and conducted online via social media. A face and content validated; 31-item questionnaire was used for the survey. A convenience sampling method was used. The data were analyzed by using the SPSS program. The independent t-test and chi-square test were used to compare variables.

Result
A total of 1251 respondents completed the survey, showing a response rate of 98%. The study results showed that half of the study participants (52.9%) are willing to inoculate their children with the COVID-19 vaccine. However, most parents (64.9%) were concerned about the safety of the vaccine citing reasons of limited clinical studies and inadequate safety and efficacy data. Younger parents between the age of 18-25 years and those who had previous acceptance of the influenza vaccine were significantly associated with higher acceptability of the COVID-19 vaccine in children compared to parents above the age of 25.

Conclusion
This study shows that most Saudi parents are willing to vaccinate their children. However, there is a need to alleviate parents› concerns and educate them about their safety and efficacy concern of the vaccine, as the study resolved that more parents will be willing to inoculate their children if safety concerns are addressed.

Pharmaceutical Sciences

Professionals

201446

Role of Dapagliflozin in the Attenuation of LPS-induced Hemodynamic Disturbances and Cardiotoxicity during Euglycemic and Hyperglycemic Conditions

Turki Harbi, Wael Alanazi

Background
Diabetes mellitus (DM) is a vital factor of cardiovascular complications related to 70% of all deaths in people with DM. Furthermore, diabetic patients are at high risk for bacterial infections, and its well-known bacteremia-induced septic shock is considered one of the leading causes of death in critical patients. Dapagliflozin is a sodium-glucose co-transporter 2-inhibitor, used as an antidiabetic drug and recently investigated to prevent diabetic cardiomyopathy. In this study, we studied the role of dapagliflozin in preventing lipopolysaccharide (LPS)-induced hemodynamic changes and cardiotoxicity during euglycemia and hyperglycemia.

Method
Wistar albino male rats (n= 48) were divided into two groups: non-diabetic and diabetic. The non-diabetic group was divided into three groups, the first group was a control,

the second group received LPS, and the third group received dapagliflozin plus LPS. The diabetic group was divided into three groups, the first group received streptozotocin (STZ), the second group received STZ and LPS, and the third group received STZ+dapagliflozin+LPS. During treatment, hemodynamic parameters were monitored, including systolic blood pressure, diastolic blood pressure, mean arterial blood, heart rate, tail blood flow, and tail blood volume. In addition, blood glucose level, body weight, tail skin temperature, and deep body temperature were regularly observed. After LPS injection, all these parameters were measured; blood samples, dorsal aorta, and heart were collected for histopathological study and biochemical analysis after treatment.

Result
The results showed that dapagliflozin provided cardioprotective benefits and regulated the hemodynamic parameter's function, tail skin temperature, and deep body temperature through attenuated inflammation and oxidative stress during euglycemia and hyperglycemia in LPS-induced septic rats. In conclusion, our results showed that dapagliflozin prevents LPS-induced cardiovascular and inflammatory complications and body temperature alterations in diabetic and non-diabetic rat models.

Conclusion
In conclusion, our results showed that dapagliflozin prevents LPS-induced cardiovascular and inflammatory complications and body temperature alterations in the diabetic and non-diabetic rat model.

201904

Investigation of protective effect of Wheatgrass (Triticum aestivum) powder against Cisplatin induced nephrotoxicity in rats

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Background
Cisplatin (CP) is a most potent chemotherapeutic agent; however, CP causes nephrotoxicity that limits its therapeutic utility. Wheatgrass (WG) is a strong antioxidant and potent detoxifying herb that has not only been studied for anticancer activity but also for efficacy and safety when combined with anticancer drugs. This study investigated the efficacy of WG against CP-induced nephrotoxicity. Male Wistar rats were divided into five groups of six rats in each: (1) normal control (NC), (2) CP-treated (7.5 mg/kg) as positive control (PC), (3) WG-200 mg/kg alone, and (4) CP with WG-100, and (5) CP with WG-200 mg/kg groups. Hydro-alcoholic extract of WG was administered orally to the animals for two weeks, and CP was administered intraperitoneally to the respective groups on the 10th day to induce nephrotoxicity. Blood samples were collected for renal function and kidneys for histological examination and quantification of apoptosis markers, pro-inflammatory cytokines and oxidative stress. CP-induced nephrotoxicity was apparent from histological damage and increased levels of blood urea nitrogen (BUN), serum creatinine (Cr) and uric acid (UA). CP also caused an increase in malondialdehyde (MDA) and decreased superoxide dismutase (SOD), glutathione (GSH), catalase (CAT) activities and led to up-regulation of pro-inflammatory cytokines and apoptosis markers. WG caused a significant decrease in Cr, BUN, UA, MDA and increase in GSH, SOD and CAT activities. WG ameliorated histological damage and led to a reversal of cytokines and apoptosis markers. Both doses of WG effectively ameliorated CP-induced nephrotoxicity; thus, during chemotherapy, WG could be a promising adjunct to CP.
Keywords: Wheatgrass, Triticum aestivum, cisplatin, nephrotoxicity, cytokine, apoptosis, antioxidant

Method
2.1. Drugs and chemicals
WG powder was purchased from Patanjali Ayurved Ltd., India, which is the main cultivator, producer, and exporter of WG (Figure 1). Renal function estimation kits for blood urea nitrogen, uric acid, and creatinine (BUN, UA, and Cr, respectively) were obtained from Randox (UK). The enzyme-linked immunosorbent assay (ELISA) kits TNF-α, IL-1β, IL-6, and caspases-9 and -3 were purchased from Abcam (UK). CP (CAS# 15663-27-1) was purchased from Sigma (St Louis, USA). Other chemicals of analytical grade were obtained from local suppliers.

2.2. Extract Preparation
WG powder (100 gm) was subject to Soxholet extraction with 350 ml of hydro-alcoholic solvent (30:70) for 72 h. The solvent extract was then evaporated to dryness under reduced pressure. The resulting dried extract (8.2% w/w) was stored at less than 4 °C until further use.

2.3. Animals
Male Wistar rats (200–250 g) were obtained from Jazan University Medical Research Center, Kingdom of Saudi Arabia (KSA) and transferred to the animal house of college of pharmacy for adaptation. For adaptation and experimentation, ideal lab conditions such as regulated room temperature of 22 ± 3 °C, humidity 50% - 60%, and 12-h dark/light cycle, were consistently maintained. Animals were provided free access to standard autoclaved food and drinking water. The study protocol was approved by Jazan University Scientific Research Committee (approval no. REC-43/06/112).

2.4. Experimental design
Animals were randomly allocated to five groups, each consisting of six rats: (1) Group 1, normal control (NC), receiving only distilled water; (2) Group 2, nephrotoxic positive control (PC) receiving distilled water for two weeks followed by CP 7.5 mg/kg; (3) Group 3, WG-200 mg/kg; (4) Group 4, WG-100+CP; and (5) Group 5, WG-200+CP. The WG extract was suspended in distilled water and administered via an oral route, once daily for 14 days. To induce nephrotoxicity 1 ml/ 100 gm doses of CP were prepared by mixing the CP in 5% dimethyl sulfoxide (DMSO)-saline and administered on the tenth day via i.p. route (Hassan et al. 2014).

2.5. Sample collection and preparation of tissue homogenate

201503

Cytotoxic Activity of Thymus Capitatus Leaves and Stem collected from Hail region with mechanistic study via induction of Caspase-dependent apoptosis and S-phase arrest

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Background
Thymus Capitatus is a plant grows in Mediterranean area and some Arab countries such as Saudi Arabia. It possesses numerous medicinal values. Its common name is Zaatar, and it belongs to family Lamiaceae

Method
Thymus Capitatus leaves, and stem were collected from Hail region, Saudi Arabia. It was extracted by ethanol and then the obtained extract was investigated on different cancer cell lines such as HepG2, A549, HCT116 and MCF7. Cytotoxic activity of each extract was assessed by Sulforhodamine-B (SRB) method against standard Doxorubicin and the relevant half

maximal inhibitory concentration (IC50) values were computed for each cell line by MTT assay. Further mechanistic study was carried out by using Apoptosis assay

Result
Thymus Capitatus leaves' extract showed high cytotoxic activity against both A549 and HepG2 cancer cells with relevant IC50 values equal to 13.6 and 21.5µg/ml, respectively. Stem's extract exerted high cytotoxic activity against only A549 cancer cells with relevant IC50 value equals to 21.38 µg/ml. Mechanistic study carried out on A549 cancer cells showed that each extract resulted in arrest of cancer cell S-phase and caused apoptosis through activation of caspase-3, p53 and Bax proteins.

Conclusion
Thymus capitatus leaves' extract possess high cytotoxic activity against A549 and HepG2 cancer cells, while that of stem has high activity against only A549 cancer cells. This activity was explained through cancer cell S-phase arrest and cell apoptosis via activation of caspase-3, p53 and Bax proteins

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201508

POLYMERIC-DRUG DELIVERY SYSTEMS FOR REDUCING PACLITAXEL-ASSOCIATED ADVERSE DRUG EVENTS

Hussah Albehaijan

Background
Cancer is the world›s second leading cause of mortality, after only cardiovascular illnesses. Chemotherapy is the most common treatment used against most types of tumors. Paclitaxel is among the highly researched medications that prevent cancer cell growth and proliferation. However, there are many challenges that limit the use of Paclitaxel, such as its poor aqueous solubility; thus, it is delivered as a micellular formulation in Cremophor EL as a vehicle causes hypersensitivity reactions in many cases. This project studied a sample of 41-cancer patients who were treated with Cremophor EL-based Paclitaxel and developed adverse drug reactions in JHAH. The results of this study indicate the studied patients' parameters, which are the patient weight, height, BMI, BSA and the serum creatine levels are insignificant factors in determining the Paclitaxel unit-dose; Thus, they cannot be considered as factors that we can modify to avoid Paclitaxel-associated adverse events. Other patients' parameters, such as serum glucose levels and the number of chemotherapy cycle can be considered in future research.

Method
This project studied a sample of 41-cancer patients who were treated with Cremophor EL-based Paclitaxel and developed adverse drug reactions in JHAH. Different statistical and graphical methods were used to determine the significant factors that impact the Paclitaxel unit-dose, including screening test, half-normal probability plot, and scatterplot matrix.

Result
It was found that the patients' body weight, height, BMI, BSA and serum creatine levels are unreliable predictors of Paclitaxel unit-dose, and they have insignificant impact. The study›s second aim was to develop a predictive model of the impact of the studied patient's parameters on Paclitaxel-unit. However, that was not achievable as none of the studied patients' parameters was a significant factor that can potentially impact the Paclitaxel-unit does. Those findings were not consistent with other prospective studies in the literature, which confirmed that increasing BMI can increase Paclitaxel-associated toxicity.

Conclusion
The generalizability of these results is subject to certain limitations. For instance, it is unfortunate that the study did not include more specific patients' parameters such as the patient serum glucose levels, and the hepatic function, which may impact on the Paclitaxel clearance, thus the unit-dose. In addition, 22% of the patients who were under study were obese patients, however, the impact of the BMI of those patients on the Paclitaxel-unit does was not investigated. Furthermore, this is study was limited by the small sample size and the research time limitations.

201506

Correlation between the Structure and the New Anti-Cancer Activity of Some Antioxidants after Modification of Their Chemical Structure by A Simple Synthesis Method; Does the Evidence Support This Relationship?

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Background
Structure-Activity Relationship is the field of medicinal chemistry has evolved from an emphasis on the synthesis, and characterization of drugs to an increased awareness of the biochemistry of disease states and the design of drugs for the prevention of diseases. An important aspect of medicinal chemistry has been to establish a relationship between chemical structure and biological activity. More discussion in recent years has been about correlating the chemical structure with chemical reactivity, and these correlations can then be related to their medicinal properties, which is exactly what we are looking for.

Method
We developed new structural methods in order to alter the basic structure of different types of scaffolds, which already present in the structure of some antioxidants (Hydroquinone, Diphenylamine and Ascorbic acid) to new derivatives in an attempt to demonstrate that their biological effects as an antioxidant will change due to this transformation. In addition, we discussed the effect of these drugs as anticancer (based on the SRB assay), in an attempt to discover other biological effects that may be associated with the changes of these substances after the transformation of their chemical structures.

Result
Compound 2C showed the highest cytotoxicity (with IC50 value of 1.2 µM) against lung cancer cell lines (A549) compared to other derivatives where 1C showed good cytotoxicity (with IC50 value of 87.66 µM) against the same cell line. In addition, compound 2C showed good cytotoxicity against the other three cell lines tested (Colorectal Cancer with IC50 value of 5.049 µM, Breast Adenocarcinoma with IC50 value of 6.26 µM, & Hepatocellular carcinoma with IC50 value of 9.71 µM).

Conclusion
These results indicated that 1C could be a potential key compound for developing a new lung cancer drug after its former chemical structure as an antioxidant has already been altered.

201528

Effect of Agmatine on Non-Alcoholic Fatty Liver Disease Induced by Type 2 Diabetes in Rats

Samar Miski, Mai Abdel Alim, Ahmad Esmat

Background
The present study was designed to investigate the hepatoprotective effects of agmatine (AGM) in Type 2 diabetes mellitus (T2DM)-induced Non-alcoholic fatty liver disease (NAFLD) versus silymarin in rats and its potential mechanisms of action.

Method
Forty male Wistar rats were used and divided into five groups: Control (Group1), streptozotocin (STZ) (diabetic)(Group2), STZ + low dose of AGM (40 mg/kg/d) (Group 3), STZ + high dose of AGM (80 mg/kg/d) (Group 4), and STZ + silymarin (100 mg/kg/d) (Group 5). The diabetic model was induced by feeding rats with 10% fructose in groups (2,3,4,5) for 12 weeks, then injecting rats with a single dose of STZ (40 mg/kg/IP). Fasting blood glucose (FBG), serum insulin & leptin levels were determined. In addition, serum levels of hepatic biomarkers & lipid profiles were measured. The underlying mechanisms were assessed by determining the oxidative stress & the inflammatory biomarkers in liver homogenates. Moreover, the concentration of Janus kinase (JAK-2), phosphorylated signal transducer and activator of transcription (STAT3), and phosphorylated AMP-activated protein kinase (p-AMPK) were also investigated.

Result
The results obtained demonstrated that the higher dose of AGM and silymarin significantly improved levels of FBG, insulin & leptin, liver function biomarkers, and lipid profiles in the STZ group compared to the control group. Additionally, oxidative stress was alleviated and the expression of proinflammatory cytokines TNF- and IL6 were significantly inhibited by AGM. Furthermore, the protein expression of JAK2, and p-STAT3 were also significantly reduced. However, the hepatic AMPK pathway was significantly activated. Moreover, AGM improved histopathological changes in liver tissues compared to the STZ group.

Conclusion
From the data obtained in the current study, it can be concluded that AGM could prevent NAFLD induced by T2DM which would open a new horizon in the understanding of the molecular mechanisms of the disease and enable the development of new approaches in treatment and prevention of the disease.

201535

Neonatal Expression of the GPR12 Receptors in Rat Model of Prenatal Hypoxia

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Background
Neonatal Hypoxic Ischemia (HI) is asphyxia of the umbilical blood supply to the human fetus at 36 gestational weeks or later. Prenatal period is one of the crucial periods for the neonatal brain formation. G-protein coupled receptors (GPCRs) are known to be the main target for several drugs that can control some central nervous system diseases. One of the highly expressed GPCRs in the CNS is G-Protein coupled receptor 12 (GPR12), and it plays a role in neuronal development, differentiation, and synaptic and neurite formation. Thus, the need to study the involvement of GPR12 in the pathophysiology of prenatal hypoxia is crucial. This study aims to assess the effect of prenatal hypoxia in the expression of GPR12 in neonatal rats.

Method
Four E18 pregnant Sprague Dawley rats were divided into HI and sham groups. Transient systemic hypoxia-ischemia was induced in the HI group. The sham group was exposed to the same procedure without uterine arteries occlusion. After normal delivery of the pup, samples were collected, and histopathological examination was done to examine the brain tissue. Protein expression of GPR12 and Glial Fibrillary Acidic Protein (GFAP) in the brains of neonatal rats was measured using immunohistochemistry. The difference between the groups was analyzed using Student's T-test.

Result
Levels of GPR12 in the cerebral cortex were decreased in the HI group compared to the sham group, while GFAP levels were increased in the HI group compared to the sham group.

Conclusion
GPR12 plays a role in neurite outgrowth, and as prenatal hypoxia resulted in impaired neurotransmitter circuits and synaptic plasticity in the brain cortex, the reduction of GPR12 expression might indicate the involvement of GPR12 in the pathogenesis of HI complications. Hence, GPR12 can be used as a research tool and potentially developed into a target for therapeutic agents with a new mechanism of action.

201567

Therapeutic Drug Monitoring Utilizing Dried Blood Spots for the Quantification of the Antipsychotic drugs; Aripiprazole, Quetiapine, Olanzapine with antidepressant drugs; Paroxetine, Escitalopram and Sertraline

Bushra Alquadeib, Nouf M. Aloudah

Background
Antipsychotic drugs, such as aripiprazole, quetiapine, and olanzapine, while antidepressant drugs such as paroxetine, Escitalopram, and sertraline, can be used simultaneously for treating behavioral disorders. Therapeutic drug monitoring is essential to reduce the rate of inpatient admission, suicide rate, and the expense of treatment.

Method
The drugs were taken from finger pricks as dried blood spots (DBS) and examined using an ultra-high-performance liquid chromatography-tandem mass spectrometry utilizing a C18-BEH reverse-phase column with a mobile phase made up of gradient elution ammonium acetate/acetic acid in water with acetonitrile: methanol. The test was approved in accordance with accepted standards for bioanalytical procedures (USP and the ICH guidelines).

Result
correlation coefficient (r) > 0.992. The intra- and inter-day precision values for the tested medications satisfy the regulatory requirements› acceptance criteria. During the stability studies, the tested medications remained stable at 25 °C ambient temperature, 2-8 °C in the refrigerator, 10 °C in an autosampler, freeze/thaw cycles, and 30 days of storage, and at 45 °C in the freezer.

Conclusion
This method has successfully completed all validation requirements in accordance with EMA and FDA guidelines, and it can be successfully applied for therapeutic drug monitoring studies for the antidepressant drugs paroxetine, escitalopram, and sertraline, as well as the antipsychotic drugs aripiprazole, quetiapine, and olanzapine.

201561

Quantitative Estimation of Hydroquinone in Selected Skin –lightening Creams Sold at Local Markets in Hail Region

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Background
Skin whitening creams & products (SL) contain certain dangerous chemicals such as mercury, steroids such as; Clobetasol propionate, hydroquinone (HQ), and a host of others that have negative health implications. The use of SL agents is associated with harmful effects such as skin disorders like depigmentation, rashes, pimples, discolorations, kidney damage, cancers, neurological and psychiatric disorders depending on how the agents for SL are used. The present study aim was to determine the presence of the HQ in the SL creams (locally mixed) that are sold in Hail city-Market.

Method
The determination of the HQ in the SL creams was carried out by using UV Spectroscopy. The pH of the cream samples was measured using a pH meter, also organoleptic properties were evaluated.

Result
This study indicated the presence of HQ in all creams in the range between 3.25 ± 0.016 - 7.105 ± 0.076 except in cream-8 and cream-10. The lower % was found in cream-5 and the higher % was in a cream-3. The pH of all formulations was found to be between 2.92 ± 0.075 and 10.04 ± 0.06. The evaluation of creams products in this study revealed that creams have a uniform color; there was no distinct or pungent odor. There were two products only cream-4 and cream-6 have phase separation, the creams have different colors.

Conclusion
The SL creams or products may contain HQ even if the label doesn't indicate the presence of these compounds. More stringent control of the use and distribution of such products to prevent possible long-term adverse effects. With the continuous use of these products without control will lead to complicated side effects not only on the skin but overall body systems.

201848

Ticks as a Potential Carrier for Antimicrobial Resistant Bacteria

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Background
Tick-borne diseases are important public health problems in the world. These emerging infectious diseases are difficult to control because of tick populations and the inability to detect the infections they transmit. Antimicrobial resistance (AMR) is one of the most serious public health threats today, which has been accelerated by the overuse and misuse of antimicrobial agents. Understanding the elements involved in the emergence and transmission of resistance as well as the ways of counteracting such resistance, requires then integrated approaches. This study is the first to investigate hard tick's role as a potential reservoir for AMR pathogens. The study aims to isolate bacteria from camels' tick within Saudi Arabia to further identify these bacteria and determine the antimicrobial susceptibilities for these isolates.

Method
Eighty-four ticks were collected from dromedary camels and classified as Hyalomma dromedarii hard ticks according to the external morphology. Ticks were then homogenized and plated according to different microbiological methods.

Result
A total of 55 bacteria were isolated from the hard ticks. About 71% of the total isolates were identified as Gram-positive bacteria with 11 different species, while 29% of the total isolates were Gram-negative bacteria with 9 different species. The most prevalent isolated organisms within the total samples were staphylococcus lentus (13%), followed by staphylococcus pseudintermedius (10.7%) and Sphingomonas paucimobilis (9.5%). Antimicrobial susceptibility test of the isolates indicates the presence of significant levels of resistance to majority of the human useful antimicrobial agents. About 25% of the Gram-negative and 49% of the Gram-positive bacterial species showed resistance to 3 or more different classes of antimicrobials.

Conclusion
This study findings will help to increase awareness of the tick-borne pathogens and to create policies toward optimum usage of antimicrobial agents for both animal and human health.

201826

Detection and assessment of drug-herbal interactions: SFDA Experience

Waad Alghamdi, Fawaz Alharbi, Nouf Alfadel

Background
Drug interaction is a clinical phenomenon where the therapeutic action could be either exaggerated, diminished or turned into a toxic effect due to the co-administration of another substance. A general perception of safety and efficacy of herbal medicine compared to conventional medicine exists, and little is known about drug-herbal interactions. The Saudi Food and Drug authority (SFDA) established the Drug-Herbal Interaction Project to detect and assess drug-herbal interactions

Method
(1) A list of SFDA registered herbal products were selected and prioritized based on commonly used herbs globally and locally. (2) Reported drug-herbal interactions were retrieved from the World Health Organization (WHO) global database of individual case safety reports (VigiBase), AdisInsight and Natural Medicines database. (3) Reported cases were assessed; labeled & documented interactions in the drug and herbal label were excluded. (4) Literature search for published evidence pertaining the reported drug-herbal interaction signals was performed. (5) An extensive safety evaluation for potential interactions including published evidence in PubMed, Cochrane and google scholar was performed. The Drug Interaction Probability Scale (DIPS) was used to assess the probability of a causal relationship between the potential drug interactions and the events. The project was performed from January to October 2021.

Result
(1) A total of 20 herbal products were screened for drug interaction signals. (2) The screening of reported drug-herbal interactions through several sourced of evidence; VigiBase, Natural Medicine, and AdisInsight yielded 517 drug-herbal interaction signals.(3) The assessment resulted in recommendations to update 15 Saudi product information (PI) for herbal products (n=7) and medicinal products (n=8). (4) Signals detected from > 1 source of evidence were 160 potential interactions, out of that number, 40 drug-herbal interaction had published evidence and were set for extensive evaluation. (5) The extensive review found;19 possibly related (47.5%), 9 probably related (22.5%) and 12 doubtful relation (30%). Upon the extensive review, label update was recommended for the probably related events; Turmeric-Tacrolimus, Etoposide-Echinacea, Flaxseed-Warfarin, Flaxseed-clopidogrel, Ginkgo Biloba-Ibuprofen, Green Tea-warfarin, Licorice-thiazides.

Conclusion
The drug-herbal interaction project in SFDA successfully improved screening and identification of potential drug-herbal interactions. The process of this project can be used in post-marketing activities to identify any potential drug interactions.

201825

Flaxseed Interaction with Clopidogrel and Warfarin and Potential Risk of Bleeding

Waad Alghamdi, Fawaz Alharbi, Nouf Alfadel

Background
Flaxseed (Linum usitatissimum) is herbal product, which contains approximately 55% alpha?linolenic acid (ALA). It is commonly used to improve digestive health or relieve constipation. Some studies suggest that flaxseed can decrease platelet aggregation and increase bleeding time.

Method
We conducted a systematic search in Embase, Cochrane, PubMed, and Google Scholar. Also, a search was also performed in Adis Insight database, and the Natural Medicines Database. The search included published articles from inception to February 2022. Moreover, a search in the World Health Organization (WHO) database (VigiBase) was conducted on February 2022 to retrieve all reported cases worldwide of potential drug-herbal interaction of flaxseed with Clopidogrel and flaxseed with Warfarin. The assessment of interaction was performed by using the Drug Interaction Probability Scale (DIPs) tool.

Result
We found two published cases of flaxseed interaction reported with warfarin and clopidogrel. The first case report was for clopidogrel and flaxseed interaction. A positive re-challenge was found between flaxseed oil and bruising intensity while taking clopidogrel. The second case described a warfarin and flaxseed interaction that resulted in an increase in international normalized ratio (INR) readings. The probability of interaction using the DIPS scale is probable for both cases. For the global cases retrieved from WHO database, one case was the same published case for clopidogrel interaction with flaxseed. While the other global case for a 49 years old male who was on warfarin for heart valve replacement. Concomitant products include flaxseed, ascorbic acid and multivitamins. The interaction resulted in INR fluctuations.

Conclusion
The available evidence shows a possible pharmacodynamics interaction between flaxseed with warfarin and flaxseed with clopidogrel. Further assessment by well-designed pharmacoepidemiological studies is needed.

201818

Potential Antigenic Candidates for the Development of Peptide-Based Vaccines to Induce Immunization against Helicobacter pylori Infection in BALB/c Mice

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Background
Helicobacter pylori (H. pylori) has been identified as a group-1 definite carcinogen. As of yet, there is no available vaccine for this microorganism. Our study aimed to identify antigenic peptides in H. pylori using an in silico proteomic approach and to evaluate their effectiveness as potential vaccine candidates.

Method
Four peptide sequences were prioritized using reverse vaccinology, namely, CagA1, CagA2, VacA, and SabA. Peptides emulsified with Freunde's adjuvant were used to immunize BALB/C mice. Subcutaneously immunized mice were challenged by oral administration of H. pylori. IgG, IgA, IL4, and IL17 were detected in mice sera. Histopathology of the dissected stomach of vaccinated and control mice were assessed using H&E stain.

Result
IgG was significantly higher in mice vaccinated with SabA. IL-4 was increased considerably in CagA1, CagA2, VacA, and SabA-vaccinated mice compared to the adjuvant group. Additionally, histopathological examination of gastric tissue showed a protective effect in the vaccinated groups compared to adjuvant and PBS groups.

Conclusion
Our findings indicate a promising effect of the tested epitopes, particularly the SabA antigen, to induce an immune response against H. pylori.

201801

Biomaterial based hydrogel films for wound dressings

Wajdi Organji, Salwa alzamzami

Background
The essential oils and plant extracts have shown remarkable antimicrobial and wound healing efficiency. With increase in antibiotic resistance, the uses of essential oils as well as plant extracts have again attracted the interests of researchers. Nanoparticles show outstanding performance in treatment of several chronic diseases and infections, due to their high surface: volume ratio. The advent of nanotechnology and introduction of "Green Chemistry" have also made great impact on research in all areas, including medicine and pharmacy. In the present research we have developed nanocomposite hydrogel films using natural products, i.e., Chitosan (CH), Cinnamaldehyde (CIN), Eucalyptus oil (EO), and enriched with silver nanoparticles (NP) biosynthesized in Moringa oleifera leaves' extract (MLE). The possibility of using these hydrogel films as wound dressings has been explored.

Method
Hydrogel films were prepared by simple blending of the components: CH, CIN, EO and NP in MLE. The films were characterized by SEM, FTIR, TGA, swelling studies (in water, phosphate-buffered saline; PBS and simulated wound fluid; SWF), biodegradation analysis, antibacterial behavior, and wound healing study on male wistar rats. The expression of wound related genes and biochemical profile of rats was also determined.

Result
The hydrogel films were found to be homogenous, foldable, and biodegradable under soil. The films were stable in water, PBS and SWF. The films showed good antibacterial behavior against E. coli (ATCC 25922) and S. aureus (ATCC 29213). EO films treated wounds healed in 18 days, which was earlier compared to Fucidin treated rat-wounds

Conclusion
"Greener", transparent, biodegradable hydrogel films were developed without using any harmful solvents, by simple synthesis strategy using natural products, through "Green Chemistry" protocol. The homogeneity of films, their good water solubility, thermally stability, biodegradability, antibacterial behavior, and wound healing efficiency indicated that the films have promising potential to be used as wound dressings.

201715

Response Surface Methodology (RSM) based optimization of ultra-sound assisted extraction method for the maximum extraction of an anthraquinone physcion from aerial parts of Senna occidentalis and analysis by HPLC-UV

Perwez Alam, Omar Noman, Rashed Herqash, Omer Almarfadi, Ali Akhtar, Ali S. Alqahtani

Background
Extraction is an essential method for isolation and identification of important chemical compounds from medicinal plants. There are several methods for medicinal plants extraction like water extraction, maceration, and solid-phase micro extraction, but these all methods are slow, costly, and inefficient. Though, in recent years many new extraction methods have been discovered particularly, ultrasound-assisted extraction (UAE) method which is

considered more efficient and has been used to extract compounds from various sources. it remains a challenge as how to optimize extraction conditions to maximize compound yields.

Method
In this research we aimed to optimize the various parameters (extraction temperature, extraction time and liquid to solid ratio) used in UAE extraction by Box–Behnken design (BBD) of response surface methodology (RSM) to get maximum yield of physcion from S. occidentalis (aerial parts) and its analysis by High-Performance Liquid Chromatography-UV (HPLC-UV) method.

Result
The optimal extraction conditions for ultrasonic extraction of physician were found as: liquid to solid ratio 20.16 mL/g, extraction temperature 52.2°C, and extraction time 46.6 min. Under these optimal conditions for extraction by ultrasonication methods, the experimental yield (% w/w) of physician was found as 2.4319 %, which agreed closely with predicted value (2.40609). The experimental value was consistent with the value predicted by RSM model, thus validating the fitness of the employed model and the success of RSM in optimizing the extraction conditions.

Conclusion
In future, this optimized ultrasonic extraction condition can be used in the maximum extraction of physician from marketed herbal supplements containing S. occidentalis as well as other Senna species.

201713

Formulation and Characterization of Sustained Release Metformin Tablets

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Background
To develop a formulation of metformin sustained release tablets with optimizing and extend medication release from tablets to increased bioavailability, patient compliance, and a reduction in side effects.

Method
The formation of granules was done by the wet granulation technique. We made three different formulations based on the percentages of HPMC that were evaluated for angle of repose, bulk density. Pharmaceutical characteristics such as weight variation, thickness, hardness, friability, drug content, disintegration time, and dissolution profile were determined.

Result
The result of granules characterization indicate that the granules have great flowability characteristics. The weight variation measured, and friability test done with a percentage of 0.34% according to USP is fair. Hardness and thickness of good formulations with average of 77.75N and 3.351mm, respectively. Disintegration time showed long duration from all formulations. Dissolution study of formulations we found that after 8 hours, the drug release reaches up to 82.6%.

Conclusion
We made three different formulations based upon different percentage of HPMC. Form pharmaceutical perspective, characterization of granules of our formulation were better than published studies and physiochemical characteristics were met the USP specifications.

201703

Evaluation of the Safety Information in "Fertility, Pregnancy and Lactation" Section of Product Information in Saudi Arabia

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Background
During the development of new medicine, pregnant and breastfeeding women are usually excluded from clinical trials. Therefore, the post-marketing data are critically important to obtain knowledge of potential risks of medications during pregnancy and lactation.

Method
The SPCs of 46 teratogenic potential medications (20 immunosuppressant agents, 13 anti-epileptics, 6 antipsychotics, and 7 antidepressants) authorized by SFDA were retrieved from the internal database at SFDA (EURS: EXTEDO Universal Review System). The information in Section 4,6 'Fertility, Pregnancy and Lactation' of included SPCs was assessed and classified as complete or incomplete information depending on whether (or not) they provided complete information regarding medicine use in pregnancy and lactation based on the available evidence.

Result
We assessed the information in the 'Fertility, Pregnancy and Lactation' section of 29 (63%) SPCs as incomplete information involving 59 subsections. There is lack of information regarding the use of medicine in pregnancy subsection in 20 SPCs, lactation subsection in 14 SPCs, fertility subsection in 15 SPCs, and women of childbearing potential subsection in 10 SPCs.

Conclusion
Important information on the use of medications during pregnancy and lactation
was lacking in the local SPCs. Further efforts are required to keep the SPCs updated with regard to post-authorization data on the exposure to medicinal products, especially during pregnancy and lactation.

201702

A promising antifibrotic drug, pyridoxamine attenuates thioacetamide-induced liver fibrosis by combating oxidative stress, advanced glycation end products, and balancing matrix metalloproteinases

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Background
Liver fibrosis is a slowly progressing, damaging process that involves the accumulation of extracellular matrix protein including collagen, in the liver that leads to liver injury and chronic liver diseases. Globally, around 1.5 billion persons have chronic liver fibrosis. This study was done to examine the effect of pyridoxamine against thioacetamide-induced hepatic fibrosis.

Method
Animals were divided into four groups (1) control group; (2) Thioacetamide group (200 mg/kg, i.p.) twice a week for eight weeks; (3) Pyridoxamine-treated group treated with pyridoxamine (100 mg/kg/day, i.p.) for eight weeks; (4) Thioacetamide and pyridoxamine group, in which pyridoxamine was given (100 mg/kg/day, i.p.) during thioacetamide injections.

Result
Thioacetamide treatment resulted in hepatic dysfunction manifested by increased serum levels of bilirubin, gamma-glutamyl transferase (GGT), alanine aminotransferase (ALT), and aspartate aminotransferase (AST). Oxidative stress was noted by increased hepatic lipid peroxidation and decreased glutathione (GSH). Increased concentrations

of total nitrite/ nitrate, advanced glycation end products (AGEs), monocyte chemoattractant protein-1 (MCP-1), tumor necrosis
factor-α (TNF-α), transforming growth factor-α (TGF-α), matrix metalloproteinases (MMP-2&9) and tissue inhibitor of metalloproteinase-1 (TIMP-1) were noticed in hepatic tissues. Immunostaining sections also revealed overexpression of MMP-2, MMP-9 and collagen IV. Liver fibrosis was confirmed by severe histopathological changes. Pyridoxamine improved the assessed parameters. Moreover, histopathological and immunohistological studies supported the ability of pyridoxamine to reduce liver fibrosis.

Conclusion
The findings of the present study provide evidence that pyridoxamine is a novel target for the treatment of liver fibrosis.

201699

Preparation and characterization of gentamycin/thymoquinone co-encapsulated polymer-lipid hybrid nanoparticles

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Background
Despite its high bactericidal activity, gentamycin (Gen) is ototoxic and nephrotoxic, with a high propensity for acquired bacterial resistance and biofilm formation. The goal of this project is to enhance the therapeutic efficacy of Gen by co-encapsulating with thymoquinone (TQ) in optimized polymer-lipid hybrid nanoparticle systems.

Method
To incorporate Gen and TQ into Polymer-lipid hybrid nanoparticles (PLN), a direct emulsification-solvent-evaporation method was used. The particle sizes and size distribution of the formed PLN were determined using a light scattering technique, and particle morphology and composition were determined using transmitted electron microscopy. A sensitive HPLC method was used to determine drug loading and entrapment efficiency. The dialysis bag technique was used to investigate the drug release profile. The antibacterial activity was tested against a variety of S. aureus resistant strains and biofilms.

Result
The prepared PLN average size ranged from 129.91.8 to 163.83.9 nm. The polydispersity index for all of the prepared formulations was in the range of 0.12 to 0.14, indicating very good particle size distribution. The values for zeta-potential were extremely low. Entrapment efficiency was above 85% in most cases. Increasing the polymer ratio resulted in smaller particle size and greater size uniformity. The TEM images of the particles revealed a uniform spherical shape and drug entrapment in the core of the particles. Both Gen and TQ demonstrated a consistent drug release profile, with Gen releasing at a faster rate than TQ.

Conclusion
The co-encapsulation of Gen and TQ into PLN was accomplished successfully using the emulsification-solvent-evaporation method. The prepared PLN exhibited distinct properties such as small particle sizes, high size uniformity, and high entrapment efficiency. The prepared system has the potential to significantly improve antibacterial activity against resistant strains of bacterial isolates and biofilms.

201698

Formulation and evaluation of Adansonia digitata fruit as suspension

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Background
Nowadays, nutraceuticals are widely used with an estimated worth of USD 117 billion globally in 2017. Adansonia digitata (AD) fruit has traditionally been used in Africa to treat dysentery and diarrhea, as well as to stimulate milk production in lactating women. AD leaves and fruit are high in polyphenols and have been shown to have cardioprotective, antioxidant, and hepatoprotective properties.

Method
Ten AD preparations were formulated using different polymers or polymers mixtures at different levels (MC, CMC, Guar, Tragacanth, and Tragacanth plus Guar. Two parameters were used to evaluate these preparations: sedimentation volumes and re-dispersibility. Complete formulae of AD suspensions were prepared by adding other excipients. In addition, some physical stability parameters such as sedimentation volume, sedimentation rate, organoleptic characteristics and pH of the suspensions were also evaluated.

Result
Methylcellulose guar mixture showed highest sedimentation volume whereas carboxymethylcellulose showed lowest one. MC, Tragacanth and Tragacanth guar mixture resulted in acceptable AD preparations which is easily redispersed. The sedimentation rates are in this order: MC>Trag> Trag+guar. AD-MC suspension showed clear supernatant and highest sedimentation rate. The result of this experiment indicated that AD has ability to absorb oil (2.76 ± 0.45 ml/g).

Conclusion
The pharmaceutical suspensions containing 400 mg/ 5 ml of AD powder was formulated. Optimum preparation was prepared using methylcellulose as suspending agent, citric acid as pH modifier and saccharine as sweetening agent. This preparation showed acceptable organoleptic features and it is easily redispersal.

201684

Euphocactoside, a New Megastigmane Glycoside from Euphorbia cactus Growing in Saudi Arabia

Hanan Aati

Background
The aerial parts, especially the latex, of Euphorbia plants are known to contain several classes of interesting secondary metabolites, such as phenolics (including ellagic acid
lactones), triterpenes, flavonoids, and coumarins, which have been found to possess several interesting bioactivities. Euphorbia cactus is known to the local populations for its curative properties for many diseases, and, in particular, the aerial parts and flowers are used as wound healing agents, to our knowledge, its detailed phytochemical profile is still lacking in the scientific literature.

Method
A phytochemical investigation of the aerial parts of Euphorbia cactus Ehrenb. ex Boiss. revealed a new megastigmane, euphocactoside, along with eleven known metabolites. Euphocactoside is the 3-O-glucoside derivative of a polyhydroxylated megastigmane showing unprecedented structural features. The structure of euphocactoside, including stereochemical details, was elucidated by extensive spectroscopic analysis based on 1D and 2D nuclear magnetic resonance (NMR) and high-resolution mass spectrometry (HR-ESIMS). The isolated compounds were

evaluated for their cytotoxic activity against three different human cancer cell lines, namely, A549 (lung), LoVo (colon), and MCF-7 (breast), using MTT assay.

Result
A phytochemical investigation on the Saudi plant E. cactus revealed a peculiar secondary metabolites profile, including triterpenoids, megastigmanes, flavonoid glycosides, ellagic acid derivatives, and a lack of diterpenoids. The new tetrahydroxylated megastigmane glucoside euphocactoside was isolated and fully characterized. This class of compounds is not unprecedented in Euphorbia plants, but it is also not very common since less than a dozen examples are reported in the literature. Euphocactoside innovates the structural diversity associated with this class of metabolites, being the first example to show a free hydroxyl group linked to one of the two geminal methyl at position 1.The antiproliferative potential previously reported for this plant can be at least in part ascribed to the triterpenoid and flavonoid glucoside content, with a significantly higher potency shown by quercetin-3-O-α-arabino-pyranoside, which is worthy of further investigation.

Conclusion
The isolated compounds showed moderate to marginal activities against all three cell lines. Perhaps, E. cactus can be used as a natural cytotoxic remedy with less side effect and interest activity against cancer.

201675

Investigation of in-vitro potential toxic metabolite formation for some selected tyrosine kinase inhibitors

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Background
Due to the adverse effects of an established drugs molecules it is very much necessary to modify the chemical structures of those drugs to overcome the toxicity issues without affecting the biological activity. It has been reported that, number of tyrosine kinase inhibitors (TKIs) such as infigratinib, olmutinib, entrectinib, avitinib, saracatinib, ponatinib, naquotinib, masitinib, flumatinib, imatinib, dasatinib, tandutinib, adavosertib and nintedanib having piperazine moiety in the side chain cause the toxicity. Therefore, number of investigations were performed to see the reactive metabolites formation (in-vivo / in-vitro) of such TKIs. As it is well known that N-oxide formation is one of the most important phase-I metabolites for a drug containing nitrogen molecules, we herein, imatinib and dasatinib were chemically modified to imatinib N-oxide and dasatinib N-oxide and in-vitro metabolic profiling were evaluated to see whether they form reactive metabolites or not.

Method
Chemical modification of tyrosine kinase inhibitors (TKIs) imatinib and dasatinib were performed and two imatinib-, and dasatinib N-oxide were obtained. Structures of both N-oxides were confirmed using various spectrometric (IR, Mass and NMR) data analysis. Metabolic profiling and the possibilities to form reactive metabolites using three trapping agents (KCN, MeONH2, Glutathione) have been studies for those TKIs' and their synthesized N-oxides' in rat liver microsomes (RLMs). Identification and characterization of metabolites/reactive metabolites were performed using Agilent 6320 Ion-Trap mass spectrometry

Result
In brief, (i) Imatinib produced four hydroxy metabolites; (ii) Imatinib N-oxides produced two dihydroxy metabolites; (iii) dasatinib produced four hydroxy metabolites & two dihydroxy metabolites; and (iv) dasatinib N-oxides produced four hydroxy metabolites & two dihydroxy metabolites, respectively. It is our surprised that, no reactive metabolites were observed for both TKIs and their corresponding N-oxides in presence on KCN

Conclusion
Therefore, it can be concluded that the piperazine ring in imatinib and dasatinib structures may not be responsible for its toxicity.

201674

Isolation and Characterization of Two Chalcone Derivatives with Anti-Hepatitis B Virus Activity from the Endemic Socotraen Dracaena cinnabari (Dragon's Blood Tree)

Ramzi Mothana, Ahmed Arbab , Ali ElGamal, Mohammad Parvez and Mohammed Al-Dosari

Background
Hepatitis B virus (HBV) infection is prevalent and continues to be a global health concern. In this study, we determined the anti-hepatitis B virus (HBV) potential of the Socotra-endemic medicinal plant Dracaena cinnabari and isolated and characterized the responsible constituents.

Method
A bioassay-guided fractionation using different chromatographic techniques of the methanolic extract of D. cinnabari led to the isolation of two chalcone derivatives. The structure elucidation was carried out using a variety of spectroscopic techniques, including 1H-, 13C-, and 2D-NMR. The compounds were first evaluated for cytotoxicity on HepG2.2.15 cells and 50% cytotoxicity concentration (CC50) values were determined. They were then evaluated for anti-HBV activity against HepG2.2.15 cells by assessing the suppression of HBsAg and HBeAg production in the culture supernatants and their half maximum inhibitory concentration (IC50) and therapeutic index (TI) values were determined.

