



مدينة الملك فهد الطبية
King Fahad Medical City



تجمع الرياض الصحي الثاني
Riyadh Second Health Cluster

RESEARCH CENTER ANNUAL REPORT

R2 2023



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Introduction

Welcome to the annual report of the Research Center, operating within the Riyadh Second Health Cluster (R2). As a vital component of R2's mission to elevate healthcare services and drive research, our center plays a pivotal role in advancing healthcare excellence and promotion of research. Grounded in scientific research and fueled by our need to advancing patients' care, we collaborate with healthcare professionals and researchers to solve real-world healthcare challenges head-on.

Our aim is to generate impactful insights that translate into tangible improvements in patient care and community health. From innovative research projects to strategic partnerships, each page of this report showcases our commitment to knowledge advancement and making a meaningful difference in healthcare delivery. Together with our partners within R2, we strive to create a healthier and more vibrant future for our communities.

In this report, we invite you to explore our journey through the year 2023. Join us as we celebrate our achievements, reflect on our challenges, and chart a course towards even greater accomplishments in the pursuit of healthcare excellence within the R2.



Message from the President Riyadh Second Health Cluster

The R2 Research Center has been working diligently to enhance its healthcare service deliveries and foster a comprehensive education and research culture consistent with the Ministry of Health's strategic plans. The Executive Administration of the Research Center has played a crucial role in promoting, reinforcing and incentivizing scientific research aimed at advancing healthcare services to patients and the community.

Over the past few years, a significant shift has occurred in healthcare transformation, with the R2 Research Center supporting research collaboration and networking among relevant stakeholders, thereby promoting the exchange of information and knowledge. The Research Center's dedication and contributions have continued to advance healthcare services, supporting the R2 mission, vision and long-term strategies. This support includes funding a wide range of research projects, providing research laboratory facilities and supporting critical research initiatives and clinical trials.

The Research Center's progress and achievements, as outlined in the 2023 annual report, reflect the institution's remarkable efforts, with the support of higher management in promoting a research culture among R2 healthcare providers and supporting national efforts. These accomplishments have received recognition at both the national and international levels.

I would like to express my gratitude to the executive administrators and staff of the Research Center for their unrelenting efforts in conducting and supporting scientific research. This report highlights their consistent contributions to the organization's success, and we look forward to further advancements in healthcare services through continued research efforts.



Dr. Fahad S. Al Ghofaili
President Riyadh Second Health Cluster

Message from the Vice President of Riyadh Second Health Cluster



We are extremely proud that the Research Center has continued to succeed in providing a conducive research environment. Besides facilitating funding of scientific merit research projects, the center also provides efficient support services and innovative educational activities, while ensuring compliance with the highest research conduct standards since its inception.

Thus, the Research Center is committed to its mission of spreading research culture and achieving research excellence towards the improvement of the healthcare system.

At the R2 Research Center, we have developed clear strategic plans based on the 2030 Saudi Ministry of Health's Vision. Given the increased understanding of aligning research with the Saudi healthcare system, we have a critical responsibility

aimed at expanding research capability across different divisions. The Research Center is dedicated not only to meeting its immediate needs but also to fostering research in all cluster II healthcare entities. Throughout this annual report, you will find the top-notch achievements of the Research Center highlighted by each administration. This report will also present Research Center staff and available services and resources. Finally, I am thankful Research Center staff for taking on these responsibilities and understanding the Research Center's vision. My sincere gratitude also goes to all of our researchers for their exceptional hard work, and I want to grab this opportunity to encourage them to keep their faith in research for a better future in health care.

Dr. Dania H. Al-Jaroudi

**Vice President, Riyadh Second Health Cluster, Research Center
Executive Director, King Fahad Medical City, Research Center**

Vision

To be a leading accountable care organization in specialized health services.

Mission

Dedicated to providing specialized value-based healthcare services empowered by innovation, training, and research.

Research Center

Five-Years Strategic Plan

1. Research capacity and productivity: Research excellence will be reached by increasing research productivity, strengthening research capacity, and ultimately increasing research output and publications.
2. Research education and training: Becomes the leading institution for research training and education nationwide.
3. Corporatization and self-sustainability: To support the corporate vision, increasing revenue from the delivery of training and education, industry-sponsored research, and lab services.

Research Center Strategy Map 2025-2020

Perspective		Strategic Objectives	
Customer Stakeholders	Enhance KFMC Research Brand	Improve Stakeholders Experience & Satisfaction	
Financial	Optimize Revenue Cycle Management	Maximize Utilization of Research Resources	
Internal Processes	Improve performance Management	Improve Quality of Research Services	
	Promote Good Governance & Regulation	Enhance Effective Communication & Knowledge Sharing	
Organization Capacity	Build Researchers Capacity	Promote Research Environment and	Maximize use of Technology & Digitalization
	Maximize KFMC Research Output	Optimize Research Education & training	Invest in leadership Development

The Research Center supports R2 staff by providing the following services:

I. Research Education and Awareness (Workshops and Courses):

- An annual educational and training calendar that includes lectures and workshops to reinforce research culture and enhance research skills.
- An outreach educational program that delivers onsite practical research lectures for residents, fellows, nurses, and other staff. Each program is tailored to meet the requisites of different hospitals, centers, and administrations.
- An Annual Research Symposium to share progress and successful stories of ongoing research projects and create a networking environment for researchers.
- Research Awareness campaigns among R2 staff to enhance their attitude, knowledge, and engagement in research

II. Research Conduct Support

- To fully support industry-sponsored clinical trials.
- To support investigator-initiated clinical trials.

III. Translational Research Support

- Provide environmental support and laboratory facilities to conduct translational research.
- Enhance research translational skills through training courses and workshops.
- Provide the necessary services to manage biological specimens, including collection and long-term storage via biobank

IV. Research Consultations

- Provide consultation services in formulating research ideas, writing proposals, study designs, statistical analyses, methodology, and manuscript preparation, to enable researchers to reach the publication stage.

V. Research Financial Support (Intramural Research Fund-IRF)

- Provide financial support to King Fahad Medical City researchers on a competitive basis, to facilitate the conduct of research.

VI. Researchers' Recognition

- Best research award
- Publications incentives
- Annual research symposium



18th Annual Research Conference

7-6th December 2023

The Annual Research Conference aimed to bring together a convergence of brilliant minds, innovative ideas, and groundbreaking advancements in the realm of clinical and translational research. This shared the latest findings and chart the course for the future of medical research from a multi-disciplinary group of physicians, scientists, and allied health professionals from KFMC, Riyadh's 2nd Health Cluster, and all over the Kingdom.

As part of KFMC's mission to provide value-based healthcare services empowered by innovation and research the conference featured various activities, including oral presentations and discussion platforms, research-focused workshops, and poster sessions. Our conference hosted scientifically rich sessions, workshops, and poster presentations. These avenues of exploration allowed participants to explore deep into the complexities of translating fundamental scientific knowledge into tangible clinical applications.

Keynote Speakers

The 18th Annual Research Conference featured distinguished keynote speakers who brought great expertise, insights, and inspiration to the diverse gathering of researchers, physicians, scientists, and professionals. The keynote presentations served as crucial points for the conference, setting the tone for engaging discussions and providing valuable perspectives on contemporary challenges and opportunities within various fields.





1- Prof. Selwa AlHazzaa

MD, FRCS, MMM, CEO and Founder at SDM

Ophthalmologist and distinguished professor at Alfaisal University.

Topic: " Saving Sight in Diabetic Retinopathy through Artificial Intelligence"

Prof. Selwa focused on the importance and clinical and financial sensitivity of implementing AI in automating retinal screening in diabetic population across Saudi Arabia.

2- Dr. Saleh AlRajhi

Consultant of Obesity Lifestyle and Family medicine, Population health management, healthcare executive management.

Topic: " Lifestyle Medicine research and practice"

Dr Saleh presented Lifestyle medicine as a holistic healthcare system that employs evidence-based health-delivery practices and therapeutic management of lifestyle-caused modifiable chronic diseases at individual and population levels. It utilizes preventive, proactive, and pre-emptive strategies supporting healthy, disease-free living, reversing chronic disease, improving quality of life, and employing the resources of public and private entities, communities, and individuals.

3- Dr. Sheraz Khan

PhD, M Eng. Harvard University Massachusetts General Hospital Massachusetts Institute of Technology (MIT). Topic: " Deciphering Brain Connectivity " Dr Khan presented development and using digital biomarkers for accurately & objectively in assessing neurodevelopmental and neurodegenerative disorders.

4- Dr. Ali AlHasan

Topic: " Deep Nanotech to Disrupt Conventional Medicine" A nonscientist with research interests in Nanomedicine. He is an Assistant Research Professor at King Abdulaziz City for Science and Technology. Dr. Ali presented nanotechnology as an application for different areas of medicine including biomaterial design, surface engineering, and even cell-based therapies, he showed an example of their achievements on a form of retinal dystrophy disease. He emphasized on the importance of such approach which have been approved for clinical use in many cases.