Result
The isolated compounds were identifying as these derivatives were identified as 2,4'-dihydroxy-4-methoxydihydrochalcone (compound 1) and 2,4'-dihydroxy-4-methoxyhydrochalcone (compound 2). Both compounds were isolated for the first time from the red resin (dragon's blood) of D. cinnabari. Compounds 1 and 2 indicated inhibition of HBsAg production in a dose- and time-dependent manner with IC50 values of 20.56 and 6.36 µg/mL, respectively.

Conclusion
In conclusion, the findings of this investigation revealed that D. cinnabari is a valuable source of potential medicinal chemicals for the treatment of hepatitis B. Two anti-hepatitis B chalcone derivatives, were isolated for the first time from this plant using bioassay guided fractionation. These findings support the hypothesis that medicinal plants can be a good source of potential antiviral medicines. Based on the current findings, D. cinnabari will be chosen for future examination with the hope of discovering novel naturally occurring bioactive chemicals. Further research is required to verify the results and explain the mode of their antiviral actions.

201599

Post-approval quality-related regulatory actions for biopharmaceuticals approved in the European Union and the United States between 1995 and 2019

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Background
The quality of biopharmaceuticals is carefully monitored by manufacturers and regulators to ensure safety and efficacy throughout the entire product life cycle. Quality defects

can lead to post-approval regulatory actions (RAs) to inform healthcare professionals (HCPs).

Method
We conducted a retrospective analysis to determine the type (letters, recalls, market withdrawal), content, frequency and timing of quality-related RAs for recombinant DNA biopharmaceuticals that had been approved in the EU and the US between January 1995 and December 2019, from their market authorization date up to August 2021.

Result
We identified 67 quality-related RAs for 41 (12.5%) of the 324 biopharmaceuticals, all for originators and none for biosimilars. Two-third were letters that had been mainly issued for manufacturing issues, such as good manufacturing practice deviations that affected the product in general, and one-third were recalls that had been mainly issued for specification issues, such as particulate matters that affected specific batches. The type of actions that had to be taken by healthcare professionals (HCPs) depended on the nature of the quality defects. Regulatory letters often specify actions such as restrict, monitor, switch, and inform at patient level, whereas regulatory recalls often specify HCP actions such as check, handle and recall at product level – all to avoid negative implications for patient care.

Conclusion
Manufacturers and regulators should continue efforts that reduce the occurrence of any quality defects that may impact patient care. Further studies are needed to assess the effectiveness and impact of the recommended HCP actions on clinical practice and patient care.

201592

Central Composite Optimization of Glycerosomes for the Enhanced Oral Bioavailability and Brain Delivery of Quetiapine Fumarate

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Background
This study aimed to formulate and statistically optimize glycerosomal formulations of Quetiapine fumarate (QTF) to increase its oral bioavailability and enhance its brain delivery.

Method
The study was designed using a Central composite rotatable design using Design-Expert® software. The independent variables in the study were glycerol ٪ w/v and cholesterol ٪ w/v, while the dependent variables were vesicle size (VS), zeta potential (ZP), and entrapment efficiency percent (EE٪). The optimum formula was selected based on the highest desirability value and further characterized for DSC, XRD, TEM, in-vitro release, the effect of aging, and pharmacokinetic study.

Result
The numerical optimization process resulted in an optimum formula composed of 29.645 (w/v%) glycerol, 0.8 (w/v%) cholesterol, and 5 (w/v%) lecithin. It showed a vesicle size of 290.4 nm, zeta potential of −34.58, and entrapment efficiency of 80.85%. DSC thermogram confirmed the compatibility of the drug with the ingredients. XRD revealed the encapsulation of the drug in the glycerosomal nanovesicles. TEM image revealed spherical vesicles with no aggregates. Additionally, it showed enhanced drug release when compared to a drug suspension and exhibited good stability for one month. Moreover, it showed higher brain Cmax, AUC0−24, and AUC0−≥ and plasma AUC0−24 and AUC0−≥ in comparison to drug suspension. It showed brain and plasma bioavailability enhancement of 153.15 and 179.85%, respectively, compared to the drug suspension.

Conclusion
The optimum glycerosomal formula may be regarded as a promising carrier to enhance the oral bioavailability and brain delivery of Quetiapine fumarate.

201500

Boron-dopped ZnO Nanoparticles for proton capture therapy and oxidative stress-mediated cytotoxicity in skov3

Ashwag Abahussain, Aliyah Almoman, Nasser Alsaleh

Background
Despite recent advances in tumor treatment, metastasis and tumor recurrence continue to be important obstacles to the full recovery of many cancer patients. After treatment, dormant tumor cells within body are capable of re-entering the cell cycle. The study of born-zinc oxide nanoparticles (B-ZnO NPs) is crucial because ZnO NPs have advantageous features for utilization as potential anti-tumor agents. When a stable boron isotope (boron-10) of the reagent is hit by a beam of neutrons in the cancer cells, it captures neutrons, which causes a nuclear reaction and creation of energetic helium (alpha particle) and lithi-um nuclei. The nuclei deposit their energy within the tumor cell, causing damage and cell death. Thus, B-ZnO NPs could be of significance in decreasing the percentage of vital cells

Method
Hydrothermal synthesis neutron irradiation was utilized to produce Boron-doped ZnO nanoparticle powders. NPs was then fully characterized. Cell lines SKOV3 and A950 cells were used for cytotoxicity assay studies.

Result
The key finding of characterization study was that B-doping increased the band gap energy of ZnO nanoparticles (from 3.2 eV to 3.63 eV for B-doped ZnO).
B-doping enhanced the cytotoxic and oxidative response of ZnO nanoparticles in HEK ,SKOV3,A549 cells. The wide electronic band gap structures of metal oxides nanoparticles with the redox potentials of different ROS generation reactions have also been proposed. Recent studies suggested has been done on the role of the electronic band gap behavior of metal-oxide nanoparticles in ROS mediated toxicity
Cell viability of A549 cells declined about 30%, whereas the vitality of SKOV3 cells dropped to about 60%

Conclusion
The study demonstrated that irradiation could inhibit cell proliferation following uptake of boron B- ZnO NPs. B- ZnO NPs were able to promote cell death in irradiation-resistant, senescent tumor cells. Our findings could be of a significance in future neutron capture therapy experiments.

201497

Protective Effect of Paeonol against Methotrexate-Induced Hepatotoxicity by Modulating Oxidative Stress, Inflammation, Apoptosis, and Drug Efflux Transporters P-gp and Mrp-2

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Background
Hepatotoxicity is one of the limiting factors for using methotrexate (MTX) as an anticancer chemotherapeutic. It has been known that oxidative stress and inflammation have been implicated in the pathogenesis of MTX hepatotoxicity. On

the other hand, paeonol, a natural phenolic compound, has antioxidant and anti-inflammatory properties. Therefore, the present study aims to explore the protective effect of paeonol against MTX hepatotoxicity in rats and the mechanisms involved.

Method
Paeonol was administered orally (100 mg/kg), alone or plus MTX, for ten days. Induction of hepatotoxicity was via a single intraperitoneal injection of MTX at a dose of 20 mg/kg on the fifth day of the experiment.

Result
Concomitant administration of paeonol with MTX significantly enhanced distorted hepatic function and histological structure, restored hepatic oxidative stress parameters (MDA, NO, and SOD), and opposed inflammatory response (iNOS and TNF-α). Moreover, paeonol improved cell proliferation and survival, supported by upregulating proliferating cell nuclear antigen (PCNA) and repressing apoptosis and collagen fibers' disposition in rats' livers treated with MTX. Notably, paeonol upregulated drug efflux transporters P-glycoprotein (P-gp) and multidrug resistance-associated protein 2 (Mrp-2) in MTX-challenged rats.

Conclusion
Paeonol offered a protective effect against MTX hepatotoxicity via inhibiting oxidative stress, inflammation, fibrosis, and apoptosis pathways, accompanied by P-gp and Mrp-2 upregulation.

201841

PEG-PLGA-based alantolactone nanoparticles display enhanced antifibrotic activity in thioacetamide-induced liver fibrosis in mice via inhibition of toll-like receptor pathway

Nabih Althiyabi, Haifa S. Almukadi, Basma G. Eid

Background
Liver fibrosis is a major health problem worldwide due to its serious complications including cirrhosis and liver cancer. Alantolactone (ALA) is a plant-derived compound with sesquiterpene skeleton and appealing pharmacological effects including antioxidant and anti-inflammatory activities. At the molecular level, it inhibits nuclear factor-αB (NFαB). However, it suffers poor solubility and low bioavailability. The current study aimed at exploring the potential of ALA loaded on PEG-PLGA nanoparticles to prevent thioacetamide-induced liver fibrosis.

Method
Thirty mice were divided equally five groups namely: Control, Thioacetamide, Thioacetamide + Plain formula, Thioacetamide + ALA-PEG-PLGA and Thioacetamide + silymarin as a positive control.

Result
A preliminary experiment indicated that the prepared ALA-NPs had no observed acute toxicity according to the guidelines of Organization for Economic Co-operation and Development (OECD). Our data indicated that ALA nanoparticles (ALA-NPs) prevented the rise in serum activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP). This was confirmed by histological examinations using three different stains that clearly indicated preservation of liver architecture and prevention of collagen deposition. This was accompanied by antioxidation as evidenced by prevention of lipid peroxidation and exhaustion of superoxide dismutase (SOD) and catalase (CAT) activities in liver tissues. Immunohistochemical examination of liver tissues indicated that ALA-NPs prevented up-regulation of interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α) highlighting a potent anti-inflammatory activity. The antifibrotic activity of ALA-NPs was confirmed by mitigating the rise in hydroxyproline concentration as well as collagen 1a and α-SMA mRNA expression. Further, tumor growth factor-α1 (TGF-α1) expression was ameliorated by ALA-NPs. Western blot analysis indicated that the observed protective effects were associated with inhibition of TLR4, NFαB, α-SMA and MYD88.

Conclusion
ALA nanoparticles loaded on PEG-PLGA protect against thioacetamide-induced liver fibrosis in mice via inhibition of toll-like receptor pathway.

201810

Computational analysis and downregulation of SDF1/CXCR4/pAKT-1/NFαB signalling by α-hederin/cisplatin combination: mitigating the mass of Ehrlich carcinomas grown in mice

Shomokh Alsharef, Hayaa Turki Alahmari, Rehab Hakami, Hanaa Awad Alatait, Sawsan Zaitone, Dana Qindil

Background
Stromal cell-derived factor-1 (SDF-1) and its C-X-C chemokine receptor type 4 receptor (CXCR4) are significant mediators for cancer cells' proliferation, and we studied their expression in mouse Ehrlich solid tumors (ESTs). The antitumor activity of the α-hederin saponin with/without cisplatin was evaluated by measuring changes in tumor masses and the SDF1/CXCR4/pAKT signaling proteins in addition to its molecular downstream; nuclear factor kappa B (NFαB).

Method
Computational analysis was performed to give evidence on the connection between the selected signaling protein and relation to tumor proliferation. The in vivo study involved Ehrlich cancer cell line, which were diluted and injected in Swiss albino female mice and 2 bilateral masses of EST were confirmed after one week. Mice were distributed to five experimental groups; Group1: ESC control group, Group2: EST+α-hederin [80 mg/kg] group, Group3: EST+cisplatin [4 mg/kg] group and Group4: EST+α-hederin/cisplatin treated group. Medications were administered for 3 weeks. Then, mice were sacrificed, and tumors were dissected, weighed and one EST was processed for histopathological staining with hematoxylin and eosin (HE) while the second MC was frozen and processed for estimation of signaling proteins. Quantitative data were collected and checked for normal distribution by Shapiro-Wilk test and then analyzed using one-way ANOVA.

Result
Computational analysis for these target proteins interactions showed direct-ordered interactions. The dissected solid tumors revealed decreases in tumor masses (~0.5-fold) and diminished viable tumor regions with significant necrotic surrounds and reduced lympho-vascular invasions, particularly with the combination regimens. Immunohistochemistry showed reductions (~0.6-fold) in intra-tumoral NFαα in mouse group received the combination therapy. The combination treatment lowered (~0.3-0.6-fold) the SDF1/CXCR4/p-AKT proteins, as well as NFαα in ESTs compared to monotherapies.

Conclusion
α-hederin augmented the chemotherapeutic potential of cisplatin against EST. α-hederin suppressed the chemokine SDF1/CXCR4/p-AKT/NFαB signaling. Further studies are recommended to confirm the chemotherapeutic potential of α-hederin in tumor models.

201782

Vaccine Development of Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2)

Aliah Aldahash, Ibtihal Alduhaymi

Background
Scientists worldwide are currently developing more than 190 vaccines to prevent the spread of the novel severe acute respiratory syndrome coronavirus (SARS-CoV-2). Most of the vaccine development targeting the SARS-CoV-2 virus focuses on the antigen, S1-protein, because it is the virus entry channel. If the immune system recognizes the structure of S1-proteins, it is more likely to activate it and induce antibodies to neutralize the virus. Among many emergency approval vaccines that resemble the S1 protein of SARS-CoV-2 are (i) BNT162b2 (novel mRNA vaccine); and (ii) ChAdOx1-nCoV-19 (DNA vaccine). This review focuses on the mechanism of both vaccines.

Method
The research methodology used high-impact original articles, including for BNT162b2 and ChAdOx1-nCoV-19.

Result
SARS-COV-2 virus was identified via genome sequencing with further sequencing for the spike protein to be encoded in vaccine development. The current SARS-COV-2 vaccine is administered intramuscularly. The ChAdOx1 compose of an adenovirus vector to deliver the DNA encode S1, while BNT162b2 uses a lipid nanoparticle to encapsulate the mRNA encode of S1. Once the vaccine is injected, the ChAdOx1-DNA is attached to the human receptor; then, it enters via endocytosis to penetrate the nucleus. Inside the nucleus, the DNA undergoes transcription, producing mRNA that code the S1. Finally, the mRNA translates via cell machinery to produce the S1. BNT162b2-mRNA enters the cells via lipid nanoparticle fusion in the cell membrane. Then the mRNA is released and undergoes translation in the cytoplasm. For both, the S1 is degraded into fragments, presented by MHCII and binds to CD4; which stimulates interleukins, memory cells and B- lymphocytes. Finally, antibodies are produced against the specific S1 of SARS-COV-2.

Conclusion
The SARS-COV-2 vaccine developer designed the mRNA and the DNA that can carry the sequence of the S1 protein because it is the virus entry channel, which develops immunity against SARS-COV-2.

201747

Quinazoline–Sulfonamide Derivatives Induced Apoptosis in Human Leukemia Cell Lines and Perturbed Hematopoiesis in Zebrafish Embryos

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Background
Many quinazoline derivatives with pharmacological properties, such as anticancer activity, have been synthesized. Previously, fourteen quinazoline derivatives bearing a substituted sulfonamide moiety (4a–n) were synthesized and fully characterized. These compounds exhibited a promising antiproliferative activity against cell lines derived from solid tumors. Herein, the antileukemic activities of these compounds (4a–n) against two different leukemia cell lines (Jurkat acute T cell and THP-1acute monocytic) were investigated. Our investigation was also extended to explore their activity in vivo zebrafish embryo model.

Method
All the synthesized compounds were evaluated for their in vitro cytotoxic activity in Jurkat and THP-1cell lines using MTT assay. The two most active compounds 4a and 4d were then tested for their apoptosis induction using DNA content, Annexin V-FITC/PI staining, RT-PCR and western blotting. Moreover, embryonic toxicity was examined in zebrafish model.

Result
We found that compounds 4a and 4d were the most effective in inhibiting cell proliferation, with an IC50 value range of 4–6.5 µM. Flow cytometry analysis showed that both compounds arrested cells division at G2/M phase and induced apoptosis in a dose-dependent manner. Upregulation of proapoptotic and downregulating of antiapoptotic markers was also detected by RT-PCR and western blot analyses. In vivo study indicated that compound 4d was more toxic than compound 4a, with compound 4d prompting several levels of teratogenic phenotypes in zebrafish embryos at a sublethal concentration. Furthermore, both compounds disturbed the hematopoiesis process in developing zebrafish embryos.

Conclusion
Overall, our data suggest that compounds 4a and 4d could be used as antileukemic agents.

201740

PRELIMINARY PHYTOCHEMICAL INVESTIGATION OF SOME SELECTED MEDICINAL PLANTS EXTRACTS FROM QASSIM AREA, SAUDI ARABIA

Shakkeela Ahammed, Sumaia Ibrahim Alhabib, Azizah Abdallah Almutairi, Seham Gulab Alkairya

Background
The plants and its various parts were evaluated for a number of pharmacological studies like anti-microbial, anti-inflammatory and anticancer and found to have medicinal importance. Previously phytochemical evaluation carried out for the plants in other area by hot extraction. Cold extraction was carried for the first time and the plant collected from Qassim area for the first time.
Aim: The aim of our present work was to investigate the qualitative phytoconstituents present in the three plants Zygophyllum coccineum, Rosmarinus officinalis Labiatae and. Salsola imbricata Forssk by extracting the arial parts collected from Qassim area Saudi Arabia.

Method
All the plants Zygophyllum coccineum (ZCE), Rosmarinus officinalis Labiatae (ROE) and Salsola imbricata Forssk (SIE) arial parts were collected shade dried powdered and extracted with ethanol (95%) and the total ethanolic extract, ZCE, ROE and SIE were obtained. The extracts ZCE, ROE and SIE were evaluated for its phytochemical screening using standard procedure.

Result
Phytochemical screening of the three plants ZCE, ROE and SIE showed the presence of important constituents like alkaloids, glycosides, carbohydrates, phenolic, flavonoids, carbohydrate, proteins, amino acid, terpenoids, steroids and saponins.

Conclusion
Phytochemical evaluation showed the presence of the important constituents present in the ZCE, ROE and SIE. All the results for the qualitative results obtained showed the importance of the extract for further development for the anticancer research.

201730

Formulation and evaluation of Silymarin inclusion complex using TPGS as auxiliary substance

Sultan Alshehri, Sayed imam, Abdulkarim Alotaibi, Saad Alhallaf

Background
Silymarin is a flavonoid, is not water soluble. It has poor dissolution property due to its low water solubility. The goal of the ongoing research is to develop a ternary inclusion complex using silymarin-beta cyclodextrin-D-tocopheryl polyethylene glycol succinate.

Method
The solvent evaporation approach was used to produce the inclusion complex. Phase solubility study was used to calculate the complexation efficiency and stability constant. The produced inclusion complex was then tested for antioxidant activity, solid state characterization, and drug release.

Result
The dissolution results showed that prepared ternary inclusion complex showed many folds enhancement in the drug release. The surface morphology evaluated by SEM study and image shows conversion of crystalline to amorphous state. The formation of complex was depicted by IR and NMR study. The antioxidant results revealed improved activity from ternary inclusion complex than the pure silymarin.

Conclusion
The prepared ternary inclusion complex showed significant effect after addition of auxiliary substance in the formulation.

201725

Synthesis of Silver Nanoparticles Containing Saudi Medicinal Plants; Insights into Anti-Cancer and Anti-Bacterial Activity

Mohamed Zayed, Mohamed El-Zahabi, Faida Bamanie , Salah Ghareeb, Heba Alshaeri, Moudi Alasmari, Mohamed Moustafa, Zohair Al-Marzooki

Background
New quinazoline-sulfonylurea hybrids were prepared and examined for their in vivo anti-hyperglycemic activities

Method
STZ-induced hyperglycemic rats using glibenclamide as a reference drug

Result
Compounds VI-6-a, V, IV-4, VI-4-c, IV-6, VI-2-a, IV-1, and IV-2 were more potent than the reference glibenclamide. They induced significant reduction in the blood glucose levels of diabetic rats: 78.2, 73.9, 71.4, 67.3, 62, 60.7, 58.4, and 55.9%, respectively, while the reference glibenclamide had 55.4%. Compounds IV-1, VI-2-a, IV-2, V, and IV-6 showed more prolonged antidiabetic activity than glibenclamide. Moreover, molecular docking and pharmacokinetic studies were performed to examine binding modes of the prepared compounds against peroxisome proliferator-activated receptor gamma (PPARα). The highest active compounds exhibited good binding affinity with high free energy of binding against PPARα. In silico absorption, distribution, metabolism, elimination and toxicity (ADMET) studies were performed to investigate pharmacokinetics and safety of the synthesized compounds. They showed considerable human intestinal absorption with low toxicity profile

Conclusion
This study showed synthesis of a novel series of quinazoline-sulfonylurea derivatives as modified structures of glibenclamide. The synthesized compounds were ex-posed to two biological tests using in-vivo antihyperglycemic activity against STZ induced hyperglycemic rats using glibenclamide as a reference drug. The first experiment was performed to measure antidiabetic activity of the tested compounds using doses of 2 mg/kg. The second experiment was performed to examine the prolonged antidiabetic effect of the tested compounds. Compounds VI-6-a, V, IV-4, VI-4-c, IV-6, VI-2-a, IV-1, and IV-2 had better antidiabetic activity than the reference glibenclamide. Compounds IV-1, VI-2-a, IV-2, V, and IV-6 had more prolonged antidiabetic activity than glibenclamide. Molecular modeling study showed good binding affinities for the tested compounds with PPARα receptors. Additionally, in silico ADMETT studies showed promising pharmacokinetic parameters for the tested compounds.

201695

Sustainable green liquid chromatographic method for trace analysis of sulfonamides in water using a novel hydrophobic deep eutectic solvent-based dispersive liquid-liquid microextraction

Semat Alsultan, Ahmed Mostafa, Heba Shaaban, Abdulmalik Alqarni, Meshal Alghamdi, Jenan Alsaeed.

Background
The use of green analytical chemistry concepts throughout method development is becoming more popular, with the goal of using green solvents and reducing waste generated. As a result, many researchers and practitioners around the world have worked to replace harmful methods with safer alternatives. Natural deep eutectic solvents (NDESs) are an eco-friendly alternative to hazardous organic solvents.

Objectives
The aim of this study was to synthesize a thymol-based natural deep eutectic solvent and utilizing it for the first time in the trace determination of sulfonamides residues in water samples. Sample preparation and preconcentration was achieved utilizing dispersive liquid-liquid microextraction (DLLME).

Method
Two groups of hydrophobic NDESs were synthesized and tested as microextraction solvents by combining natural monoterpenes (thymol and menthol) with various acids and an alcohol. According to the findings, thymol-acetic acid combination showed the highest extraction recovery. Vortex mixing was used to disperse the extracting solvents. DLLME parameters were all optimized. Finally, method greenness was evaluated and compared to other previous methods using Analytical Eco-scale, Analytical Procedure Index (GAPI) and AGREE metric.

Result
Results revealed the method had low detection limits ranging from 0,78 ng mL1- to 3,42 ng mL1-. good linearity (5000 - 5 ng mL1-) with determination coefficients (r0,9990 < (2 was obtained. Accuracy and precision were both satisfactory, with ٪ recovery ranging from 81,3 to ٪105,2. ٪RSD were lower than ٪7,9. The proposed method was successfully applied for tracing the target analytes in various water samples. The method showed to be more eco-friendly compared to published methods.

Conclusion
The proposed method can be regarded as a valid eco-friendly alternative to the conventional hydrophobic DES-based DLLME methods for routine sulfonamide determination in various water samples.

201598

Formulation and in vitro Evaluation of Lisinopril-loaded alginate-chitosan Mucoadhesive Sustained Release Matrix Pellets

Bushra Alquadeib, Modhi Alagili, Lubna Alashri, Momamed Abass

Background
Pellets are produced by agglomerating fine powders with a binder solution. The administration of conventional oral dosage forms of Lisinopril (LIS) may exhibit a low bioavailability of around 25%, although it is highly water soluble, but has low permeability, with large inter-subject variability (6- 60%), resulting in slow absorption. Different formulation approaches such as tablets, microspheres, and nanoparticles have been developed to sustain the oral release of LIS. However, there is no study reported in the literature on the application of the conventional palletization technique for the preparation of LIS pellets as an oral delivery system.

Method
Two independent variables were examined for their effects on the properties of LIS pellets using the three levels (32) full factorial design. The evaluated independent variables were sodium alginate (X1) and chitosan solution (X2). Statistical models including main, quadratic, and interactive effects were calculated to estimate the impact of the three variables on the mean line torque of wet pellet (Nm, Y1), pellet particle size (µm, Y2), drug release percentage after 6 h (Y3) and mucoadhesive properties (Y4).

Result
Effect of SA (X1) and CS solution (X2) on the dependent variables (responses).
Experiment No. Peak torque in Nm
(Y1) pellet particle size in µm
(Y2) % LIS release after 6 h
(Y3) Mucoadhesion (zeta potential) mV
(Y4)
F1 0.985 1721 59.29 -18.17
F2 1.584 1677 64.24 -17.5
F3 0.557 1610 59.1 -22.1
F4 1.524 1731 57.8 -19.93
F5 0.674 1796 56.46 -21.67
F6 0.461 1442 53.73 -15.23
F7 1.286 1655 56.72 -19.13

Conclusion
Based on these parameters, the optimized pellet formula was selected based on the composition suggested by the statistical software, composed of 2.107% SA (X1) and 0.378% CS (X2).

Pharmaceutical Sciences

Students

201900

Effect of Pill Organizers on The Physical Characteristics of Tablet Dosage Form

Rawan Bafail, Fatima Naji, Deema Alerwi, Dina Alahmadi

Background
Adherence is one of the key factors in achieving treatment goals. One of the most common strategies to enhance adherence is using pill organizers. Our study aims to measure the effect of pill organizers on some of the physical characteristics of tablets dosage form.

Method
A questionnaire about pill organizers was conducted. Based on the responses, four types of medications which are Panadol®, Glucophage®, Clarinse®, and Amlodipine® were selected. Each medication was divided into control and experimental groups. Three different settings were applied for each group, which are at home, in car, and in bag. The medications were tested in different placements inside the organizer, separated or together. Each tablet in each group was initially examined for visual inspection, weight, hardness, and disintegration according to the USP reference standard. Final measurements of each tablet were performed after one month. The results were then calculated and statistically compared using ANOVA and two tailed t tests to the initial values.

Results
Visual inspection didn't reveal any major differences except for the bag setting which showed some staining, edge softening, and erosion. The results showed that there is no statistical difference in tablets' weight, hardness, and disintegration tests in all the three settings regardless of the placement of the tablet inside the organizers with P value of 0.346, 0.264, and 0.554, respectively.

Conclusion
Using pill organizers for storing tablets dosage form didn't show any significant impact on tablets› physical characteristics. However, it is recommended to perform more quality control tests in order to explore more about the effect of pill organizers.

201887

Development and Evaluation of PBPK Models for Metoclopramide in Healthy and Disease Populations

Khaled Alsuhaibani, Faleh Alqahtani, Sultan Almazroa, Abdullah Alruwaili

Background
Metoclopramide (MCP) acts as an anti-emetic drug that blocks dopamine D2 and serotonin 5-HT3 receptors. It has been used in several medical conditions such as the prevention of neoplastic drugs-induced nausea and vomiting, radiation, surgery as well as gastroesophageal reflux disorders. The current study aimed to develop and evaluate Physiologically Based Pharmacokinetic (PBPK) models for MCP for suggesting model-informed dosing in healthy and diseased populations.

Method
An extensive literature review was performed for the development of a model that includes both pharmacokinetic (PK) data from healthy and diseased populations. Using PK-sim®, the whole-body PBPK model was created. For model evaluation, visual predictive checks were conducted, and the ratio of observed PK parameters was compared with their predicted values (Robs/Pre).

Result
The developed model has successfully described MCP disposition following IV and oral administration in healthy, liver cirrhosis, and renal failure populations. All observed was within the predicted 95% confidence interval (CI). The PK parameters (AUC, Cmax, and CL) mean Robs/Pre and average fold error (AFE) after IV and oral MCP administration were within the allowed 2-fold error range. A significant increase in plasma concentration of MCP and decrease in clearance was observed in severe liver cirrhosis patients. Whereas more than a 50% increase in plasma concentration of MCP and a decrease in clearance was observed in end-stage renal disease (ESRD).

Conclusion
The PBPK model has been successfully used to describe the PK of MCP in healthy and diseased populations. The purpose of this study was to evaluate the underlying causes for differences in the PK of MCP in healthy and diseased populations. The model has many implications in predicting drug dosing in diseased populations i.e., liver cirrhosis and renal failure population.

201885

Development and Evaluation of PBPK Models for Ondansetron Healthy and Disease Populations

Abdullah Alruwaili, Faleh Alqahtani

Background
Ondansetron is an anti-emetic drug and works as a serotonin 5-HT3 (5-hydroxytryptamine-3) receptor antagonist. It has been given for a variety of medical illnesses, including chemotherapy, surgery, radiation, and gastroesophageal reflux disease, to avoid nausea and vomiting. The presented study employed a Physiologically Based Pharmacokinetic (PBPK) model-building approach for recommending ondansetron dosing in healthy and liver cirrhosis patients with distinct stages.

Method
A whole-body PBPK model was developed by using the PK-Sim® software platform after incorporating drug-specific and population-specific data of ondansetron in healthy and liver cirrhosis populations. The PBPK model was evaluated, by visual verification and comparing the observed/predicted ratios (Robs/pred) of the pharmacokinetic (PK) parameters such as AUC, Cmax, and Clearance

Result
The presented model was successfully developed in healthy and liver cirrhosis populations after intravenous and oral ondansetron administration. All the observed data was within the 95% confidence interval of the predictions. Moreover, the mean Robs/pred of PK parameters and average fold error (AFE) were within a 2-fold error range. Box-whisker plots were used to compare overall drug concentrations at different stages of disease severity. A significant increase in AUC was observed in severe stages of liver cirrhosis. By evaluating the developed model with the clinical PK data, model-informed ondansetron dosing in different stages of liver cirrhosis was suggested based on the drug›s altered pharmacokinetics.

Conclusion
Ondansetron PK in healthy and diseased populations has been successfully described by the developed PBPK model following IV and oral dosing. The study›s main objective was to comprehend the fundamental reasons for the variations in ondansetron PK between healthy and diseased populations. The assessed PBPK ondansetron disease model can have many implications in predicting drug dosing at various stages of disease severity.

201882

Investigating Therapeutic Benefits of Quercetin in Preclinical Mice Model of Traumatic Brain Injury upon Cigarette Smoke Exposure

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Background
Traumatic brain injury (TBI) is one of the diseases that causes a high percentage of disabilities worldwide, and it is estimated that 69 million people suffer from TBI each year. Scientific evidence reported an aberrant impact of smoking on the integrity of blood-brain barrier; therefore, in TBI patients, precipitation of other co-morbidities such as smoking may increase the risk of cerebrovascular and neurological disorders. The study is the first of its kind where we have demonstrated quercetin as a neuroprotective antioxidant compound in TBI plus smoked mice model.

Method
Male (C57BL/6) mice were divided into four groups (n=16/per group): Group A (Non-smoked + vehicle + sham), Group B (Non-smoked + vehicle + TBI), Group C (Smoked + vehicle + TBI); and Group D (Smoked + quercetin 50 mg/kg + TBI). Mice were injected (IP) daily with quercetin or vehicle and exposed to smoke or oxygen for three weeks. After 21 days, utilizing weight-drop method, TBI was induced and verified. Subsequently, all 4 groups of mice were subjected to assess locomotive and cognitive functions. Furthermore, blood and brain samples were evaluated for inflammation, oxidative stress, and apoptosis by using various techniques.

Result
Our results revealed a significant compromise of locomotive and cognitive function in smoked group and TBI group. The chronic treatment with quercetin in TBI-impacted mice group and smoked mice group ameliorated the animal mobility (open field) and learning/memory functionality (% of spontaneous alternation and % of discrimination index). In the smoked + TBI group, there were significant pathological features such as escalation of inflammation, apoptosis, and oxidative stress markers. Quercetin treatment with simultaneous smoking significantly reduced these inflammatory/apoptotic markers possibly due to anti-inflammatory, anti-apoptotic, and anti-oxidative potential

Conclusion
In the TBI model of mice pre-exposed to tobacco smoking, quercetin may have a beneficial effect on improving neurobehavioral activities. These effects are due to its anti-inflammatory, anti-apoptotic, and anti-oxidative activities

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201878

A National mRNA Platform for Development of Vaccine Candidate for COVID-19

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Background
Vaccine research and development has taken several years in the past. The COVID19 pandemic emphasized the importance of new biotechnology in preventing the spread of the virus and saving human lives. Messenger RNA (mRNA) biotechnology provides rapid and cost-effective solution for development of vaccines and biologics for both infectious and non-infectious diseases.

In this project, we aim to establish a national mRNA platform for developing of a vaccine candidate against COVID19.

Method
Our methodology consists of three major steps. First, the SARS-CoV2 strains circulating within Saudi Arabia were analyzed to identify the local strains and utilize them for vaccine development to boost vaccine efficacy. Second, the spike gene DNA (the most immunogenic gene for coronaviruses) was cloned into a suitable vector. The recombinant vector was linearized and subjected to transcription to produce the target mRNA. The produced mRNA was polyadenylated and capped, to increase its stability, followed by purification step. Finally, the purified mRNA was tested for its ability to induce the immune responses with macrophage cells.

Result
Based on our results, the DNA sequences of circulating strain of SARS-CoV-2 within Saudi Arabia was determined. The spike gene was successfully cloned into the desired vector. After that, the spike gene DNA sequence was transcribed and produced mRNA with high quantity and quality. The produced mRNA was successfully polyadenylated, capped and then purified. The purified mRNA was formulated with lipofectamine and transfected into macrophage cells. After transfection, different immune responses were induced in comparison with the non-transfected macrophage cells indicating the ability of the mRNA-based vaccine candidate to induce immune response within macrophage cells.

Conclusion
This study established a platform for developing mRNA vaccine for COVID-19 that can be extended for developing vaccines against other infectious diseases.

201876

Development and Optimization of Resveratrol and TPGS-Loaded Buccal Film Using 3D Printing Technology for the Treatment of Alzheimer›s Disease

Abdulaziz Al Qahtani, Abdalshakour Jazzar, Shadi Salem, Abdulrahman Basheikh, Waleed Rizg, Walid Al-Harbi

Background
More advanced applications are being developed after the approval of the three-dimensional (3D)-printed tablet Spritam® by the U.S. Food and Drug Administration (FDA). Using the same approach, the neuroprotective properties of resveratrol could be beneficial to Alzheimer›s disease patients who have limited therapy alternatives. This novel study aims to utilize 3D-printing technology to manufacture and develop a buccal film dosage form that aids in the treatment of patients suffering from Alzheimer's disease.

Method
Mucoadhesive buccal films loaded with Resveratrol were prepared using 3D printing. This was carried out by formulating a hydrogel composed of the following excipients: HPMC (Hydroxypropyl methylcellulose), TPGS (tocofersolan), ethanol, sucrose, glycerol, and Tween 80. The preparation was then loaded into printer-compatible syringes to be printed by the 3D bioprinter (Regemat BIO V1 [its temperature neutrality was fitting given some of the ingredients' heat sensitivity]) with specific parameters regarding the flow speed and printing skirt. The buccal film was designed with the appropriate dimensions suitable for oral muco-adhesion (20mm x 20mm x 0.35mm). Various tests were carried out on the printed buccal films, including SEM (scanning electron microscope), FTIR (Fourier-transform infrared spectroscopy), and drug-release studies.

Result
High-quality medicated and non-medicated buccal films were successfully printed using 3D-printing technology at different HPMC concentrations. The morphological characteristics of the buccal films were moderately opaque. The SEM (scanning electron microscope) results showed that the buccal films were non-porous.

Conclusion
Non-porous, moderately opaque buccal films (medicated and non-medicated) were successfully prepared using 3D-printing technology using different HPMC concentrations. It was found that the concentration of HPMC affected the buccal films' viscosity and that consequently affected the outcomes of the buccal films (higher concentrations of HPMC showed greater printing success). The non-porous nature of the films could lead to an extended-release property being identified.

201868

Inhalable Nano-liposomal dry powder of voriconazole for effective management of pulmonary aspergillosis: formulation and in vitro characterization

Sarah Almarshad, Alanood Almurshedi, Sarah Bukhari, Basmah Aldosari

Background
Invasive pulmonary aspergillosis is a fatal fungal infection with a high mortality rate. Voriconazole (VRZ) is considered first-line therapy for invasive pulmonary aspergillosis and shows efficacy even for patients who have failed other antifungal drug treatments. The objective of this study is to develop high potency VRZ loaded liposomal system for dry powder inhalation using the spray drying technique. In this study, VRZ encapsulated nano-liposomes will be prepared by thin film hydration technique and will be characterized in terms of particle size, charge, and morphology. Additionally, encapsulation efficiency %, and in vitro drug release will be evaluated. VRZ-Ls will be subjected to spray drying using L-leucine in various mass ratios and then in-vitro characterization studies will be performed. These inhalable liposomal dry powder formulations are expected to be a potential pulmonary delivery system for VRZ to treat lung infections.

Method
VRZ -Ls were prepared using a standard thin-film hydration method and characterized by Zeta sizer, Zeta potential, PDI, differential scanning calorimetry, TEM, encapsulation efficiency %, in-vitro drug release and study of Antifungal Activity. Novel DPI formulations of VRZ -Ls were prepared by spray drying method using Leucine.

Result
Nano-liposomes prepared by standard thin-film hydration method using DSPC, DOPE and DOPC, showed smaller particle sizes (< 100 nm) and relatively high encapsulation efficiencies (92 ±1.8%) and optimum zeta potential (-26 ± 0.153 mV). The DPI prepared showed good flow properties, and good drug release.

Conclusion
The obtainable results indicated the novel inhalable DPI nanoparticles of VRZ -Ls could provide a promising strategy for the treatment of IPA.

201856

Optimization of Apigenin stabilized gold nanoparticle synthesis as Targeted drug delivery for cancer therapy

Faisal Alshehri, Sulaiman Alsharkh, Mohammed Alsaleh, Abdullah Alawaji, Wael Mahdi

Background
The development of metallic nanoparticles delivery systems is a rapidly emerging area of nanotechnology applications where nanomaterials (NMs) are used to control the delivery of therapeutic agents to a specific site. Apigenin is a flavonoid, derived from edible fruits and vegetables, it possesses antimicrobial, antiviral, and anticarcinogenic activities. This project demonstrates an optimized synthesis of a targeted delivery system of apigenin-gold nanoparticles (ap-AuNPs) to enhance a potential therapeutic solution for the treatment of various cancers.

Method
Different formulations of ap-AuNPs were synthesized with apigenin itself acting as the stabilizing agent and model drug to control brain cancer. The synthesized ap-AuNPs have been characterized by UV-Visible spectroscopy, electron microscopic studies (SEM & TEM), Fourier transform infrared spectroscopy (FTIR), Dynamic light scattering (DLS), and zeta potential and MTT viability assay.

Result
The Ap-AuNPs formulations were synthesized via reducing gold salts with apigenin, and folate as target moiety. The optimal formula had an average diameter of 20 nm to 35 nm and zeta potential of -32±8.1 mV. The stability of Ap-AuNPs in the biological environment was verified through UV-Vis spectroscopy. Furthermore, the FTIR spectroscopy analysis has illustrated that chemical binding of apigenin on the surface of Ap-AuNPs through hydroxyl and carbonyl functional groups was found to be the main reason for the stability of all Ap-AuNPs formulations. Compared to apigenin and Ap-AuNPs, the optimal Ap-AuNPs formula has shown a significant reduction in U87-MG (glioblastoma) cell viability in a dose-dependent manner (in vitro).

Conclusion
The promising results of targeted delivery of flavonoids such as Apigenin using AuNP have great potential in improving the efficiency of cancer therapy, especially U87-MG.

201852

Dapagliflozin mitigates hypothermia and renal injury in lipopolysaccharide-induced acute inflammation independent of glycemia level

Abdullah Aljuraybah, Wael Alanazi

Background
Lipopolysaccharide (LPS) is a fundamental structural component of the outer membrane of Gram-negative bacteria-induced sepsis resulting from severe inflammatory conditions linked to hypothermia and renal-cardiovascular complications. Dapagliflozin (DAPA) is a novel antidiabetic drug, which produces glycosuric and naturalistic effects by blocking renal reabsorption of glucose. The current study was conducted to evaluate the protective roles of dapagliflozin against blood sepsis-induced hypothermia and renal injury through inhibition of inflammation induction.

Method
Male rats (n= 48) were divided into six groups as following: control, LPS, LPS+DAPA, diabetic, diabetic+LPS and diabetic+DAPA+LPS. After two weeks of DAPA (1 mg/kg/day) treatment, each rat was received a single dose of LPS (10 mg/kg) in LPS treated groups. Tail skin and deep body temperature was recorded every two hours in all treated groups. After six hours of LPS treatment, all rats were anesthetized for harvesting blood samples and kidneys for analysis.

Result
The finding results showed that DAPA attenuates hypothermia induced by LPS in both normal and diabetic septic rats. Inflammatory markers were significantly decreased in DAPA treated groups as compared with non-treated septic groups. On the pathohistological studies, septic rats showed massive incidence of granulomatous inflammation and edema in kidneys. In contrast, DAPA decreased the number of inflammatory cells, and showed great improvement in glomeruli and tubules. Also, kidney injury markers including blood urea nitrogen and creatinine levels were returned to normal levels in DAPA treated groups. Taken together, DAPA attenuated LPS complications related to body temperature and kidneys through prevention of induced inflammation in both normal and diabetic septic rats.

Conclusion
However, these protective roles of DAPA against LPS-induced blood sepsis were independent on blood glucose levels. The current results found a pivotal role of DAPA in prevention of acute inflammation independent of glycemia level, which may provide novel approaches in the management of blood sepsis complications.

201839

Ciprofloxacin-incapsulated bilosomes In-situ gel for ocular delivery: Development and in-vitro evaluation

Waleed Alruwaili, Abdulkarim Albadaiwi, Omar Alsaidan, Ameeduzzafar Zafar

Background
Topical conventional eye drops are commonly used for the treatment of various ophthalmic diseases i.e., bacterial conjunctivitis. But the eye drops have drawbacks like low corneal contact time, and 90-95 % drug-eliminated from the eye by various mechanisms (blinking, high tear fluid turnover) leading to low bioavailability and requiring multiple dose administration. The aim of this is to develop the ciprofloxacin-loaded bilosomes in situ gel to improve ocular delivery. The in-situ gel system is initially in sol form and after administration in the eye topically it converts into gel form by stimulation of ions, pH, and temperature.

Method
The ciprofloxacin (CP) -loaded bilosomes (BL) were prepared by the thin film hydration method. The formulation was characterized for vesicle size, polydispersity index, and zeta potential by zeta sizer. The entrapment efficiency of CP in BL was evaluated by the centrifugation method. The optimized CP-BL was transformed into an in-situ gel system by using different concentrations of pH-sensitive polymer carbopol. The in-situ gel formulations were evaluated for, clarity, viscosity, gelling strength, pH, and drug release.

Result
The optimized CP-BL4 formulation displayed a vesicle size of 161.0 nm, a polydispersity index of 0.274 and zeta potential of -11.2 mV, and an entrapment efficiency of 80.3 %. The CP-BL4 formulation was successfully incorporated into an in-situ gel system using a gelling agent, i.e., Carbopol. The CP-BL4-IG3 exhibited satisfactory gelling properties with a viscosity of 266.32 CP in the gelling state. CP-BL4-IG3 displayed sustained release of CP release (80.77%) in 12h with the Korsmeyer Peppas kinetic release model (R2=0.9345).

Conclusion
The finding propose that BL in situ gel could be a novel carrier for increasing corneal residency time and therapeutic efficacy of CP and require further investigation

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201817

Mechanisms Underlying Electronic and Tobacco Cigarette Smoking-Induced Hypertension: Role of Oxidative Stress

Yazeed Alqudayri, Wael Alanaz, Abdulah Algerebah, Saud Aleed

Background
Tobacco cigarette (T-Cig) smoking is one of the main factors causing cardiovascular diseases (CVDs) worldwide. Studies confirmed that T-Cig smoking causes (CVDs) and hypertension (HTN) through various mechanisms. However, electronic-cigarette (E-Cig) has been used as an alternative to tobacco smoking as it lacks most toxicants found in T-Cig smoke. Still, the toxicological mechanisms of (E-Cig) inhalation on cardiac health and blood pressure are not well studied. The current study aimed to compare the effect of E-Cig and T-Cig in causing (HTN) through induction of oxidative stress leading to angiotensin-II production and vasoconstriction.

Method
Male mice were randomly divided equally into eight groups as follows: (Air control vehicle group), (Air control group treated with tempol as a potent free radical scavenger 50 mg/kg), (E-Cig without nicotine vehicle group), (E-Cig without nicotine group treated with tempol), (E-Cig with nicotine vehicle group), (E-Cig with nicotine group treated with tempol), (T-Cig vehicle group), (T-Cig group treated with tempol). Smoke conditions in which they were exposed 1h/ daily, 7day/week for 4 weeks.

Result
Results showed an increase in blood pressure in T-Cig and E-Cig with nicotine except those who received tempol as compared to control group. Plasma levels of Angiotensin-II was elevated, nitric oxide level was decreased, and vasoconstriction was indicated in the collected aorta of in T-Cig and E-Cig with nicotine groups. In addition, T-Cig and E-Cig with nicotine disrupted the balance between oxidants/antioxidants through measurement of oxidative stress markers including glutathione, glutathione peroxidase-1, malondialdehyde and superoxide dismutase. Most of these parameters including angiotensin-II were normalized by tempol.

Conclusion
Overall, results found that oxidative stress is the main cause of endothelial dysfunction and hypertension in both E-Cig and T-Cig. Scavenging free radical by an antioxidant (tempol) helped in prevention of oxidative stress, angiotensin-II production and hypertension induced by E-Cig and T-Cig smoking.

201814

Radioprotective Effect of Carvacrol and/or Thymol Against Irradiation-Induced acute Nephropathy: The Involvement of IGF-1 and Calcitonin Gene Related Peptide

Rawan Turki Ali Alaznazi, Amira Badr, Yasmen Mahran, Nour Alanazi

Background
Worldwide, cancer incidence and mortality are increasing rapidly. One of the most critical forms of curative cancer treatment is radiotherapy. However, radiotherapy can seriously damage healthy tissues, that unavoidably exposed to radiation. kidneys are the most radiosensitive abdominal organ. In most cases, acute nephrotoxicity evolves into chronic kidney disease. Calcitonin gene-related peptide (CGRP) is a potent neuropeptide that promotes vasodilation. The depletion of insulin like growth factor-1 (IGF-1) has been shown to play a role in radiation and chemotherapy-induced kidney insults. Thymol and carvacrol are the main terpenoids of Thymus vulgaris. Both components are known with their antioxidative and anti- inflammatory activity. Therefore, our aim is to investigate the potential nephroprotective effects of carvacrol and/or thymol against irradiation-induced nephrotoxicity in rats and to explore the involvement of CGRP signaling and IGF-1.

Method
Wistar rats were randomly divided into five groups; control group, untreated-irradiated group, irradiated animals treated with thymol, irradiated animals treated with carvacrol, and irradiated ones treated with carvacrol and thymol. Serum and kidney samples were collected for histopathology and biochemical tests.

Result
Both drugs showed protective effects as evidenced by improving renal histopathological features, reducing renal creatinine and blood urea nitrogen, improving oxidative stress markers, and reducing inflammatory markers; TNF-α and NF-kB. They also increased CGRP and IGF-1.

Conclusion
Thymol and carvacrol are potential nephroprotective agents against radiation-induced damage. Mechanisms include antioxidative, anti-inflammatory, in addition to increasing CGRP and IGF-1.

201807

In Vitro Anti-Proliferative and Apoptotic Effects of Polygonaceae Family Against Various Cancer Cell Lines

Raghad Alshafi, Meshal Aljutayli, Allulu Alturki, Sara Alghashem, Rasha Saad Suliman, Zeyad Alehaideb, Rizwan Ali, and Sahar Alghamdi

Background
Cancer is acknowledged as a global public health issue. As a result, there is a constant search for more effective drugs with fewer adverse effects. Researchers› interest in medicinal plants has grown in recent years; thus, we intend to research two therapeutic herbs that must be well investigated, including Calligonum Comosum and Rumex Vesicarius from Polygonaceae plant family.

Method
The medicinal extracts were prepared using four different solvents including chloroform, ethanol, ethyl acetate, and water. Prepared extracts were examined against three types of cancer cell lines including breast (KAIMRC2, and MDA-MB-231), colorectal (HCT8), and liver (HepG2). High Content Imaging (HCI)-Apoptosis Assay and the ApoTox-GloTM Triplex Assay were performed on extracts that demonstrated the highest potency.

Result
Eight extracts were prepared and performed an MTT on two cell lines colorectal (HCT8), and liver (HepG2). The results were promising with Calligonum Comosum in ethanol and Calligonum Comosum in water extracts with IC50 values of 143.1 µg/mL ,385.3 µg/mL,147.4 µg/mL and 888.9 µg/mL for HepG2 and HCT8, respectively. Further investigation was performed for the two extracts that showed the highest activity on the breast (KAIMRC2, and MDA-MB-231) cell line, The Calligonum Comosum in ethanol exhibited the highest cytotoxic activity with IC50 values of 54.97 µg/mL and, 58 µg/mL, respectively. Then, HCI-Apoptosis Assay was conducted on HCT8 and KAIMRC2 cell lines that were treated with extract Calligonum Comosum in ethanol which demonstrated induction of apoptosis. Moreover, ApoTox-GloTM was carried out on the two breast cancer cell lines that were treated with Calligonum Comosum in ethanol, and the results were correlated with HCI-Apoptosis Assay.

Conclusion
Few studies have explored and investigated the Polygonaceae family›s promising anti-cancer properties in numerous cancer cell lines. Nevertheless, additional biological characterization against various cancer types, as well as additional mechanistic studies, are required to assess the bioactive metabolites› potential application in drug discovery.

201806

Comparative Quality Evaluation of Expired and Unexpired Immediate Release Tablet of Metformin (Glucophage)

Abdullah Ali

Background
Metformin is an antidiabetic medication that belongs to the biguanide class of oral hypoglycemic medicines and is used to treat type 2 diabetes. It reduces glucose absorption in the intestine, inhibits glucose synthesis, particularly hepatic gluconeogenesis, and increases peripheral tissue insulin sensitivity by boosting glucose uptake and utilization. Many Studies have demonstrated that the pharmacological effects of most solid dosage forms last much beyond the expiration date.
Method
The study examined the quality of expired and unexpired metformin tablets marketed in Saudi Arabia. Both of them are (Glucophage®) 850 mg doses. The characteristics of expired and unexpired drug had been compared by using parameters.

Result
Weight variation results show all the individual weights deviated from the official standard less than ±5%, so all the brands passed the test. In friability test result show samples passed this test with % friability <1%. For disintegration test the result show the mean disintegration time for all tablets was less than 15min.So the samples passed the test. In thickness and hardness test, all tablets are greater than 4kp and the within the specified range (±5%) thus passed the test. In dissolution test all tablets release more than 70% within 45min. hence, the samples passed the test.

Conclusion
The study found that the expired and unexpired Glucophage compliance with USP specifications. The weight variation test shows a similar content weight that indicates no degradation of the active ingredient occurred 4 years after the expiration date. According to the result of this study, I do recommend that the expired Glucophage could be used as alternative to unexpired Glucophage.

201800

Development of Inhalable Osimertinib-loaded Liposomes for Targeting Non-Small Cell Lung Cancer: Part I

Baraa Hajjar, Alanood Almurshedi, Basmah Aldosari, Sultan Alshehri

Background
Lung cancer is the second most diagnosed cancer globally and the first leading cause of death. Accordingly, widespread research focuses on developing novel nanotechnology-based strategies for treating non-small cell lung cancer (NSCLC). This study aimed to develop Osimertinib (OSI)-loaded cationic and pH-sensitive liposomes to improve tumor-targetability and therapeutic efficacy against NSCLC.

Method
Non-targeting (NLs), cationic (CLs), and pH-sensitive (PSLs) liposomes were formulated with different ratios of lipid to OSI using the film hydration technique. The obtained Osimertinib-loaded liposomes (OSI-Ls) were characterized in terms of particle size, charge, and morphology. Additionally, encapsulation efficiency (EE) %, stability, and in vitro drug release have been examined. The amount of OSI has been analyzed using a newly developed and validated HPLC method.

Result
The HPLC technique developed to quantify OSI in formulations was found to be sensitive and selective. Using a film hydration method, OSI was successfully incorporated in different liposomes (NLs, CLs, and PSLs) with varying ratios of lipid to OSI. The obtained liposomes were small vesicles (<100 nm) with a low polydispersity index (PDI) (<0.2) and acceptable zeta potential values (> +30 mV). Further, transmission electron microscope (TEM) images of various formulations depicted spherical, uniform, and homogenous liposomes with smooth surfaces. The highest EE% obtained was 88% for NLs, 83% for PSLs and 68% for CLs prepared at OSI: lipid ratio of 1:1. According to stability data, all OSI-loaded liposomes were physically stable for one month at 4 and 25 °C. The in vitro release study demonstrated sustained OSI release at pH 7.5 from PSLs, CLs, and NLs. In acidic pH conditions, however, PSLs displayed rapid drug release, indicating pH-sensitive release behavior.

Conclusion
In vitro characterization of various OSI-loaded liposomes showed promising formulations to improve tumor-targetability and therapeutic efficacy against NSCLC. Further apoptosis assessment, cellular uptake, and cytotoxicity should be explored in NSCLC cell lines.

201791

Microsphere drug delivery system for novel anticancer combination

Fadeek busaleh, Kouther al majed, Faheem Pottoo, Ashfaq Mohsin

Background
Neuroblastoma is a type of cancer that affects nerve tissue mostly developed in children and our target developed new drug combinations to reduce EGFR expression. The formulation of microsphere was prepared by a mixture of polymer (sodium alginate 1.5g and dextran 0.5g) and the drug combination dissolved within it in different ratios 1:1, 1:2, 1:5. we use the microsphere with a diameter of 1-1000 µm as a drug delivery system due to its beneficial effect such as can be delivered in several routes and play important role in the improved bioavailability of conventional drugs and minimizing side effects. The drug combination contains first ampicillin broad spectrum antibiotics and second acetazolamide a carbonic anhydrase inhibitor. our aims find a novel drug regimen for the treatment of neuroblastoma and achieve controlled drug delivery.

Method
we evaluate microsphere characterization by using multiple parameters such as particle size analysis, flow property, drug content, in vitro drug release and Scanning electron microscopy (SEM).

Result
Molecular docking Surface representation that shows favorable overall binding. Interaction of Acetazolamide and Ampicillin with key residues of EGFR. The flow properties of our formulation ratio ranged from excellent to good when using the compressibility index, angle of repose, and Hausner ratio.
The drug content was obtained, and the encapsulation efficiency was calculated and compared from the different formulations. The results of the dissolution test for the different formulations are Demonstrating the high dissolution rate for Formulation 1(1:1). For both Ampicillin and acetazolamide showed higher release in acidic media. Scanning electron microscopy (SEM) confirmed the spherical nature and smooth surfaces of the micro- spheres produced.

Conclusion
There is a sustained release pattern of Ampicillin and acetazolamide microsphere. The combination intercepts signaling through EGFR, by exhibiting cooperative binding at EGFR.

201790

Computational prediction of descriptors representing absorption, distribution, metabolism, and excretion properties (ADME) of selected synthetic chalcones

Shatha Ibrahim Alwuthayh, Eatezaz alenzi, Syed Nasir Abbas Bukhari

Background
From discovery of a novel medicine idea to the introduction of the final product can take 12-15 years and cost more than $1 billion. Academic research, medical studies, and even the private sector can all provide inspiration for a project. Before choosing a target for an expensive drug development effort, it may take many years to accumulate sufficient evidence. In drug development, one of the main reasons for failure in clinical trials is the ADME property of a molecule, that is, absorption, distribution, metabolism, and excretion (ADME). This is why studying ADME/Tox (Absorption, Distribution, Metabolism, Elimination, Toxicity) is crucial in drug discovery and development

Method
In this study fifty chalcone derivatives with anticancer activities and fifty chalcones with anti-inflammatory activities have been selected from reported literature and in silico ADME/Tox properties have been calculated by using different software to support the further drug development. Toxicity risks parameters such as mutagenicity, tumorigenicity, irritation and reproductive toxicity issues of chalcone derivatives were also calculated. Blood brain barrier prediction was done by utilizing a web-based program (www.cbligand.org/BBB/).

Result
Majority of chalcones followed the rule of five. Structural comparison has been done for all series that will be presented by types of structures and values of different tested parameters.

Conclusion
Most chalcones are consistent with the norm and can be chosen for future research. In conclusion, in the era of big data, a key goal is the capacity to use quickly accumulating data to spot potential ADME/T concerns before to approaching late-stage development. Finding a more druggable molecule is like looking for a needle in a haystack because most in silico ADME/T models aren't very accurate because of the complexity of the underlying mechanisms and processes. In order to overcome this obstacle, cutting-edge analytic approaches established in computer and informatics research are necessary to enable ADME/T modeling based on data from several sources and encompassing multiple bioassays. When a toxic warning is generated, it means that the building being drawn poses a certain level of danger, as defined by the category of danger. In any case, danger alerts aren't meant to be used as a replacement for rigorous toxicity testing. Even if there are no warnings about a substance, it doesn't mean it's fully safe to use.

201789

Memantine mitigates ROS/TXNIP/NLRP3 inflammasome signaling and protects against ultrastructural pathologies in diabetes induced retinal and optic nerve injury: experimental and bioinformatic studies

Alhanouf Aljohani, Sarah Albalawi, Mjd Alanazi, Ibtisam Alnasser, Sawsan Zaitone

Background
Diabetic retinopathy causes loss of vision in adults at working-age however, few therapeutic options are available for treatment. Memantine is an anti-Alzheimer drug that antagonizes the action of glutamate at N-methyl-D-aspartate (NMDA) receptors. Glutamate, reactive oxygen species (ROS) and thioredoxin-interacting protein (TXNIP) are known to be overexpression in diabetic retinas and can produce NOD-like receptor protein 3 (NLRP3) activation with subsequent secretion of interlukin-1β. This study investigated the neuroprotective effect of memantine in an experimental model of diabetic retinopathy and tested its impact on ROS/TXNIP/NLRP3 as a possible mechanism that may contribute to its neuroprotective effect. In addition, KEGG pathway database and STRING database identified the protein-protein interaction between glutamate receptors and TXNIP/NLRP3.

Method
Male Swiss albino mice received alloxan (180 mg/kg) to induce type 1 diabetes mellitus. After 9 weeks, mice were assigned to treatment groups: (i) saline, (ii) alloxan-diabetic, (iii and iv) alloxan + oral memantine (5 or 10 mg per kg) for 4 weeks. After completion of the therapeutic period, mice were sacrificed, and eyeballs were enucleated. Retinal samples were utilized for biochemical, histopathological, immunohistochemical and electron microscopy studies. Retinal levels of glutamate, TXNIP, NLRP3 and interlukin-1β were estimated using ELISA technique and Western blotting. In addition, retinal malondialdehyde and reduced glutathione (GSH) were measured.

Result
Histopathological and ultrastructural examination demonstrated that oral memantine attenuated vacuolization, reduced fibrosis and restored normal thickness (~32%) of retinal cell layers. Furthermore, memantine doses reduced retinal TXNIP (~42-65%), NLRP3 (~36-59%), interlukin-1β (~43-67%) and malondialdehyde (~36-49%) but increased GSH (~0.5-fold) without affecting retinal glutamate.

Conclusion
The findings provide the first evidence demonstrating that memantine alleviates diabetic retinal injury via suppressing ROS/TXNIP/NLRP3 signaling. Therefore, memantine might serve as a potential therapy for retinopathy after adequate clinical research.

201787

Synthesis and Development of a Novel First-in-Class Cofilin Inhibitor for Neuroinflammation in Hemorrhagic Brain Injury

Amal Alinzea, Saleh Aleaql

Background
Intracerebral hemorrhage (ICH) is a fatal condition that kills thousands of people annually and is associated with the highest mortality among stroke subtypes. Survivors often have major neurological impairment, ICH-induced injury is classified as primary injury occurs due to the spontaneous rupture of cerebral vessels, and secondary, injury overtakes the primary when blood components such as, hemin, iron, and thrombin infuse into the brain parenchyma. Cofilin, an acting-binding protein, plays an essential role in the dynamic turnover of actin filaments. Cofilin plays a critical role in inflammation and neuronal cell death. In the current study, we embarked on designing and synthesizing a first-in-class small-molecule inhibitor of cofilin to target secondary complications of ICH, mainly neuroinflammation. A series of compounds were synthesized, and lead compound SZ3-.Neuronal and microglial viabilities were assessed by HMC3-,LPS-induced inflammation in HMC3- cells was used for neurotoxicity assay, Other assays NO,PAR1,TNFα,thrombin.
Objective:SZ3- was designed and synthesized as a small molecule to target and inhibit cofilin.

Method
SZ3- Design and synthesized , The lead-like structure of SZ3- was initially obtained and subsequently optimized from the ZINC database library with a size of 6,053,287 molecules.

Result
our results support the novel idea of targeting cofilin to counter neuroinflammation during secondary injury following ICH.SZ3- decreased

cofilin binding activity. In addition, SZ-3-treated showed a significant increase in cell viability by significantly reducing nuclear factor-κ B, caspase3-, and (HtrA2),TNFα,NO.

Conclusion
We observed improvement in neuronal viability with SZ3- treatment due to reduced neuronal apoptosis, SZ3- attenuated neuroinflammation by inhibiting microglial activation.

201786

Development and Validation of UPLC-MS/MS Method for Simultaneous Determination and Pharmacokinetics Studies of Doxorubicin and Sorafenib in Rat Plasma

Alanoud Altalal, Aliyah Almomen, Musaed Alkholief, and Aws Alshamsan

Background
A suggested way to overcome some of the drawbacks associated with using a single agent in cancer treatment is to use two or more agents as a combination therapy. Doxorubicin (DOX) has a broad-spectrum antitumor activity but also many serious adverse effects. Another option is sorafenib (SOR) which is an innovative bi-aryl urea. DOX and SOR could be used together as co-therapy in treating some resistant tumors when using a convenient drug delivery system (DDS). Thus, in this work, we developed a method that simultaneously detects DOX and SOR and the impact of the co-administration on PK parameters.

Method
Four groups of Wistar rats were given oral doses of SOR (40 mg/kg) and a single intraperitoneal injection of DOX (5 mg/kg). The concentrations in rat plasma were determined using UPLC MS/MS. Chromatographic analysis was performed using Acquity UPLC BEH™ and erlotinib (ERL) as an internal standard. Gradient elution was performed using water, acetic acid, and methanol over 8 min. Quantitation was performed using MRM of the transitions from protonated precursor ions [M+H] + to product ions at m/z 544 > 397.005 (DOX), m/z 465.05> 252.03 (SOR) and m/z 394 > 278 (ERL). Different PK parameters were calculated.

Result
Data revealed that the use of the drug combination exhibited a synergetic effect which was seen on some of the PK parameters, such as Cmax, which increased from 842.8082 ± 13.94 to 1913.19 ± 121.06 in DOX.

Conclusion
Our newly developed method is reliable in detecting both drugs in rats› plasma. Moreover, the combination showed a synergetic effect; further analysis for the efficacy in cancer cells in vitro is needed.

201777

Design, Development, and Characterization of Loratadine Sustained Released Buccal Film

Amlak Altuwayjiri, Khawlah Alburayh, Siham Abdoun Mohammed

Background
Introduction: Oral drug administration is the most convenient route. Comparatively to oral drug delivery, the buccal has distinct advantages for its higher permeability and improvement of bioavailability in addition to overcome the first-pass effect and slow onset of action for oral drug.
Mucoadhesive films have been shown to improve drug absorption. Loratadine (LTD) is one of the medications that could benefit from this route to provide rapid absorption and fast onset of action with improving its bioavailability.

Objectives: The present study was designed to formulate and evaluate sustained released buccal film formulations of LTD and to study the effect of different polymer used on the formulation.

Method
Twelve different sustained released buccal film were prepared using different proportion of Carbopol, pectin, sodium alginate, glycerol, carboxymethyl cellulose (CMC), hydroxypropyl cellulose (HPC), Gelatin, Hydroxyethyl cellulose (HEC), and Hydroxypropyl methylcellulose (HPMC) as mucoadhesive polymers. To assess the best formula physicochemical characterizations including thickness, swelling index, moisture content, and drug content were studied. In addition to an in vitro release of the drug from films were evaluated using USP type II dissolution apparatus.

Result
Significance variation in the release rate of LTD from the different film formula (49% to 97%) was observed, with best sustained released achieved (10 %, - 97%) in 24 hours with the formula contain high concentration of sodium alginate. These formulae also display good physicochemical characteristics; the swelling index (1.8%-2.1%), whereas the moisture content and uptake range (0.0- 0.5% and 1.8%-2.0%) respectively, while their pH were (5.5-6.7). However, their average content were found (85.0% and 104.5%).

Conclusion
The formulated LTD mucoadhesive buccal films represent an alternative delivery system to avoid hepatic first pass metabolism and provide prolonged and uniform drug release. The obtained results encouraged to perform in-vivo and pharmacokinetics studies to investigate the LTD buccal film formulation.

201775

In silico molecular docking of novel isatin derivatives as potential antiviral agents against COVID-19

Maryam Aldhwihi, Majdi Mohamed, Reem Alenzi

Background
Over the last 3 years, COVID 19 has been a big burden worldwide due to high contagiousness and pathogenesis. Currently available vaccines and FDA approved drugs have major drawbacks including equitable distribution, economic burden and lack of efficacy against all COVID-19 virus variants. In silico drug discovery has been a fascinating approach for cutting short the time and cost needed to bring a new drug to the market. An attractive drug target in SARs-COV-2 is the non-structural protein 3 (NSP3) which is essential for viral life cycle. Inhibiting the activity of this protein would block viral replication and the host immune system can eradicate the virus completely. Isatin has been reported to be an interesting scaffold for discovery of NSP3 inhibitors.

Method
The 3D structures of isatin derivatives 1-3, co-crystalized ligand, isatin and reference compound were generated by ChemDraw Ultra 12.0, structurally minimized and saved as pdb files. The SARs-COV-2 NSP3 (PDBID 6WOJ) was downloaded from the Protein Data Bank, prepared by Discovery Studio 2020 Visualizer (DSV), energy minimized by SPDBV and saved as pdb file. Molecular docking was performed using AutoDock Vina 1.2.0. Ligands and protein pdbbqt files were prepared following standard protocols using AutoDockTools-1.5.7. Binding interactions were visualized using DSV and binding energies were recorded as kcal/mole.

Result
All isatin derivatives were docked nicely in the binding pocket of the protein and interacted with most of the active residues via interesting attractive forces. Both 2

and 3 showed better affinities in terms of binding energies (−8.5 and −9.9 kcal/mol, respectively) when compared to the co-crystalized ligand which had a binding energy almost similar to 1 (−7.6 and −7.8 kcal/mol, respectively).

Conclusion
Isatin derivative 3 is reported herein as a potential antiviral agent against COVID 19. However, further investigations should be done to confirm this finding.

201768

Urinary parabens in Saudi females: Implications of exposure and risk assessment

Abdulmalik Ayashy, Raghad Alomari, Noura Alkhalifa, Alya Alarfaj, Meshal Alghamdi, Heba Shaaban, Abdulmalik Alqarni and Ahmed Mostafa

Background
Parabens are commonly used as preservatives in pharmaceuticals, food and cosmetics. Frequent exposure to parabens may impose human health hazards. Although numerous studies investigated parabens exposure in several countries, such studies are still very limited in Saudi Arabia.
Objectives: The aim of this study was to assess five different parabens levels in urine samples collected from Saudi females using a dispersive liquid-liquid microextraction (DLLME) method coupled to ultraperformance liquid chromatography tandem mass spectrometry (UPLC-MS/MS). Then parabens urinary concentrations were used to estimate the exposure doses and health hazards.

Method
42 urine samples were collected from Saudi females and analyzed, after enzymatic hydrolysis, using DLLME-UPLC-MS/MS. On the basis of parabens urinary levels, the total daily intake was calculated.

Result
: The optimized method showed good linearity with determination coefficients > 0.99 and low detection limits (i.e., 0.05 ng mL 1). The results illustrated that 93% of the collected samples contained at least one of the target parabens. Methyl paraben was the most frequently detected paraben and was detected in 61.9% of the samples in a concentration range 1.7 – 141.1 ng ml-1

Conclusion
Our findings indicate that parabens exposure is widespread among females in Saudi Arabia, and more research into the potential health risks of these chemicals is required

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201763

Biological screening of different origins Glycyrrhiza glabra L. samples for its antidiabetic and anticancer potential

Abdulmalik Ayashy, Mohammed Alsulaiman, Mohsen Alshowaiki

Background
the geographical variation may affect the phytochemistry as well as the biological activities of licorice root. Herein, a series of biological activities were performed to evaluate the impact of geographical origin on the biological potential of eight different licorice samples.

Method
cell culture studies were performed for cytotoxicity (MCF7, HCT116, HepG2, MRC5), glucose uptake assay (HepG2), and glutathione peroxidase activity (HepG2) whereas, for antidiabetic potential α-amylase inhibition activity was tested.
Result

Indian sample was observed more cytotoxic against MCF7 (22%) and HCT116 (43%) with an IC50 value of 56.10 (±2.38) µg/ml against the MCF7 cell line. The glucose uptake was seen with a mean value of 96 (±2.82) and a range of 92-101%. For glutathione peroxidase activity (GPx), Syrian (0.31±0.11) and Pakistani samples (0.21±0.08) revealed a significant activity whereas, Palestinian (70±0.09) and Indian samples (68±0.06) effectively inhibited the α-amylase activity with a least IC50 value (67.11±0.97) µg/mL for Palestinian sample. The statistical models of PCA (principal component analysis) and K-mean cluster analysis were performed to correlate the geographical origin, extract yield, and biological activities for the eight different origin licorice samples.

Conclusion
the licorice samples exhibited significant cytotoxic, GPx, and α-amylase inhibitory activity. Samples with more extract yield showed more potential in these biological activities.

201751

In silico identification of potential multitargeted ligands for Alzheimer›s disease via molecular docking and molecular dynamics simulation

Reema Baabdullah, Yara Alghamdi, Dalah Bahamdein

Background
Alzheimer's disease (AD) is a progressive neurodegenerative disease that primarily affects the elderly and causes memory and function loss and death. Alzheimer's disease is the 6th leading cause of death, yet it is still an incurable and unpreventable illness. The available approved treatments involve two classes of drugs providing solely symptomatic relief, that being acetylcholinesterase (AchE) inhibitors and n-methyl-d-aspartic acid (NMDA) receptor antagonists.

Method
Using multi-targeting drugs -a new approach- we looked at the enzymes involved in the pathogenesis of AD that substantially affect the progression of the disease. To achieve this goal, a library of compounds was screened virtually with four enzymes, including AchE, monoamine oxidase-b (MAO-b), β-site amyloid precursor protein cleaving enzyme 1 (BACE1), and glycogen synthase kinase 3 (GSK-3). We selected the highest docking score that's working for two targets or more aiming to get a multitarget compound.

Result
The compound (MCP-65 (El-Araby et al., 2021)) was chosen as having balanced activity then best docked posed has been refined with 100ns molecular dynamic simulation.

Conclusion
Based on the virtual screening results and molecular dynamic simulation, the compound (MCP-65) appears to be a potential multi-targeted ligand, suggesting in vitro and in vivo testing.

201744

Control release microbeads formulation of Captopril and Metronidazole with potential anti-cancer effect

Fatimah Al Nass, Jumanah Alhayek, Faheem Hyder Pottoo, Ashfaq Mohsin

Background
Glioblastoma is one of the most common malignant primary brain tumors. Captopril caused a fourfold increase in P53 expression in a prostate cancer cell line. Moreover, metronidazole is cytotoxic by inhibiting the FAK pathway and inducing apoptosis. Traditional therapy for glioblastoma is insufficiently effective, necessitating the development of a new strategy. Preparing controlled-release microbeads with a

medication that has shown anticancer effects in other types of cancer could be a promising treatment option for glioblastoma.

Method
Using an ionotropic gelation (IG) technique, metronidazole-captopril microbeads were prepared. The medications dissolved in various ratios in the polymer solution: 1:1 as a control, 1:2, and 2:1. The mixture was then dropped into a CaCl solution and stirred for 30 minutes at 200 rpm. Finally, they filtered and spread the microbeads to dry. Many characterizations are done, including angle of repose for flow properties, microscope-based particle size analysis, scanning electron microscopy morphology analysis, drug content of microbeads determined using ultraviolet-visible spectroscopy and a sonicator, differential scanning calorimetry (DSC) for thermal analysis, and molecular docking analysis. In vitro drug release was performed using a paddle dissolution device on an acidic buffer (pH = 1.2) for 2h and an alkaline medium (pH = 6.8) for 6h.

Result
All prepared microbead ratios demonstrated good flow properties, with a median particle size of 939.16 µm, and the absence of any chemical interaction by DSC. Docking revealed the presence of cooperative binding and an active EGFR component. According to in vitro drug release, drugs are released more in acidic media than alkaline.

Conclusion
In this study, we successfully synthesized microbeads, and characterization was measured to give a clear picture of their physical properties. Glioma cells have an acidic PH, and microbeads are released better in acidic media, so it›s probable to show activity against glioblastoma cell lines for an in vivo study.

201739

Cross-regulatory interaction between autophagy and apoptosis induced by some natural antioxidants against mercuric chloride -induced kidney injury

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Background
Autophagy and apoptosis are two important regulatory mechanisms for how the body could response to diseases, however, the exact molecular interaction between these two pathways is not adequately understood. This study was designed to investigate the potential protective actions of vitamin E (Vit-E) and lactobacillus plantarum (Lac-B) against mercury-induced kidney injury.

Method
A total of thirty albino rats were randomly divided into five groups: group 1 served as the normal control; rats in group 2 received high doses of mercuric chloride (HgCl2) to induce kidney injury; rats in groups 3, 4 and 5 were given Vit-E, Lac-B and the combination of Vit-E and Lac-B, respectively along with HgCl2 for 2 weeks. The effects of those agents were studied focusing mainly on their autophagic, anti-apoptotic, anti-oxidative stress and anti-inflammatory actions. Histopathological examinations were also conducted.

Result
The administration of high doses of HgCl2 caused damaging effect to the kidney which manifested by elevation in serum urea, urea nitrogen and creatinine. Kidney levels of MDA, caspase-3, IL-6 and TNF-α were markedly increased, whereas GSH level and SOD activity were significantly declined. HgCl2 significantly elevated the expressions levels of renal VCAM-1 and cystatin C mRNA, while the gene expression of podocin was downregulated. Also, it markedly decreased the protein expression of Beclin-1 and BcL-2. Histopathological examination revealed massive degeneration with congested blood vessels following HgCl2 administration.

Treatment with Vit-E or/and Lac-B restored the normal levels of the previously mentioned parameters, as well as improved the morphology of kidney tissues.

Conclusion
Both Vit-E and Lac-B are able to provide a protective effect against HgCl2-induced kidney damage by regulating autophagy and apoptosis through Beclin-1 network.

201737

Therapeutic potential of Moringa oleifera as a protective agent for high risk of cardiovascular disease in diabetics patients – a systematic review

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Background
Moringa oleifera (MO) has long been common choice in folklore medicine as being really helpful for enhancing wellness. It has an acknowledged use as an antidiabetic, antilipidemic, anti-inflammatory, analgesic, anti-oxidant, antiviral and wound healing agent .Various parts of the plant including the leaves, flowers and seeds are used. However, in terms of pharmaceutical potential and nutritional value are stand out abundantly in leaves and seeds.

Method
We searched several electronic databases using appropriate keywords through PubMed, Scopus, Google Scholar, Web of Science journals, was conducted from inception to 1 November 2022. We included studies that evaluate the effectiveness potential of MO, biological activity and in vitro and in vivo studies.

Result
Studies carried out on MO view it as a very promising medicinal plant that can be used in the management and treatment of diabetes and related complications. MO has been shown investigate clinically the hypoglycemic effect in 55 type 2 diabetic subjects (36 men and 19 women in the age group of 30-60 years). Also, it had potential activity in preventing thrombosis in a study using animal model. Hydroalcoholic extract of MO was prepared and administered orally to hyperlipidemic rats for a period of 28 days showed significant reduction in lipids profile. Serves as important components has been isolated in vitro, studies shows that the Methanol extract of MO whole leaves possesses phytochemicals that possess high therapeutic value. N,α-Lrhamnopyranosyl vincosamide , quercetin and kaempferol have the molecular function of antioxidant, antiinflammation and antilipidemic, these lead to improving cardiac contractility and protecting cardiac structural integrity from damage.

Conclusion
In view of the evidences of the potential effects of Moringa leaves as revealed in previous studies, this will lead to its acceptance as a good therapy in the treatment and management of diabetes and possible complications especially risk of CVD.

201734

Miconazole-incorporated bilosomes gel for topical delivery: Development, and in-vitro evaluation

Mashael Hussain, Sultana Ibrahim, Ameeduzzafar Zafar

Background
Fungal infections are a vital reason for illness and carriage of a serious health concern, particularly in immunocompromised patients. The present research work was to develop the topical miconazole nitrated loaded bilosomes for improvement of

permeability and therapeutic efficacy. Miconazole nitrate (MN) is a poorly soluble drug having low bioavailability and poor permeability

Method
MN-loaded Bilosomes (BE) were prepared by the thin film hydration method and optimized by box-bhekhen statistical design. The formulation was evaluated for vesicle size, polydispersity index, zeta potential, and entrapment efficiency. The optimized MN-loaded Bilosomes (BE) was transformed into the gel using Carbopol and chitosan gelling polymers and evaluated for viscosity, pH, drug content, in-vitro releases, and kinetic release study

Result
The optimized MN-BE has a vesicle size of 196.72 nm, polydispersity index of 0.274, entrapment efficiency of 76.11%, and zeta potential of-25.6mV. The optimized MN-BE (MN-BE13) was incorporated into the gel using Carbopol 394P and chitosan polymers. The MN-BE13-G2 has 6.4±0.1of pH, 1736±27 Cp of viscosity, and 99.85±0.65% of drug content. The MN-BEopt-G2 has a significantly ($P<0.05$) high drug release (80.02 ±3.67 % in 24h) than MN-gel (52.02 ± 4.82%). The Korsmeyer-Peppas model is the best-fit kinetic release model ($R2=0.9705$).

Conclusion
The finding suggested that MN-loaded bilosomes gel could be a good alternative carrier of topical application of MN and require further investigation of ex-vivo, antifungal, and in-vivo studies

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201727

Synthesis of Silver Nanoparticles Containing Saudi Medicinal Plants; Insights Into Anti-Cancer and Anti-Bacterial Activity

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Background
Plant-mediated nanofabrication is an emerging field of nanotechnology that is preferred over conventional techniques due to its safety, cost-effectiveness, and biocompatibility.

Method
Present study focuses on the green synthesis of silver nanoparticles using silver nitrate (AgNO3) and biocomponents of aerial extract of Rhazya Stricta (R.S), Rumex Vesicarius (R.V), Calligonum Crinitum (C.C), and Calotropis Procera (C.P). Different microscopic and spectroscopic characterization techniques were performed to confirm the bio fabrication of R.S, R.V, C.C and C.P mediated AgNO3NPs. The cytotoxicity of the AgNPs was measured against the large intestine adenocarcinoma cell line (HCT8) and human liver cancer cell line (HepG2) using an MTT assay. Moreover, the antibacterial activity of the prepared nanoparticles was evaluated on S. aureus and E. coli bacterial strains.

Result
Nanoparticle characterization, using TEM, exhibits excellent encapsulation of nanoparticles by medicinal herbs. Observed cytotoxicity against HCT-8 was IC50 22.8 ± 1.84 µg/ml for R.S, IC50 156.4 ± 16.75 µg/ml for R.V, IC50 190 ± 1.24 µg/ml for C.C, and IC50 21.2 ± 0.12µg/ml for C.P. Also, the MTT assay revealed cytotoxicity against HepG2 that was IC50 55.6 ± 4.9 µg/ml for R.S, IC50 138.7 ± 8.2µg/ml for R.V, IC50 191.7 ± 8.7 µg/ml for C.C, and IC50 67.7 ± 3.1µg/ml for C.P. Furthermore, our findings would seem to show that there was antimicrobial activity against S. aureus with an inhibition zone of 19 mm for R.S, 20 mm for R.V, 20 mm for C.C, and 19 mm for C.P. An activity against E. coli strain was also observed with an inhibition zone of 20 mm for R.S, 18 mm for R.V, 18 mm for C.C, and 17 mm for C.P.

Conclusion
Silver Nanoparticles mediated by the previously mentioned plants could possess cytotoxic activity against several cancer cell lines. Such AgNPs treated by plant extracts could enhance antimicrobial activity against well-known pathogenic strains.

201724

NASAL INSERT : A NEW ANTIBIOTIC DELIVERY SYSTEM FOR BACTERIAL INFECTIONS

Shatha Alhuwaytan, Sara Almotrad , Munerah Alfadhel

Background
Cefdinir (CFR) is a cephalosporin antibiotic used to treat bacterial infections such as bronchitis. The objective of this study was to develop nasal inserts (NI) using HPMC and CMC bio adhesive polymers in order to increase the residence time of the drug thereby improving therapeutic effects at the site of administration (local) and enhancing the bioavailability of drug systemically.

Method
Preparation of cefdinir nasal inserts: Drug CFR (100mg) dissolved in 10mL phosphate buffer pH 6.5, followed by addition of bio adhesive polymeric solution 1% (HPMC & CMC), to this CFR polymeric mixture 1% mannitol was added until gelation was achieved. Nasal inserts were then fabricated by filling this solution into Eppendorf microcentrifuge Tubes (1mL capacity) and lyophilized.
Drug content estimation was carried out by dissolving NI in SNF, prefiltered aliquots were then analyzed spectrophotometrically at λmax 276 nm. Water uptake was determined by the weight difference of NI before and after soaking it SNF. In vitro release profile was plotted by % drug released against time. Release study was performed in USP II apparatus at predetermined time intervals samples withdrawn and analyzed in UV-spectrophotometer. Optimized formulation was then tested for antibacterial effects against bacterial strains using cup-plate technique by measuring zone of inhibition.

Result
Drug content estimation NI reported was 25.01%, 21.75% for HMPC and CMC, respectively.
Water up take of NI in SNF after 30 min was relatively more for HPMC. Sustained drug released showed by CMC inserts with initial burst effects. Potential antibacterial effects showed by HPMC nasal inserts against B. subtilus and S. aureu.

Conclusion
The nasal inserts could deliver the drug directly at the site for local action. Furthermore, drug could also be absorbed through the olfactory and trigeminal routes and improve the systemic bioavailability. Thus Nasal inserts of Cefdinir could be the effective delivery system for bacterial infection.

201720

Acetyl-L-carnitine and liposomal Co-enzyme Q10: Promising candidates for neuroprotection against propionic acid-induced autistic disorder by modulating ALDH1A1-RA-RARα signaling

Amjad Sari AboHamad, Sara Alhumaidan, Ahlam Alhusaini, Iman Hasan

Background
Autism spectrum disorder (ASD) is a group of developmental disorders. ASD can be caused by complex genetic and environmental factors; however, the exact mechanisms are still not fully elucidated. The purpose of this study was to investigate the protective effect of acetyl-L-carnitine (ALCAR) and liposomal Co-enzyme Q10 (CoQ10) against cerebral and cerebellar oxidative injury, inflammation, and cell death, and alterations in ALDH1A1-RA-RARα signaling in an autism-like rat model induced by propionic acid (PPA).

Method
The rats were treated with PPA and concurrently received ALCAR and/or CoQ10 for 5 days. The animals were sacrificed, and cerebral cortex and cerebellum were collected for analyses.

Result
PPA caused histopathological alterations along with increased malondialdehyde (MDA), NF-κB p65, TNF-α and IL-6 in the cerebrum and cerebellum of rats. Reduced glutathione (GSH) and antioxidant enzymes were declined in the brain of rats that received PPA. Concurrent treatment with ALCAR and/or CoQ10 prevented tissue injury, decreased MDA, NF-κB p65, and pro-inflammatory cytokines, and enhanced cellular antioxidants activity levels in PPA-administered rats. ALCAR and/or CoQ10 upregulated Bcl-2 and decreased Bax and caspase-3 in the brain of rats. In addition, ALCAR and/or CoQ10 upregulated cerebral and cerebellar ALDH1A1 and RARα in PPA-treated rats. The combination of ALCAR and CoQ10 showed more potent effects when compared with the individual treatments.

Conclusion
ALCAR and/or CoQ10 prevented tissue injury, ameliorated oxidative stress, inflammatory response, and apoptosis, and upregulated ALDH1A1-RA-RARα signaling in the brain of autistic rats.

201719

Luteolin-7-O-Glucoside As A Novel Anti-Tubulin Binding Agent With Potential Use In Cancer Therapy: In Vitro and In-Silico Study

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Background
Cancer is responsible for approximately 10 million deaths worldwide, with 70% of deaths occurring in low- and middle-income countries. Consequently, new, and effective medications are required. Therefore, the potential benefits of Ziziphus nummularia and Ziziphus spina-christi against cancer were investigated, along with a deeper understanding of their anti-cancer mechanisms.

Method
Several extracts, including chloroform, ethanol, ethyl acetate, and water, were prepared from Z. nummularia and Z. spina-christi. The extracts were tested and evaluated for their anti-cancer properties using the MTT Cell Viability Assay in four cancer cell lines including breast (KAIMRC2 and MDA-MB-231), colorectal (HCT8), and liver (HepG2). Next, KAIMRC2 and HCT8 cells were used for the high-content imaging (HCI)-Apoptosis Assay and the ApoTox-GloTM Triplex Assay. Microtubule staining and western blotting for multiple downstream markers were performed in the KAIMRC2 cell line. Liquid chromatography-mass spectrometry (LC-MS) was performed to identify secondary metabolites in the ethanol and ethyl acetate extracts, followed by molecular docking into the tubulin crystal structure.

Result
The results of the eight extracts showed that Ziziphus nummularia ethanol extract against KAIMRC2 demonstrated the highest potency with an IC50 value of 29.2 µg/ml. The HCI assay on KAIMRC2 showed the induction of apoptosis that was further confirmed by ApoTox-GloTM Triplex Assay which indicates the induction of apoptosis and reduced cell viability. Microtubule staining showed a disrupted microtubular network that could be mediated by luteolin-7-O-glucoside which demonstrated the highest docking score (-7.686) and similar binding interactions relative to the native ligand.

Conclusion
Our findings indicate that Ziziphus nummularia possesses a promising anticancer activity which could be further examined using in-vivo studies.

201797

Tetrazolium Blue Fast Colorimetric Method for Analysis of Corticosteroids

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Background
Corticosteroids are effective in treating a broad range of acute and chronic severe conditions since they have anti-inflammatory, immunosuppressive, and vasoconstrictive effects. Tetrazolium blue (TZB) reaction is a powerful tool used to analyze corticosteroids, with the advantage of being a rapid, accurate, simple, sensitive, quantitative analysis. It can be carried out at room temperature. The detection limit of TZB is also extensive. One of the key advantages of this technique is that it can be used to look into the adulterating of medications with corticosteroids. TZB oxidizes the α-ketol of corticosteroids in an alkaline medium resulting in a highly colored formazan derivative. The aim of this study is to develop and validate a robust, rapid method for quantitating corticosteroids. And to examine the effects of variables factors on the reaction rate (Time, Wavelength, stability, and solvent) to find the most efficient method's conditions.