The main goal of this work is to harness the unique attributes of nanotechnology to advance next-generation tissue adhesives, drug delivery, and cell-based therapy.

5- Dr. Adnan AlWatban

Ph.D., FIPEM, Flnt. P, CLSO, Director at Central Second Health Cluster & Director at KFMC, University of Alabama, University of Nottingham Topic: " MRI a Great Tool for Clinical and Research Application". Dr. Watban presented the unique MRI unit which is only available at KFMC as state-of-the-art technology that is made to facilitate diagnosis and treatment plan for oncology patients in the Kingdom, eventually, this technology can serve many other patients with different neurological diseases.

Workshops

The conference had five workshops designed to provide attendees with hands-on experiences, practical skills, and in-depth knowledge of specific research methodologies, tools, and emerging trends in their respective fields.

These workshops were facilitated by recognized experts and covered various topics, such as,

- 1- Retain Research Integrity in the AI Era
- 2- Translational Research Workshop
- 3- Questionnaire design workshop
- 4- Key elements in clinical research, ethical issues, and more
- 5- A journey to successful grant application

Conference Important Numbers

Abstract submission:

Total of 180 abstracts were received.

The Research center serves all areas of interest at KFMC and R2, which results in a variety of specialties and projects presented which covered over 150 scientific and healthcare topics. This diversity of topics attracted over 760 attendees with different professional expertise.

Oral Presentations:

A total of 22 oral presentations (see program below)

The heart of the conference lay in the oral presentations, where researchers could showcase their studies, methodologies, and results to a broad audience. Presenters demonstrated a high level of expertise, and lively discussions followed each session, encouraging knowledge exchange and the exploration of potential collaborations. Topics varied from pure clinical research and scientific materials into more specialized areas in physics and artificial intelligence, but all shared the same focus on clinical and healthcare research.

Day 1		Wednesday, 6 December, 2023	
From	To	Topic	Speaker
8:15	8:40	Registration	Front Desk
8:40	8:50	Overview of Research Center Services	Dr. Dania Aljaroudi
9:00	9:20	Opening Ceremony & Welcome Remarks	Dr. Leen Abu Safieh
Session 1 Theme: Clinical Research (Moderator: Dr. Husam M. Sakkijha)			
9:20	10:00	Saving Sight in Diabetic Retinopathy through Artificial Intelligence	Prof. Selwa AlHazzaa (Keynote Speaker)
10:00	10:40	Lifestyle Medicine research and practice	Dr. Saleh AlRajhi (Keynote Speaker)
10:40	10:55	Biophysical characterization of Cav3.1 channel mutation in trigeminal neuralgia	Dr. Abdulaziz Mohammed
10:55	11:10	Association between peak oxygen uptake and left ventricular systolic function in individuals with cervical and upper-thoracic spinal cord injury	Dr. Abdullah A. Alrashidi
11:10	11:20	Coffee Break	
11:20	11:35	Predicting 90-Day Prognosis in Ischemic Stroke Patients Post-Thrombolysis Using Machine Learning	Dr. Baraa Helal bahelal
11:35	11:50	Efficacy of switching controlled and uncontrolled asthma patients on Mepolizumab to Benralizumab	Dr. Riyadh AlLehebi
11:50	12:05	Association between magnetoencephalography-localized epileptogenic zone, surgical resection volume and postsurgical seizure outcome	Dr. Vahe Poghosyan
12:05	12:20	Social Determinants of Health and Quality of Life of Children and Families with Chronic Kidney Disease: Insights from Saudi Arabia	Dr. Hamad Almusa
12:20	12:30	Posters viewing and Networking	Dr. Tarfa Alsharidi
12:30	13:30	Prayer and Lunch Break	
Session 2, Theme: Clinical Research (Moderator: Dr. Ali Alfaiz)			
13:30	14:10	Deciphering Brain Connectivity (Virtual)	Dr. Sheraz Khan (Keynote Speaker)
14:10	14:25	Multicentre Validation of CT criteria for thoracolumbar posterior ligamentous complex injury	Dr. Mohammed Ali
14:25	14:40	The lived experience of return to work in individuals with spinal cord injury in Saudi Arabia: an interpretative	Ms. Walaa A. AlAmmar
14:40	14:55	Changes in Imaging of Musculoskeletal Conditions Following Extracorporeal Shockwave Therapy	Dr. Hani AlAbbad
14:55	15:10	Factor associated with snoring and sleep disturbance among students	Dr. Waleed Khalid
15:10	15:25	Establishing the initial cut-off values of free carnitine level by tandem mass spectrometry for newborn screening	Mrs. Abeer Alqadi
15:25	15:40	Posters Viewing and Networking	
15:45	15:50	1st Day Closing Remarks	Dr. Leen Abu Safieh