Method
Analysis of nine selected corticosteroids was performed using Ultraviolet-visible (UV-VIS) Spectrophotometry. We investigated the effects of two solvents (ethanol and Dichloromethane) on the reaction rate. The absorption Scan started 5 minutes after reagents (TZB, and TMAH) addition for 120 min at wavelength 525 nm against the blank. To investigate 3-stages of reaction: reaction starting point, optimum absorption, and formazan product stability.

Result
The findings showed that, when dichloromethane was used as the solvent, the oxidation reaction of corticosteroids was completed in around 5 minutes as opposed to 90 minutes when ethanol was used.

Conclusion
Based on the modification of the official USP procedure, we found that using dichloromethane as a solvent for the reaction leads to enhancing the efficiency of the response in a relatively shorter time. Despite shortening the reaction time, the procedure is still quantitative, specific, and qualitative. Considering the time and effort savings, this method would be a promising approach for the rapid analysis of corticosteroids.

201693

Role of mesenchymal stem cells derived exosomes in modulating Alzheimer›s disease: Effect on PI3K/Akt/mTOR axis, autophagy and neuroinflammation

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Background
Alzheimer›s disease (AD) is a prevalent neurodegenerative disease in Saudi Arabia, accounting for two-thirds of cognitive decline incidences in the geriatric population. Inflammation and accumulation of amyloid plaques with subsequent neuronal degeneration are hallmarks of AD. Exosomes are extracellular vesicles with reported ability to modulate immunity and stimulate repair and differentiation process. The present study aimed to outline the potential therapeutic role of exosomes in AD and to elaborate the possible underlying mechanisms.

Method
AD was induced in Albino rats by AlCl3 intra-gastric intubation (17mg/kg/day) for 8 weeks. Rats were assigned into 3 groups: normal control receiving vehicle, AD, and AD+MSCs-derived exosomes. Treatment was continued for 4 weeks. Learning and memory impairment was assessed by novel object recognition test. Potential therapeutic effect of MSCs-derived exosomes was assessed

in brain tissue using gene expression analyses, western blot, histological studies, immunohistochemistry, and transmission electron microscopy. All experimental procedures were approved by Research Ethics Committee at Faculty of Medicine, Benha University, Egypt. One-way analysis of variance (ANOVA) was used for multiple variable comparisons followed by Tukey's post-hoc test to compare the significance between groups. Kruskal Wallis test ($\chi 2$) was used for non-parametric data.

Result
MSCs-derived exosomes administration improved learning and memory of AD rats, suppressed Aβ accumulation and tau phosphorylation, enhanced neurogenesis and synaptic function, and mitigated astrogliosis in brain tissues of AD animals. Additionally, MSCs-derived exosomes restored autophagy markers expression (beclin-1, LC3II and p62), suppressed PI3K and AKT phosphorylation, and decreased expression of downstream mTOR. Moreover, MSCs-derived exosomes decreased brain expression of inflammatory markers (iNOS &NFK-B).

Conclusion
Collectively, the present study shed the light on MSCs-derived exosomes as a potential therapeutic option for the treatment of AD. Restoring autophagy, suppressing PI3K/Akt/mTOR axis and modulating neuroinflammation participated in the therapeutic effect of MSCs-derived exosomes in AD brain.

201692

Development of thyme oil loaded microsponge for topical and stomach specific drug delivery

Hadi AlSaihaty, Mohammed jafar, Mohd Khan, Ayidh alasmari

Background
Thyme oil (TO) is a priceless essential oil that is said to possess a variety of bioactivities, including antibacterial, anticancer, and antioxidant actions. These qualities provide TO the excellent capacity to cure a wide range of diseases, mainly the effective eradication of h. pylori infection in the stomach and lowering skin aging by reducing oxidative stress. However, its ineffective use is constrained by its low stability in atmospheric conditions. Our current research aims to encapsulate TO in eudragit (EGT) micro sponge for increased stability and ameliorated bioactivities.

Method
To prepare TO micro sponge, which contains EGT as a polymer, Tween 80 as stabilizer, and dichloromethane (DCM) as solvent, the quasi-emulsion solvent evaporation method was used. The production yield, particle size, surface morphology, entrapment efficiency, drug-polymer interaction, in-vitro floating, and in-vitro drug release of the produced micro sponges were assessed. The best micro sponge was tested against h. pylori ATCC 43504 strains, and it was also tested for its antioxidant potential by DPPH assay method.

Result
showed that micro sponges exhibited high production yield (0,75± ٪41 to 1,13± ٪81,27), excellent entrapment efficiency, prolonged in-vitro floating time (> 12 hours) and sustained in-vitro drug release for 24 hours. The average particle size of the selected micro sponge was 49,79µm, scanning electron microscopy results showed that the micro sponges were spherical in shape with spongy surface. Results of DSC study revealed that TO is physically entrapped in micro sponge. The results of In-vitro antioxidant and In-vitro anti h. pylori activity studies demonstrated that the TO in micro sponge was more effective against h. pylori, and it exhibited high antioxidant activity than the pure TO.

Conclusion
To sum up, the developed micro sponge with thyme oil offers a viable alternative for the efficient targeting and eradication of h. pylori, and lowering skin ageing by reducing oxidative stress.

201691

Nifuroxazide repurposing for protection from diabetes-induced retinal injury in rats: implication of JAK2/STAT3 axis

Reem oudah altaymani, Amany Tawfik, Nehal M Elsherbiny

Background
The prevalence of diabetes mellitus (DM) in Saudi Arabia is alarmingly increasing, affecting more than 20% of the population. Diabetic retinopathy (DR) is a prevailing DM microvascular complication, representing the major cause of blindness in Saudi Arabia. Inflammation is a crucial player in DR pathogenesis. JAK2/STAT3 axis is a pleotropic cascade that modulates diverse inflammatory events. Nifuroxazide (Nifu) is a commonly used oral antibiotic with reported JAK2/STAT3 inhibition activity. The present study investigated the potential protective effect of Nifu against diabetes-induced retinal injury. Effect of Nifu on JAK2/STAT3 axis and downstream inflammatory mediators has been also studied.

Method
Diabetes was induced in Sprague Dawley rats by single intraperitoneal injection of streptozotocin (50 mg/kg). Animals were assigned into four groups: normal, Nifu control, DM, and DM+Nifu. Nifu was orally administrated at 25 mg/kg/day for eight weeks. The effects of Nifu on JAK2/STAT3 axis proteins, inflammatory and anti-inflammatory factors, tight junction proteins, histological and ultrastructural alterations were evaluated using gene and protein analyses, histological studies, and transmission electron microscopy. All experimental procedures were approved by the Research Ethics Committee, Faculty of Medicine, Mansoura University, Egypt. Statistical significance among experimental groups was evaluated using one-way ANOVA test followed by Tukey's post-hoc test.

Result
Nifu administration to diabetic rats attenuated histopathological and ultrastructural signs of retinal injury. Additionally, Nifu inhibited JAK2 and STAT3 phosphorylation, augmented the expression of STAT3 signaling inhibitor SOCS3, dampened the expression of transcription factor of inflammation NF-κB along with inflammatory cytokines TNF-α and IL-6, and restored the expression of anti-inflammatory cytokine IL10 as well as tight junction protein occluding in diabetic retina.

Conclusion
The current study indicated that Nifu alleviated DR progression in diabetic rats, suggesting beneficial retino-protective effect. This can be attributed to blocking JAK2/STAT3 axis in retinal tissues with subsequent amelioration of inflammation.

201689

Treating acute exacerbation of bronchial asthma utilizing 3D printing technology

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Background
Current tablet manufacturing methods follow the “one size fits all method” with no customization. However, 3D printing technology can customize tablets based on patients’ needs. In this study, we aim to use 3D printing technology to manufacture a polypill/tablet containing two active pharmaceutical ingredients (cortisone acetate and montelukast sodium) to treat acute exacerbation of asthma while customizing the dose of cortisone acetate based on patients’ needs.

Method
A fused deposition modeling (FDM) 3D printer, which is Craftbot, was loaded with a Poly-dissolve polymer to fabricate several 3DP tablets. Ultimately, several high-quality tablets were manufactured with various dimensions. Dimensions were measured by using an electronic caliper to ensure they have the same dimensions of the designed tablets. After that, the tablets were subjected to friability and hardness tests to ensure they are strong enough for transport and handling. Finally, a scanning electron microscope (SEM) was used to investigate the quality of the printer.

Result
The results showed that the manufactured tablets matched the design. Moreover, the Craftbot 3D printer achieved the quality that is needed in fabricating non-medicated tablets. The friability and hardness tests showed that the printed tablets have good mechanical strength, and they are strong enough to be handled and transported. Finally, The SEM images display the organized printed layers of the poly dissolve filament; further, the printed layers are uniformly connected and distributed. Moreover, there is no overlapping between each layer. Furthermore, no cracks or pores are on the surface of the printed object, indicating that the printer gives a proper resolution of the printed materials.

Conclusion
We successfully printed non-medicated tablets with different dimensions using Craftbot 3D printer. Currently we are working on using the hot melt extrusion method to prepare the medicated filament (containing cortisone acetate and montelukast sodium) and great promising results are expected.

201668

Artemisia sieberi essential oil exerts potent in vitro anticancer activity and causes cancer cell death via modulation of ERK signaling pathway

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Background
Cancer is a major health concern and is responsible for the deaths of millions yearly. Artemisia sieberi (sheeh) is a plant that is found in several Middle Eastern countries and has been shown to possess anticancer activity. However, there were no studies conducted on the anticancer activity of the plant’s essential oil, as most of the previous studies focused on the plant’s organic extracts. Herein, we report for the first time the anticancer potential of Artemisia sieberi from Saudi Arabia’s region of Hail in a detailed manner along with its mechanism of action and chemical constituents.

Method
Artemisia sieberi aerial parts were subjected to hydro distillation in a Clevenger apparatus for 3 h to obtain the essential oil. The essential oil’s anticancer activity was assessed via SRB assay against MCF-7, HepG2, HCT116 and A549 cancer cells, while flow cytometry was used to analyze apoptosis and cell cycle induction. Finally, protein expression levels were assessed via Western blotting. GCMS was used to analyse the oil’s chemical constituents.

Result
The essential oil exerted growth inhibitory activity against HCT116, HepG2, A549 and MCF-7 cancer cell lines in a dose-dependent manner, with IC50 values of 53.1 µg/ml, 56.6 µg/ml, 60.7 µg/ml and 38.7 µg/ml, respectively. Further investigation showed that the oil induced apoptosis and S-phase cell-cycle arrest in MCF-7 cancer cells in addition to downregulating ERK protein expression level. GCMS analysis identified cis-crysanthenyl acetate as the main component of the essential oil.

Conclusion
This novel study highlighted the potential of Artemisia sieberi essential oil as a highly active anticancer agent and elucidated its anticancer mechanism of action in detail for the first time ever. In the future, it is hoped that the oil or one of its chemical constituents would be finally developed as an anticancer agent.

201651

Black seed oil micro sponge development for dermatological applications

Njoud Al-Hamid, Majd alghamdi, Sarah algarni, Mohammed Jafar, Saira Zahoor, Mohd sajjad Khan

Background
Black seed oil (BSO) is a treasures essential oil proclaimed to have diverse pharmacological properties viz antimicrobial, anticancer, and antioxidant activities. Because of these characteristics, BSO has the great capability to treat variety of skin conditions including minimizing ageing of the skin by reducing its oxidative stress. Moreover, unlike antibiotics BSO does not develop resistance. But, due to its poor stability at high temperature, light and humid environment, restricts its efficient utilization. To conquer these concerns, in our current research we aim to encapsulate BSO in eudragit (EGT) micro sponge for improved stability, and enhanced antioxidant and antibacterial actions of BSO.

Method
The quasi-emulsion solvent evaporation method was employed to prepare BSO micro sponge incorporating EGT as polymer, Tween 80 as emulgent, and dichloromethane (DCM) as solvent. The prepared micro sponges were assessed for production yield, particle size, surface morphology, entrapment efficiency, drug-polymer interaction, stability, and in-vitro drug release. The best formulation was evaluated for in-vitro antioxidant activity and in-vitro anti-microbial assay against common skin offenders Staphylococcus aureus, and Pseudomonas aeruginosa.

Result
showed that all the micro sponges exhibited high production yield (42.46% ±1.15 to 60.89% ±1.02), excellent entrapment efficiency (66.37% ±0.71 to 97.21% ±1.02) and prolonged in-vitro drug release (cumulative drug release 31.18% ±2.75 in 8 hours). The particle size of the selected micro sponge was 5.34µm ±2.2, Scanning electron microscopy results showed that the micro sponges were spherical uniform in shape with spongy surface. Results of DSC study revealed that there was no BSO-EGT interaction in micro sponge. The results of In-vitro antioxidant and In-vitro antimicrobial studies demonstrated that the BSO in micro sponge was more effective than the pure BSO. Furthermore, the results of stability assessment indicated improved stability of BSO in micro sponge.

Conclusion
Thus, loading of BSO in micro sponge resulted in beneficial drug carrier system in terms of stability along with handling advantages.

201650

FORMULATION AND OPTIMIZATION OF METFORMIN LOADED CUBOSOMS AND IT's EFFECT AGAINST LUNG CANCER CELLS

Raneem Alosaimi, Ghaida Alhuwaytan , Randa Zaki

Background
Metformin is a hydrophilic drug that is conventionally used as anti-diabetic. Additionally, many researchers have discovered its use as anti-cancer. Unfortunately, metformin has low bioavailability and a short half-life; it also has difficult penetration to cells. So the aim of the study was to develop metformin loaded cubosomes to improve its bioavailability and promote its anticancer effect.

Method
different cubosomal formulations were elaborated according to Box-Behnken Design using Design Expert® software to study different variables on the characteristics of cubosomes. The independent variables were glyceryl monooleate GMO, Pluronic F127, and tween 80 while the dependent variables were zeta potential (ZP) and vesicle size. Different formulations of Metformin loaded cubosomes were prepared by top-down emulsification technique followed by characterization for vesicles size, zeta potential. The composition of the optimized formulation was GMO 4.9 %w/w of total weight of dispersion, Pluronic F127 (5 w/w% of total weight of GMO) and Tween 80 (0.00689 w\w% of total weight of GMO). Furthermore, the optimized formula was characterized for in-vitro release, Transmission electron microscope TEM, and its cytotoxic effect against lung cancer cells.

Result
cubosomal formulations showed vesicles size ranging from 225.6 to 447.7 nm indicating a successful preparation method. Also, ZP values were in the range of 19.8 to 28.1 mV indicating the high stability of cubosomes. The in-vitro release of optimum formula showed higher and controlled release compared to the marketed product. TEM image showed cubical shape nanovesicles with the absence of aggregations confirming the high stability. Furthermore, it revealed higher cytotoxic effect against the lung cancer cells compared to metformin solution.

Conclusion
Metformin has been successfully formulated as nano-vesicles with high zeta potential, enhanced and controlled release. Additionally, it showed improved anticancer activity against lung cancer cells. So, metformin loaded cubosomes could be considered as a promising carrier for lung cancer treatment.

201649

Streptophenazine-H, a microbial metabolite as potential EGFR inhibitor for cancer therapy: Induced-fit docking and stability assessment by molecular dynamics

Nermeen Alqadi, Neelaveni Chellappan

Background
Epidemiological data indicate breast and colorectal cancers are most common in Saudi Arabia. Overexpression of epidermal growth factor receptor (EGFR) is associated with lung, breast, and colorectal cancers. EGFR inhibition can modulate cell growth, cell proliferation, and apoptosis. Streptophenazines A-H reported from a sponge-derived Streptomyces strain were investigated for EGFR inhibition by induced-fit docking and stability assessment by molecular dynamics (MD).

Method
Schrodinger's software Glide, Desmond was used for induced-fit docking and MD. The 3D crystal structure of EGFR downloaded from PDB (ID: 1M17) served as the target for docking. Streptophenazines structures were downloaded from PubChem. The binding site was located using the native ligand Erlotinib bound to EGFR. The top-ranked molecule was identified based on the docking score and its EGFR-bound complex was subjected to 100ns MD analysis. MD results in terms of RMSD, RMSF, and the nature and duration of protein-ligand contacts were used to determine the stability of the complex.

Result
Streptophenazine-H exhibited maximum binding to EGFR. Streptophenazine-H bound EGFR was stable throughout the simulation time, and the ligand and protein RMSD converged at 1.75Å after 80ns. RMSF plot indicated that residues at positions 10 to 30 fluctuated the most and interacting residues Met98, Cys102, and Asp105 were stable. Ester moiety of Streptophenazine-H formed a hydrogen bond with Met98 that was maintained 88% of the simulation time indicating the significance of the ester group in binding. Water bridges played a critical role in bridging the gaps between ligand atoms and residue atoms facilitating the hydrogen bonds.

Conclusion
Streptophenazine-H is predicted to inhibit EGFR by engaging the cytoplasmic kinase domain of EGFR and interacting with key residues in the C-terminal thereby halting the transphosphorylation of tyrosine residues necessary for EGFR signaling.

201648

EXPLORATION OF THE PHYTOCHEMICAL CONTENT AND ANTI-OXIDANT POTENTIAL OF HELIOTROPIUM DIGYNUM FROM QASSIM FLORA

Raghd Alhamed, Elham Amin

Background
Boraginaceae is large family of flowering plants that includes shrubs and trees. Heliotropium is one of Boraginaceae genera commonly found in Saudi Arabia. Qassim region located in the central part of Saudi Arabia constitutes many plant species that have not yet been adequately studied. H. digynum is one of the species commonly found in Qassim region. The objective of this study is to investigate the phytochemical content and antioxidant potential of H. digynum collected from Qassim region.

Method
H. digynum was collected, identified, and extracted by using 80% methanol. The extract was tested for the presence of variable classes of secondary metabolites. Then, the total phenolic (TPC), total flavonoids content (TFC) and antioxidant activity of the hydroalcoholic extract was measured using Folin-Ciocalteu, Aluminum chloride (ALCl3) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay methods, respectively.

Result
The results indicated the presence of flavonoids, carbohydrates, tannins, cardiac glycoside, and sterol in H. digynum extract. Estimation of TPC in the extract revealed 6.7 mg GAE/g dry extract, while the value of TFC was measured as 433.7 mg QE/g dry extract. Moreover, the determination of antioxidant activity using DPPH assay method displayed antioxidant activity calculated as 110.4 mg AAE/g extract.

Conclusion
The study revealed the present of variable types of secondary metabolites in H. digynum extracts. Furthermore, H. digynum extract displayed satisfactory levels of TFC and TPC, which indicated the possibility of promising biological activity.

201639

Characterization of target-specific injectable sodium selenite nanoparticles surface linked with cetuximab against human breast cancer cells

Hissah Sufyani, Manar Hakami, Razan Areshyi, Fatma Halawi, and Sivakumar S. Moni

Background
Doxorubicin is a widely prescribed anticancer drug for the first-line treatment of breast cancer. However, drug-induced cardiotoxicity and drug resistance are the two significant barriers that limit its use. Targeted nanoparticle drug delivery is a promising therapeutic method for delivering drug molecules directly to cancer cells, mitigating drug-related toxicity, and overcoming drug resistance. In the present study, injectable doxorubicin loaded in sodium selenite nanoparticle surfaces linked to cetuximab was formulated, physiochemically characterized, and its in vitro cytotoxic effect was determined against MCF-7 ATCC human breast cancer cells.

Method
The doxorubicin-loaded sodium selenite nanoparticles (doxssnp) and doxssnp surface linked with cetuximab (doxssnpmab) were formulated by solvent evaporation technique. Dynamic light scattering (DLS) analysis was performed to determine zeta potential (ZP) analysis, polydispersity index (PDI), mobility, and particle size. In vitro cytotoxicity assay was performed using MCF-7 ATCC human breast cancer cells.

Result
The epidermal growth factor receptor (EGFR) is one of the main targets for treating breast cancers. In the present study, we attempt to develop target-specific novel drug formulation doxssnpmab to target EGFR and improve the therapeutic index. Both doxssnp and doxssnpmab showed unique physicochemical characteristics such as zeta potential, polydispersity index, sizes, and mobility. The formulations were successful as injectable dosage forms and showed a significant cytotoxic effect against MCF-7 human breast cancer cells on compared with the efficacy of standard doxorubicin drug at $p<0,05$ level.

Conclusion
The novel therapeutic dosage form will be a milestone in treating human breast cancer.

201622

Screening and Isolation of Novel Native Bacteria with Anti- Candida Activity against Multidrug-Resistant Candida auris

Rawan Alaqeel, Aqeelah Alfaraj, Maryam Alabdullah

Background
Candida Auris, first reported in 2009 in Japan, is a multidrug-resistant (MDR) emerging yeast pathogen causing nosocomial outbreaks and invasive infection. Bacteria can be considered as producers of diverse bioactive metabolites including fungicides. Objectives: The study aims to screen novel native bacteria against the MDR C. Auris, identify using 16S rRNA gene sequence, and to reveal the cytotoxic effect of crude bacterial extract.

Method
Bacteria were isolated from 123 samples from a wide range of sources using trypticase soy broth and trypticase soy agar. Anti-Candida auris activity was screened using the Kirby-Bauer method with isolated bacteria on disk against MDR C. Auris (clinical isolate identified earlier) streaked on sabouraud dextrose agar. Bacteria showed zone of inhibition were identified by 16S rRNA gene sequencing technique followed by bioinformatics tools. The identified bacteria were structurally elucidated using scanning electron microscope (SEM) and crude bacterial broth has proceeded for cytotoxicity assay using MTT assay.

Result
Of 225 isolated bacteria, 7.5% demonstrated anti-Candida activity against MDR C. Auris. Identified isolates were Bacillus, Priestia, and Enterobacter species with a range of 13 to 30 mm diameter of the inhibition zone. A rod-shaped bacterium with 2.722±0.088 µm in length and 0.66 µm in width showed 30mm zone inhibition and identified as Bacillus halotolerant (GenBank accession number: MZ619061) through molecular taxonomy. B. halotolerant showed no cytotoxic effect on the treated human foreskin fibroblast cells (HFF-1).

Conclusion
Several bacteria species, particularly Bacillus spp., with potential anti-Candida activity against the emerging MDR pathogen C. Auris were successfully isolated. B. halotolerant (MZ619061) had the highest anti-Candida activity with no cytotoxic effect and further studies can be conducted to determine its efficacy as an anti-Candida Auris drug.

201618

Echinacea possesses a protective effect against acetic acid-induced ulcerative colitis via modulating inflammation, oxidative stress and MMP-9 activity

Ayman Alhabri, Ahmed Alzahrani, Heba Eltahir, Hossein Eladaway, Mekky Abouzied

Background
Ulcerative colitis (UC) is an inflammatory GIT disorder that has multifactorial etiologies including genetic, immunity, infection, and psychological factors. Yet, UC represents a challenge due to the high recurrence rate in addition to being a cancer-prone disorder that showed increased incidence in the last decade. Several assumptions have been made regarding the mechanism of UC, which were closely connected to oxidative stress, the first step in the inflammatory response pathway aided by IL-1β, IL-6, NFkB and TNF-α. In addition, MMp-9, a proinflammatory enzyme, was shown to play a role in pathology of UC.
Available treatments include corticosteroids, tumor necrosis factor antagonists, integrin blockers, interleukin antagonist, and immunomodulators.
Echinacea has been shown to possess antioxidant and anti-inflammatory potential in several pathological conditions as well as aiding tissue regeneration
In this study we aimed at testing the efficacy of using Echinacea protection against acetic acid-induced ulcerative colitis and to investigate the underlying molecular mechanisms

Method
24 male Wistar albino rats were divided into four groups (n = 6). Group I: Normal saline control group with no colitis; Group II: Acetic acid colitis group; Group III: 100 mg/kg/day Echinacea extract; Group IV: Prednisolone group (4 mg/kg/day). Induction of colitis was initiated 5 days after starting the treatments using intrarectal instillation of 2 mL of 4% acetic acid. Colon damage was evaluated macroscopically and microscopically.
Serum and tissue were used for evaluating biomarkers.

Result
Echinacea successfully improved macro- and microscopic damage signs in acetic acid-induced UC. In addition, it ameliorated the increase in levels of inflammatory cytokines (IL-1β, IL-6, NFkB and TNF-α). It also improved superoxide dismutase and GSH content and decreased MDA levels and MMP-9 activity within colon tissues.

Conclusion
Echinacea represents a promising, safe, and natural candidate in prophylaxis against UC via down-regulation of pro-inflammatory cytokines and MMP-9

201617

Sitagliptin protects against on acute kidney injury via alleviating oxidative stress and modulating expression of TNF-α and IL-6

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Background
Sitagliptin is a dipeptidyl peptidase-4 inhibitor that is commonly used as a glucose-lowering drug. It has been shown to possess anti-inflammatory and antioxidant properties. Acute kidney injury (AKI) is a disorder that can cause severe complications, which may end up by death. In this work, Sitagliptin was tested for its ability to alleviate AKI induced by glycerol in an experimental rat model

Method
30 Male Sprague-Dawley rats were equally divided into a healthy group, glycerol-treated group, and sitagliptin-treated group. Glycerol- and sitagliptin groups received a single IM dose of glycerol (50% glycerol in saline, 8ml/kg), whereas controls received saline only. Sitagliptin treatment (a single oral daily dose, 10 mg/kg) was accomplished for 5 consecutive days starting three days before glycerol injection. Animals were euthanized to collect blood and kidney tissue for biochemical and histological assessment. Evaluation of cytokines expression was performed via ELISA, q-PCR, and western blot analysis

Result
glycerol injection successfully induced renal damage as observed by the increase in serum creatinine, blood urea nitrogen (BUN), lipid peroxidation, serum magnesium, TNF-α, Il-1β and IL-6 as well as increase in kidney index. Also, hypocalcemia along with damage to cellular components of the kidney were observed. Sitagliptin treatment improved the renal histology and ameliorated the increase in serum creatinine, BUN, serum magnesium, TNF-α, Il-1β and IL-6 levels as well as renal edema and lipid peroxidation but did not affect serum calcium levels.

Conclusion
This suggests sitagliptin as a potential therapeutic agent for management of AKI mainly via its antioxidant and anti-inflammatory properties

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201611

Therapeutic effects of genistein in experimentally induced ulcerative colitis in rats via affecting mitochondrial biogenesis

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Background
Ulcerative colitis (UC) is of the inflammatory bowel diseases that affects the mucosa of colon producing severe inflammation and ulcers. Genistein is a polyphenolic isoflavone present in several vegetables as soybeans and fava beans. Therefore, we conducted the following study to investigate the potential therapeutic effects of genistein in experimentally induced UC in rats through affecting antioxidant activity and mitochondrial biogenesis.

Method
UC was introduced in rats using an intracolonic single administration of 2 ml of 4% acetic acid. Then, UC rats were treated with 25 mg/kg genistein. Samples of colon were obtained to assess gene and protein expression of nuclear factor erythroid 2-related factor-2 (Nrf2), heme Oxygenase-1 (HO-1), peroxisome proliferator-activated receptor-gamma coactivator (PGC-1), mitochondrial transcription factor A (TFAM), B-cell lymphoma 2 (BCL2) and BCL2-associated X (BAX). In addition, colon sections were stained for investigation of cell structure.

Result
Investigation of micro-images of UC rats revealed damaged intestinal glands, severe hemorrhage and inflammatory cell infiltration, which were improved by treating with genistein. Finally, treatment with genistein significantly increased expression of PGC-1, TFAM, Nrf2, HO-1 and BCL2 associated with reduction in expression of BAX.

Conclusion
Genistein produced therapeutic effects against UC in rats. The therapeutic activity can be explained by enhancing antioxidant activity and elevating mitochondrial biogenesis leading to reduction cell apoptosis.

201610

Comparative study of brand and generics of Amoxicillin /Clavulanic acid tablets available in Saudi Arabia market

Mohammed Sunbul, Ahmed Al Shuwaikhat

Background
Amoxicillin/Clavulanate is one of the most known and used antibiotics to human and is used to a many medical conditions. In our study we compared between the brand and generics of our chosen drug available in the Saudi market and are they equal in their pharmaceutical properties by doing pharmaceutical comparative study by looking at physiochemical properties like hardness, febrility test and disintegration and dissolution profile using biowaiver concept. Our aim was to encourage generic drug prescribing to minimize the finical burden of purchasing the medication using biowaiver studies.

Method
In our methodology we tested six physiochemical and pharmaceutical properties of Amoxicillin/Clavulanate tablets available in Saudi Arabia, Augmentin (brand), Klavox, Clavador and Megamox (generics) which are; Weight variation, Hardness test, Febrility test, Disintegration test, Dissolution test and Uniformity of content.

Result
Weight test achieved the standard and fall into the allowed range of no more difference which is ± 5%. Friability passed the acceptance criteria of the targeted value which did not exceed 1%. Disintegration test showed that all tablets of each drug are disintegrated in acceptable time which is less than 30 minutes. Dissolution test exhibited that both Amoxicillin and Clavulanate of each product release 95% at the 30 minutes mark. Uniformity of the content: All the drugs have more than 500 mg of Amoxicillin. All the tested products passed all tests and within the USP limits.

Conclusion
The results shown that the three generics and brand of Amoxicillin/Clavulanic acid achieved equivalent results in term of quality and dissolution profile according to biowaiver results so they can be used interchangeably. It is recommended to increase awareness of the quality of generics and enhance the physicians to trust in local products and potentiate cost saving investment for national health insurance.

201597

Therapeutic effects of sulforaphane in experimentally induced gastric ulcer in rats via affecting epidermal growth factor and inflammation

Kunouz Alsubaie, Ghadeer Albalawi, Maha Albalawi, Athari Albalawi

Background
Gastric ulcer (GU) is a common chronic digestive system disease affecting about 10% of the world›s population. Repeated episodes of GU can lead to many complications as gastrointestinal perforation and bleeding, therefore, affecting patients› quality of life. Sulforaphane is a sulfur-rich compound that is present in cruciferous vegetables such as broccoli and cabbage. Therefore, we conducted this study to investigate the ability of sulforaphane to cure experimentally induced GU in rats through affecting epidermal growth factor (EGF) and inflammation.

Method
GU was induced in rats by a single oral administration of 80 mg/kg indomethacin. Part of the rats were treated with 15 mg/kg sulforaphane. The gastric tissues were eliminated for investigation of gene and protein expression of epidermal growth factor (EGF), NFκB, IL-1β, TNF-α and signal transducer and activator of transcription 3 (STAT3). In addition, gastric sections were stained for investigation of cell structure.

Result
Investigation of micro-images of GU rats revealed degeneration in both surface cells and glandular epithelial cells with inflammatory cell infiltration, which were improved by treating with sulforaphane. Finally, treatment with sulforaphane significantly increased the expression of EGF associated with significant reduction in the expression of NFκB, IL-1β, TNF-α and STAT3.

Conclusion
Sulforaphane produced therapeutic effects against GU experimentally induced in rats. The protective effects of sulforaphane could be explained by its ability to increase the expression of EGF and deactivation of inflammatory pathway.

201586

Discovery of Novel Mpro Inhibitors as Therapeutic Candidates for COVID-19

Reem Abumostafa, Mohammad Khanfar, Nada Salaas

Background
COVID-19 is an infectious disease caused by SARS-CoV-2 that develops fatal dyspnea and acute respiratory distress syndrome. Few treatments are currently available that can act specifically against SARS-CoV-2; therefore, there is an urgent need to develop novel and specific SARS-CoV-2 antiviral agents. The main protease (Mpro) is an essential enzyme for the life cycle of SARS-CoV-2. Inhibiting Mpro will halt the virus›s life cycle; thus, this enzyme represents an important antiviral target. This research aims to employ manually generated pharmacophore models and quantitative structure–activity relationship (QSAR) analysis to explore novel chemical scaffolds of Mpro inhibitors from the natural products repository.

Method
Genetic function algorithm (GFA) and multiple linear regression (MLR) analysis were employed to generate self-consistent and predictive QSAR models based on optimal combinations of pharmacophores and physiochemical descriptors. AnalytiCon Discovery database of purified natural products was screened using the pharmacophore model that emerged in the highest-ranked QSAR model for structurally novel Mpro inhibitors. The twelve compounds with the highest predicted activity were bio assayed for their Mpro inhibitory activity.

Result
Three compounds showed high bioactivity with IC50 values in low micromolar (μM) ranges. This algorithm discovered Lactucopicrin, Pseurotin A, and Alpinetin as active Mpro inhibitors with IC50 values of 0.99 μM, 1.06 μM, and 8.8 μM, respectively.

Conclusion
This work demonstrates a powerful strategy that combines computational modelling with experimental validation to identify structurally diverse and effective molecules that can serve as a basis for developing novel and potent drugs for pandemic pathogens, in this case, Mpro inhibitors.

201583

Immuno-informatics Approach to Study the Effect of Delta, Alpha and Omicron Mutations of Sars-Cov-2 Spike Protein on The Activation of Immune Response

Aljawharah Almufarrej, Hisham Altayeb

Background
The coronavirus pandemic has negatively affected the global economy and social life. Vaccines have been produced to compact the outbreak of the virus. But as usual, the virus began to overcome the vaccine, which led to the emergence of new mutations. This study analyzes the effect of Alpha, Delta and Omicron mutations of Sars-Cov-2 spike protein on immune response using immune-informatics.

Method
Mutations D614G were selected from Alpha and K417N from Delta and Q503R from Omicron. Using the IEBD database the Antigenicity, Accessibility, and Flexibility of epitopes were predicted. T-cell MHC-II binding affinity to epitopes was evaluated, then the strength of HLA binding affinity was characterized by molecular docking using HPEPDOCK server. The generated complex was visualized by the Chimera software.

Result
Through the results, it shows that the Alpha and Delta mutations that the Antigenicity, Flexibility, and Accessibility scores were significantly lower than the normal strain which means that they have an effect in decreasing the activity of B-cells, while Omicron increased their activity. The docking scores showed that the Alpha and Omicron mutations have an effect in T-cell activation in contrast to the Delta that reduced it.

Conclusion
We conclude that the omicron mutation activated both B and T cells and thus stimulated the immune response. This study concludes that the Omicron variant has more effect on the activation of immune response of B-cell and T-cell activation while the Delta and Alpha variants had an effect on one of the cells.

201580

DISCOVERY OF POTENT AND NON-TOXIC DprE1 INHIBITORS FOR TUBERCULOSIS

Sanad Alshammari, Mohd Imran

Background
The emergence of drug-resistance Tuberculosis (TB) is a global concern. This problem can be addressed by developing new drugs. DprE1 is a validated target for developing anti-TB drugs against drug-resistance TB.

Method
Novel ethionamide (ETH) and prothionamide (PTH) based molecules were prepared and characterized by their spectral data. The Microplate Alamar Blue Assay was utilized to evaluate the anti-TB activity of compounds against Mycobacterium tuberculosis H37Rv

employing ETH, PTH, isoniazid (INH), and pyrazinamide (PYZ) as standard drugs. The cytotoxicity studies were carried out versus HepG2 and Vero cell lines. The molecular docking studies of compounds concerning the DprE1 enzyme and the in-silico evaluation of the physicochemical and pharmacokinetic parameters were also performed.

Result
The compounds 4a, 4b, 4f, and 4g displayed equal minimum inhibitory concentration (MIC) values in comparison to INH (3.125 µg/ml) and PYZ (3.125 µg/ml), whereas 4c-4e and 4h- 4j displayed better MIC values (1.562 µg/ml) than INH and PYZ. All compounds presented better anti-TB potential than ETH (6.25 µg/ml) and PTH (6.25 µg/ml). The toxicity studies unveiled that 4a-4j were safe up to 300 µg/ml concentration versus Vero and HepG2 cell lines. The molecular docking studies suggested that 4a-4j display anti-TB activity by inhibiting the DprE1 enzyme. The in-silico studies exposed that compound followed Lipinski's rule (drug-likeliness) and showed better gastrointestinal absorption than BTZ043 and macozinone.

Conclusion
The ETH and PTH-based coumarinyl-thiazole template can help to develop selective DprE1 enzyme inhibitors as potent anti-TB agents.

201572

New approach for buccal delivery of gliclazide for pediatric use

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Background
Design of buccal adhesive films of gliclazide for pediatric use.

Method
Different films were designed using different polymer combination based on gelatin, HPMC, , chitosan, polyethylene glycol, sodium alginate, and carbopol. Drug and polymers compatibility were studied using both differential scanning calorimetry method and Fourier transform infrared spectroscopy. All films were studied for drug content, thickness, weight variation, muco-adhesion, swelling index, and folding endurance. In vitro release study of gliclazide has been completed for two hours using a modified USP dissolution apparatus. Stability studies for selected films were conducted at different temperatures namely, 4°C, 25°C, and 40°C. Based on in vitro release results the optimized formula was selected for an in vivo bioavailability study.

Result
The compatibility studies showed no physical or chemical interactions between the drug and polymers. In addition, films showed an accepted drug content, muco-adhesion strength, and good mechanical properties. The in vitro release results showed complete and rapid release of gliclazide from buccal films. Stability studies revealed an accepted stability of the films at both 4°C and 25°C, while the film get harder with many particles appear at 40°C. The in vivo bioavailability study showed that the selected film has 2.1-fold increase in the AUC0-24 compared with oral tablets.

Conclusion
Buccal delivery of gliclazide via adhesive films is a hopeful dosage form for the management of diabetes in pediatrics.

201571

Repurposing of Antiviral Drugs to Treat Medullary Thyroid Carcinoma

Abdulrahman Alamer, Meshari Aloumi, Ayman Alotaibi

Background
Between 2013 and 2017, only 3.4% of all reported human malignant tumors were thyroid carcinoma; It is the most common type of endocrine neoplasia and, over the past two decades, has shown the highest increase in incidence rate of all cancers. The clinical outcome and survival rates of thyroid neoplasm are prominently better than other types of neoplasia. Medullary thyroid carcinoma (MTC) is a relatively uncommon thyroid cancer; nevertheless, it accounts for most mortality cases related to thyroid cancer. MTC is described as a tumor derived from the para-follicular cells of the thyroid gland, which normally secretes calcitonin. The majority of MTC is sporadic whereas only 25% is a dominant component of the hereditary multiple endocrine neoplasia (MEN2). Specific mutations are associated with phenotype and prognosis for both hereditary and sporadic MTC. Most research and studies have shown that there are few genetic alterations involved in the pathogenesis of MTC which is The Rearranged during Transfection (RET). RET is a single pass transmembrane receptor protein-tyrosine kinase. In our present research we are trying to target RET by repurposing antiviral drugs which will diminish the tumor proliferation and induced apoptosis of MTC.

Method
A docking study was performed utilizing antiviral library to evaluate the binding mode or the interaction between the drugs and RET receptor. The docking study was performed using the Glide tool in Maestro Schrödinger software and two scoring function were utilized.

Result
Our preliminary SP and XP docking results showed several antiviral drugs with high binding activity for the protein-tyrosine kinase receptor with glide score of -12000 to -9000.

Conclusion
Repurposing the antiviral medications would benefit patients by providing additional or alternative anti-tumor, with fewer side effects and less cancer resistance.

201560

Simvastatin and Ursolic Acid Ameliorate Cisplatin-Induced Acute Kidney Injury via Modulating Autophagic and Necroptotic Pathways

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Background
Cisplatin (CP) is one of the most effective antineoplastic agents. However, its use is restricted by acute kidney injury (AKI), which, if not prevented, it could progress to fatal chronic kidney dysfunction. Several mechanisms have been involved in CP-induced AKI. Of them, autophagy and necroptosis exert a remarkable role in the protection and pathogenesis of this side effect, respectively. In the present work, we aimed to investigate the protective role of simvastatin (SIM), ursolic acid (UA), and their combination against CP-induced AKI through modulation of autophagic and necroptotic signaling pathways.

Method
Mice received either the vehicle, a single dose of CP (20 mg/kg), CP+SIM (20 mg/kg/day), CP+UA (50 mg/kg/day), or CP+SIM+UA at the same aforementioned doses. Kidney function, histopathological changes, and markers of autophagy, necroptosis, and inflammation were investigated.

Result
Administration of CP resulted in renal injury as evidenced by significant increases in serum creatinine and blood urea nitrogen along with histological abnormalities of kidney tissues. Additionally, CP significantly increased the renal levels of proinflammatory cytokines including tumor necrosis factor-α and interleukin-6 and upregulated the expression of necroptosis markers including receptor-interacting protein (RIP)-1, RIP3, and phosphorylated mixed lineage kinase domain-like protein (p-MLKL). Moreover, the expression of autophagy-related proteins including Bcl-2-interacting myosin-like coiled-coil protein (Beclin-1), and light chain 3B-II (LC3B-II) and their regulatory kinases;

phosphorylated adenosine monophosphate-activated protein kinase (p-AMPK), and phosphorylated mammalian target of rapamycin (p-mTOR), all were slightly increased after CP injection. Treatment with SIM, combination, and to a lesser extent UA attenuated CP-induced AKI. Both monotherapies and combination treatment suppressed RIP1/RIP3/p-MLKL necroptosis signaling, lowered levels of inflammatory cytokines, and boosted activation of AMPK/mTOR-mediated autophagy in CP-intoxicated mice.

Conclusion
Taken together, these data demonstrated that SIM, combination, and to a lesser extent UA may protect against CP-induced AKI through activation of autophagy and inhibition of necroptosis and its associated inflammation.

201556

Curative effects of crocin in ulcerative colitis via modulating apoptosis and inflammation

Ghadeer albalawi, Maha albalawi, Kunuz alsubaie, Athari albalawi

Background
Ulcerative colitis (UC) is one of the inflammatory bowel diseases, which has a characteristic inflammation in mucosal cells in rectum and colon. In addition, crocin is a carotenoid compound among the active constituents of saffron with many pharmacological effects as antioxidant, anti-inflammatory and anticancer activities. Therefore, we conducted the following study to investigate the therapeutic effects of crocin against UC through affecting cAMP/BCL2/BAX pathway.

Method
UC was induced in rats via intracolonic 2 ml of 4% acetic acid. Then UC rats were treated with 20 mg/kg crocin. The gene and protein expression levels of cAMP, B-cell lymphoma 2 (BCL2), BCL2-associated X (BAX), NF-κB, tumor necrosis factor (TNF)-α, IL-4 and IL-10. Colon sections were stained with hematoxylin-eosin and Alcian blue or immunostained with anti-TNF-α antibodies.

Result
Microscopic images of colon sections of UC group showed damaged intestinal glands, infiltration of inflammatory cell in mucosa and submucosa and severe hemorrhage. While images of colon sections stained with Alcian Blue showed damaged and almost absent intestinal glands. Crocin treatment improved the induced morphological changes. In UC rats, crocin significantly reduced expression levels of BAX, NF-κB and TNF-α, associated with cAMP, BCL2, IL-4 and IL-10 overexpression.

Conclusion
Crocin could treat UC induced in rats. It restored the normal weight and length of colon associated with morphological improvement as found by examining sections stained with hematoxylin/eosin and Alcian Blue. The curative effects could be explained by enhancing antioxidant activity, anti-apoptotic and anti-inflammatory effects.

201555

Studying the actions of sage and thymoquinone combination on blood pressure and lipid profile in high fat diet fed rats

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Background
High fat diet is one of the most imperative risk factors for cardiovascular disorders. Thymoquinone (TQ) is the main active pharmacological components of Nigella sativa (black cumin). Salvia officinalis L. (sage) has been demonstrated to have diverse pharmacological actions. The main objective was to determine the effects of sage and TQ combination on blood pressure and lipid profile in the rats fed with high fat diet (HFD).