Day 2		Thursday, 7 December, 2023	
From	To	Topic	Speaker
8:30	9:00	Registration	Front Desk
Session 1, Theme: Translational Research (Moderator: Dr. Mohammed Jazzar)			
9:00	9:40	Liquid biopsies in colorectal cancer-are we a step closer to personalized medicine?	Dr. Khurum Khan (<i>Keynote Speaker</i>)
9:40	10:20	Deep Nanotech to Disrupt Conventional Medicine	Dr. Ali AlHasan (<i>Keynote Speaker</i>)
10:20	10:35	Safe Birth™ Model of Care at Primary Health Care Centers of Riyadh Second Health Cluster	Dr. Alaa Mansoor
10:35	10:50	The impact of Model of Care of urgent care centers on non-urgent emergency department visits at Riyadh Second Health Cluster hospitals	Mr. Bader AlOtaibi
10:50	11:00	Coffee Break	
11:00	11:15	Genetic Mutations of $K_{Ca}2.3$ Channels Affect Calcium Sensitivity	Dr. Razan Orfali
11:15	11:30	Mitochondrial Fragmentation and Associated Cell Signaling Pathways in Ventral Horn at 6-m vs 24-m Rats	Dr. Maryam Alamodi
11:30	11:45	The In-Vitro Effect of Selenium Supplementation on A549 Non-Small Cell Lung Cancer Cell Line Treated with RSL-3 & Cisplatin	Dr. Sarah Alsaleh
11:45	12:00	High grade av block and torsades-des-pointes: a rare complication of immune check point inhibitor myocarditis	Dr. Eman Javed Baqal
12:00	13:00	Prayer, and Lunch Break	
Session 2, Theme: Clinical Research (Moderator: Dr. Muawiyah Ahmad Hamza)			
13:00	13:40	MRI a Great Tool for Clinical and Research Application	Dr. Adnan Al Watban (<i>Keynote Speaker</i>)
13:40	13:55	Complete Heart Block is a Significant Predictor of Mortality in Immune Checkpoint Inhibitor Myocarditis	Dr. Eman Javed Baqal
13:55	14:10	Role of Glucagon-Like Peptide-1 Receptor agonists as an adjunctive treatment in Adults with Type-1 Diabetes Mellitus, A retrospective Cohort, Saudi Arabia	Dr. Kholoud A Habib
14:10	14:25	Reduce patient risk by evaluating lactate dehydrogenase (LDH) measurements	Dr. Shadi Alhusaini
14:25	15:00	Posters Viewing, praying and Networking	
Session 3 : Awarding Ceremony			
15:00	15:30	Awarding Ceremony	Dr. Dania Aljaroudi
15:30	15:40	Symposium Closing Remarks	Dr. Leen Abu Safieh

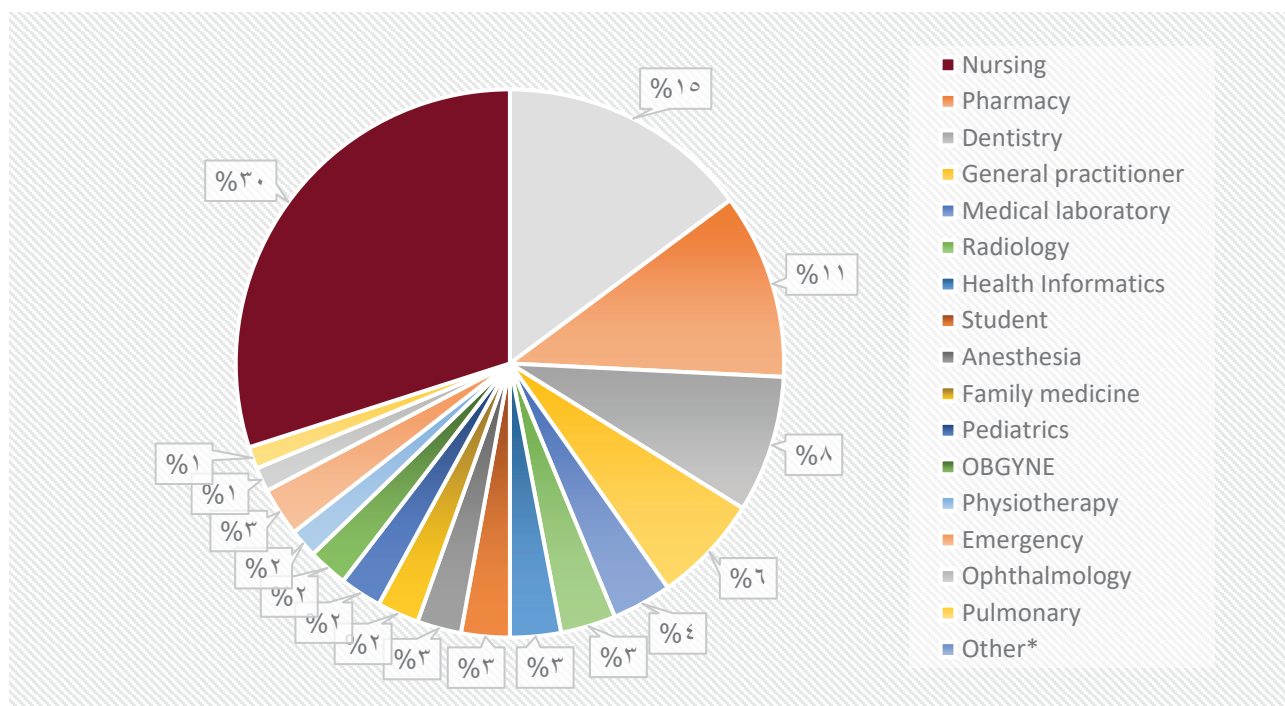
Poster Presentations:

A total of 118 posters were accepted

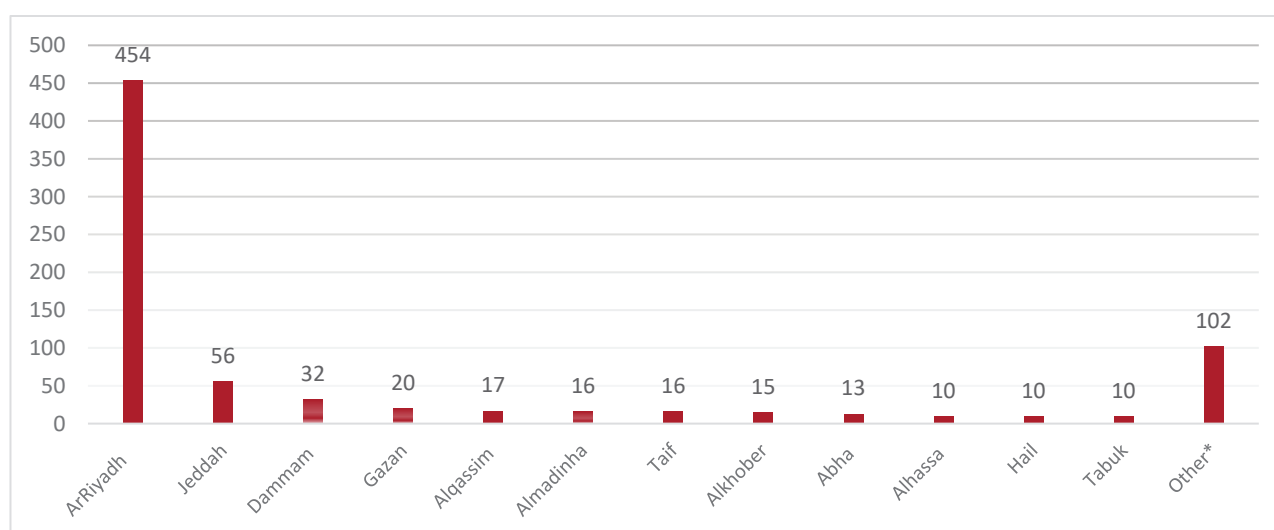
The poster sessions provided a platform for researchers to visually communicate their work and engage in one-on-one discussions with conference attendees. The poster presentations covered various research topics, allowing participants to gain insights into emerging trends and novel approaches within various disciplines. Attendees appreciated the interactive nature of the poster sessions, as they facilitated in-depth conversations and networking opportunities.