Method
Wistar male rats were divided into five groups; normal diet (ND) and HFD in which rats were fed with normal diet or HFD for 10 weeks respectively. HFD + sage in which animals were administered sage essential oil (0.052 ml/ kg) orally along with HFD. HFD + TQ in which rats administered TQ (50mg/kg) orally with HFD. HF + sage + TQ in which animals received a combination of sage and TQ along with HFD. Blood pressure, liver function tests and lipid profile were measured.

Result
The combination of sage and TQ result in lowered systolic and diastolic arterial pressures and liver function enzymes. The combination reduced the LDL levels and amplified HDL in plasma and hepatic tissue.

Conclusion
The results of the current study verified that the combination of both sage essential oil together with TQ exhibited hypolipidemic and antihypertensive effects superior than each one alone.

201545

Innovative spray drying (Buchi B-90) technology for the preparation and evaluation of mucoadhesive nanoparticles for urinary tract infections

Amjad Alboubyed, Sree Harsha Nagaraja

Background
One of the most serious infectious disorders affecting society today is urinary tract infection, which can make women uncomfortable and ill. Through systemic distribution, only a little amount of Trimethoprim reaches the target location, which reduces the drug›s effectiveness. To minimize first-pass metabolism and other systemic side effects, mucoadhesive nanoparticles are targeted drug delivery techniques for intravenous injection.

Method
Buchi nanospray drier B-90 was used to spray a solution of trimethoprim and gelatin bloom 250 powder in 100 ml of water. Spray drying fixed parameters were a 4-µm spray nozzle, a 100°C inlet temperature, a 25-ml/hr feed flow rate, and a drug-to-polymer ratio (1: 4).

Result
According to scanning electron microscopy, the average particle size was found to be between 650 nm, and the surface was either smooth or shriveled. The yield was 69.55 percent and the drug content was 85.2 percent, respectively. By using infrared spectroscopy, it was demonstrated that there was no interaction between the medication and the polymer. The drug was released from the nanoparticles over the course of a 12-hour period, adhering to Kors Meyer's Peppas model. Under the same release conditions, the initial pure drug was released at 85.48% in the first 30 minutes. Investigation into the biocompatibility of trimethoprim-gelatin composite nanoparticles revealed that they were compatible.

Conclusion
Data gathered indicated that results indicated that such a mechanism is excellent for mucoadhesive medication delivery systems to the bladder.

201544

In vitro and in vivo study-based discovery of a new combination of BTZ-043 and isoniazid to shorten tuberculosis therapy

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Background
Long-term tuberculosis (TB) therapy is not patient-compliant and is also the reason for TB drug's side effects including hepatotoxicity. Therefore, creating a TB therapy with a shorter treatment duration is one of the priorities to develop TB treatment.

Method
Firstly, the MIC values of BTZ-043 and INH were determined against Mycobacterium tuberculosis (Mtb) utilizing in vitro assays. Secondly, the effect of the combination of different sub-MIC concentrations of BTZ-043 and INH were quantified through a checkerboard assay. Thirdly, the in vivo effect of the combination of BTZ-043 (10 mg/kg) and INH (10 mg/kg) was assessed utilizing the mouse infection model and Guinea pig infection model of TB.

Result
BTZ-043 and INH did not hinder the growth of Mtb at 0.8 nm. and 1.6 nm. concentrations, respectively. However, their combinations (0.2 nm. of BTZ-043 + 0.4 nm. of INH; 0.2 nm. of BTZ-043 + 0.8 nm. of INH; 0.2 nm. of BTZ-043 + 1.6 nm. of INH; 0.4 nm. of BTZ-043 + 0.4 nm. of INH) inhibit the growth of Mtb. The in vivo studies revealed that the combination of BTZ-043 and INH completely cleared lung bacterial load in three months, whereas the combination of INH, rifampicin (RIF), pyrazinamide (PZA), and ethambutol (EMB) required more than four months to clear lung bacterial load.

Conclusion
The combination of BTZ043- and INH is synergistic and shortens TB therapy duration.

201540

Angiotensin-II type 1 Receptor Blockade Prevents Tivozanib-induced Hypertension and Renal-cardiovascular Toxicity

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Background
Tivozanib is a potent selective inhibitor of triple vascular endothelial growth factor receptor tyrosine kinase, and hypertension is one of the main adverse effects of tivozanib. Recently, it was approved for the treatment of adult patients with relapsed or refractory advanced renal cell carcinoma. In this study, we investigated the role of losartan as angiotensin-II type 1 receptor (AT1R) blocker in attenuation of hypertension and renal-cardiovascular toxicities induced by tivozanib.

Method
Forty-eight C57BL/6J mice were divided into 4 groups and treated for 21 days. The first group was received normal saline, and the second group was given tivozanib (1 mg/kg/day). The third group was treated with losartan (10 mg/kg/day) and tivozanib, and the last group was treated with losartan (30 mg/kg/day) and tivozanib. During treatment, blood pressure and heart rate were measured, and urine samples were collected. Blood and organs were harvested for histopathological and biochemical analysis.

Result
Our results found that tivozanib decreased weight gain % and urine flow, and increased death rate, whereas these parameters returned to the normal levels by cotreatment with losartan. Tivozanib elevated blood pressure and caused sustained hypertension until the end of the study, and our histological results showed that tivozanib caused renal-cardiovascular injuries. In contrast, cotreatment with losartan attenuated hypertension and renal-cardiovascular toxicity induced by tivozanib.

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201533

Investigation Of a Novel Combination Therapy Using EGFR And c-Met inhibitors For Non-Small Cell Lung Cancer Treatment: In Vitro And In Vivo Studies

Meshal Alsahli, Khaled Alhosaini, Khaled Alhazzani, Mohammad Rashid

Background
Cancer is known to be challenging disease worldwide. In Saudi Arabia, International Agency for Research on Cancer reported over 27800 cases of cancer in 2020-2021. Among cancer types, lung cancer is considered fifth of top ten cancer types. Current study aims to determine whether using Epidermal Growth Factor Receptors (EGFR) inhibitor, Erlotinib in combination with Mesenchymal-epithelial transition factor (c-Met) inhibitor, Cabozantinib can have synergistic antitumor activity in lung cancer.

Method
We have deployed human lung cancer cell line (A549) as a model of Non-Small-Cell Lung Carcinoma (NSCLC). Erlotinib (5uM) and Cabozantinib (5uM) combination therapy has higher potency to induce cytotoxicity and reduces Metastasis-associated behavior compared to each monotherapy at > 10uM.

Result
This is confirmed by using Real Time Cell Analysis (RTCA) and 3-(4,5-diMethylThiazol-2-yl)-2,5-diphenyl-2H-Tetrazolium bromide (MTT) assay which showed that combination therapy inhibits A549 cell growth, cell proliferation and cell viability in a dose and time-dependent manner. Combination therapy also has more potent antitumor activity than monotherapy on cell migration and invasion using wound-healing assay. In term of oncogenic markers, western blotting analysis showed significant inhibition of Bcl-2 and elevation in Caspase3, P53, P21 proteins as indicator of Cell death via apoptosis. Furthermore, in PCR experiments to measure mRNA expression for assessing apoptosis, metastasis, and cell cycle-related, our results showed that combination therapy significantly inhibits levels of BCL-2, MMP-9, VEGF and TGF-β while inducing P53, P21, and BAX expression. In addition to in vitro study, we implanted A549 cell line tumor in nude mice to induce in vivo tumor. Mice were divided into four groups and treated with vehicle (control), Erlotinib monotherapy, Cabozantinib monotherapy and combination therapy over 32 days. Antitumor effect of combination therapy in these mice is more potent compared to monotherapy.

Conclusion
According to our findings, combination therapy could be potential promising strategy to treat lung cancer with lower toxicity.

201532

Synthesis of a novel deep eutectic solvent as a sustainable alternative in dispersive liquid-liquid microextraction for trace analysis of bisphenol A and its alternatives in baby products

Norah Alsubaie, Heba Shaaban, Ahmed Mostafa, Abdulmalik Alqarni

Background
Bisphenol A is a manufacturing chemical used in many plastic products. Developing sensitive analytical methods that allow determination of trace concentrations of bisphenols A is important. Deep eutectic solvents (DESs) are natural solvents employed as a substitute of the hazardous halogenated solvents used for dispersive liquid-liquid microextraction (DLLME).
The aim of this study is to synthesize and characterize a novel fenchone-based DES to be used as a green solvent in DLLME. Additionally, to investigate the occurrence of bisphenol A and its alternative bisphenol F in baby products marketed in Saudi Arabia.

Method
DES was prepared by mixing fenchone and octanoic acid (molar ratio, 1:1) at 70°C with continuous steering for 15 min. Then, DLLME parameters were optimized in terms of DES volume, pH, centrifugation, vortex time, sonication times, salt concentration, dispersing solvent type and sample volume. The developed method was validated in terms of linearity, precision, accuracy, limits of detection and limits of quantitation.

Result
The coefficient of determination for the calibration curves were > 0.9995. The recovery ranged from 80.0 to 100.2% with relative standard deviations not higher than 4.6%. The developed method was successfully applied for the quantification of bisphenol A and bisphenol F in thirty baby products including baby toys, pacifiers and bottles. Bisphenol A was detected in 10% of the analyzed samples at concentrations ranged from below limit of detection to of 0.35 µg/L.

Conclusion
This is the first study to report the use of fenchone based deep eutectic solvents as an alternative to the hazardous halogenated solvents for DLLME applications. The extraction procedure was rapid and environmentally friendly with low volume of organic solvents consumption and waste generation. A novel LC-MS/MS method has been developed and validated for trace analysis of bisphenol A and bisphenol F in baby products from the Saudi markets.

201531

Evaluating The Antiproliferative Actions of Irisin on Prostate Cancer In Vitro

Khalil Alshanqiti, Aliyah Almomen

Background
Prostate cancer is the second most common cancer occurring in male worldwide, it is estimated that 1 in 8 men will be diagnosed with it and 1 out of 41 men will die of prostate cancer. αVβ5 is a type of integrin receptor that are known to stimulates angiogenesis and activate the process of the growth in prostate cancer. Irisin is one of the recently found and isolated myokine hormones. Since the αVβ5 is the responsible receptor of activating Irisin in the cells, and irisin has an inhibitory action on it , this study aims to investigate the possible effect of irisin on prostate cancer cells and understand the underlying mechanism in vitro.

Method
Effects of Irisin on the viability of PC-3 cells were evaluated using MTT assay. The ability of irisin to induce apoptosis was evaluated using flow cytometry. Apoptosis was confirmed by evaluating expressions of cleaved PARP and cleaved Caspase 3. Western blot was used to evaluate the effect of irisin on Bcl-2, BAX, αVβ5, PI3K and AKT.

Result
Irisin was able to decrease the viability PC-3 cells as well as increase Annexin-V/ 7AAD positive cell population. Western blot results showed the ability of Irisin to cleave PARP and caspase 3. Irisin was also able to decrease Bcl-2 and showed no effect on BAX. αVβ5 expression was also decreased following Irisin treatment.

Conclusion
Irisin has an apoptotic effect on PC-3 cells possibly through a direct effect on BCL-2 family and probably has a role in the inhibition of angiogenesis witnessed by an inhibitory effect on αVβ5. These results encourage further investigation using an in vivo prostate cancer animal model. Key words: Irisin, prostate cancer, αVβ5, apoptosis, Bcl-2, cleaved PARP.

201522

Knowledge and role of the pharmacist in parenteral nutrition compounding technology - a cross-sectional study

Afnan Althunayyan, Bayan Al-Mass, Dalia Elmaghraby

Background
Parenteral nutrition (PN) prescription and admixture need clinical skills and special training. Pharmacists are important members of the nutrition support team. We aim in this study to assess the clinical knowledge as well as the knowledge of compounding technology of PN of the pharmacist.

Method
A descriptive cross-sectional study targeting pharmacists who practice in Saudi Arabia from June to September 2022. Data were collected using a structured validated electronic questionnaire. The study questionnaire covered participants' personal data, and their experience in pharmacy; pharmacists' clinical knowledge; Pharmacists perceived practice technique regarding PN. The questionnaire was a digital survey and distributed electronically to the target population.

Result
1021 pharmacists participated in this study. 77.2% of the participants had poor clinical knowledge regarding PN. On the other hand, 66.2% had good perceived practice regarding PN.

Conclusion
Pharmacists who participated in the study had good technical knowledge of PN admixture but their medical information was poor. More educational programs should be addressed to the pharmacists in Saudi Arabia to advance their clinical knowledge and to empower their role in the nutrition support team.

201521

Design, development, and in vivo evaluation of Darunavir-Loaded Mucoadhesive in situ gel for the nose to brain delivery

Fatemah Alqattan, Anroop B. Nair, Sunita Chaudhary

Background
The low perfusion of the drug to the brain is the main factor limiting the clinical efficacy of antiretroviral therapy in NeuroAIDS. The current research aimed to formulate an in situ mucoadhesive gel loaded with darunavir to evaluate the viability of brain targeting via intranasal delivery.

Method
Preliminary batches (F1-F9) were prepared and evaluated for various pharmaceutical characteristics. A full factorial design of the experiment was applied to optimize and assess the effect of two influencing variables. To examine and optimize the impact of two influencing variables (Carbopol 934P (X1) and Poloxamer 407 (X2)) on the response effects (gelation temperature (Y1) and % drug release (Y2) at 8 h), a full factorial design of the experiment was used. An in vivo pharmacokinetic study in rats was performed to assess drug targeting to the brain following the nasal application of the selected in situ gel (D7).

Result
The data show that both influencing factors have a substantial ($p < 0.05$) impact on the response variables. The optimized formulation

(F7) showed good mucoadhesion, favorable rheological characteristics, prolonged drug release, and increased penetration across the nasal mucosa. An in vitro ciliotoxicity study confirms the nontoxicity of the optimized in situ gel (D7) on the nasal mucosa. In comparison to intravenous administration, nasal administration resulted in significantly higher ($p < 0.0001$) Cmax (4-fold) and AUC0-α (~3.5-fold) values in the brain. Darunavir›s exposure to the system was reduced with nasal therapy, which supports the limited central compartment drug absorption.

Conclusion
Overall, the data show that the optimized in situ mucoadhesive nasal gel is successful in delivering darunavir to the brain via the nasal route and may provide a therapeutic alternative for NeuroAIDS.

201520

Development of a reverse phase gradient HPLC method to determine Atorvastatin water solubility in the presence and absence of nicotinamide

Bayan almalki, Atheer Alshehri, Mohammed Alqarni

Background
Most medications available on the market are taken orally, and roughly 40% of them have limited water solubility. Low water solubility is one of the main difficulties in administering medications orally. According to BCS (biopharmaceutical classification system), the low water-soluble medication atorvastatin calcium (ATO) was categorized as class II. The ATO has a 14% oral bioavailability due to the lower water solubility. The medication must then be consumed consistently and daily.

Method
This study aims to increase ATO›s water solubility by using nicotinamide (NIC) as a co-former and a hydrotropic agent. ATO with NIC could not be detected or quantified by HPLC with any reliability. Hence the RP-gradient-HPLC method was developed. ICH guidelines were used to validate this approach. This new approach was used to assess the ATO in the presence and absence of NIC at various temperatures (4 Co, 25 Co, and 40 Co).

Result
The results of this study demonstrate how linear, specific, precise, and accurate the developed method was. The linearity of ATO and NIC was 0.999. ATO and NIC limit of detections (LOD) were 1.58 and 0.39 µg/mL, respectively. On the other hand, the limit of quantification (LOQ) for ATO and NIC were 4.78 and 1.18 µg/mL, respectively. The recovery mean percent was 101.05% for ATO and 101.6% for NIC (n=3). Additionally, the RSD% result for intra- and inter-day precision for ATO and NIC was less than 2%.

Conclusion
ATO was 16 times more water soluble in the presence of NIC (5M concentration) than ATO alone

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201519

Development of 96-microwell plate spectrophotometer assay with Chloranilin acid for the detection of sildenafil in tablet dosage form

Atheer Alshehri, Bayan Almalki, Mohammad Alqarni

Background
Medication counterfeiting is a worldwide problem affecting general health. It can be found in both brand and generic products. The cause is usually commercial in low-income countries with a high chance of falsified medicines. Impurities of products or incorrect Active Pharmaceutical Ingredients (API) are the most critical factors in classifying falsified medications. The most common falsified drugs are antimalarial, antidiabetic, and analgesics.

Method
This study describes the validation method of 96-micro well plate spectroscopy for the quality control and counterfeit of sildenafil (SILD). This method was developed for SILD using charge transfer complexes (CTCs) with Chloranilin acid (CLA). The reactions of SILD with CLA reagents were carried out in 96-microwell plates, and the absorbance of the colored complexes was measured at 529 nm using an absorbance microplate reader. The 96-microwell-based spectrophotometer›s method was based on the generation of color with the CLA reagent, using an inexpensive analytical reagent and a low quantity of reagent (an environmentally friendly «Green» method).

Result
The results of this method showed good correlation coefficients (0.999). The limit of detection was 1.75 x10-5 M, and the limit of quantification was 5.29 x10-5 M. This method showed high precision with RSD % not exceeding 4.27%. The accuracy of this method was obtained by recovery percentage with percentage values less than (± 5%). The results show no significant difference between the references, label, and recovery was less than 5%.

Conclusion
Compared to the amount used in the spectrophotometer method, the amount of the organic solvent was reduced by 50 times. The benefit of this study is suggested to use this method in quality control laboratories for routine sildenafil analysis as an alternative to current methods.

201516

Multi-residue analysis of sulfonamides in infants and young children milk formulas

Zainab Al Shehab, Heba Shaaban, Ahmed Mostafa, Abdulmalik Alqarni, Ruya Alsultan, Zahra Aljarrash, Weaam Al-Zawad, Shahad Al-Kahlah, Mohd Amir XO

Background
Sulfonamides are widely used for the treatment of bacterial infections; however they have multiple health effects such as allergic reactions and antibiotics resistance. Children have not well-developed immune system, so they are more sensitive to trace levels of sulfonamides. Developing sensitive green analytical methods for the determination of sulfonamides residues is highly needed. The aim of this study is to develop and optimize a green dispersive liquid–liquid microextraction method for simultaneous determination of sulfonamides in infant milk formulas from the Saudi market.

Method
A natural deep eutectic solvent (DES) was synthesized and characterized. Initially, twelve DESs systems including two monoterpenes (thymol and menthol) and six acids (acetic acid, formic acid, octanoic acid, oleic acid, decanoic acid, dodecanoic acid) were screened. The DES components were mixed at molar ration of 1:1 in a conical flask and stirred continuously at 70°C till a clear transparent solution was formed. Finally, a DES composed of menthol and octanoic acid at a molar ratio of 1:2 was selected. The synthesized DES was utilized as a green solvent in combination with liquid–liquid microextraction method followed by UPLC-MS/MS for simultaneous determination of sulfonamides residues in milk-based infant formulas marketed in KSA. Different extraction parameters such as DES volume, centrifugation time, sample volume and pH were investigated.

Result
The limits of detection ranged from 5– 500 µg Kg–1. Sulfamethoxazole was found at a mean concentration of 17.17 µg kg–1 and sulfadimethoxine was found at maximum concentration of 22.5 µg kg–1. The total amounts of the detected sulfonamides were below the maximum residual limit (100 µg kg– 1) set by FDA and European commission.

Conclusion
A novel green LC-MS/MS method for simultaneous determination of sulfonamides residues in infant milk samples has been developed and validated. The developed method was fast, sensitive, and environmentally friendly.

201512

Faisal Alsuwaylami, Ali Mujtaba, Nawaf Alotaibi

Background
Apigenin is a natural flavonoid present in various vegetables and fruits as well as in some medicinal plants. It has multiple biological effects; in addition, it has potent chemoprotective and chemotherapeutic features for a variety of cancers, including lung, breast, skin, prostate, and colon cancer. Unfortunately, the poor water solubility of apigenin leads to a relatively low bioavailability, which greatly limits its further clinical application. This study aimed to develop apigenin-loaded PEGylated chitosan nanoparticles to enhance therapeutic efficacy against breast cancer.

Method
The apigenin nanoparticles (NPs) were prepared by ionotropic gelation of chitosan with tripolyphosphate anions (TPP). Then, immediately NPs were surface coated with PEG 400 to ensure their safety and stability. The NPs were optimized for particle size, polydispersity index (PDI), and zeta potential and then evaluated for cytotoxicity in MCF-7 cell lines.

Result
NPs prepared with 0.2% chitosan, TPP and 10 mg apigenin, showed particle size of 132.4±28.52 nm and PDI of 0.261, %drug entrapment efficiency 79.15±3.62 and zeta potential 23.88±1.84 mV. The release study revealed that PEGylated-CNPs exhibited biphasic release patterns distinguished by an initial burst release of APG only at early phases accompanied by a delayed release near 24h. Furthermore, APG-PEGylated CNPs demonstrated statistically increased cytotoxicity against MCF-7 cells compared to pure APG.

Conclusion
This study's conclusive result is that PEGylated CNPs improved the therapeutic potential and expanded the current use of novel formulations of APG in cancer treatments.

201511

The Docking Studies of Activin Receptor type-1 (ACVR1) Inhibitors

Almaha Alnafjan, Waad Alrowily, Suliman Almahmoud

Background
Activin receptor-like kinase 2 (ALK2) is a member of a protein family called bone morphogenetic protein (BMP). ALK2 is found in many tissues of the body including skeletal muscle and cartilage, and it controls the growth and development of bones and muscles. The mutation of ALK2 is associated with fibro dysplasia ossificans progressive (FOP), a disorder in which muscles and connective tissue are gradually replaced by bone. Inhibition of the mutant ALK2 by small-molecule drugs is a promising therapeutic approach to treat FOP. Hence, our goal is to provide a structural basis of ALK2 and to determine important residues for ligand binding that would help in the designing and development of ALK2 inhibitors by applying molecular docking studies.

Method
Docking studies of several ALK2 inhibitors against the X-ray crystal structures of the ALK2 were run by using Auto dock Vina. The X-ray structures of ALK2 were downloaded from the Protein Data Bank (RCSB). BIOVIA Discovery studio client were used for the ligand-protein interactions.
Result
Our data revealed that Auto dock Vina performance was well within the predicted range of the binding affinity of ALK2 inhibitors. The docking scores of the model 4BGG is in good agreement with the experimentally data. The statistical errors for the docking scores of the model 4BGG is low. Our data showed that Tyr219, Val222, Tyr285, and lys343 play critical roles in ligand binding to ALK2.

Conclusion
Our structural analysis on the docked complexes of ALK2 inhibitors suggested that Auto dock Vina is dependable for binding affinity with low error compared to those observed values. The analyses of the interactions for ALK2 revealed that Tyr219, Val222, Tyr285, and lys343 are most vital residues for interaction with ALK2 inhibitors.

201509

Molecular Modeling Studies on the Binding Mode of the X-linked inhibitor of apoptosis (XIAP) Inhibitors

Nadiah Almutairi, Reema Alhabib

Background
The programmed cell death (PCD) (apoptosis) plays an important role in cellular process for normal development and homeostasis. Inhibitors of apoptosis proteins (IAPs) serves as endogenous inhibitors of PCD. Inhibition of IAPs is a promising strategy in the treatment of cancer. Through the eight members of IAP family, XIAP controls the apoptosis in malignant cells. XIAP consists of BIR domains (types 1, 2, and 3), a ubiquitin-associated (UBA) domain and a RING domain. BIR3 is the target site for second mitochondria-derived activator of caspase (SMACs) which is endogenous antagonist of IAPs. Our objective of this project is to define the structural basis of the BIR3 domain of XIAP interactions with the reported XIAP antagonist and determine important residues for ligand binding. Our molecular docking studies offers significant structural insight for the design and development of new XIAP inhibitors.

Method
AutoDuck Vina was used for the molecular docking of XIAP antagonists against the X-ray crystal structure of XIAP. The X-ray structures of XIAP-BIR3 were downloaded from the Protein Data Bank (RCSB). The ligand-protein Interactions were analysed by BIOVIA discovery studio client.

Result
The comparisons of predicted docking scores to the experimental affinity shows that the docking scores of the model 5C3H are in good agreement, with mean errors of -0.77 kcal/mol, the root mean square errors of 1.41 kcal/mol, and the mean absolute errors of 1.22. Our data revealed that the residues Trp323, Tyr324, and Lys297 play critical roles in ligand binding to XIAP protein.

Conclusion
Our studies on the docked complexes of have XIAP-BIR3 with XIAP inhibitors revealed that AutoDuck Vina is very dependable in terms of their predictability of the activity for XIAP inhibitors.

201496

Lymecycline and Hexoprenaline as repurposed candidates that may interfere with the viral S-glycoprotein and host ACE2 receptor protein interaction, an in silico study

Hadi AlSaihaty, Dania Hussein, Abdullah Almatrafi, Mohammed Sayed Mansour, Alanood Howsawi, Sarah Almustafa, Manar Alghamdi

Background
The protein interaction between the viral S-glycoprotein and the host angiotensin-converting enzyme-2 receptor (ACE2) is key to the virulent nature of SARS-CoV-2. This study utilizes advanced computational methods to analyze the S-glycoprotein-ACE2 protein interaction and to identify agents that can interfere with viral-host engagement.

Method
Crystal structures were retrieved from the protein databank. A library of FDA and worldwide-approved medications, as well as nutraceuticals, was compiled from Drug Bank and Zinc databases. A comprehensive screening approach was employed to shortlist compounds capable of binding to the viral-host interface. Findings were corroborated using both Schrödinger's Glide and Auto Dock Vina molecular modeling software. Molecular dynamic simulations further verified the stability of the ligand-target interaction at the protein interface.

Result
Polydatin, Lymecycline, Hexoprenaline, and Pentagalloylglucose were identified as hit candidates for potential repurposing, given the robust and stable nature of their interaction at the viral-host interface and relevance for clinical testing (respective binding affinity (kcal/mol) were -7.6, -9.1, -10.1, and -12.7 respectively). These agents were shown in a 100-nanosecond simulation trajectory to favorably disrupt key binding interactions at the viral host interface and may potentially inhibit viral entry into host cells. Furthermore, in all hit molecules it was observed that inhibiting the interaction with the following key viral binding residues: Lys17, Gly496, Tyr505, and key host residues: His34, Asp38, Lys353, played a critical role toward the inhibition of the viral-host protein interaction.

Conclusion
This study outlines a comprehensive approach towards in-silico drug discovery which aims to identify hit agents that can be suitably translated into a clinical setting. The hit compounds identified are prime agents for further in vitro and clinical investigations to verify their efficacy in the potential treatment of COVID-19.

201473

ANTIBIOTIC AND PHYTOCONSTITUENT COMBINATION LOADED GASTRIC FLOATING MICROSPONGE FOR THE EFFECTIVE ERADICATION OF HELICOBACTER PYLORI INFECTION: FORMULATION, PHYSICOCHEMICAL AND MICROBIOLOGICAL ASSESSMENTS

Essa Abdullah Aldulaym, Ahmed Alsahwan, Hassan Alkhamis, Hussain Aljanobi

Background
The present investigation aimed to develop an antibiotic and a phytoconstituent combination loaded gastric floating micro sponge for the effective eradication of Helicobacter pylori infection by the synergistic effects of the loaded drugs.

Method
The micro sponge formulations were prepared by quasi-emulsion method, and then the prepared formulations were assessed for various parameters including in vitro drug release study and in vitro anti H. pylori activity. The production yield, drug content, and entrapment efficiency of the micro sponges were increased on increasing the polymer and the drugs amounts. All micro sponges were exhibited prolonged in vitro floating time (>12 h) and controlled in-vitro drug release (for 24 hours). The surface morphology imaging study revealed that the micro sponge was spherical in shape and had a porous surface with interconnecting channels. DSC study demonstrated the absence of drug-drug and drug-polymer interactions.

Result
The in vitro MIC results showed that the anti-H. pylori activity of the micro sponge containing both drugs showed synergistic and more prolonged effect than the micro sponge containing single drugs.

Conclusion
it could be concluded that the loading of two synergistic drugs in a gastric floating micro sponge could be an excellent option to effectively eradicate H. pylori infection and the pharmacokinetic and pharmacodynamic assessments of our micro sponge formulation can be expected to provide a rewarding outcome.

201470

Developments in Taste-Masking Techniques for Bitter Drug: An in-vitro–in-vivo assessment

Saleh Alyami, Ibrahim Al Alhareth, Hamad S Alyami

Background
Patient compliance is critical for effective clinical outcomes and taste masking is key as it is positively related to patient compliance. Promethazine hydrochloride (PMZ), a potent H1-histamine blocker that is widely used to prevent motion sickness, dizziness, nausea, and vomiting, has a very bitter taste.

Method
A one-step approach was used to expedite the synthesis of NCs made from a biocompatible and biodegradable polyamide based on L-arginine amino acid.

Result
The NCs that were produced had an average particle size of 193.63 ± 39.1 nm and a zeta potential of -31.7 ± 1.25 mV, indicating their stability. The NCs were characterized using differential scanning calorimetric analysis and x-ray diffraction, as well as transmission electron microscopy that demonstrated the formation of the NCs and the incorporation of PMZ within the polymer. The in vitro release study of PMZ-loaded NCs displayed a 0.91 ± 0.02% release of PMZ after 10 minutes using artificial saliva as dissolution media, indicating excellent taste-masked particles. The in-vivo study using mice revealed that the amount of fluid consumed by the PMZ-NCs group was significantly higher than that consumed by the free PMZ group ($p<0.05$).

Conclusion
This study confirmed that NCs using polyamides based on L-arginine and interfacial polycondensation can serve as a good platform for effective taste masking of bitter actives.

201468

A novel natural deep eutectic solvent for green dispersive liquid-liquid microextraction (DLLME) of Parabens from cosmetic products using UHPLC-PDA

Danyah Albashryi, Batool Hasheeshi, Nujud Bakhashwain, Abdulmalik M. Alqarni, Heba Shaaban and Ahmed Mostafa

Background
Parabens are type of preservatives that have been widely used as an antimicrobial agent with low toxicity and good stability. Methyl, ethyl, propyl, and butyl parabens are widely used in cosmetics. Some recent studies detected the presence of parabens

in human breast tumor, and some reported that parabens could exhibit an endocrine disrupting effect. Therefore, development of sensitive methods for parabens determination is needed. Currently, green chemistry and sustainability has attracted considerable attention. Thus, large effort has been made to obtain low toxic and biodegradable green extractants, such as deep eutectic solvents (DES, for sample extraction and preparation.

Method
Hydrophobic DES ware prepared by mixing DL-menthol with formic acid (60°C, 5 min) and characterized using Fourier transform infrared (FTIR). Then, DLLME parameters were optimized to include molar ratio, DES volume, pH, salt concentration, addition of dispersive solvents, vortex time, centrifugation, and sonication times. Green chemistry concepts were also considered in the UHPLC-PDA separation and ethanol was used as the organic solvent.

Result
The menthol-formic acid DES (1:2) was selected for optimization. Under the optimum conditions, the calibration curves exhibit a good linearity (20-4000 ng mL 1) with satisfactory correlation coefficients (r2 ≥ 0.9919). The limit of detections (LODs) was in the range of 0.45 to 0.69 ng mL 1. The limit of quantifications (LOQs) was < 6.14% and 5.25 % for intra-day and inter-day precision, respectively, indicating good precision. The proposed method was applied successfully for the quantification of the target analytes in 15 cosmetic samples.

Conclusion
The natural menthol-formic acid DES in the molar ratio of 1:2 was synthesized, characterized, and showed excellent characteristics to be used as an alternative green extraction solvent in DLLME applications. The optimized DLLME method using menthol-based DES is simple, rapid, highly efficient, and eco-friendly for extraction of parabens in real cosmetic samples.

201462

Ameliorative Effects of Taraxacum officinale Crude Extracts on Paclitaxel Induced-Hematological Toxicity and Oxidative Stress

Haya AlMofarfesh

Background
Paclitaxel (PTX) is an effective anticancer agent but in the same fashion, has a major dose-limiting hematological toxicity. Taraxacum officinale (TXO) crude extract has been used in the treatment of anemia in herbal remedies. Here, this study evaluated the possible attenuation of PTX-induced hematological adverse effects and lipid peroxidation with coadministration of TXO crude extract

Method
The whole plant of TXO was soaked in water for 24 hrs., filtered, and evaporated to dryness with rotary evaporator. Five groups of 6 adult rats weighing between 150-160 g were used. Normal saline was administered to control group 1, group 2 was given 30 mg kg–1 of PTX alone intraperitoneally. Group 3 and 4 were given PTX 30 mg kg–1 followed by 200 and 400 mg kg–1 TXO respectively. The fifth group received 200 mg kg–1 TXO alone. Drug administration lasted for 10 days after which animals were sacrificed and blood collected for differential analysis. Significant ($p<0.001$) weight losses in PTX treated group and were attenuated by coadministration of TXO.

Result
Group treated with TXO alone showed a significant ($p<0.001$) weight gain. Non-significant decreases in RBC counts, hemoglobin and hematocrit were observed with PTX alone, which were increased with the addition of TXO. Results also showed significant ($p<0.05$) decreases in WBC, neutrophil and platelet counts by PTX were also attenuated by co-administration with TXO. Increased lipid peroxidation by PTX was significantly reduced as well.

Conclusion
This study has demonstrated that TXO crude extract has the potential to attenuate PTX-induced hematological adverse effects in rats, an anticancer drug frequently used in the treatment of many cancers.

201450

A Novel, Sensitive technique for the isolation of Mycobacterium tuberculosis

Mustafa AlGhatam, Khaled Alsubaie, Ali AlAbdulathim, Zuhair AlKafil, Khalid Alanzi, Pottathil Shinu

Background
The present study compared the performance of newly developed pancreatin-cetylpyridinium chloride (pancreatin-CPC) digestion and decontamination method (DDM) with N-acetyl L-Cysteine-sodium hydroxide (NALC-NaOH) DDM for culturing Mycobacteria from clinically suspected pulmonary tuberculosis (PTB) patients

Method
For the study, sputum samples collected from clinically suspected PTB cases were subjected to direct microscopy, pretreatment with NALC-NaOH DDM (reference method), and pancreatin-CPC DDM followed by culture, and the data were analyzed.

Result
The direct microscopy showed sensitivity, specificity, positive predictive value and negative predictive value of 60.4%, 99.77%, 98.9%, and 88.3%, respectively (against culture) for the detection of Mycobacterial species. The pancreatin-CPC DDM demonstrated sensitivity, specificity, positive predictive value, and negative predictive value of 99.32%, 94.07%, 85.05%, and 99.76%, respectively, for the isolation of Mycobacterial species

Conclusion
In conclusion, pancreatin-CPC DMM was found to be a highly sensitive and technically simple for the isolation of MTB.

201766

A novel natural anisaldehyde-based deep eutectic solvent for green dispersive liquid-liquid microextraction of different antibiotics in food samples

Makarem ALkhalaf, Marwaa Alsalman, Abdulmalik Alqarni, Heba Shaaban, Ahmed Mostafa

Background
A wide variety of antibiotics is used in the growing livestock and poultry to enhance growth and/or resist infection. As a result, it may accumulate leading to infiltration to milk and eggs. The presence of antibiotic residues might pose risk to human health. The aim of the study is to develop an eco-friendly method for the quality control and trace analysis of five different antibiotics in cow milk and chicken eggs using a novel natural deep eutectic solvent (DES)-based dispersive liquid-liquid microextraction (DLLME) coupled to UHPLC-MS/MS.

Method
The deep eutectic solvent was prepared by mixing anisaldehyde and decanoic acid in a molar ratio of 3:1. Thereafter, it was employed as a green extraction solvent for the DLLME method. Several extraction parameters were optimized such as DES volume, salt addition, pH, vortex and centrifugation times. The optimized method was then utilized for the trace analysis of 5 antibiotics in cow milk and chicken eggs using UHPLC-MS/MS.

Result
The method showed high sensitivity with limits of detection in the range of 0.75 – 100 ng L-1. Satisfactory precision (RSD < 4.13%) and accuracy (extraction recovery 77.8 – 103.5%) were obtained. Finally, the method was successfully applied for the analysis of 5 antibiotics in cow milk and chicken eggs. Sulfamethoxazole was the most frequently detected antibiotic in milk samples (77.8%) followed by enrofloxacin (44.4%). For egg samples, sulfamethoxazole was also the most frequently detected antibiotic (80%) followed by sulfadimethoxine (60%). All detected concentrations were lower than

the maximum residual limits of the studied antibiotics.

Conclusion
a novel natural anisaldehyde-based DES was synthesized and characterized. DLLME was used in combination with UHPLC-MS/MS for the extraction and trace analysis of 5 antibiotics in food stuff. The develop method was validated and showed good sensitivity, recovery and precision. To sum up, DES can be used as an eco-friendly alternative to harmful organic solvents for the extraction and trace analysis of antibiotics in different food samples.

201694

The role of serotonergic and catecholaminergic systems for possible antidepressant activity of apigenin

Reem Alshammari, Abdulkhaliq Alsalman

Background
Although, the anti-depressant like effects of apigenin (APG) are documented in the literature, the underlying mechanism for exerting such an effect is still not clear. In this research, an attempt was made to determine the possible role of APG for antidepressant activity through serotonergic and catecholaminergic systems using standardized animal models.

Method
The antidepressant property of APG was determine by involving tail suspension (TST) and modified forced swimming tests (MFST). The effect of APG was evaluated at 25 and 50 mg/kg. In mechanistic models, animals were pretreated with catecholaminergic and serotonergic antagonists prior to administration of APG. The results obtained were statistically analyzed to determine the level of significance.

Result
The period of immobility in both models (TST and MFST) was significantly reduced by APG (25 and 50 mg/kg). The best therapeutic dose of APG (50 mg/kg) was selected for the mechanistic study. The anti-immobility effect of APG declined to a significant extent upon pretreatment with catecholaminergic antagonists (α-methyl-para-tyrosine methyl ester; SCH 23390; sulpiride; phentolamine) and serotonergic inhibitors (p-clorophenylalanine-methyl-ester; ondansetron) in both TST and MFST models. The antidepressant benefits of apigenin were only modestly reversed when rats were given propranolol.

Conclusion
The findings suggest that APG's antidepressant effect is mediated by the α-adrenergic, dopaminergic and 5-HT3 serotonergic receptors.

201537

Pharmacodynamic studies of Zaatar (thymus vulgaris)

Ghada khalid Almejlad, Samreen Soomro

Background
Introduction: Thymus vulgaris (zaatar) is one of most famous and traditional spice of Arab countries. Extracts of Thymus vulgaris (zaatar) are useful in traditional medicine because of their known biological activity. The current studies aiming to further explore the Phyto-constituents of thymus vulgaris and its effect as anti-inflammatory, anti-bacterial and anti-cancer agent.

Method
The present study investigated the phytochemical constituent of zaatar and fractionated with organic solvents using classical method. Biological activity was done on the fractions using immunomodulatory activity, anti-bacterial and anti-cancer activity in vitro. Cytotoxic effect of compound using normal cells was also studied by MTT assay.

Result
Hundred gram of ethanolic crude extract was prepared from zaatar leaves using classical method and fractionated with organic solvents. Phytochemical studies showed positive results for alkaloids, carbohydrates/glycosides, tannins, flavonoids and triterpenes/sterols and absence of saponins and anthraquinones. Ethyl acetate and n-Butanol samples exhibited significant activity against pathogenic E. coli. Our results demonstrated that ethanolic extract of zaatar exhibited remarkable activity against salmonella typhi, staph. aureus and bacillus subtlis. Furthermore. The anticancer potential for zaatar was also evaluated on Hela cell line and was found to be slightly effective against cancer cells with percent inhibition of 25%. Cytotoxicity analysis of on 3T3 mouse fibroblast, showed that none of the extract is significantly toxic to normal cell system.

Conclusion
Results suggested that zaatar found to be a potential free radical inhibitor generated during the process of inflammation and hence a potent immunomodulatory and also a lead bactericidal molecule toward the gram-negative pathogenic organism. This compound is nontoxic as proven by cytotoxicity analysis these investigations could lead toward discovery of zaatar extracts as potential antibacterial as well as Immunomodulating agents.

201517

Trans-ungual Delivery of Terbinafine by Constant Voltage Iontophoresis Technique: Formulation Optimization and Evaluation

Maryam Almajhad, Anoop Nair, Zainab Alsultan, Dalya Alsuliman

Background
Due to the low intrinsic transport of drugs through the thick, multi-layered keratinized nail plate, topical therapy for antifungals is predominantly limited. The goal of this study was to create a gel formulation, as well as to improve and assess the trans ungual terbinafine distribution utilizing the constant voltage iontophoresis method.

Method
The trans ungual administration of terbinafine was optimized utilizing statistical analysis employing the Box-Behnken design by assessing the importance of the polyethylene glycol concentration, voltage, and application time (2–6 h).

Result
The effects of the chemical enhancer, applied voltage, and application time on the delivery of terbinafine nails were shown by optimization data in batches (F1–F17). The optimized batch (F8) showed greater ex vivo penetration and drug accumulation into the nail tissue as compared to other batches (F1–F17). When terbinafine was accumulated using iontophoresis as opposed to passive absorption, a greater amount of the medication was released over the nails. In contrast to the passive procedure, nails that have undergone iontophoresis had a significantly higher zone of inhibition.

Conclusion
The findings shown show that the low voltage iontophoresis-optimized formulation could be a workable and alternative method for delivering terbinafine transungally, which could increase the likelihood that topical nail therapy for onychomycosis will be successful.

201499

Formulation and evaluation of Sesamol Laden Nanosponges for skin cancer

Roaya Alsaeed

Background
Sesamol has exceptional chemotherapeutic activity due to its anti-inflammatory and antioxidant properties. However, poor physicochemical properties and stability issues limit sesamol's potential. The objective of this study was to develop and evaluate the potential of developing nano sponges to improve sesamol clinical efficacy.

Method
Prepared formulation was evaluated for various pharmaceutical properties and cytotoxicity studies against B16F12 Melanoma cell lines.

Result
The particle size of sesamol-laden nano sponges was shown to be in the nano range (200 to 500 nm), with a small polydispersity index, an adequate charge (-17 to -26 mV), and a high payload. The drug release data displayed controlled release behavior of sesamol from nano sponges. The findings of the egg-albumin denaturation assay revealed the enhanced anti-inflammatory potential of sesamol-laden nano sponges as compared to pure sesamol. Further, the cytotoxicity assay showed that sesamol-laden nano sponges were more effective against B16F12 melanoma cell lines than bioactive alone. Findings of this assay demonstrated a reduction in IC50 values of sesamol-laden nano sponges (67.38 µg/mL) in comparison to sesamol (106 µg/mL).

Conclusion
The findings from the present investigation demonstrated in vitro controlled release pattern, and cytotoxic activity of sesamol-laden nano sponges, suggesting it is a promising drug delivery carrier with enhanced potential against skin cancer.

201478

Aspartames Alter Pharmacokinetics Parameters of Erlotinib and Gefitinib and Elevate Liver Enzymes in Wistar Rats

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Background
Erlotinib (ERL) and gefitinib (GEF) are extensively metabolized by CYP450 enzymes. Aspartame (ASP), an artificial sweetener, induce CYP2E1 and CYP3A2 enzymes in the brain and could increase liver enzymes. In this work, the influence of ASP on the pharmacokinetics (PK) of ERL and GEF in Wistar rats were evaluated.

Method
ERL and GEF PKs were evaluated after receiving 175 mg/kg or 1000 mg/kg of ASP for four weeks using UPLC-MS/MS. Levels of liver enzymes after four weeks of ASP consumption were also evaluated.

Result
ASP 175 mg/kg was able to significantly alter levels of Cmax (36% increase for ERL, 38% decrease for GEF), AUC0-48 (two folds increase for ERL, 41% increase for GEF), and AUC0-≥ (112% increase for ERL, 185% increase for GEF).Also , ASP 175 mg/kg decreased the apparent oral clearance of both drugs by 58% for ERL and 12% for GEF. ASP 1000 mg/kg increased Cmax of both ERL and GEF by 159% and 73%, respectively. Both AUC0-72 and AUC0-≥ were increased by ASP 1000 for ERL and decreased for GEF. CL/F has increased by 38% for ERL and decreased by 12% for GEF. Moreover, data indicated that ASP have significantly increased levels of liver enzymes within two weeks of administration.

Conclusion
Although ASP 175 and 1000 mg/kg alter ERL and GEF PKs parameters, ASP 1000 mg/kg has the highest impact on most parameters. ASP 1000 mg/kg also can significantly increase activities of liver enzymes indicating the possibility of inducing liver injury. Therefore, it might be of clinical importance to avoid the administration of aspartame containing products while on ERL or GEF therapy.

Clinical Pharmacy

Professionals

201441

Oral squamous cell carcinoma with 100% PD-L 1 expression and autoimmune disease patient Case report

Batool Albaqshi, Shaheed Humaid, Fatima Alhaddad

Background
Oral cancer is the most abundant type of head and neck cancer that is treated with surgical resection followed by radiation with or without addition of chemotherapy. The primary objectives of the study are to describe the management of metastatic oral squamous cell carcinoma with high PD-L1 expression in presence of autoimmune disease.

Method
We report a forty-seven-year-old female patient with recurrent metastatic oral cavity cancer and stable rheumatoid arthritis.

Result
Immuno-histochemical examination showed a combined positive score of 100% of PD-L1 by Dako 22C3 staining of tumor cells. The patient received eight cycles of Pembrolizumab. The response was reported both clinically and radiologically. Pembrolizumab was well tolerated without exacerbation of the rheumatoid disease. This is the first case describing the efficacy and safety of pembrolizumab utilization in an Oral squamous cell carcinoma patient with a strong PD-L1 expression and presence of autoimmune disease.

Conclusion
Pembrolizumab for oral cavity squamous cell carcinoma with high-level expression of the PD-L1 protein, have shown good response, suggesting that higher PD-L1 expression is a favorable prognostic factor. Pembrolizumab use in presence of autoimmune illness like rheumatoid arthritis, at least for our case, did not lead to disease flare.

201452

Population pharmacokinetics of Rivaroxaban in real-world patients

Razan AlMofada, Saeed Alqahtania, Jamilah Alnahdia, Asma'a bin hazzaa

Background
The pharmacokinetics of rivaroxaban have been studied in different populations, and there were differences in the pharmacokinetic parameters. However, most of these studies were conducted on healthy subjects from different ethnic groups. Thus, this study aimed to investigate the pharmacokinetics of rivaroxaban in real-world patients to determine the variables that may cause differences in the pharmacokinetics and pharmacodynamics of rivaroxaban.

Method
This was a prospective observational study. Five blood samples were collected at different time points after starting the rivaroxaban dose. Plasma concentrations were analyzed using a validated high-performance liquid chromatography (HPLC) method. Then, population pharmacokinetic models were developed using Monolix (version 4.4) software.

Result
In total, 100 blood samples from 20 patients (50% male /50% female) were analyzed. The patients' mean (± SD) age was 53.1 (± 15.5) years and their mean body weight was 81.7 (± 27.2) kg. The pharmacokinetics of rivaroxaban were described by a one-compartment model. Covariates were tested for their influence on rivaroxaban pharmacokinetics. The initial estimates for the absorption rate constant (Ka), apparent clearance (CL/F), and apparent volume of distribution (Vd/F) were 1.8 hr-1, 4.46 L/h, and 21.7 L, respectively. The inter-patient variability for Ka, CL/F, and Vd/F was 14% 24%, and 29.3%, respectively. The Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Body mass index (BMI), and albumin concentrations had an effect on the CL/F of rivaroxaban.

Conclusion
In this analysis, the population pharmacokinetic model of rivaroxaban found significant interindividual variability between subjects. Several variables influenced the Clearance (CL) of rivaroxaban and contributed toward this variability. The results may provide a guide that can aid the clinician during the initiation and adjustment of therapeutic regimens.

201466

Meta-analysis of the efficacy of topical spray containing malic acid 1% in patients with xerostomia

Afnan Ali, John Smart, Alison Lansley

Background
Dry mouth, which is also known as xerostomia, is a condition in which the salivary glands lack saliva production. Common causes of xerostomia include adverse effects of commonly prescribed medications and diseases. Recent studies have reported that malic acid use may be effective for improving the symptoms of dry mouth.

Method
A Literature search of multiple electronic databases was conducted, and the included trials met the following criteria: A randomised controlled trial with a double-blind design. All participants had dry mouth symptoms at the baseline and were treated with a malic acid spray in comparison to a control group (placebo). The mean difference (MD) and confidence interval (95% CI) were calculated using Review Manager (RevMan) software, v. 5.4 (Cochrane Collaboration),2020 and used a random-effects model from the data of four studies. The outcome measures of this meta-analysis were changes in stimulated and unstimulated salivary flow. The extracted data from each study included trial participants, type of intervention used, dosage, frequency, duration of the intervention and outcome measurements for treatment and control groups.

Result
A four studies were evaluated in this meta-analysis. There were 174 participants in total. All studies presented results favouring the experimental group with statistical significance ($p < 0.00001$). There was a significant improvement in both unstimulated and stimulated salivary flow with 1% malic acid topical spray 2 weeks after treatment compared to the placebo group.

Conclusion
A topical sialogogue spray containing 1% malic acid topical spray can be effective in increasing salivary flow and has the advantage over a placebo of reducing dry mouth.

201487

Tocilizumab effectiveness in mechanically ventilated COVID-19 patients (T-MVC-19 Study): a multicenter real-world evidence

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Background
This study aimed to evaluate the effectiveness of tocilizumab in mechanically ventilated patients with coronavirus disease 2019 (COVID-19).

Method
This retrospective multicenter study included adults (≥18 years), diagnosed with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by real-time polymerase chain reaction (RT-PCR) from nasopharyngeal swab, and requiring invasive mechanical ventilation during admission. Survival analyses with inverse propensity score treatment weighting (IPTW) and propensity score matching (PSM) were conducted. To account for immortal bias, we used Cox proportional modelling with time-dependent covariance. Competing risk analysis was performed for the extubation endpoint.

Result
A total of 556 (tocilizumab=193, control=363) patients were included. Males constituted the majority of the participants (69.2% in tocilizumab arm,74.1% in control arm). Tocilizumab was not associated with a reduction in mortality with hazard ratio (HR)=0.82 (95% confidence interval (CI: 0.62 to 1.10) in the Inverse propensity score weighting (IPTW) analysis and HR=0.86(95% CI: 0.64 to 1.16, P=0.349) in the PSM analysis. However, tocilizumab was associated with an increased rate of extubation (33.6%) compared to the control group (11.9%; subdistributional hazards (SHR)=3.1, 95% CI:1.86 to 5.16).

Conclusion
Although tocilizumab was not found to be effective in reducing mortality, extubation rate while on mechanical ventilation was higher among tocilizumab-treated group.

201489

Altered Pharmacokinetics Parameters of Vancomycin in Patients with Hematological Malignancy with Febrile Neutropenia, A Bayesian Software Estimation

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Background
The pharmacokinetics of vancomycin vary significantly between specific groups of patients, such as the critically ill patient and the patient with hematologic malignancy with febrile neutropenia (FN). Recent evidence suggests that the use of the usual standard dose of antibiotics such as vancomycin in patients with FN may not offer adequate exposure due to pharmacokinetic variability (PK). Therefore, the purpose of this study is to determine which vancomycin PK parameters are affected by the presence of FN by using Bayesian software PrecisePK.

Method
The study was carried out in King Abdulaziz Medical City. All adult patients who were admitted to the Princess Norah Oncology Center PNOC between January 1 and 2017 and December 31, 2020, hospitalized and received vancomycin dose with a steady-state trough concentration measured before the fourth dose were included. During the trial period, 297 patients have received vancomycin during their stay (oncology center) stay, with 217 of them meeting the inclusion criteria. Pharmacokinetic parameters for neutropenic

and non-neutropenic patients were calculated using a Bayesian software, PrecisePKTM, which utilizes a single measured vancomycin trough concentration. The two-compartment model in this platform and population parameters (Bayesian prior values) was used to estimate the Bayesian conditional posterior of patient pharmacokinetic parameters adjusted by patient vancomycin trough level (s).

Result
An important finding of this study was that vancomycin Vdss, and Vp in FN-HM patients are significantly lower than in non-neutropenic patients. On the contrary, no differences were detected in Vc and Vdα. Furthermore, the results of this study show a significant increase in vancomycin clearance of 23% in patients with FN compared to patients without FN.

Conclusion
The FN has a significant effect on the PK parameters of vancomycin, which may require specific consideration during the initiation of treatment in such patients.

201495

Prediction of the vancomycin AUC0-24/MIC Ratio Using the Bayesian Platform: A retrospective, single-center, cross-sectional study

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Background
The AUC0-24 is the most accurate way to track the vancomycin level while the Cmin is not an accurate surrogate. Most hospitals in Saudi Arabia are under-practicing the AUC-guided vancomycin dosing and monitoring. No previous work has been conducted to evaluate such practice in the whole kingdom. The current study objective is to calculate the AUC0-24 using the Bayesian dosing software (PrecisePK), identify the probability of patients who receive the optimum dose of vancomycin, and evaluate the accuracy and precision of the Bayesian platform.

Method
This retrospective study was conducted at King Abdulaziz medical city, Jeddah. All adult patients treated with vancomycin were included. While pediatric, critically ill patients requiring ICU admission, patients with acute renal failure or undergoing dialysis, and febrile neutropenic patients were excluded. The AUC0-24 was predicted using the PrecisePK platform based on the Bayesian principle. The two-compartmental model by Rodvold et al. in this platform and patients' dose data were utilized to calculate the AUC0-24, and trough level.

Result
Among 342 patients included in the present study, the mean of the estimated vancomycin AUC0-24 by the posterior model of PrecisePK was 573 ± 199.6 mg, and the model had a bias of 16.8%, whereas the precision was 2.85 mg/L. The target AUC0-24 (400 to 600 mg.hr/L) and measured trough (10 to 20 mg/L) were documented in 127 (37.1%) and 185 (54%) respectively. Furthermore, the result demonstrated an increase in odds of AUC0-24 > 600 mg.hr/L among trough level 15 - 20 mg/L group (OR=13.2, p < 0.05) as compared with trough level 10 – 14.9 mg/L group.

Conclusion
The discordance in the AUC0-24 and measured trough concentration may jeopardize patient safety, and the implantation of the Bayesian approach as a workable alternative to the traditional trough method should be considered.

201514

Mapping the impact of medication distribution automation on communication, safety and departmental satisfaction through quantitative surveys and system data.

Maged Farrag, Aseel Jambi, Afaf Almalki, Basem Elbehiry, Hala Albuti, James Waterson

Background
Our facility moved from manual distribution systems and floor stock to Automated Dispensing Cabinets (ADC). Previous studies on the impact of ADCs have focused on nurse satisfaction, administration error rates, and turn-around-times for medication replenishment. We extended our assessment to include volume of medication issue calls managed by the pharmacy, satisfaction with communications between pharmacy and nursing, proactive use of the ADC for medication knowledge, waste loss per month, and number of delayed treatment incidents.

Method
A blend of quantitative survey data, internal telephone system data, and head-to-head inventory and error/delay rate data assessments between nursing units pre and post ADC implementation triangulated the impact of ADCs. Surveys were distributed electronically to pharmacists and nursing staff. Telephone records indicating answered and made calls from nursing units to the pharmacy were obtained for pre- and post-ADC implementation periods. Monthly delayed medication incidents, non-ADC medication orders resolved in <30 minutes, medication waste and returns were collected for both periods.

Result
Changes in metrics post-ADC implementation. (30 months of data): Medication-turnaround-time: order-administration: α83% Non-ADC medications distributed < 30 minutes: α39% Estimated annual cost saving: expired medications: 692,182 EUR Monthly medication consumption: α24% Stock item count: ward stock: α81% No. returned items/month: α72% Delay incidents reported via quality system: Zero incidents No. answered calls / calls made re stock: α160% 64% of nurses stated that ADC introduction increased their productivity by >40%, >50% identified having more time for value added activities. 67% of pharmacists stated that ADCS increased productivity by >40%, 65% identified less time topping up nursing units, 47% felt they received less 'out of stock calls'.

Conclusion
It can be difficult to capture the full value of automation. Surveying staff perceptions can help appraise the effectiveness of human-automation synergies. Quantitative review of communication channels helps complete the system review.

201570

Effect of zinc supplementation on symptom reduction and length of hospitalization among pediatric patients with COVID-19 infection

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Background
Zinc is considered an essential multipurpose trace element because of its ability to act as a cofactor, signaling molecule, and structural component. Zinc exhibits potent immunoregulatory and antiviral properties as reported in the earlier studies on the management of respiratory infections in pediatrics. However, its effect in pediatric patients with COVID-19 remains unknown. The aim of this study is to assess the effect of zinc supplementation as an adjunctive therapy on improving the clinical outcomes among pediatric patients with COVID-19.

Method
We designed a retrospective cohort study and recruited pediatric patients with confirmed COVID-19 infection during the study period

from 1st March 2020 until 31st December 2021. The study population was divided into two arms (zinc versus no zinc supplementation as an adjunctive to the standard therapy). Ethical approval was obtained from the Ministry of Health Institutional Review Board before the commencement of this study.

Result
A total of 169 hospitalized patients younger than 18 years were screened, and 101 patients met the inclusion criteria. No statistically significant association in symptoms reduction, ICU admission, and mortality was found with the administration of zinc as adjunctive therapy (p= 0.105; p= 0.941 and p=0.073; respectively). However, respiratory failure and length of hospitalization were statistically significantly lower with the use of zinc supplementation (p= 0.004 and p= 0.017; respectively).

Conclusion
Zinc supplement as adjunctive therapy was found to be associated with lesser hospital stay among pediatric patients with COVID-19. However, zinc supplementation failed to demonstrate a significant effect on the improvement of the symptoms, in-hospital mortality, and ICU admission between the two groups however it raises question of development of kidney injury as demonstrated of high serum creatinine.

201579

Implementation of medication reconciliation at admission and discharge in ministry of defense health services hospitals; a multicenter study

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Background
There are many potentials for medication errors to occur due to the complex medication use process. The medication reconciliation process can significantly lower the incidence of medication errors that may arise from an incomplete or inaccurate medication history as well as reductions in length of hospital stay, patients' readmissions and lower healthcare costs.

Method
The quality improvement collaborative project was conducted as a pilot study in two hospitals, then implemented on a broader scale in 18 hospitals in Saudi Arabia. The goal of the project was to reduce the percent of patients by 50% of at least one outstanding unintentional discrepancy at admission, by November 2021. Our interventions depended on the Top High 5's project medication reconciliation World Health Organization (WHO), and Medications at Transitions and Clinical Handoffs (MATCH) toolkit for medication reconciliation by Agency for Healthcare Research and Quality (AHRQ). Improvement teams used the Institute of Healthcare Improvement's (IHI's) Model for improvement as a tool for testing and implementing changes. Collaboration and learning between hospitals were facilitated by conducting learning sessions (LSs) using the IHI's Collaborative Model for Achieving Breakthrough Improvement. The improvement teams underwent three cycles.

Result
By the end of the project significant improvements were observed. The percentage of patients with at least one outstanding unintentional discrepancy at admission showed a 20% reduction (27% before, 7% after; p value < 0.05) (RR 0.74) with a mean reduction in the number of discrepancies per patient by 0.74. The percentage of patients with at least one outstanding unintentional discrepancy at discharge showed 12% reduction (17% before, 5% after; p value < 0.05) (RR 0.71) with a mean reduction in the number of discrepancies per patient by 0.34.

Conclusion
An effective medication reconciliation process can significantly lower the incidence of medication errors that may arise from an incomplete or inaccurate medication history. One of the project's significant strengths is the implementation across multiple hospitals with different populations, sizes, and levels of leadership and team engagement. In addition, most of the enrolled hospitals achieved the target percentage for reconciliations that were successfully completed.

201603

Effectiveness and Safety of Enoxaparin versus Unfractionated Heparin as Thromboprophylaxis in Hospitalized COVID-19 Patients: A Retrospective Observational Cohort Study

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Background
Coronavirus 2019 (COVID-19) patients are at risk of thrombosis. Literature that compares the effectiveness of enoxaparin to unfractionated heparin (UFH) in COVID-19 patients is scarce. Therefore, the aim of this study is to evaluate the effectiveness and safety of enoxaparin compared to UFH when used at their standard/intermediate dosing in COVID-19 patients.

Method
This was a retrospective observational cohort study conducted at a large COVID-19 center located in Eastern Province, Saudi Arabia. Confirmed COVID-19 cases (≥18 years old) admitted between January and December 2020 who received thromboprophylaxis were randomly screened for inclusion. Exclusion criteria were patients receiving therapeutic anticoagulation, on chronic anticoagulation for ≥3 months, had received COVID 19 vaccine, had active bleeding, had a platelet count <25. The primary endpoint was a composite of death or any thrombotic event, including pulmonary embolism, deep venous thrombosis, ischemic stroke, or myocardial infarction. The secondary endpoints were 30 days of in-hospital survival, thrombotic events (i.e., pulmonary embolism, deep venous thrombosis, ischemic stroke, myocardial infarction), and occurrence of major bleeding or minor bleeding. We applied inverse propensity score weighting (IPTW) with survival analysis to analyze the primary endpoint. Logistic regression was used for the secondary endpoint.

Result
A total of 980 patients were included (enoxaparin, n=470 and UFH, n=510) with a mean age (±SD) of 47.7 (± 12.3) for the enoxaparin arm and 52 (±13.9) for the UFH arm. There was a statistically significant difference in the primary endpoint with an adjusted hazard ratio (aHR) of 0.46 (95%CI: 0.22 to 0.96, P= 0.039) in favor of the enoxaparin arm. Regarding the secondary endpoints, there was no statistically significant difference in 30 days of in-hospital survival with P=0.214, pulmonary embolism with aHR of 0.87 (0.44 to 1.71), P=0.691, ischemic stroke with aHR of 0.53 (0.05 to 5.97), P=0.607 and myocardial infarction with aHR 0.64 (0.07 to 6.30) P= 0.703 occurrence of major bleeding with aHR 1.89 (0.99 to 3.62), P= 0.052 or minor bleeding with aHR 1.37 (0.58 to 3.24), P=0.467 between the two arms.

Conclusion
When compared to UFH, enoxaparin was associated with a significant reduction in thrombotic events or mortality among COVID-19 patients. These findings provide a foundation for randomized controlled clinical trials of anticoagulation regimens.

201623

Population pharmacokinetics of vancomycin in very low birth weight neonates: A multicenter observation study

Manea Fares Al Munjem, Abdullah Al sultan, Zekra Al jehani, Kholoud Al Atiq

Background
Vancomycin dosing in very low birth weight (VLBW) neonates is challenging. Compared with the general neonatal population, VLBW neonates are less likely to achieve vancomycin therapeutic targets. Current dosing recommendations are based on studies on general neonatal population as only very limited number of studies have evaluated the pharmacokinetics of vancomycin in VLBW neonates. The main aim of this study is to develop a vancomycin population pharmacokinetic model to optimize vancomycin dosing in VLBW neonates.

Method
This was a multicenter observation study at six major hospitals in Saudi Arabia. The study included VLBW (less than 1500 gm) neonates who received vancomycin and had at least one vancomycin serum trough concentration measured at steady state. We developed a pharmacokinetic model and performed Monte Carlo simulations to develop an optimized dosing regimen in VLBW. We evaluated two different targets, an AUC0-24 of 400-600 or 400-800 ug.hr/mL. We also estimated the probability of having trough concentrations > 15 and 20 ug/mL.

Result
In total we had 236 patients, 162 in the learning data set and 74 in the validation data set. A one compartment model was used, volume of distribution was significantly associated only with weight, whereas, clearance was significantly associated with weight, post menstrual age (PMA) and serum creatinine (Scr). We developed dosing regimens for VLBW neonates considering both probability of achieving vancomycin therapeutic target and different toxicity threshold. The dosing regimens developed were classified according to PMA and Scr.

Conclusion
Our population specific model-based dosing approach is promising to improve vancomycin target attainment in VLBW neonates.

201669

Clinical Outcomes of Dronabinol in Patients with Cardiothoracic Surgery

Mohammed Alrashed, Nayoung Kang, Nicole Darian, Ferena Salek

Background
Dronabinol is a new addition to non-opioid analgesics, providing perioperative uses for postoperative nausea vomiting (PONV) and analgesic to minimize opioid use by its activity on the central cannabinoid receptors, implementing psychological effects on somatic and sensory pathways. There are no studies of dronabinol to date that have been conducted in cardiothoracic (CT) surgery patients, and we believe that this is the first analysis to evaluate the impact of dronabinol in cardiothoracic surgery. The primary objective of this study is to evaluate the use of adjunctive dronabinol for pain management in patients undergoing cardiothoracic surgery on hospital length of stay and ventilation time.

Method
This was a retrospective pre-post comparison of dronabinol use at a community hospital in Southwestern United States to examine the effects of adjunctive dronabinol for patient management following cardiothoracic surgery. A total of 81 patients admitted to the hospital for cardiac surgery were included.

Result
The total MME by day 5 was not different between groups. The mean difference of 14 mg favored the use of dronabinol however the P value was not significant (P value = 0.44). The use of gabapentin and acetaminophen was noted significantly in the dronabinol (P value = 0.001 & 0.00001 respectively). The mean pain scores were the same between the two groups on day 1, day 2, day 3, day 4, and day 5 (P value = NS). ICU and ACT length of stay (LOS) were the same between the two groups (P value = NS). Ventilation time in hours was the same between the two groups (P value = NS)

Conclusion
Dronabinol administration following cardiothoracic surgery did not reduce the total MME doses, ICU LOS, ventilation time compared to treatment with standard of care. Further large prospective data are required to confirm these findings.

201712

Comparison of the Efficacy and Safety for Different Regimen of Venous Thromboembolism Pharmacoprophylaxis among Severely Burn Patients: A Pilot, Randomized Controlled Trial

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Background
Venous thromboembolism (VTE) is a common complication in critically ill patients including burn cases. Burn patients respond differently to medications due to pharmacokinetic changes. This study aims to assess efficacy of VTE prophylaxis and safety in severely burn patients.

Method
A prospective, pilot, randomized controlled open label trial conducted in ICU patients with severe burns admitted within 24 hours of injury or transferred within 7 days. By using block randomization, patients allocated to receive high dose Enoxaparin 30 mg every 12 hours (E30q12), standard dose Enoxaparin 40 mg every 24 hours (E40q24) or Unfractionated heparin (UFH) 5000 U every 8 hours.

Result
20 out of 114 screened adult patients enrolled to receive E30q12 (40%), E4q24 (30%), and UFH (30%). The venous thromboembolism (VTE) was reported in one patient who was admitted with an electrical burn (50 % of TBSA) and received E4q24. Major bleeding happened in two patients, one in E30q12 and one in the UFH group. Five patients had minor bleeding reported; out of which two patients received E30q12, two patients in the E4q24, and the remaining patient was in the UFH group. RBCs transfusion needed in four patients, two in E30q12, and two in the UFH group. Five patients had graft failure, out of which three patients in the UFH group, and one patient in each Enoxaparin groups. ICU length of stay was longer in UFH patients (72.5±56.1days). There were four deceased patients, Three in E30q12 group and one in UFH group. ARDS reported in 17 patients followed by infection, and kidney injury. The mean anti-Xa was 0.29±0.15 in E30q12, 0.22±0.07 in E40q24, and 0.15±0.05 in UFH group.

Conclusion
Our preliminary results suggest that standard dose enoxaparin patients had a lower incidence of bleeding, ICU length of stay and mortality compared to other groups. We plan to continue to enroll patients on this study to further validate the safety and efficacy of different thrombophylactic modalities in this population.

201746

Prevalence of Bacterial Coinfection and Patterns of Antibiotics Prescribing in Patients with COVID-19: A Systematic review and Meta-Analysis

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Background
Evidence around prevalence of bacterial coinfection and pattern of antibiotic use in COVID-19 is controversial although high prevalence rates of bacterial coinfection have been reported in previous global viral respiratory pandemics1,2. Early data on the prevalence of antibiotic prescribing in COVID-19 indicates conflicting prevalence of antibiotic prescribing which challenges antimicrobial stewardship programmes and increases risk of antimicrobial resistance3-5.
This review aims at building on previous publications through identifying the prevalence of bacterial co-infection, and the prevalence of antibiotic use in COVID-19 patients across multiple regions to guide future prescribing

Method
Systematic review and meta-analysis. Proportion (prevalence) data was pooled using random effects meta-analysis approach; and stratified based on region and study design. Data: OVID MEDLINE, EMBASE, Cochrane and MedRxiv (January-2020 to June-2021). Studies: English-language studies of laboratory-confirmed COVID-19 patients which reported (a) bacterial coinfection prevalence and/or (b) antibiotic prescribing prevalence with no restrictions to study designs or healthcare setting. Participants: Adults (≥ 18-years) with RT-PCR-confirmed COVID-19.

Result
22 of 1058 hospital-based studies were eligible (76,176 COVID-19 patients). Pooled estimates for the prevalence of bacterial co-infection and antibiotic use were 5.62% (95% CI 2.26–10.31) and 61.77% (CI 50.95–70.90), respectively. Sub-group analysis by region demonstrated that bacterial co-infection was more prevalent in North American (7.89%, 95% CI 3.30-14.18). Antibiotic prescribing by region demonstrated that North America had reported the highest antibiotic use in COVID-19 patients (68.84%, 95% CI 62.27–75.05). The funnel plots demonstrate no evidence of publication bias. P-values for prevalence of bacterial coinfection is(0.43) and antibiotic use is(0.59).

Conclusion
This study demonstrates that the prevalence of bacterial coinfection amongst COVID-19 patients was low, 5.62%, nevertheless, antibiotics use amongst COVID-19 patients was high (61.77%). These findings encourage a more rational approach to antibiotics prescribing in COVID-19 patients, an approach based on laboratory-confirmed diagnosis of coinfection, rather than clinical, advocating for more antimicrobial stewardship.

201752

Impact of Insulin Infusion Therapy on Glycemic Variability and the Clinical Outcomes in Critically Ill Patients: A prospective cohort study

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Background
Glycemic variability (GV) has been associated with increased mortality among critically ill patients. The clinical outcomes of having less GV even with slight hyperglycemia are better than having tight glycemic control but higher GV. Insulin infusion remains the preferred method to control stress hyperglycemia in critically ill patients. However, its impacts on GV and clinical outcomes still need further investigation. This study intended to evaluate the extent of GV and its impact on clinical outcomes in critically ill patients who received either insulin infusion therapy (IIT) or insulin sliding scale (ISS).

Method
A prospective, single-center observational cohort study was conducted between March 2021 and November 2021. The study included ICUs adult patients who received either ITT or ISS for hyperglycemia management. We excluded diabetic ketoacidosis and hyperosmolar hyperglycemic state patients. The primary outcome was to assess the blood GV between the groups. GV was measured using the mean of blood glucose levels, continuous overlapping net glycemic action (CONGA), and J.Index. We opted to use ANCOVA over propensity score matching of APACHE and SOFA scores. Secondary outcomes were hypoglycemia and ICU length of stay (LOS).

Result
A total of 381 patients were screened; out of them, 80 patients met the eligibility criteria. The most common reason for ICU admission for both groups was COVID-19 complications. Patients who received IIT were older (64.36vs9.67) male (61%) and had a lower BMI (28.66vs32.47). The distribution in diabetic history was similar between groups. Patients who received insulin infusion had a lower incidence of hypoglycemia that required correction. Moreover, additional correction doses were lower in patients who received ITT during infusion time. In contrast, ICU-LOS was similar between the groups' analyses with an estimated mean difference of 2.76 days (p-value=0.4).

Conclusion
Our study showed lower GV and hypoglycemia incidence with IIT protocol. Additional studies with a larger sample size are needed to confirm our findings.

201757

Ketamine-based sedative in mechanically ventilated critically ill with COVID-19: A multicenter ambidirectional cohort study

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Background
Supportive therapies and mechanical ventilation (MV) are required for the management of ARDS in patients presenting with COVID-19. Among its many properties, ketamine acts as an analgesic, anti-inflammatory, anticonvulsant, and neuroprotective agent. Therefore, the aim of the study is to evaluate the effectiveness and safety of ketamine among mechanically ventilated critically ill patients with COVID-19.

Method
This multicenter, retrospective cohort study included critically ill adult patients with confirmed COVID-19 treated from March 01, 2020, until July 31, 2021, at five centers in Saudi Arabia. Eligible patients with COVID-19 on mechanical ventilation were subsequently categorized into two groups based on Ketamine use throughout their ICU stay. The primary endpoint was the ICU length of stay. Other outcomes were considered secondary. Propensity score matching (1:2) was used based on predefined criteria.

Result
A total of 1650 patients were screened, and 1130 were included based on eligibility criteria. Among them, 94 patients (8.3%) received ketamine and 1036 patients (91.7%) were in the control group. The hospital length of stay (LOS) was significantly shorter in the ketamine group compared with the control (beta coefficient (95% CI): -0.26 (0.0.45, -0.07), p-value=0.008). Oxygenation parameters (PaO2, FiO2 requirement, P/F ratio, oxygenation index) were significantly improved 24 h post ketamine initiation compared to 6-hour pre-initiation (124.9 (92.1,

184.5) vs. 106 (73.1, 129.3); p-value= 0.002). Additionally, the mean time for lactic acid normalization was statistically significantly shorter in patients who received ketamine compared to the control group (4.9±14.16 vs. 22.8±25.80 hours; p-value<0.01). In contrast, there were no statistically significant differences in 30-day mortality, in-hospital mortality, MV duration, ICU-acquired complications or ICU length of stay between the two groups.

Conclusion
In critically ill COVID-19 patients with ARDS, Ketamine-based sedation is associated with improved hospital length of stay, oxygenation parameters, and time for lactic acid normalization but no mortality benefits.

201765

Oseltamivir enhances viral load clearance and reduces mechanical ventilation duration in COVID-19 critically ill patients: A multicenter propensity score-matched study

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Background
Oseltamivir has been used as adjunctive therapy in the management of patients with COVID-19. This study aims to evaluate the effectiveness and safety of oseltamivir in critically ill COVID-19 patients.

Method
This multicenter, retrospective cohort study includes critically ill adult COVID-19 patients admitted to the intensive care unit (ICU). Patients were categorized into two groups based on oseltamivir use within 48 hours of ICU admission (Oseltamivir vs. Control). The primary endpoint was viral load clearance.

Result
A total of 226 patients were matched into two groups based on their propensity score. The time to COVID-19 viral load clearance was shorter in patients received oseltamivir (11 vs. 16 days, p = 0.042; beta coefficient: -0.84, 95%CI: (-1.33, 0.34), p = 0.0009). Mechanical ventilation (MV) duration was shorter in patients received oseltamivir (6.5 vs. 8.5 days, p =0.02; beta coefficient: -0.27, 95% CI: [-0.55,0.02], P=0.06). In addition, patients who received oseltamivir had lower odds of hospital/ventilator-acquired pneumonia (OR:0.49, 95% CI:(0.283 ,0.861), p =0.01). On the other hand, there were no significant differences between the groups in the 30-day and in-hospital mortality.

Conclusion
In critically ill COVID-19 patients, oseltamivir was associated with faster viral clearance and shorter MV duration without safety concerns.

201769

The Role of Ascorbic Acid in the Prevention of Colistin-Induced Nephrotoxicity: A Retrospective Study

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Background
Colistin antibiotic is considered a valuable and last-resort therapeutic option for MDR gram-negative bacteria. Nephrotoxicity is the most clinically pertinent adverse effect of colistin. Vivo studies suggest that administering oxidative stress-reducing agents, such as ascorbic acid, is a promising strategy to overcome colistin-induced nephrotoxicity (CIN). However, limited clinical data explores the potential benefit of adjunctive ascorbic acid therapy for preventing CIN. Therefore, this study aims to assess the potential nephroprotective role of ascorbic acid as adjunctive therapy against CIN in critically ill patients.

Method
This was a retrospective cohort study at King Abdulaziz Medical City (KAMC) for all critically ill adult patients who received IV colistin. Eligible patients were classified into two groups based on the ascorbic acid use as concomitant therapy within three days of colistin initiation. The primary outcome was CIN odds after colistin initiation, while the secondary outcomes were 30-day mortality, in-hospital mortality, ICU, and hospital LOS. Propensity score (PS) matching was used (1:1 ratio) based on the patient's age, SOFA score, and serum creatinine.

Result
A total of 451 patients were screened for eligibility; 90 patients were included after propensity score matching based on the selected criteria. The odds of developing CIN after colistin initiation were similar between patients who received ascorbic acid (AA) as adjunctive therapy compared to patients who did not (OR (95%CI): 0.83 (0.33, 2.10), p-value=0.68). In addition, the 30-day mortality, in-hospital mortality, ICU, and hospital LOS were similar between the two groups.

Conclusion
Concomitant use of Ascorbic acid with colistin was not associated with lower odds of CIN. Further studies with a larger sample size are required to confirm these findings.

201770

Evaluation of inhaled nitric oxide (iNO) treatment for moderate-to-severe ARDS in critically ill patients with COVID-19: a multicenter cohort study

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Background
Inhaled nitric oxide (iNO) is used as rescue therapy in patients with refractory hypoxemia due to severe COVID-19 acute respiratory distress syndrome (ARDS) despite the recommendation against the use of this treatment. To date, the effect of iNO on the clinical outcomes of critically ill COVID-19 patients with moderate-to-severe ARDS remains arguable. Therefore, this study aimed to evaluate the use of iNO in critically ill COVID-19 patients with moderate-to-severe ARDS.

Method
This multicenter, retrospective cohort study included critically ill adult patients with confirmed COVID-19 treated from March 01, 2020, until July 31, 2021. Eligible patients with moderate-to-severe ARDS were subsequently categorized into two groups based on inhaled nitric oxide (iNO) use throughout their ICU stay. The primary endpoint was the improvement in oxygenation parameters 24 h after iNO use. Other outcomes were considered secondary. Propensity score matching (1:2) was used based on the predefined criteria.

Result
A total of 1598 patients were screened, and

815 were included based on the eligibility criteria. Among them, 210 patients were matched based on predefined criteria. Oxygenation parameters (PaO2, FiO2 requirement, P/F ratio, oxygenation index) were significantly improved 24 h after iNO administration within a median of six days of ICU admission. However, the risk of 30-day and in-hospital mortality were found to be similar between the two groups (HR: 1.18; 95% CI: 0.77, 1.82; p = 0.45 and HR: 1.40; 95% CI: 0.94, 2.11; p= 0.10, respectively). On the other hand, ventilator-free days (VFDs) were significantly fewer, and ICU and hospital LOS were significantly longer in the iNO group.

Conclusion
In critically ill COVID-19 patients with moderate-to-severe ARDS, iNO rescue therapy is associated with improved oxygenation parameters but no mortality benefits. Moreover, iNO use is associated with higher odds of AKI, pneumonia, longer LOS, and fewer VFDs.

201793

Predictors of adverse events' Severity following COVID-19 Vaccines in Young Adult Recipients in Taif: A Cross-Sectional Study

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Background
Predictors of COVID-19 vaccine-related adverse events are inconsistently described in the literature. This study aimed to identify the predictors of adverse events' severity after COVID-19 vaccines among young adult students at Taif University (TU).

Method
This was a cross-sectional study conducted using a self-reported online questionnaire to investigate the predictors of severity of COVID-19 vaccine-related adverse events in young population in Saudi Arabia. The inclusion criteria included participants who had received at least one dose of COVID-19 vaccine of any type (n = 760). The study protocol was approved by the Research Ethics Committee of TU. All participants provided consent for participation in the study. Descriptive statistics were calculated for numerical and categorical variables. Possible correlations with other characteristics were identified using the chi-square test.

Result
A total of 760 adult participants from TU were included in the study. Most of them were 20–25 years old (79%, n = 600), 50.9% of them were female (n = 387), and 97% (n = 737) were Saudi. About 42.8% (n = 325) were students in medical colleges. Pain at the injection site (18.6%), headache (15.3%), lethargy and fatigue (14.7%), and fever (12.7%) were the most frequently reported COVID-19 vaccine-related adverse events after the first dose. The most frequent adverse events were reported among the 20–25-year-old age group for all doses of all vaccines. Females experienced remarkably more side effects after the second ($p < 0.001$) and third doses ($p = 0.002$). Moreover, ABO blood groups significantly correlated with vaccine-related adverse events after the second dose ($p = 0.020$). The participants' general health status correlated with adverse events after the first and second doses ($p < 0.001$ and 0.022, respectively).

Conclusion
The predictors of COVID-19 vaccine-related adverse events in young vaccinated people were blood group B, young age, female gender, vaccine type, and poor health status.

201809

Evaluation of voriconazole therapeutic level monitoring: a single-center retrospective study

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Background
Background: Voriconazole is a triazole antifungal medication that has potent activity against a broad range of clinically fungal pathogens. Guidelines recommend clinical assessment in conjugation with therapeutic drug monitoring (TDM) when using voriconazole. TDM should be maintained within the therapeutic range to ensure proper clinical outcomes with minimal side effects. There are limited studies that examine voriconazole monitoring, adverse effects, and drug-drug interactions (DDI) in Saudi Arabia. The aim of this study was to assess the compliance of voriconazole trough level monitoring to best practices and to evaluate the impact of (DDI) and adverse drug reactions (ADR) on the monitoring of voriconazole level.

Method
Methods: A single-center retrospective study was performed at King Abdullah Medical City in Makkah, Saudi Arabia. We included all patients who received oral or intravenous voriconazole from January 2020 to September 2021. Pregnant and children were excluded. The demographic details, comorbidities, voriconazole indication, trough level, adverse drug reactions, and any changes in medication level due to DDI were collected using medication order history and electronic medical records. Statistical analysis was done by using independent t-test and chi-squire.

Result
Results: From 798 orders of 104 patients screened, 95 of them met inclusion criteria. Around 51% of the patients on voriconazole had therapeutic-level monitoring that complies with current guidelines and best practices. The majority of the patients had a therapeutic level, followed by a subtherapeutic level. No correlation was found between the type of ADR and voriconazole trough. Documented supratherapeutic levels were also not associated with ADR. DDI with budesonide was associated with a significantly lower level of voriconazole (p-value <0.001).

Conclusion
Conclusion: Many of the voriconazole patients did have appropriate therapeutic drug monitoring. Nevertheless, our findings showed that there was no correlation between trough-level monitoring of voriconazole and ADR or DDI.
Key words: voriconazole, antifungal agent, therapeutic drug monitoring.

201815

Efficacy, Safety, and Cost of Aerosolized versus Intravenous Pentamidine for Pneumocystis Jirvecii Pneumonia Prophylaxis in immunocompromised patients

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Background
Pentamidine inhalation (INH) is an approved alternative for Pneumocystis jirovecii pneumonia (PJP) prophylaxis when the first-line agent cannot be used. However, since the INH requires special equipment and training some prefer monthly intravenous (IV) pentamidine. To date, studies that compared the two routes of administration as prophylaxis for PJP in adults are limited. This study aims to compare the efficacy, safety, and cost of aerosolized and IV pentamidine as PJP prophylaxis in immunocompromised patients.

Method
A single-center retrospective cohort study was conducted to include immunosuppressed,

>14 years old and received at least, one dose of pentamidine, either INH or IV for PJP prophylaxis, between January 2016-December 2021. Excluded are patients who received treatment dose. The primary outcome was the breakthrough incidence of PJP infection until 4 weeks from the last dose of pentamidine. The secondary outcomes are safety and cost differences.

Result
A total of 110 patients met the inclusion criteria, 81 (73.6%) patients received INH pentamidine. The mean age was 35.7±15.8 years. The main primary diagnoses were solid organ transplant (60%), hematopoietic stem cell transplant (20%), and hematologic malignancy (12.7%).
There was no PJP infection in either route. Approximately 25.5% of patients developed side effects (SE). Aerosolized pentamidine was significantly associated with SE when compared with IV (32.1% versus 6.9%, p=0.008). These included the following: respiratory (18.2%): bronchospasm, shortness of breath, cough, and wheezing, cardiovascular (6.4%): tachycardia and hypertension, gastrointestinal (3.6%): nausea and vomiting, and dermatological SE (1.8%). Aerosolized pentamidine was discontinued due to SE in 23.5% vs 6.9% in IV which led to the hospital admission of 2.5% and dose rescheduling of 3.7% of patients with INH pentamidine. The average cost with aerosolized pentamidine had a higher cost of care (1488±182 versus 364±119, p<0.001).

Conclusion
Data showed that IV Pentamidine is a reasonable option, tolerated with less SE, and cost with no documented infection. However, a larger-scale study is needed to confirm our findings.

201832

Proactive Drug Safety Monitoring of Adverse Drug Events in Saudi Arabia: 2021 SFDA Experience

Nouf Al-Fadel, Hadir Aljohani, Nora Alorf, Fawaz Alharbi

Background
The Proactive Drug Safety Monitoring Program was established by Saudi Food and Drug Authority (SFDA) for post-marketing monitoring of the registered medications' safety, to monitor the safety of medicinal products more proactively and efficiently. AdisInsight is
an integrated database that aggregates scientifically based content assembled from different sources to enable access to relevant, unbiased studies and case reports with citations and links to the original source. The objective of this program is to assess the relatedness of adverse drug event (ADE) case reports in AdisInsight database to a group of medications approved by SFDA.

Method
A list of medicines registered by SFDA from 2015 to 2021 was selected. The main pharmacological categories of the included medications were monoclonal antibodies, antineoplastic agents, vaccines, and immunomodulatory agents. The ADE case reports
of the selected medications was retrieved from AdisInsight database. First, the labelness assessment was performed on the retrieved ADEs lists by crosschecking the U.S. Food and Drug Administration , European Medicines Agency and local label information to exclude labeled ADEs. Then, a comprehensive drug
safety review for the unlabeled ADEs was performed using several evidence sources including unpublished clinical trial, literature, local and global spontaneous reports and Periodic Benefit-Risk Evaluation Reports.

Result
A total of 110 medications were selected with 13,535 reported ADE case reports retrieved from AdisInsight database. The labelness assessment resulted in requesting of label update for 40 medicines (36.4%). A total of 64 comprehensive drug safety reviews were performed for 141 potential safety signals. The safety review
recommendations were an update in the product safety information (n= 4 signals); request additional safety data from pharmaceutical companies (n=23 signals), or routine monitoring of the risk (n=79 signals). In some cases, no regulatory action may be needed (n=35 signals).

Conclusion
The Proactive Drug Safety Monitoring Program in SFDA successfully improved the identification of new safety information for medicinal products.

201845

The Effect of Renal Function on The Clinical Outcomes and Management of Diabetic Ketoacidosis

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Background
Diabetic ketoacidosis (DKA) patients with impaired renal function encounter a delay in insulin clearance, complicating the adjustment of insulin dosing and increasing the risk of hypoglycemic events. Thus, this study aims to evaluate the effect of renal function on the safety and efficacy of insulin use in the management of DKA patients.

Method
We performed a single-center, retrospective study at King Abdulaziz Medical City in Riyadh between January 2016, and December 2021. Patients included if they were ≥ 18 years old, admitted to the ICU, received continuous insulin infusion, DKA diagnosis, and anion gap of ≥ 16. Patients were categorized into two groups, normal and impaired renal function. The primary outcome was to determine the difference of time to close the anion gap between the groups in the first 12-hours of admission. Prism (Version 9.3.0) was used to perform data analysis.

Result
We included 196 patients. The median of time to close the anion gap among patients with impaired kidney function was 5.65 vs. 16 hours among patients with normal kidney function (p-value= <0.001). The median time to close the anion gap was significantly shorter among patients with normal kidney function who have type 1 diabetes (17 vs.19, p-value= <0.0001) or received an insulin bolus dose (16 vs. 20, p-value= 0.0042). Only four patients with normal kidney function had a documented hypoglycemia event contrasted to six patients with impaired kidney function (p-value= <0.1904).

Conclusion
Patients with impaired kidney function had a shorter time to close the anion gap compared to patients with normal kidney function. The administration of insulin bolus dose and being diagnosed with type 1 diabetes resulted in a shorter time to close the gap among patients with normal kidney function. Hypoglycemia event rates were similar in our study. More studies are needed to confirm our findings.

201855

Assessment of Tacrolimus Dosing based on Trough Level Appropriateness in Solid Organ Transplant Patients: A Tertiary Hospital Experience

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Background
Tacrolimus is a calcineurin-inhibitor that suppresses immunity by inhibiting T-lymphocyte activation. It has a high intra- and inter-patient variability in its pharmacokinetics. Therefore, Therapeutic Drug Monitoring is required to individualize the dose. In practice, initial dosing and sampling time of tacrolimus levels are not standardized, which may result in resources wastage, frequent blood sampling and longer time to achieve therapeutic exposure. We proposed this study to investigate whether tacrolimus level sampling time and frequency correlate with its pharmacokinetic parameters and to assess variability affecting tacrolimus.

Method
A retrospective cohort study at King Abdulaziz Medical City, Riyadh, KSA over the period of 01/01/2018 to 31/12/2021. We included >= 18 years old solid organ transplant patients who received tacrolimus in their initial immunosuppression regimen. The tacrolimus trough levels were recorded during early post transplantation (first 10 days). Statistical analysis was performed using IBM SPSS (Version 21.0). A p-value < 0.05 was considered statistically significant difference.

Result
The cohort for analysis consists of 390 patients who met the inclusion criteria. The coefficient of variation (CV%) in Tac. Doses (D), trough concentrations (C), and C/D ratio were calculated and compared for different demographic and clinical characteristics. The CV% for dose and trough concentration are lower in subjects with hypertension and renal diseases. While Patients with liver disease had higher trough and dose CV%. Higher variability in trough concentration was found in patients who were not started on appropriate tacrolimus dose. Patients on steroids had higher variability when compared to patients who received ATG or Basiliximab.

Conclusion
The coefficient of variation in dose and trough level is associated with different demographic and clinical factors that will predict the incidence of adverse events. Better dosing strategies can be modified to reduce the coefficient of variation which is associated with poor outcomes.

201859

The impact of restricting the prescribing and duration of colistin and ceftazidime-avibactam during the implementation of AMS program on MDR rate infection and cost

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Background
Emerging of antimicrobial resistance (AMR) has adversely impacted the healthcare cost. According to the center for disease control and prevention the additional cost caused by treating AMR could significantly increase to 2 billion $ per year. The most well-known cases of AMR were Methicillin resistance staphylococcus aureus (MRSA) and multi-drug resistant gram-negative bacteria (MDR-GNB) that led to the activation of the antimicrobial stewardship (AMS) program in Dammam medical complex (DMC).

Method
AMS was re-activated in June,2021 with force implementation of pre-authorization and audit/feedback post prescribing of Anti-MDR and restricted antimicrobials. Defined daily dose (DDD) was measured for the consumption of carbapenems, colistin and ceftazidime-avibactam along with other antimicrobials. In addition to measuring the following parameters: MDR rate, type of interventions delivered by clinical pharmacist and cost saving.

Result
120 patients on colistin and 26 patients on ceftazidime-avibactam were reviewed from June,2021 until December,2021 and the utilization decrease by 57.11% and 21.30%, respectively. In addition to a decrease in carbapenems and tigecycline (89.2%, 89.91%) without effecting the rate of MDR gram negative infection in DMC. The most significant factors affecting the decrease of antibiotics consumptions are: changing duration (38%), stopping antimicrobials (28%) and requesting culture (28%) for patient on empirical treatment. As net result on the direct cost of these antibiotics, a total of 131,182.85 SAR /month was saved, which is around 787,097 SAR over 6 months from applying the AMS.

Conclusion
The emerging of AMR world wide and specifically in DMC has a devastating impact on health cost in general and on antibiotics cost. Interventions that significantly reduced the cost, consumption and sustained MDR rate are: changing duration of antibiotics and requesting cultures in DMC.

201891

Comparative safety and efficacy between Ryzodeg and Novomix in adult patients with type 2 diabetes mellitus

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Background
Insulin Degludec/insulin Aspart (Ryzodeg) is a combination of two insulin analogues rapidly-acting insulin Aspart and ultra-long-acting degludec in one single injection which provides effective basal and prandial glycemic coverage in the treatment of diabetes. This study aimed to evaluate the long-term efficacy and safety of Ryzodeg compared to insulin Aspart/insulin Aspart crystallized protamine (Novomix) in adults with type 2 diabetes.

Method
A retrospective observational cohort study conducted at SFH-R, SA. The electronic health records of 451 type 2 diabetic patients who were switched from NovoMix to Ryzodeg were scanned from 2017 to 2022. Descriptive analysis and one sample T test were used for statistical analysis.

Result
Among 451 patients, 239 were female patients (52.8%) & 212 (46.8%) were male. Mean age was 65.68 years (SD+11.173). 273(60.3%) patients were taking the same diabetes medication during their either course of insulin, which permits accurate comparison between the effect of the two types of insulin (Novomix & Ryzodec). 178(39.3%) patients had different types/doses of medications before/after switching which might impact HA1C. Majority of physicians are following the ADA guidelines while prescribing insulin (254(56.1%)) while the remaining is deviating from the guidelines (197(43.5%)). Mean HA1c pre-switching was 8.685(SD+1.66), and improved post-switching to be 8.209(SD+1.52). Mean fasting blood glucose pre-switching to Ryzodec was 9.930(SD+3.85), after switching was 8.483(SD+3.65) (P<0.001).HA1C of patients using similar medications before (8.55(SD+1.6)), and post-switching (8.2(SD+1.55)) but without following guidelines in switching/adjusting insulin dose before switching, (P<0.0001). HA1C for patients with similar medication pre-(8.531(SD+1.69)) and post-switching (8.093(SD+1.4)) with following guideline in switching/adjusting the insulin dose,(P<0.0001).

Conclusion
Our study shows that switching from NovoMix to Ryzodeg improved glycemic control of type 2 patients despite of using the same anti-diabetic medications, pre and post switching also the control of HA1C was better when physicians followed the ADA guidelines.

Clinical Pharmacy

Students

201451

Kidney Post-transplant anemia and effects on patients and graft outcomes; Seven years follow up

Raghad Abid, Sarah Bargawi

Background
Post-transplant anemia (PTA) is a serious complication following kidney transplantation. It effects the graft and patient survival, anemia presented within 6 months post-transplantation defined as early PTA, while late PTA when anemia occurs more than six months following transplantation, despite of this, there is limited studies for long term impact of anemia on patient and graft survival in kidney transplant for this we design a retrospective study with long term follow-up to investigate the effect of early and late PTA in patient and graft survival within seven years, and to estimate the prevalence of PTA at 6 months, 2,4,7 years post renal transplantation in Saudi Arabia.

Method
A retrospective cohort chart review of 145 adult patients who had kidney transplants during January 1st till December 31st, 2015 were studied. Pre-transplant, 6 months, 2, 4 and 7 years- post renal transplantation, medications and laboratory data were obtained, patients were excluded if they were pediatrics, or patients with missing data.

Result
180 patients were screened, 145 patients met the inclusion criteria, the prevalence of early PTA is 8.3% which was increased at 2,4- and 7-years post-transplant (24.8%,24.8%,27.6% respectively), graft failure was significantly associated with late PTA at 4 and 7 years (P.value <0.001. P<0.005 respectively), death reported on 3 patients, and it was significantly associated with late transplant anemia (P.value 0.005)

Conclusion
The results of this study indicate that late post-transplant anemia was associated with graft failure and patients' death, so more attention should be paid for managing anemia post transplantation.

201471

The ffect of Metformin on improving survival among obese and diabetic patients affected with COVID-19: Findings of a Meta-analysis

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Background
Diabetes Mellitus is one of the major non-communicable diseases among patients suffering from COVID-19, which increases the likelihood of hospital admission mortality. While Metformin has been found effective in reducing the mortality associated with COVID-19, there is a need to update the existing meta-analyses and quantitively synthesize the findings regarding the effect of Metformin in reducing mortality.

Method
We undertook a meta-analysis of 21 studies after searching for epidemiological studies systematically in PubMed/Medline, EMBASE, and Science Direct. We used odds ratios and their respective 95% confidence interval (CI) for a binary outcome, which was mortality, to examine the effect of Metformin on mortality. Heterogeneity was assessed using the I2 statistic and Q-test statistics. We evaluated the publication bias using a funnel plot, which was further confirmed by eager test statistics. A p-value of < 0.05 was considered statistically significant.

Result
Overall, the findings revealed that Metformin reduced mortality by about 35%, and the results were statistically significant (OR= 0.66; 95% CI 0.62 to 0.69; p<0.05). This revealed that patients who took Metformin had improved survival by more than one-third than those who were not given Metformin. We found a relatively higher heterogeneity with an I2 value of 85.60% (Chi-squared = 138.85). The inverted funnel plot for the findings for the effect of Metformin on mortality was asymmetrical with test statistics for an eager test of -3.64 and a P-value of 0.002.

Conclusion
The present updated meta-analysis revealed a positive effect of Metformin in reducing mortality among diabetic patients suffering from COVID-19. However, before implementing Metformin at a larger scale, clinicians and endocrinologists need to assess the risks versus benefits associated with Metformin for diabetic patients of COVID-19. Also, future studies are warranted to investigate the effects of Metformin for non-diabetic patients.

201472

Assessment of adherence to stress ulcer prophylaxis guidelines: a cross-sectional analysis

Shaden Alhujilan, Mustafa Saleh, Abdullah Alalwan

Background
Critically ill patients are at higher risk of developing stress ulcers. Clinical guidelines support the use of stress ulcer prophylaxis (SUP) in patients prone to gastrointestinal (GI) bleeding such as those with coagulopathy, renal replacement therapy, and mechanical ventilation. Despite the observed benefits of SUP, its overuse has been highly associated with serious adverse effects.

Purpose: To evaluate the adherence to SUP guidelines in a hospital-based setting using real-world data.

Method
A cross-sectional study was conducted using the electronic health records of patients at King Fahad Specialist Hospital (KFSH), Buraydah, Saudi Arabia. Data were collected from January 1, 2020, to December 31, 2020. Adult patients aged 18 and older who received SUP prescriptions were included. Descriptive analysis was performed to assess adherence to the guidelines and to explore the factors associated with SUP use in a hospital-based setting.

Result
A total of 424 patients were enrolled in this study, 236 (55.7%) of them were male. The median age of patients was 55.2 years old. Internal medicine ward and surgery wards ranked the highest in prescribing SUP at 34.2% and 30.4%, respectively. Only 54% of

patients were candidates for SUP vs 46% were non-candidates for SUP. The concomitant use of two or more of the anticoagulants, aspirin, NSAIDs, corticosteroids, and antidepressants was the most common major criteria to start SUP followed by patients on NSAIDs or corticosteroids who are aged (≥65 years) or having GI bleeding history at 43.2% and 21.5%, respectively.

Conclusion
Observed overuse of anti-ulcer medications indicates a need for greater adherence to SUP guidelines. Areas of improvement can be implemented to ensure appropriate adherence to SUP guidelines to avoid unnecessary anti-ulcer-related adverse effects.

201475

Nitrofurantoin versus Comparators in The Treatment of Lower Urinary Tract Infections Due to Extended-Spectrum α-Lactamase-producing Enterobacteriaceae

Sarah Radwan, Layan Almadfaa, Raneen Mokhtar, Abrar Thabit

Background
Cystitis is one of the most common urinary tract infections. The emergence of bacterial resistance, particularly ESBL production, led to the limiting of options for treatment of cystitis due to pathogens producing this enzyme. We aimed to evaluate the effectiveness of nitrofurantoin vs. comparators in the treatment of cystitis due to ESBL-producing Enterobacterales.

Method
A retrospective cohort study of adults with symptomatic cystitis who were afebrile, had a confirmed urine culture showing ≥105 CFU/mL of ESBL-producing organism susceptible to nitrofurantoin and comparators. Clinical cure was the primary endpoint. Microbiological was a secondary endpoint.

Result
The preliminary data included 71 patients, (44) nitrofurantoin and (27) comparators. clinical cure rates were not high in both groups, the difference was not significant (77.3% vs. 77.8%; P=0.961). Follow up urine cultures were available for 25 and 19 patients in the nitrofurantoin and comparators, respectively, with no difference in cure rates (48% vs. 73.7%; P=0.086).

Conclusion
These results indicate that nitrofurantoin can be as effective as comparators in the treatment of cystitis, which confirms the recommendations made by the Infectious Diseases Society of America for the treatment of such infections.

201483

Design and Validation of a Medication Assessment Tool to Evaluate The Quality of Prescribing in The Management of Type 2 Diabetes in Kuwait

Fajer Alsejari, Dalal AlTaweel

Background
Diabetes is considered globally as one of the most challenging chronic illnesses in the 21st century. Healthcare systems need to develop a quality measurement framework to improve patient care. With the diversity of prescribers in Kuwait, there is an urgent need for standardization of care by healthcare professionals to offer consistent provision of best quality care to patients with diabetes. This study aims to develop and validate a medication assessment tool (MAT) using quality standards extracted from international guidelines to evaluate prescribing practices in the management of type 2 diabetes (T2DM).

Method
The development process of the MAT was based on two stages: Development stage includes Concept definition/identification; Domain definition/identification; Item generation; and Instrument construction. Judgment-quantifying stage includes content validity determined using 2 quantitative approaches: a) Content Validity Ratio (CVR) and the Content Validity Index (CVI), and b) Content Validity Index at the item level (I-CVI) beside the scale-level (S-CVI/Ave) with the average approach. Criteria were considered for removal if CVR<0.566 and/or I-CVI<78%. Feasibility study was conducted on 30 random patient records from Kuwait National Diabetes Registry to ensure the tool's fitness for purpose.

Result
Development stage resulted in draft 1 of the MAT (42 criteria). Judgment-quantifying stage (with participation of 12 experts) showed 8 criteria below values. From those, 3 were removed, 5 were retained, and one criterion was divided. Data revealed that blood pressure control standards were the most agreed among experts, and lipid management recommendations were the least agreed criteria. As a result, the MAT had 39 criteria with total MAT CVI of 0.79 and S-CVI of 0.89, indicating acceptable content validity. A feasibility study revealed total adherence of 54.9%.

Conclusion
The designed and validated tool can be used to measure prescribing practices in the management of T2DM in Kuwait and highlight areas for review and improvement in prescribing adherence.

201501

Targeted drug delivery using spray-dried microspheres' pharmacokinetics and tissue distribution

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Background
The anti-asthma drug in the traditional dosage form travels freely and disperses widely in highly perfused tissues after delivery, causing adverse side effects. The required drug concentration cannot reach the lungs, making the treatment ineffective. As a corrective measure and to increase salbutamol concentration in the pulmonary capillary network, microspheres have become a popular targeted drug delivery technology.

Method
Using a Buchi B-90 nano spray-drier, salbutamol-loaded albumin microspheres (SAM) were created. To enhance the spray drying procedure, central composite design (CCD) was used. Surface morphology was applied to the improved SAM, and it was discovered that the particle was shriveled.

Result
The average particle size was 8.24 µm, a size that is appropriate for depositing in the lungs' capillary bed. The maximum percentage yield and drug encapsulation were 86 and 72 respectively. The maximum linearity and best explanation for the drug release came from Korsmeyer-Peppas equation. The medication release also demonstrated sustained release (R2 – 0.9915). The concentration of the medication in the lung was higher (1311.18.12 µg/g, 15 min) compared to the usual formulation (90.20.76 µg/g, 10 min) according to in vivo data that demonstrate sustained release and targeted efficacy of SAM. Under temperatures of (25 2°C) and (5 2°C), the product remained stable.

Conclusion
The microspheres may be a substitute for other drug delivery systems to the lungs, according to the results.

201507

A Questionnaire-Based Study for Using Weight Loss Medications & Herbal Mixtures among the Pharmacy Female Students in Hail Region

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Background
The obesity epidemic continues to grow at an alarming rate because the lifestyle we live plays a big role in the continuation and exacerbation of this problem. The use of medicines and herbs has become widespread, especially among young people. The aim of this study was to determine the medicines and herbs used to treat obesity specifically among pharmacy female students in the Hail city.

Method
Data were collected with an online, semi-structured questionnaire; the obtained data were converted into statistical data using (SPSS, V.21 2022) & Excel V.10 2022.

Result
Obesity problem can be observed among pharmacy female students but at a moderate rate (39%) and the most of the participants started showing symptoms of obesity at an early age (5-7 years). 10% of study participants have an incorrect belief that natural products are better than synthetic ones. Horsetail, green tea extract, and red tea extract were the most popular and extensively utilized herbal extracts for weight loss, according to this study. Liraglutide, Semaglutide, and Orlistat were the most commonly used weight-loss medicines among female students, even though their use was less common than that of herbal combinations. Although a number of the research, respondents used unknown herbal mixtures mostly on commercial market.

Conclusion
This investigation showed that the treatment to reduce weight of those who were overweight or obese by herbal drugs were somewhat high among the pharmacy female students in Hail region. Therefore, it has become one of the priorities of our upcoming research to try to find out the truth of what is contained in the herbal mixtures used by the students and to reveal their side effects.

201515

Prevalence and Antimicrobial Susceptibility Pattern of Methicillin Resistant Staphylococcus aureus (MRSA) at Buraydah Maternity and Children Hospital

Heyam Albahadel, Hind Aldalbahi, Masaad Almutairi

Background
Staphylococcus aureus is a major human pathogen that causes a wide variety of clinical infections. While many strains of Staphylococcus aureus (S. aureus) are easily treatable, methicillin-resistant Staphylococcus aureus (MRSA) is a much more challenging disease. MRSA infection is one of the leading causes of community and hospital-acquired infection, which is commonly associated with significant morbidity, mortality, and higher burden of health care costs. The prevalence of MRSA infections shows a range of 13-74% worldwide. In Saudi Arabia, many studies have observed an increase in MRSA prevalence.
Aims: This study determined the prevalence of MRSA and their antimicrobial susceptibility pattern at Burydah Maternity and Children Hospital (MCH)

Method
A retrospective cross-sectional study was conducted at Buraydah MCH from January 2020 to February 2022. A total of 152 patients with a positive isolate of S. aureus were included and categorized into two groups; pediatric patients (114) and maternity patients (38). Descriptive and inferential statistical tests were used in the analysis.

Result
Among a total of 152 patients the prevalence of MRSA was 45%. In 114 pediatric patients with S. aureus, the MRSA was reported in 54 (47.4%) while, in 38 patients maternity it was reported in 15 (39.5%). MRSA was highest in age below one year (26.3%) in pediatric and in age group 19-30 years (21.1%) in maternity. The most common site of MRSA infection in pediatric was skin infection 29/54 (25.4%) and in maternity was wound infection 14/15 (36.8%). A 100% of MRSA isolated were sensitive to vancomycin, followed by trimethoprim/ sulfamethoxazole 85.0% and tetracycline 80.9%. While, the resistance to oxacillin, penicillin, cephalosporin, ampicillin, amoxicillin/ clavulanic acid, imipenem/ cilastatin was detected in all patients.

Conclusion
The prevalence of MRSA at Buraydah MCH is high and showed multiple resistance to antimicrobial.

201557

The impact of Rifampin Initiation on Systolic Blood Pressure in Patients Receiving Nifedipine: A retrospective study

Sana Alwafai, Khalid Eljaaly

Background
Nifedipine is still commonly used in Saudi Arabia, mainly for hypertension. Rifampin is a Cytochrome P450 (CYP) 3A4 inducer, while nifedipine is metabolized by this CYP. Although there are pharmacokinetic data supporting this drug-drug interaction (DDI), the clinical data to date are lacking. This study aimed to investigate the changes in the systolic blood pressure (SBP) of hypertensive patients who were started on rifampin while they were receiving nifedipine.

Method
This retrospective study was conducted at a tertiary care hospital in Jeddah, Saudi Arabia. We included hospitalized adults ≥18 years who were started on rifampin while they were receiving nifedipine for hypertension. Patients with uncontrolled hypertension (baseline SBP >140 mmHg) were excluded. The study outcomes were SBP changes by day 8 after rifampin initiation. Categorical data were analyzed using the chi-square test and Fisher's exact test. Continuous data were analyzed using paired t-test for normally distributed data and Wilcoxon signed rank test for non-normally distributed data.

Result
A total of 16 patients were included. The median age and body weight of included patients was 63.5 [61.25 – 69.75] years and 73.1 [62-80] kg, respectively. Seven patients (43.8%) were male. The median baseline SBP reading was 133 [125.25 - 139] mmHg. The median increase in SBP was not significant on the second day but it achieved statistical significance on all the following days. The median maximum increase in SBP from baseline after the introduction of rifampin was 24 [17.75 - 29] mmHg.

Conclusion
Starting rifampin in hypertensive patients on nifedipine was associated with statistically and clinically significant increases in SBP. Patients using rifampin should temporarily substitute nifedipine with another class of antihypertensive medications.

201563

Population Pharmacokinetic Model for Vancomycin in Intensive Care Unit Patients; strategy for best empirical dose

Shatha Aloraifej, Laila Alrashidi, Ahmed Almosabeh, Amal Aldufairi, Jenan Almateeq, Bader Alalwan, Abdulmonem Alsaleh, Aymen Alqurain

Background
Vancomycin is a glycopeptide antibiotic which is effective in eradicating methicillin resistance staph aureus infection, but it requires specialized care when it is prescribed for renally impaired patients, such as those in intensive care units.
Aims. To develop a population base model for vancomycin for patients admitted into intensive care unit to determine which covariates may influence its pharmacokinetic parameters in such cohort of patients.

Method
This retrospective: population pharmacokinetics study was performed in intensive care unit patients aged 60 years and over and were initiated on vancomycin therapy between January till December 2020. Patients' demographic data, concurrent prescribed medications, biochemistry lab results, vancomycin trough concentration were collected from patient's medical records. Creatinine clearance (CrCl) was calculated using the Cockcroft-Gault equation. Model building was done using Monolix software. The model building process involved three steps; identification and development of a structural base model, development of a covariate model and finally evaluation and validating of the model. Predicted vancomycin exposure was simulated using the final model parameters using Simulix to examine the influence of key covariates.

Result
43 patients were included into this study. A one compartment, linear elimination model was best to fit vancomycin data. Serum albumin level and creatinine clearance were the only covariate included into the final model, whereas albumin level reduces the between subject variability (BSV) for volume of distribution (V) from 27% to 25% and CrCL reduced BSV for clearance (Cl) from 45% to 27%. The predicted parameters for the final model were 104 L for V (relative standard error (RSE) 28.5) and 1.77 L/h for Cl (RSE 45.1). The goodness of fits plots indicated that the model was well developed supported by the RSE value, which means that all parameters were well predicted. The simulated vancomycin exposure showed thatvancomycin trough concentration increased with increasing serum albumin level and reduced with increasing CrCl.

Conclusion
A large between subject variability was detected in vancomycin pharmacokinetics, where albumin level and CrCl are important covariates to consider when dosing vancomycin for ICU patients.

201584

Cytomegalovirus reactivation in patients with allogenic stem cell transplantation secondary to hematological and non-hematological etiologies in large academic center in Saudi Arabia

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Background
Cytomegalovirus (CMV) reactivation in patients with allogenic- stem cell transplantation (Allo-SCT) has been associated with increased morbidity and mortality. Many risk factors have been identified to be associated with increased risk of CMV reactivation including mismatched human leukocyte antigen (HLA) transplant, cord blood transplant, myeloablative conditioning and T-cell depletion.

Method
All patients =/> 14 years that underwent allo-SCT from April 2014 until April 2022 with adequate medical records were included. Data collected include CMV serostatus, CMV viral load, time to CMV reactivation, conditioning regimen, use of in-vivo T-cell depletion for graft vs. host disease (GvHD)prophylaxis, and GvHD prophylaxis medications if used.

Result
Research project is ongoing for which presented data are preliminary. We included 412 patients with an average age of 29 years and 42% were of female sex. 223 underwent all-SCT for underlying non-hematological etiologies mainly sickle cell anemia and remaining patients distribute between ALL, AML, CML, Hodgkin and non- Hodgkin lymphomas. CMV seropositive recipients constitute 61; 88% of patients experienced primary CMV reactivation within a median time of 13 days post SCT and had median viral load of 50 IU during reactivation. 225 patients (62%) were to clear CMV spontaneously within median time of 50 days post reactivation. Patients required treatment for CMV viremia was 132 for which valganciclovir, ganciclovir and foscarnet were prescribed. 90 day non-relapse mortality and 2years overall survival were 2% and 82% respectively.

Conclusion
Our population are considered at high risk of CMV reactivation due to the high prevalence of CMV seropositivity. Identifying factors that could contribute to CMV reactivation would help in identifying patients at highest risk and therefore, identify the best approach to mange CMV reactivation in those patients.

201600

Development of a specific, accurate, and precise method for the therapeutic drug monitoring for cefdinir in human plasma.

Bandar Alanazi, Tauquir Alam, Mohd. Imran

Background
Cefdinir is a broad-spectrum oral antibiotic for the treatment of many infections. It is essential to develop methods to assess the concentration of drugs in human blood to avoid side effects.

Method
LC-MS/MS systems was used as a primary tool for the quantification of the cefdinir in human plasma (Internal standard: cefpodoxime acid; Chromatographic column: Kromasil C-18 (100x4.6 mm, 5 um); Flow rate: 1.00 mL/min: Temperature: 40ºC±2).

Result
A linear response between concentration and peak area ratio of the drug in human plasma was found over a concentration range of 30.0-7072.9 ng/ml for cefdinir. The accuracy and precision of the method were evaluated by peak area ratio response of the drug and internal standard. The total precision (% C.V) for the cefdinir ranged from 0.8 % (HQC) to 5.1 % (LLOQQC) and within the batch, accuracy ranged from 100.0 % (HQC) to 96.3% (LLOQ QC). The mean recovery of the Cefdinir was found to be 69.33 % and internal standards were found to be 61.2 %.

Conclusion
The developed method falls within the acceptance range for bioanalytical batch acceptance criteria of USFDA, and can be used for the therapeutic drug monitoring of cefdinir.

201642

Impact of COVID-19 Vaccine on Menstrual Cycle: A Cross Sectional Analysis Among Pharmacy and Medical Students of Qassim University, Saudi Arabia

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Background
Since the introduction of COVID-19, many women worldwide have reported abnormalities in their menstrual cycle after receiving COVID-19 vaccination. The aim of this study is to investigate the prevalence and impact of menstrual abnormalities after the COVID-19 vaccine among female pharmacy and medical students of Qassim university, Saudi Arabia.

Method
Female students from the Unaizah College of Pharmacy and Medicine at Qassim University who were over the age of menarche, had received the vaccine, were not pregnant or nursing, were not using contraceptives, did not have a history of primary ovarian insufficiency, hypothalamic menopause, or had undergone a hysterectomy were invited to participate. A universal sampling method was used to collect the data using an online method. Consequently, a total of 299 enrolled students participated in the survey.

Result
Out of 329 registered students, 299 agreed to participate, giving a response rate of 90.88%. The mean age of the participants was 22.1 ± 1.70, majority were unmarried (n=255; 85.3%) and were from PharmD (n=206; 69.8%). A total of 70(26.1%) reported to have COVID-19 infection. About 258(86.2 %) reported menstrual symptoms post-vaccination, of which 108(41.8%) reported irregular, 94(36.4 %)length of menstruation changed, for 56(21.7%) mensuration completely stopped. Only 16(6.20%) required a hospital visit to resolve post COVID vaccination menstrual symptoms. Previous COVID 19 infection significantly influenced the incidence of mensural abnormalities (p=0.03). After the second dose of the vaccine, Pfizer-BioNTech (91.3%) followed by Johnson and Johnson (66.7%), there were significant variations in the menstrual abnormalities across different vaccination types (p = 0.014).

Conclusion
The study showed a possible link between the COVID-19 vaccine and menstrual abnormalities which needs further investigation regarding its impact on their quality of life.

201667

Investigation of the Epigenetic Effect on Treatment Response in Chronic Myeloid Leukemia (CML) Patients.

Joud Althubyani, Heba Alkhatabi

Background
The discovery of BCR/ABL fusion as the causative agent of more than 95% of Chronic Myeloid Leukemia (CML) led to the development of the tyrosine kinase inhibitor (TKI) such as imatinib. Even though the majority of CML patients under TKI therapy achieve complete remission, the application of TKIs is not always successful. Recent advances in omics technologies raising the possibility of developing therapies based on the genetic make-up of each cancer. It has been proven that abnormal DNA methylation plays a significant role in leukemia by silencing normal key genes for hematopoiesis. DNA methylation can be repressed by MicroRNAs (MiRNAs) which are single-stranded non-coding RNAs. MicroRNAs (miRNAs) regulate RNA expression by either mRNA degradation or translation inhibition and play an important role in cancer development and progression. However, the knowledge behind the role of miRNAs in leukemogenesis is limited and nothing yet known about its association with treatment resistance mainly in Chronis myeloid leukemia. The purpose of this research is to evaluate the expression pattern of miR-29a in CML, and to study the correlation of miRNA expression with the Philadelphia chromosome abnormalities and treatment resistance in CML patients. This miRNA plays important role in methylation because of its direct targeting on DNMT1, DNMT3a, DNMT3b, DNMTA3a expression will also be investigated.

Method
15 Patient samples has been taken (5 AML, 5 CML (Ph+), 5CML(Ph-)) from king abdulaziz university hospital. RNA had been extracted using QIAGEN RNeasy kit and the concentration has been measured using NanoDrop2000c. The concentration has been normalized then the cDNA has been made by using ImProm-11 Reverse Transcription System kit. The expression of the epigenetic markers (MiR-29A and DNMT3A) on each sample has been measured by qRTPCR using sybergreen. Data analysis was done using delta delta CT method for relative expression estimation.

Result
The results on the patient samples showed a high expression of the MiR-29A and low expression of the target gene (DNMT3A) in the majority of AML and CML samples. Except for the CML patients type B2/a2 there was down regulation in miR-29a expression and increase in DNMTA expression whereas in CML patients with B3/a2 there were hypomethylating effect represented by down regulation of both MiR-29a and DNMT3A.

Conclusion
According to the prlimenary findings, high expression ofMiR-29A and low expression of DNMT3A have been identified in most of the parints. This implies that there is a DNMT3A suppression by the MiR-29A. However, in AML patients samples the DNMT3A was lower than the CML patients. Interestingly, in CML patients type B2/a2, there was a low MiR-29A expression and high DNMT3A expression which suggest an epigenetic modulation (methylation effect) compared to B3/a2 samples which showed a hypomethylation effect. Considering the patient clinical manifestation and treatment response in addition to the quantitative detection of BCR/ABL, epigenetic association with disease progression and treatment response will be recognized.

201678

Favipiravir therapeutic effectiveness and clinical outcome in patients with COVID-19 admitted to critical care unit, Riyadh, Saudi Arabia

Ibtihal Alkhudhayr, Mohammed Al mohaini, Abbas Al mutair

Background
Prior to the availability of the current COVID-19 vaccine, the need to control the pandemic worldwide was focused on management of the disease using previously approved antivirals, including Favipiravir which inhibits viral replication through the RNA-dependent RNA polymerase enzyme. Favipiravir's efficacy against different viral infections has made it a potential treatment for COVID-19. We aim in this study to assess Favipiravir's therapeutic efficacy and safety in treating critically ill patients admitted with COVID-19 to ICUs.

Method
This study was done retrospectively in five tertiary hospitals in Riyadh, Saudi Arabia. The studied sample was randomized from a huge pool of data mostly for critically ill COVID-19 patients admitted to ICUs between April 2020-March 2021. In the study, two patient groups with same age and body mass index were enrolled; one group received favipiravir while the other comparator group received different antimicrobial drugs.

Result
A total data of 538 COVID-19 patients were analyzed, 269 (50.%) received Favipiravir and 269 (50%) of the control group received different treatments. More than two-thirds 201 (74.7%) were Saudi citizens, the majority 177 (65.8%) were males and the mean age and (BMI) were; (57.23 ± 15.16) years and (31.61 ± 7.33) kg/m2 respectively. The most frequent symptoms of presentation were shortness of breath, fever, and cough, and the most frequent comorbidity was DM , hypertension, and IHD.

Conclusion
According to the study's results revealing FVP is not superior to other antivirals, patients who received Favipiravir presented with more severe symptoms, more comorbidities, more complications, and is not effective in controlling the cytokine storm which negatively impacts the efficacy of Favipiravir.
FVP therapy had no influence on ICU and hospital length of stay compared with the control group and the overall mortality rate among the FVP group was not statistically significant.

201679

Anticoagulation versus no anticoagulation in elderly patients with nonvalvular atrial fibrillation: a systematic review and meta-analysis of randomized controlled trials and observational studies

Shatha Alqarni, Sarah Alghonaim, khawla Qahtani, Lama Alnashwan, Seba Alobathani, Saleh Alqifari, Sumaya Almohareb, Khuloud Aljoudi, Omar Alshaya

Background
Advanced age is the most common risk factor for developing nonvalvular atrial fibrillation (NVAF), as well as increasing the risk of cardioembolic strokes. Despite the importance of anticoagulation, the increased risk of bleeding complicates the decision to initiate it in this vulnerable population.

Method
We searched PubMed, Embase, and Cochrane databases from inception through October 2022 to identify relevant randomized controlled trials (RCTs) and observational studies for inclusion. Studies were included if evaluated elderly patients (≥ 75 years old) with NVAF and utilized oral anticoagulants (warfarin, apixaban, rivaroxaban, dabigatran, or edoxaban) in the treatment arm with no anticoagulation in the control arm. The primary efficacy outcome was the composite of stroke, transient ischemic attack, and systemic embolism. The primary safety outcome was major bleeding. Cochrane risk-of-bias and Newcastle-Ottawa Scale tools were used to assess risk of bias.

Result
A total of 1,019 articles were identified, and 7 studies met our inclusion criteria (3 RCTs, 1 subgroup of an RCT, 1 prospective, and 2 retrospective). The total number of patients was 3,944 who received anticoagulation and 17,643 who did not receive anticoagulation. Anticoagulation significantly decreased the risk of the composite outcome by 49% compared to no anticoagulation OR= 0.51 (95% CI: 0.34-0.76) with moderate heterogeneity I2= 65%. However, the anticoagulation group experienced more major bleeding events than patients who did not OR= 1.29 (95% CI: 0.96-1.73) with low heterogeneity I2= 8%. Any bleeding event was reported high in the no anticoagulation group OR= 0.89 (95% CI: 0.52-1.50). In addition, mortality was lower in the anticoagulation group OR= 0.87 (95% CI: 0.72-1.05).

Conclusion
Anticoagulation for stroke prevention in elderly patients with NVAF resulted in a lower risk of the composite outcome opposed with an increased risk of major bleeding. Diligent evaluation and family involvement is imperative when deciding to initiate anticoagulation.

201680

Coadministration of Phosphodiesterase Inhibitors and Clomiphene Citrate as A Potential Therapy for Unexplained Infertility in Women: A Randomized Prospective Clinical Study

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Background
Complains of unexplained infertility are common among women. Clomiphene citrate (CC) promotes ovarian stimulation, even though, high rates of miscarriage and low rates of pregnancy have been reported for CC owing to the negative effects of its antiestrogenic action on the endometrium. Undesirable effects of CC were reported to be mitigated by using phosphodiesterase inhibitors such as sildenafil citrate (SC). In this research, treating unexplained infertility in women by coadministration of SC with CC was investigated.

Method
A randomized prospective study with a total of 130 women experiencing unexplained infertility was conducted. Fifty mg of CC was orally given BID to all participants starting from the 2nd through the 7th day of the cycle. Twenty mg of SC, as adjuvant therapy, was orally given BID to 50% of the participants after the termination of the menstruation up to ovulation. Endometrial thickness (ET), ovulation intensity, and follicular count were determined in all participants using transvaginal ultrasound. Two weeks after ovulation, pregnancy was determined via beta-hCG blood test and ultrasound was performed to ensure viability. For up to 12 weeks post pregnancy, adverse events encompassing miscarriage, ectopic, and multi-fetal pregnancy were tracked and recorded.

Result
In the SC treated group, median ET was 8 mm compared to 7 mm in the untreated group ($p<0.01$). Incidence of pregnancy was elevated in the SC treated group but without significant difference statistical wise. Subgroup analysis revealed higher median ET in the SC treated group when women were infertile for 2 years or less. The most prominent complaint noted in the SC treated group was headache (9.2% vs 1.5%, $p=0.052$).

Conclusion
Women experiencing unexplained infertility, particularly those who have been infertile for 2 years or less, could benefit from adding SC to CC as a way for beating the latter's antiestrogenic effect and enhancing ET.

201690

Real-world Evaluation of the Safety and effectiveness of apixaban & rivaroxaban lead-in dosing compared to Parentral lead-in dosing in the treatment of venous thromboembolism: a multi-center retrospective cohort study

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Background
Around 17% of patients diagnosed with venous thromboembolism (VTE) start on parenteral anticoagulation before switching to Direct oral anticoagulation (DOACs). Parenteral anticoagulation lead-in is not recommended with apixaban and rivaroxaban, yet they are often used for the initial phase treatment of VTE. Given the AMPLIFY and EINSTEIN trials excluded patients who received multiple doses or ≥48 hours of parental anticoagulation before recommended lead-in dosing, meanwhile, efficacy and safety of parenteral anticoagulation are still unpredicted. Thus,

our study objective is to compare the safety and effectiveness of lead-in parental anticoagulation to recommended lead-in.

Method
A multi-center retrospective observational cohort study included adult patients admitted to the hospital with acute VTE and treated with either apixaban or rivaroxaban for VTE. Patients were grouped into "recommended lead-in dosing" group, including patients who received an appropriate lead-in dose apixaban and rivaroxaban. The second group of patients who received parenteral lead-in dose was enrolled the "Parenteral lead-in dosing. Patient's data were compared in both groups using an unpaired t-test for continuous variables and the X2 for categorical variables.

Result
A total of 389 patients were included. The recommended lead-in dosing group included 296 patients, whereas 93 patients were in the parenteral lead-in group. VTE recurrence during hospitalization and within 30 days was numerically higher in the parenteral lead-in group compared to recommended lead-in group (3.3% vs. 0.6%; P-value =0.09 and 1.1% vs. 0.7%, P-value =0.560). The major bleeding rate during hospitalization was significantly higher among parenteral lead-in group than the recommended lead-in (14.0% vs. 3.7%; P-value<0.001).

Conclusion
Parenteral anticoagulation lead-in before starting maintenance apixaban and rivaroxaban showed a significantly higher risk of bleeding and VTE recurrence than the recommended lead-in. Clinians should assess the risk of bleeding and VTE recurrence before immediately starting parenteral lead-in over starting lead-in apixaban or rivaroxaban doses.

201750

Comparative effectiveness of apixaban and rivaroxaban lead-in dosing in VTE treatment: observational multicenter real-world study

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Background
Apixaban and rivaroxaban require lead-in dosing for 7 and 21 days, respectively, when treating patients with venous thromboembolism (VTE). However, no consensus currently exists regarding the appropriateness of subtracting parenteral anticoagulation days from total lead-in therapy duration.

Method
A multicenter study was conducted including patients (≥ 18 years) with acute VTE who received apixaban or rivaroxaban. Patients were distributed between two groups; recommended group: received oral lead-in anticoagulant for the full recommended duration of 7 or 21 days for apixaban and rivaroxaban, respectively; mixed group: received lead-in therapy as parenteral with oral anticoagulant. The incidence of recurrent VTE (rVTE) and major bleeding (MB) within 90 days were the main outcomes.

Result
Of the included 368 patients; 47.8% received apixaban, and 52.2% received rivaroxaban. The recommended lead-in was used in 296 patients (80.4%), whereas 72 (19.6%) received the mixed lead-in regimen. Five patients had rVTE events within 90 days; two occurred during hospitalization in the recommended group versus none in the mixed group (0.7% vs. 0.0%; p=1.000). After discharge, two events occurred in the recommended group and one in the mixed group (0.7% vs. 1.4%; p=0.481). In terms of MB, 24 events occurred in 21 patients within 90 days. During hospitalization, 11 events occurred in the recommended group and seven in the mixed group (3.7% vs. 9.7%; p=0.060). After discharge, five more events occurred in the recommended group and one in the mixed group (1.4% vs. 1.7%; p=1.000).

Conclusion
The mixed lead-in regimen is safe and effective in comparison to the recommended lead-in regimen.

201753

Completeness of Medication Prescriptions: Assessment of the Electronic Prescription Errors in Tertiary Hospitals in Hail Region, Saudi Arabia "EPeSHR"

Mubarak Alsubaie, Ahmed Alafnan, Shaima'a Hasson, Gehad Subaiea

Background
Previously, we identified the types and frequency of hand-written prescription errors in major hospitals in the Hail Region, Saudi Arabia (Altebainawi et.al., 2019). In this study, we aimed to identify electronic prescription errors as the majority of health care centers in Hail regions converted to computerized physician order entry system as means to fasten the prescription and dispensing services to patients with less errors.

Method
Randomly, 1070 electronic prescriptions were collected from different hospitals and health care centers in Hail Region between the period of April and May 2021. Errors in prescription were identified according to Neville's classification, and descriptive statistics were performed for analysis.

Result
The majority of electronic prescriptions included the age of patients (98.69%), the file numbers (100%), weight (31.58%), and dosage information (92.62%), that represent enhancement in prescription process compared to the hand-written ones. Surprisingly, only 25.05% of electronic prescriptions included the diagnosis and 37.94% of electronic prescriptions included directions of use with food. When it comes to Type D errors, all electronic prescriptions had the Patients' name and prescription dates (100%).

Conclusion
Even though majority of tertiary hospitals in Hail regions converted to computerized physician order entry system, different types of prescription errors continue to occur. These results necessitate interventions to adherence to good prescription practices and enhanced communication between health care professionals, including involving clinical decision support system.

201755

Incidence and clinical outcomes of new-onset atrial fibrillation in critically ill COVID-19 patients: A multicenter cohort study

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Background
Atrial fibrillation (Afib) can contribute to a significant increase in mortality and morbidity in critically ill patients. Thus, our study aims to investigate the incidence and clinical outcomes associated with new-onset Afib in critically ill patients with COVID-19.

Method
A multicenter, retrospective cohort study includes critically ill adult patients with COVID-19 admitted to the intensive care units (ICUs) from 2020 -2021. Patients were categorized into two groups (new-onset Afib vs. control). The primary outcome was in-hospital mortality. Other outcomes were observed, such as mechanical ventilation (MV) duration, 30-day mortality, hospital length of stay (LOS), ICU LOS.

Result
A total of 135 (10.7%) patients developed new-onset Afib during their ICU stay. After propensity score matching, 400 patients were included in the final analysis. There was no significant difference in the 30-day mortality between the two groups (OR 1.55; 95% CI 0.91, 2.63; P=0.10). However, patients who developed new-onset Afib had higher odds of in-hospital mortality (OR 2.76; 95% CI 1.49, 5.11, P=0.001). Also, the MV duration, ICU LOS, and hospital LOS were longer in patients who developed new-onset Afib (beta coefficient 0.52; 95% CI 0.28, 0.77; P<0.0001), (beta coefficient 0.29; 95% CI 0.12, 0.46; P<0.001), (beta coefficient 0.35; 95% CI 0.18, 0.52; P<0.0001); respectively. Moreover, the control group had significantly lower odds of multiple organ dysfunction scores on day three, major bleeding, liver injury, and respiratory failure that required MV.

Conclusion
New-onset Afib is a common complication among critically ill patients with COVID-19 that is associated with poor clinical outcomes.

201758

Clinical outcomes for COVID19 critically ill patients co-infected with other respiratory viral infections: A multicenter, cohort study

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Background
Previous studies have shown that individuals with COVID-19 and superimposed viral co-infections have poor clinical outcomes. However, limited studies focused on critically ill patients. This study aims to describe the characteristics and outcomes of critically ill COVID-19 patients with superimposed viral co-infections.

Method
We conducted a multicenter retrospective analysis for all adult patients with COVID-19 who were hospitalized in the ICU between 2020-2021. Eligible patients were subcategorized into two groups based on simultaneous coinfection with other respiratory viruses throughout their ICU stay. Patients were followed until discharge from the hospital or in-hospital death.

Result
A total of 836 patients were included in the final analysis. Eleven patients (1.3%) were infected concomitantly with other respiratory viral infections. Rhinovirus/Enterovirus (38.5%) was the most common reported coinfection. No difference was observed between the two groups regarding the 30 days mortality rate (HR 0.39, 95% CI 0.13, 1.20; P= 0.10). The in-hospital mortality was significantly lower among concomitantly infected patients vs. COVID-19 mono-infection (HR 0.32 95% CI 0.10, 0.97; P=0.04). Patients concomitantly infected with other respiratory viral infections had longer median mechanical ventilation duration and hospital length of stay.

Conclusion
Critically ill patients with COVID-19 who were concomitantly infected with other respiratory viral infections had comparable 30 days mortality rate compared to those not concomitantly infected. Co-infection with respiratory viral infections could dictate further proactive care.

201760

Pattern Of Discontinuation of Oral Midodrine and The Clinical Outcomes During Intensive Care Unit (ICU) Stay: A Cohort study

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Background
Midodrine is an oral alpha-1 adrenergic agonist and also has been utilized to reduce the time to vasopressors discontinuation. Midodrine titration strategy was not addressed in the majority of studies. Therefore, this study aimed to compare the safety and effectiveness of two Midodrine discontinuation regimens (tapering versus non-tapering) during weaning vasopressors in critically ill patients.

Method
A retrospective cohort study was conducted at King Abdulaziz Medical City. This study included adult patients admitted to intensive care units (ICUs) who received Midodrine after being unable to be weaned from IV vasopressors for more than 24 hours. The included patients were then categorized into two subgroups depending on the pattern of Midodrine discontinuation (non-tapering vs. tapering). The primary endpoint was the incidence of inotropes and vasopressors re-initiation after successful discontinuation of Midodrine. Other endpoints were considered secondary. Propensity score matching (1:1 ratio) was used based on the predefined criteria.

Result
Our results showed that the incidence of inotropes or vasopressors re-initiation after successful discontinuation of Midodrine was lower in the tapering group (15.4%) compared with the non-tapering group (40.7%) in the crude analysis as well as regression analysis (OR 0.15; 95% CI 0.03, 0.73, p-value=0.02). The time required for antihypertensive medication (s) initiation after Midodrine discontinuation was longer in patients who had dose tapering (beta coefficient (95% CI): 3.11 (0.95, 5.28), p-value=0.005). Moreover, inotrope or vasopressors requirement was lower 24-hour post Midodrine initiation. In contrast, there were no statistically significant differences in 30-day mortality, in-hospital mortality, or ICU length of stay between the two groups (HR 0.95; 95% CI 0.36, 2.45, p-value=0.91 and HR 0.87; 95% CI 0.46, 1.64, p-value=0.66, and beta coefficient (95% CI): -0.47 (-0.96, 0.02), p-value=0.06 respectively.

Conclusion
Tapering Midodrine dosage before discontinuation in critically ill patients reduced the frequency of inotropes or vasopressor re-initiation. The results of this study suggest that Midodrine dosage tapering might be a reasonable approach among ICU patients who require inotropes or vasopressors support.

201761

Standard dosing of Enoxaparin Versus unfractionated heparin in critically ill COVID19 patients: A Multicenter Cohort Study

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Background
Thrombotic events are common in critically ill patients with COVID-19 and have been linked with COVID-19- induced hyperinflammatory state. In addition to anticoagulant effects, heparin and its derivatives have various anti-inflammatory and immunomodulatory properties that may affect patient outcomes. This study compared the effectiveness and safety of prophylactic standard-doses of enoxaparin and UFH in critically ill patients with COVID-19.

Method
A multicenter, retrospective cohort study included critically ill adult patients with COVID-19 admitted to the ICU between March 2020 and July 2021. Patients were categorized into two groups based on the type of pharmacological VTE prophylaxis given in fixed doses (Enoxaparin 40 mg every 24 hours versus UFH 5000 Units every 8 hours) throughout their ICU stay. The primary endpoint was all cases of thrombosis. Other endpoints were considered secondary. Propensity score matching was used to match patients (1:1 ratio) who received UFH to patients with Enoxaparin prophylaxis dose based on the predefined criteria. Multivariable logistic, Cox proportional hazards, and negative binomial regression analysis were used as appropriate.

Result
A total of 306 patients were eligible based on the eligibility criteria; 130 patients were included after PS matching (1:1 ratio). Patients who received UFH compared to Enoxaparin had higher all thrombosis events at crude analysis (18.3% vs. 4.6 %; p-value=0.02 as well in logistic regression analysis (OR: 4.10 (1.05, 15.93); p-value=0.04). Although there were no significant differences in all bleeding cases and major bleeding between the two groups (OR: 0.40 (0.07, 2.29); p-value=0.31 and OR: 1.10 (0.14, 8.56); p-value=0.93, respectively); however, blood transfusion requirement was higher in the UFH group but did not reach statistical significance (OR: 2.98 (0.85, 10.39); p-value=0.09). The 30-day and in-hospital mortality were similar between the two groups at Cox hazards regression analysis. In contrast, hospital LOS was longer in the UFH group; however, it did not reach the statistically significant (beta coefficient: 0.22; 95% CI: -0.03, 0.48; p-value=0.09).

Conclusion
Prophylactic enoxaparin use in critically ill patients with COVID-19 provided a significant reduction in thrombosis with similar bleeding risk compared to UFH.

201762

Doxycycline Potential Roles in Reducing Thrombosis and Mortality in Critically Ill Patients with COVID-19: A Multicenter Cohort Study

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Background
Developing therapeutic agents against coronavirus disease 2019 (COVID-19) has been a top priority. Doxycycline has revealed potential effects in animal studies to prevent thrombosis and reduce mortality. However, less is known about its antithrombotic role in patients with COVID-19. Our study aimed to evaluate doxycycline's clinical outcomes in critically ill patients with COVID-19.

Method
A multicenter retrospective cohort study was conducted between March 1, 2020, and July 31, 2021. Patients who received doxycycline in intensive care units (ICUs) were compared against patients who did not (controls). The primary outcome was composite thrombotic events. The secondary outcomes were 30-day and in-hospital mortality, length of stay, ventilator-free days (VFDs), and complications during ICU stay. Propensity score (PS) matching was used based on the selected criteria. Logistic, negative binomial, and Cox proportional hazards regression analyses were used as appropriate.

Result
A total of 1302 patients met the inclusion criteria (doxycycline, 203; control, 1099). After PS (1:3) matching, 664 patients (doxycycline, 166; control, 498) were included. Thromboembolic events were lower in the doxycycline group (OR: 0.54; 95% CI: 0.26-1.08; p=0.08); however, it failed to reach statistical significance. Moreover, D-dimer levels and 30-day mortality were lower during ICU stay in doxycycline group [beta coefficient (95% CI): -0.22 (-0.46, 0.03; p=0.08); HR: 0.73; 95% CI: 0.52-1.00; p=0.05, respectively]. In addition, patients who received doxycycline had significantly lower odds of bacterial/fungal pneumonia (OR; 0.65; 95% CI; 0.44-0.94; p=0.02).

Conclusion
Doxycycline use as adjunctive therapy in critically ill patients with COVID-19 might be an appealing therapeutic option for thrombosis reduction and survival benefits.

201764

Comparison of 4-factor fixed dose versus 4-factor weight-based dose prothrombin complex concentrate for emergent warfarin reversal: An updated systematic review and meta-analysis

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Background
Major bleeding secondary to warfarin use is estimated to occur in 2-5% of patients per year, with a fetal complication in up to 3% of patients. The availability of rapid and effective reversal agent is required to control for negative consequences. Although 4PCC is the preferred agent in addition to vitamin K for warfarin-induced bleeding by the ACC guideline, the optimal dose of 4PCC remains unknown. Thus a systematic review and meta-analysis of clinical studies is needed to evaluate if fixed-dose 4-PCC confers advantages over variable dose in warfarin reversal patients.

Method
A comprehensive systematic review was conducted using the PubMed and Cochrane databases from inception through October 2022. The primary investigator of the study sets the objectives of the study and clarifies the selection criteria to all members of the research team. The treatment effects were expressed as relative ratios (RR) with 95% confidence intervals and pooled by a random-effect model.

Result
A total of fourteen studies were included. The overall use of fixed-dose 4-PCC was associated with lower INR goal reached (RR = 0.84, 95% CI 0.80 – 0.89) compared to variable dose. The rate of mortality (RR=0.85, 95% CI 0.70 – 1.03), 4-PCC cumulative dose (RR=1.18, 95% CI 1.07 – 1.31), thromboembolic events (RR=1.27, 95% CI 0.65 – 2.45) were the same between the two treatment groups.

Conclusion
The use of fixed dose may be considered an effective approach for achieving the goal of INR for VKAs reversal. Mortality, thromboembolic event rates, 4-PCC cumulative dose in this systematic review and meta-analysis appeared similar between two treatment groups.

201767

Comparison of anticoagulation treatment dose versus prophylaxis in critically ill patients with new-onset atrial fibrillation: A multicenter cohort study

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Background
The rate of thrombosis was reported to be higher in COVID19 compared with non-COVID19 critically ill patients. New-onset atrial fibrillation (Afib) in critically ill patients with COVID-19 is associated with worse patients outcomes. The ideal care in this clinical context is still poorly understood, and the available evidence about the role of using treatment doses of anticoagulation in new onset-Afib has been questioned. Therefore, our study aimed to evaluate the effectiveness and safety of anticoagulation treatment doses in COVID19 critically ill patients who developed new-onset Afib. during ICU stay.

Method
A multicenter, retrospective cohort study includes critically ill adult patients with COVID-19 admitted to the intensive care units (ICUs) from March 01, 2020, until July 31, 2021. Patients who developed new-onset Afib. were categorized into two groups based on receiving anticoagulation dose (prophylaxis vs. treatment dose). The primary outcome was major and minor bleeding during the ICU stay. Other outcomes of interest include blood products transfusion requirement, RBCs transfusion, thrombosis, mortality, length of stay (LOS), and ventilator-free days (VFDs) at 30 days. Propensity score (PS) matching was used based on predefined criteria. Logistic, linear and Cox proportional hazards regression analysis were used as appropriate.

Result
A total of 1592 patients were screened, 107 included based on the eligibility criteria. After PS matching (1:1 ratio), 56 patients were included in the final analysis. Major and minor bleeding were higher in the patients who received treatment doses of anticoagulation; however, it did not reach the statistically significant (OR 1.41; 95% CI 0.28, 7.03; P=0.68 and OR 2.27; 95% CI 0.19, 26.9; P=0.52, respectively). In addition, patients in the treatment group had a statistically significant higher requirement of blood product and RBCs transfusion than patients who received prophylaxis dose (OR 4.54; 95% CI 1.22, 16.7, P=0.02 and beta coefficient 1.28; 95% CI 0.08, 2.49; P<0.04, respectively). In contrast, the two groups showed similar thrombosis events, VFDs, ICU/hospital LOS, and mortality.

Conclusion
The use of treatment dose anticoagulation in new-onset Afib was not associated with superior outcomes, but its use was associated with a higher requirement of blood product and RBCs transfusion compared with prophylaxis dose anticoagulation. Further randomized interventional studies with a larger sample size are required to confirm our findings.

201772

The Use of Tocilizumab in COVID-19 Critically ill Patients with Renal Impairment: A Multicenter, Cohort Study.

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Background
Tocilizumab (TCZ) is recommended by the Covid-19 guideline to be use in hospitalized patients who require oxygen therapy or ventilatory support. Despite the wide use of TCZ little is known about its safety and effectiveness in patients with renal impairment. Therefore, this study aims to identify the safety and efficacy of tocilizumab in critically ill COVID-19 patients with renal impairment and renal replacement therapy.

Method
A multicenter retrospective cohort study that included all adult COVID-19 patients with CKD eGFRα60 and admitted to the ICUs between March 2020 and July 2021. Patients were categorized into two sub-cohorts based on Tocilizumab use (Tocilizumab versus Control). The primary endpoint was to assess the development of AKI during ICU stay. Secondary outcomes were hospital LOS, ventilator-free days (VFDs), 30-day/in-hospital mortality and ICU-acquired complications. Propensity score (PS) matching (1:1) was used based on the predefined criteria. Multivariable logistic, Cox proportional hazards, and negative binomial regression analysis were employed.

Result
A total of 1592 patients were screened and 524 were included based on the eligibility criteria; 274 patients were included after propensity score matching based on the selected criteria. The rate of acute kidney injury was higher in the TCZ group compared to control group (74.2% vs 57.6%) beta coefficient ((95%CI): 2.03 (1.102 ,3.725), p-value=0.02). In addition, ICU length of stay was significantly longer in TCZ vs control group (16 vs 12) days beta coefficient ((95%CI):0.22 (0.02 ,0.42), p-value=0.028). However, the ventilator-free days, 30-day mortality, in-hospital mortality, hospital LOS, ICU complications respiratory failure requiring MV, new onset A fib and liver injury were similar between the two groups.

Conclusion
In critically ill COVID-19 patients with CKD the use of TCZ is associated with a higher incidence of AKI and increased ICU length of stay. Further studies are needed to confirm these findings.

201776

The association between tocilizumab therapy and the development of thrombosis in critically ill COVID-19 patients: A Multicenter, Cohort Study

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Background
The use of tocilizumab for the management of COVID-19 emerged since it modulates the inflammatory markers by blocking interleukin 6 receptors. Concerns regarding higher thrombosis risk while being treated with tocilizumab raised in the literature. The aim of this study to investigate the association between tocilizumab therapy and the development of thrombosis in critically ill COVID-19 patients.

Method
A propensity score-matched, multicenter cohort study for adult critically ill patients with COVID-19. Eligible patients admitted to ICU between March 2020 and July 2021

were categorized into two sub-cohorts based on tocilizumab use within 24 hours of ICU admission. The primary endpoint was to assess the incidence of all thrombosis cases during ICU stay. The secondary endpoints were 30-day mortality, in-hospital mortality, and the highest coagulation parameters follow-up (i.e., D-dimer, Fibrinogen) during the stay. Propensity score matching (1:2 ratio) was based on nine matching covariates.

Result
Among a total of 867 eligible patients, 453 patients were matched (1:2 ratio) using propensity scores. The thrombosis events were not statistically different between the two groups in crude analysis (6.8% vs. 7.7%; p-value=0.71) and regression analysis [OR 0.83, 95% CI (0.385, 1.786)]. Peak D-dimer levels did not change significantly when the patient received tocilizumab (beta coefficient (95% CI): 0.19 (-0.08, 0.47)), while there was a significant reduction in fibrinogen levels during ICU stay (beta coefficient (95% CI): -0.15 (-0.28, -0.02)). On the other hand, the 30-day and in-hospital mortality were significantly lower in tocilizumab-treated patients (HR 0.57, 95% CI (0.37, 0.87), [HR 0.67, 95% CI (0.46, 0.98), respectively

Conclusion
The COVID-19 cytokines surge interaction with interstice coagulation markers is complex. Our findings found comparable thrombotic odds with remarked mortality benefit in COVID-19 patients who were treated with tocilizumab. Further studies needed to understand the reality of immune modulation and COVID-19 infection.

201779

The impact of recombinant human erythropoietin administration on disease progress and outcomes in critically ill COVID-19 patients: A multicenter, cohort study

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Background
The use of Erythropoietin-Stimulating Agents (ESAs) as adjunctive therapy in critically ill patients with COVID-19 may have potential survival benefits. However, insufficient evidence is available, particularly on their safety and efficacy. Therefore, the objective of this study is to evaluate the effect of ESAs on the clinical outcomes of critically ill COVID-19 patients.

Method
A multicenter, observational cohort study was conducted from 01-03-2020 till 31-07-2021 and included all COVID-19 adult patients admitted to intensive care units (ICUs). Patients were categorized into two groups based on ESAs use during ICU stay (ESAs vs. control). The primary endpoint was the length of stay. The secondary endpoints were ventilator-free days (VFDs), 30-day and in-hospital mortality, and complications during ICU stay.

Result
A total of 1592 patients were evaluated for inclusion, of which 1457 patients were included. After Propensity Score (PS) matching (3:1), the overall included patients were 120. Among those, 30 patients received ESA. The mean age of the study population was 62.3 (±14.75) years, and the majority were males (62.3 %). A longer duration of ICU stay as well as hospital stay were observed in ESA compared to the control group (beta coefficient: 0.64; 95% CI: 0.31-0.97; P= < 0.01, and beta coefficient: 0.41; 95% CI: 0.12-0.69; P= < 0.01, respectively). However, the ESA group's mean VFDs were statistically significantly shorter than the control group.

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No statistically significant differences between the two groups in terms of 30-day and in-hospital mortality (HR: 1.22; 95% CI:0.7-2.12, P= 0.48 and HR: 1.07; 95% CI: 0.62-1.83, P= 0.82, respectively). In addition, the ESA group had more ICU complications.

Conclusion
The use of ESA in COVID-19 critically ill patients was associated with longer hospital and ICU stays, with no survival benefits but linked with lower VFDs.

201781

Prescribing hydroxyurea for sickle cell patients.

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Background
Hydroxyurea is a cytotoxic medication that is approved to be used with sickle cell disease. Several reports emphasized its beneficial role in managing long-term complications, but there is a lack of evidence documenting a pattern of its use in the Eastern Region in Saudi Arabia. This study aims to identify patterns of hydroxyurea prescribing among sickle-cell patients who attended a hematology clinic in a tertiary hospital.

Method
Data for sickle-cell patients presented to the hospital between the period of January- December 2021 were collected retrospectively from their medical records. Patients' demographic data, their prescribed medications, their comorbidities, and their laboratory results were collected. Comorbidities were identified as being reported in the medical record and by applying the Rx-risk comorbidity index on the prescribed medications list. Descriptive statistics were used, and data were presented as mean (standard deviation) for continuous variables and as number (percentage) for categorical variables. Student-T test was used to compare continuous variables where Chi square test to compare categorical variables.

Result
2714 patients were included, the median age was (37 years (range 18 – 95), and the majority were female (52%). 57% of the cohort were prescribed a hydroxyurea medication. Hydroxyurea users were younger (35 vs 42 years, P < 0.001) compared to non-users, whereas males were more likely to use hydroxyurea (54% vs 46%, P = 0.01) compared to females. Interestingly, hydroxyurea users were prescribed more tramadol (34% vs 15%, P < 0.001), paracetamol (45% v 18%, P < 0.001), and ibuprofen (46% vs 16%, P < 0.001) compared to non-users. Moreover, supplements mediations such as vitamin D3 (66.2% vs 16%, P < 0.001), calcium (50% vs 12, P < 0.001), and folic acid (78% vs 32%, P < 0.001) were prescribed more often to hydroxyurea users compared to non-users.

Conclusion
57% of the cohort were prescribed hydroxyurea, as young population were higher consumers. Hydroxyurea users utilize more analgesic medication and this question the overall efficacy of hydroxyurea in improving the quality of life among sickle cell patients in the Eastern Region, Saudi Arabia.

201783

Evaluation of Vitamin D as adjunctive therapy in COVID19 critically ill patients: A multicenter study

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Background
Background and Aims: Despite insufficient evidence, vitamin D has been used as adjunctive therapy in critically ill patients with COVID-19. This study evaluates the effectiveness and safety of vitamin D as adjunctive therapy in COVID-19 critically ill patients.

Method
A multicenter retrospective cohort study that included all adult COVID-19 patients admitted to the ICUs between March 2020 and July 2021. Patients were categorized into two groups based on the vitamin D use throughout their ICU stay (control vs. vitamin D). The primary endpoint was in-hospital mortality. Secondary outcomes were LOS, MV duration, and ICU-acquired complications. Propensity score (PS) matching (1:1) was used based on the predefined criteria. Multivariable logistic, Cox proportional hazards, and negative binomial regression analysis were employed.

Result
1441 patients were included during the study. Vitamin D was initiated in 177 patients (12.2%), whereas 1258 patients did not receive it. A total of 288 patients were matched (1:1) using PS. The in-hospital mortality showed no difference between patients who received vitamin D and the control group (HR 1.22, 95% CI 0.87- 1.71: P=0.26). However, MV duration and ICU LOS were longer in the vitamin D group (beta coefficient 0.24 (95% CI 0.00 - 0.47), P=0.049 and beta coefficient 0.16 (95% CI -0.01, 0.33), P=0.07, respectively). In addition, ICU-acquired complications were higher in the vitamin D group.

Conclusion
The use of vitamin D in COVID-19 critically ill patients was not associated with survival benefits but linked with longer MV duration, ICU LOS, and higher odds of major bleeding.

201784

Dexamethasone versus methylprednisolone for multiple organ dysfunction in COVID-19 critically ill patients: A multicenter propensity score matching study

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Background
Dexamethasone was recommended for patients with severe and critical coronavirus disease 2019 (COVID-19) to reduce short-term mortality. However, it is uncertain if another corticosteroid, such as methylprednisolone, may be utilized to obtain a superior clinical outcome. This study assessed dexamethasone's clinical and safety outcomes compared to methylprednisolone.

Method
A multicenter, retrospective cohort study was conducted between March 01, 2020, and July 31, 2021. It included adult COVID-19 patients who were initiated on either dexamethasone or methylprednisolone therapy within 24 hours of intensive care unit (ICU) admission. The primary outcome was the progression of multiple organ dysfunction score (MODS) on day three of ICU admission. Propensity score (PS) matching was used (1:3 ratio) based on the patient's age and MODS within 24 hours of ICU admission.

Result
Post-PS matching, 264 patients were included; 198 received dexamethasone, while 66 patients received methylprednisolone within 24 hours of ICU admission. In regression analysis, patients who received methylprednisolone had a higher MODS on day 3 of ICU admission than those who received dexamethasone (beta coefficient: 0.17 (95% CI 0.02, 0.32), P= 0.03). Moreover, hospital-acquired infection was higher in the methylprednisolone group (OR 2.17, 95% CI 1.01, 4.66; p = 0.04). However, other complications during the stay were similar between the two groups. The 30-day and the in-hospital mortality were similar in both groups on multivariable cox proportional hazards regression analysis.

Conclusion
Conclusion: Dexamethasone showed a lower MODS on day three of ICU admission compared to methylprednisolone, with no difference in mortality.

201792

Impact of glucagon-like peptide 1 receptor agonist on respiratory disease exacerbation: A retrospective study

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Background
Glucagon-like peptide-1 receptor agonist (GLP1RA) like semaglutide and liraglutide are mainly used in the management of type 2 diabetes (T2DM). Previous studies observed that GLP1RA also expresses anti-inflammatory and bronchodilator effects. This study aims to assess the association between GLP1RA and respiratory exacerbations in patients with comorbid T2DM and chronic lower respiratory disease (CLRD) i.e. asthma and COPD.

Method
A retrospective cohort study. The data of adult patients with T2DM with concomitant CLRD were collected and screened for any respiratory exacerbations using hospital database. Patients were divided into two categories those who were on GLP1RA compared with patients who were on other antidiabetic medications (sodium-glucose co-transporter-2 inhibitors, dipeptidyl peptidase-4 inhibitors, sulfonylureas or metformin). The comparison held on the basis of number of respiratory exacerbation the patient had after they were treated with the respective antidiabetic medication.

Result
The study sample consisted of 108 patients on GLP1RA and 154 patients on other antidiabetic medications with co-morbid T2DM and CLRD. The percentage of patients who had respiratory exacerbation in GLP1RA vs other antidiabetic medications was (14/108) 13% and (73/154) 47% respectively.

Conclusion
GLP1RA users had fewer CLRD exacerbations than users of other antidiabetic medications. Potential beneficial effects can be considered in selecting antidiabetic regimen.

201794

A Randomized Controlled Trial evaluating Sacubitril/Valsartan Efficacy in Treating Heart Failure Patients with Reduced Ejection Fraction.

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Background
This study aims to compare efficacy of sacubitril/valsartan combination and valsartan in the treatment of heart failure (HF) patients over six months and how this is reflected on the ejection fraction (EF) and N-terminal pro- B-type natriuretic peptide (NT-proBNP) levels

Method
a prospective randomized, active-controlled trial. sixty heart failure patients with reduced ejection fraction (HFrEF) received either sacubitril/valsartan combination or valsartan with an allocation of a 1:1 for six months with the determination of baseline and exit EF and NT-proBNP levels in both groups

Result
After 6 months, a significant increase was observed in the EF level of HF patients receiving sacubitril/valsartan, compared to those receiving valsartan. At baseline, the mean EF level of patients receiving sacubitril/valsartan was 33.18±5.9 %, while after 6 months, it was 38.68 ±5.29 % (p<0.001**). Also, there was a significant decrease in the NT-proBNP level in the sacubitril/valsartan group from 547.14±101.21 pg/ml at baseline to 150±26.39 pg/ml (p<0.001**), after 6 months

Conclusion
Sacubitril/valsartan represents an essential advancement in the treatment of HFrEF as it lowers the NT-proBNP level and raises EF level which improves the quality of life in HF patients.

201799

Ceftolozane-tazobactam versus ceftazidime-avibactam for the treatment of infections caused by multidrug-resistant Pseudomonas aeruginosa: A multicenter cohort study

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Background
Ceftolozane-tazobactam (C-T) and ceftazidime-avibactam (CAZ-AVI) are two novel antimicrobials that retain activity against multidrug-resistant (MDR) Pseudomonas aeruginosa. The comparative effectiveness and safety of C-T versus CAZ-AVI remains unknown. To address this gap, we designed this study to compare C-T to CAZ-AVI in treating infections due to MDR P. aeruginosa.

Method
This was a retrospective, multicenter, cohort study conducted at 6 tertiary centers in Saudi Arabia. Eligible patients were those aged ≥ 18 years, who developed MDR P. aeruginosa infections and treated with either CAZ-AVI or C-T for ≥ 48 hours. Overall in-hospital mortality, 30-day mortality, clinical cure, and acute kidney injury (AKI) were the main study outcomes. Multivariate analysis using logistic regression was used to determine the independent impact of treatment on the outcomes of interest. Ethical reviews and approvals were obtained from the ethics committee of all participating sites.

Result
We enrolled 200 patients in the study (100 in each treatment arm). A total of 56% were in the intensive care unit, 48% were mechanical ventilated, and 37% were in septic shock. Around 19% of patients presented with bacteremia. Combination therapy was administered in 41% of patients. There were no statistically significant differences between C-T and CAZ-AVI groups in the overall in-hospital mortality (44% vs 37%; P = 0.314; OR, 1.34; 95% CI, 0.76-2.36), 30-day mortality (27% vs 23%; P = 0.514; OR, 1.24; 95% CI, 0.65-2.35), clinical cure (61% vs 66%; P = 0.463; OR, 0.81; 95% CI, 0.43-1.49) or AKI (23% vs 17%; P = 0.289; OR, 1.46; 95% CI, 0.69-3.14) even after adjusting for differences between the two groups.

Conclusion
C-T and CAZ-AVI are associated with similar clinical outcomes and serve as potential options for the treatment of infections caused by MDR P. aeruginosa.

201803

Evolocumab Safety and effectiveness Post Marketing Surveillance in Saudi Arabia

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Background
Hypercholesterolemia and hyperlipidemia are considered as amajor risks of developing cardiovascular diseases (CDV). Patients with hyperlipidemia typically have a twofold increased risk of having CVD compared to those with normal levels of total cholesterol. A recent orphan drug has been approved by FDA for homozygous familial hypercholesterolemia. Which is Evolocumab, it is a humanized monoclonal antibody that inhibits proprotein convertase subtilisin/kexin type 9 (PCSK9). As a result, it lowers the low-density lipoprotein (LDL) level by 60%. Evolocumab's short-term efficacy and safety were proven in a phase 3 clinical research, however the Saudi population's long-term safety and effectiveness have not yet been studied. To evaluate the long-term safety and effectiveness of Evolocumab in Saudi individuals with primary hypercholesterolemia and mixed dyslipidemia using data collected from hospital database.

Method
This is a retro/prospective observational cohort study. It included all patients who were prescribed Evolocumab. We exclude any patients who were not on Evolocumab, or on plasma apheresis. Additionally, patients who have no baseline lab or follow up labs and visits. The primary outcomes were safety outcomes which are the Incidence of adverse events (AE) and adverse drug reactions (ADR) within 6 months. Effectiveness outcomes are LDL-C, HDL-C, non-HDL-C, Total cholesterol, and triglycerides.

Result
389 patients were included in the safety and effectiveness analysis at 6 months. The LDL, total cholesterol and triglyceride levels were significantly decreased with a mean difference -1.65 (95%CI: -1.88, -1.43), -1.65 (95%CI: -1.90, -1.40), -0.36 (95%CI: -0.70, -0.02) respectively. In addition, there was no statistical difference in the incidences of adverse events. However, the most frequent was myalgia with 2.06% (95%CI:1.03, 4.07) followed by rhabdomyolysis 0.514% (95%CI: 0.128, 2.04).

Conclusion
After evaluating the long-term safety and effectiveness of Evolocumab in Saudi individuals with primary hypercholesterolemia and mixed dyslipidemia, we demonstrated that Evolocumab is safe and effective.

201821

Vitamin B12 deficiency and supplementation in patients on metformin

Lina Alasmari, Mai Alajaji, Madhawi Mahdali, Nouf alqahtani, Rawan Al-Otaibi

Background
Despite the widespread use of the respective treatment, studies have linked metformin to vitamin B12 deficiency. The incidence of vitamin B12 deficiency in type 2 diabetes individuals using metformin was 17.5%. Despite this, research examining the risk factors that relate to Vitamin B12 deficiency, and the use of metformin are inconclusive due to limited findings. This study will identify the risk factors for metformin-related vitamin B12 deficiency.

Method
This retrospective chart review included 3211 type 2 diabetes patient.Inclusion criteria were Type 2 diabetes and above age of 18 who had been taking b12 supplements. Information on metformin use and confounding variables was collected from the Ministry of National Guard Health Affairs' BestCare system and analyzed using the tidyverse and janitor packages in RStudio (version 4.2.0). The patients were divided into four different groups reflgarding the use of metformin and the vit B12 dosage form.The study was done at Riyadh's KAMC-CR tertiary health care clinics using data from 2016 to December 2022

Result
It was noticed that Vitamin B12 deficiency was significantly higher among females with a p value of 0.024, and among patients aged 60 or older with p value <0.001. It was also seen to be significantly higher with Metformin dose of 1000 mg than with 500 mg; p<0.001, also seen in patients with longer prescription periods; p<0.001.

Conclusion
As a conclusion, this study shows that the deficiency of vitamin B12 was associated with older age (60 or older) and higher Metformin dose (more than 1000mg) with longer prescription period, also showed that female patients were significantly more likely to develop vitamin B12 deficiency compared to males.

201822

Early Versus Late Initiation of Hydrocortisone in Patients with Septic Shock; A prospective study

Moath Alsulami, Lamees Alrojaie, Abubaker Owmer

Background
• The use of Hydrocortisone in septic shock is well established. Yet the time of initiation remains arguable.
• According to Surviving Sepsis Campaign Guidelines for Sepsis and Septic Shock 2021 suggest using of Hydrocortisone at least 4 hours after the onset of septic shock; however, the best time to initiate Hydrocortisone is uncertain.
• Several studies have found a positive link between the timing of corticosteroid administration and outcomes such as time to discontinue vasopressor.
• Therefore this study aims to evaluate the impact of early (within 3 hours) versus late initiation of Hydrocortisone in septic patients.

Method
A prospective observational study conducted at tertiary hospital, King Saud Medical City in Riyadh, Saudi Arabia between February to August, 31 2022.

Result
• A total of 81 patients were included; 45 (56.8%) were in the early group, while 36 (43.2%) were in the late group.
• The mean age of the included patients was (60 years in the early group versus 59 years in the late group),
• There were no difference between the two groups in baseline characteristics and comorbidities.
• Primary outcome: time to discontinue vasopressor, there was a statistical difference between the groups (Early= 25 hours versus Late= 37 hours, P= 0.009).
• For the secondary outcomes: there was no difference between the two groups in a reversal of shock (Early= 35 patients versus Late= 24 patients), ICU mortality (Early= 25 patients versus Late= 19 patients), and ICU length of stay (Early= 17 days versus Late=20 days).

Conclusion
Early Initiation of hydrocortisone within 3 hours shown to be superior in term of time to discontinue vasopressor than late in studied patients. Both strategies reported similar outcomes in ICU mortality, ICU length of stay, and reversal of shock.

201842

Real-world retrospective study of the impact of the intravenous vs. subcutaneous insulin on the management of non-emergent hyperglycemia and emergency department (ED) length of stay (LOS)

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Background
Intravenous (IV) and subcutaneous (SQ) insulin are the two modalities of treating hyperglycemia in the ED. Despite published guidelines for the optimal selection of insulin therapy, there is no consensus on the necessity of ED glucose reduction for ED patients. AACE and ADA guidelines recommend administration of insulin therapy prior to discharge. Glycemic control remain one of the challenges for choosing insulin route of administration in the ED. In our experience this practice has been extrapolated to include provision of IV or SC first dose insulin in ED patients with hyperglycemia despite a lack of evidence in this patient population. The effect of a single IV vs. SC insulin dose administered in the ED prior to discharge home is unknown. Thus studies are needed to evaluate if IV insulin administration in the ED confers advantages over SC insulin administration in the ED.

Method
This retrospective cohort study conducted at the emergency medicine department at King Abdulaziz Medical City (KAMC) to compare length of stay and the rate of re-visits within 30 days between patients with hyperglycemia who received SC or IV insulin during ED visit.

Result
A total of 429 patients with an ED visit for hyperglycemia were included. ED treatment consisted of IV push (37%) vs. Subcutaneous (63%) insulin administration. ED LOS and number of administered unites were similar among patients received IV push or Subcutaneous (P = 0.16 & P = 0.25 respectively). Advanced age, obesity, worsening kidney function were associated with longer ED LOS. Further analysis will be conducted to gain insight into the number of received insulin units to the patient's weight.

Conclusion
Findings of this study suggest that the use of subcutaneous insulin administration may be considered an effective and safe approach for the management of non-emergent hyperglycemia in the ED.

201864

Clinical Characteristics and Outcomes of Bloodstream Infections Caused by Potential AmpC Beta-Lactamase-Producing Enterobacterales.

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Background
AmpC beta-lactamases are inducible enzymes produced by select Enterobacterales. The production of AmpC beta-lactamases increases the risk of clinical failure in patients treated with a third-generation cephalosporin, even if the isolate was shown to be initially susceptible. Carbapenems are the mainstay of therapy. However, data are conflicting about what other antibiotics can withstand the presence of AmpC. The aim of our study is to evaluate the clinical outcomes in patients with bloodstream infections due to potential AmpC-producing organisms.

Method
retrospective, single-center, cohort study of adult patients with bloodstream infections due to Enterobacter cloacae, Klebsiella aerogenes, Citrobacter freundii, Serratia marcescens, Morganella morganii, and Providencia stritti. Patients with multiple infections or polymicrobial cultures were excluded. We used descriptive statistics to summarize baseline characteristics and treatment outcomes. Statistical analysis was conducted using SPSS V29.0.

Result
104 patients met the inclusion criteria. The mean age is 58.37 years (±17.7), and 58.65% of subjects are male. The median PITT bacteremia score was 1(1-10). Sixty patients were infected with E. cloacae, 28 with S. marcescens, 9 with K. aerogenes, 4 with P. sturtii, and 2 with M. morganii. Three isolates were resistant to carbapenems. Sixty-six (63.46%) patients were on a carbapenem-based definitive regimen. Other definitive regimens include ceftriaxone, piperacillin/tazobactam, ciprofloxacin, gentamicin, colistin, tigecycline, trimethoprim/sulfamethoxazole, and ceftazidime/avibactam. The mean duration of definitive antibiotic therapy was 8.6 days. A total of 35 (33.6%) patients were admitted to the critical care unit. In patients who received non-carbapenem definitive therapy, mortality within 30 days was seen in 8 out of total 9 deaths, and In-hospital mortality was 11 out of 16. Total treatment failure was observed in 13 patients.

Conclusion
Our findings show that bacteremia caused by potential AmpC-producing organisms are associated with substantial morbidity and mortality. Higher rate of treatment failure was observed in patients treated with non-carbapenem agents.

201890

Genetic And Epigenetic Factors Regulating Immune Checkpoints Associated with Relapse in Colorectal Cancer Patients.

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Background
Immune checkpoints are regulatory genes that prevent the immune system from attacking cells indiscriminately. However, cancer cells utilize such function to evade immune response and negatively influence treatment efficiency and subsequently contribute to relapse. The overall aim of our study was to screen for potential immune checkpoint genes that may influence treatment response and are associated with relapse in colorectal cancer (CRC) patients and identify genetic and epigenetic mechanisms by which these genes can be targeted.

Method
Genomic (gene expression, copy number alterations (CNA), and somatic mutations) and epigenetic (methylation status) data of 223 CRC patients with relapse information [relapse-free (n=193) and relapsed (30)] extracted from The Cancer Genome Atlas (TCGA). 51 immune checkpoint genes were analyzed in the study. Student's t-test (p-value < 0.05) was used to identify significant genetic and epigenetic factors between relapse-free and relapsed patients. Free survival analyses were performed using log-rank test (p-value < 0.05) based on patient gene expression profiles.

Result
Among the 51 genes examined, PVR was significantly upregulated in relapsed patients compared with relapse-free patients (P = 0.0434). No significant abnormal CNA, somatic mutations, or aberrant methylation was observed in PVR in the relapsed group relative to the relapse-free group. Patients with high PVR expression were 2.16 times more likely to experience recurrence relative to patients with low PVR expression (P = 0.0369).

Conclusion
The upregulation of PVR was significantly associated with relapse in CRC patients. Promisingly, PVR expression profile has the potential to be used as a prognostic biomarker for relapse risk and rationale for alternative therapeutic strategies. Our study suggests that targeting PVR might be beneficial in enhancing the treatment efficiency and, thereby, reducing the recurrence risk.

201902

Cancer therapy-Induced Cardiotoxicity in Children with Cancer: A Cohort Study from Saudi Arabia

Razan Albakili, Lujain Alhomaid, Hadeel Alkofide, Lamya Alnaim, Basmah Alfajeh

Background
Cardiotoxicity is a major adverse event of cancer therapy. As many patients survive their childhood cancer diagnosis, they may suffer from short- or long-term cardiotoxic events. Due to limited cardiotoxicity data on pediatrics, this study aims to investigate cardiotoxicity incidence, risk factors, and cardiac monitoring practices in pediatric cancer patients. Moreover, it aims to assess the types of cardiotoxicity events associated with different agents.

Method
This is a retrospective cohort study conducted in Saudi Arabia using electronic medical records of two tertiary hospitals from January 2016 to January 2022. The study included all children aged 13 years or younger who were diagnosed with any type of cancer and received cancer therapy during the study period. Children diagnosed with cardiovascular disease before starting cancer therapy, and those who were treated with radiotherapy only were excluded. Univariable and multivariable logistic regressions were used to measure the association between cardiotoxicity and various clinical predictors.

Result
These results present the preliminary findings of the study. Currently, medical charts from 78 pediatric cancer patients were reviewed and included in this study. The median age of participants was 3 years and the interquartile range was 2-7 years. At the end of the study follow-up, 73.08% of participants had completed their cancer treatment. Almost all patients (77/78) received one or more known cardiotoxic agents. We found that 16.17% (21/77) of the cohort developed cardiotoxicity either during or post-treatment with chemotherapeutic agents, with most events happening during therapy. Most of the patients had an echocardiogram done before treatment initiation (80.76%), and during treatment (70.51%) while only 6.41% had an echocardiogram done post-treatment.

Conclusion
This study shows a high incidence rate of cardiotoxicity in pediatric cancer patients in Saudi Arabia. As well as suboptimal post-treatment cardiac monitoring, which could impact the reporting of chronic cardiotoxicity.

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نبذة عن Amgen

تعتبر شركة أمجن السعودية المحدودة فرع شركة أمجن الأمريكية العالمية الرائدة التكنولوجيا الحيوية والمتواجدة في أكثر من 100 دولة حول العالم والتي تجد عملائها في تطوير علاجات مبتكرة للمرضى الذين يعانون من أمراض خطيرة منذ عام 1980. و تشمل منتجاتها عدة مجالات علاجية أبرزها الأورام وأمراض الدم وأمراض الكلى وأمراض العظام وأمراض القلب والأوعية الدموية وتجدت في بلك سمعة متميزة في جميع أنحاء العالم في مجال الأدوية المصنوعة باستخدام تقنيات التكنولوجيا الحيوية لتوفيرها أدوية عالية الجودة تركز على المرضى الذين يعانون من حالات لا يوجد فيها سوى خيارات علاج قليلة أو معدومة.

وقد بدأت شركة أمجن السعودية المحدودة مسيرتها بالسوق السعودي منذ عام 2017 م بافتتاح مكتب أمجن العلمي في محيلة الواقع لينتقل إلى شركة أمجن السعودية المحدودة بحلول عام 2020 م بعد حصولها على رخصة استثمار أجنبي لتستمر في توفير الخدمات الفنية والاستشارية والعلمية والأدوية للمرضى في المملكة وفق رؤية وطموح خدماتها العالمية إلى المملكة كون السوق السعودي من الأسواق الواعدة والكبيرة والتي تقبل الابتكارات العلمية الحديثة

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EXHIBITORS

The Annual Meeting of SPS
SIPHA 2023

Exhibitors

وزارة الصحة
Ministry of Health

الهيئة العامة للغذاء والدواء
Saudi Food & Drug Authority

جمعية التوعية الصحية الرقمية
Digital Health Awareness Society

SSCP
Saudi Society of Clinical Pharmacy

نادي الصيدلة
جامعة الملك سعود

Kuwait Pharmaceutical Association

BAHRAIN PHARMACISTS SOCIETY

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RESIDENCY SHOWCASE

The activity aims to bring residency program centers together to connect pharmacy graduates, residency program directors, and former/current residents to provide insights into the programs.
Start browsing to learn about the unique opportunities each of these programs provide.

The Annual Meeting of SPS
SIPHA 2023

Residency showcase

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CLINICAL SKILLS COMPETITION

The Annual Meeting of SPS
SIPHA 2023

Clinical skills competition

Clinical skills competition

SIPHA 23

The Annual Meeting of SPS

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