Registration information

Non-physicians	341
Physicians	359
Students	68
Total number of registered participants	768



(*Representing 230 participants from 112 scientific and clinical specialties, less than 10)
Percentage of participant according to their professional specialty



(*Representing 230 participants from 112 scientific and clinical specialties, less than 10)
Percentage of participant according to their professional specialty

Annual Research Symposium Awards

The 18th Annual Research Conference was a resounding success, bringing together a diverse community of researchers and professionals to share knowledge, engage in discussions, and establish connections. The workshops, oral presentations, and poster sessions collectively contributed to the conference's vibrant atmosphere and provided valuable insights into the latest developments in various fields. As the research community evolves, conferences like these are crucial in advancing knowledge and fostering collaborative efforts.

The conference recognized excellence in research and announced the winners in various categories.

The following researchers were honored for their outstanding contributions during the conference:

Poster winners

Award Category	Researcher Name	Title
1st Rank	Dalal Alageel	In the lungs and beyond exploring igg4-related disease with pleural manifestation
2st Rank	Abdullah Bagazi	Nursing driven a safe early mobility for post-cardiac surgery patients with vasopressor medication: a quality study
2st Rank	Alla Salem Almoulad	Risk-based quality control plan incorporating patient-based real-time quality control using moving average and internal quality control
3st Rank	Wassima Kaidali	Autoantibody profile in monogenic lupus
4st Rank	Roaa Alsharif	Assessment of nurses' knowledge of the Glasgow Coma Scale

Oral presentation winners

Award Category	Researcher Name	Title
1st Rank	Dr. Razan Orfali	Genetic mutations of KCa2.3 channels affect calcium sensitivity
2st Rank	Dr. Maryam Alamodi	Mitochondrial fragmentation and associated cell signaling pathways in Ventral Horn at 6-m vs 24-m rats
3st Rank	Dr. Riyadh Allehebi	Efficacy of switching controlled and uncontrolled asthma patients from Mepolizumab to Benralizumab

18th Annual Research Conference Summary

Successful Highlights

- For the first time, the conference was held under the patronage of H.E. Dr. Mansour AlHawasi, Chairman of the Founding Board of the Central Health Sector and full support from Dr Fahad Al Ghofaili, CEO of Riyadh Second Health Cluster.
- We received over 180 abstracts from more than 20 major scientific and clinical specialties.
- The conference attracted over 760 attendees from over 120 subspecialties in the clinical and scientific field.
- Four local keynote and two international speakers presenting the latest trendy discoveries in Artificial Intelligence and Nano-medicine in Healthcare.
- Five research-focused workshops were held parallel to the conference sessions

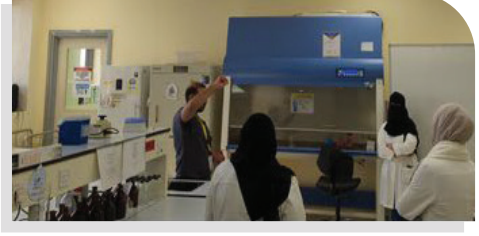
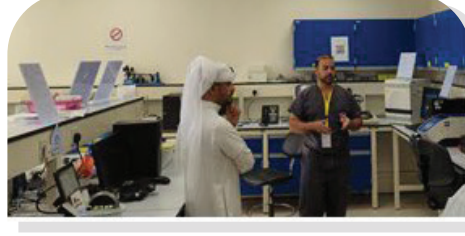
Photo Gallery

Top researchers recognition certification

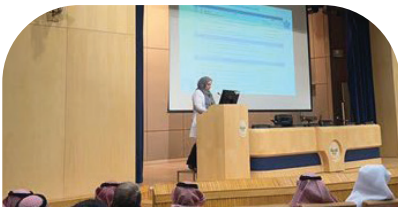


Images from the
oral presentations
sessions

Images from the workshops



Images from the conference activities



Social responsibility

Part of the social responsibility at the Research Center is recruiting fresh graduates as trainees and volunteers.

- Trainees were recruited in conjunction with academic and training affairs from different institutions.
- Volunteers were recruited in conjunction with public relations via the Health volunteering platform.

Quality and KAIZEN Projects

- Virtual Research Consultation Clinic to the Second Health Cluster in Central Region.
- Research Awareness to the Second Health Cluster in Central Region.
- Journal Credibility and selection-A process of efficiency quality improvement project.
- Standardization and development of a dashboard for R2 publications from 2004 to 2022.
- Digital Transformation of Research Labs Materials into One Integrated Database.
- Hybrid Research Consultation Clinic to the Riyadh Second Health Cluster.

Awards

- Best Published Paper Award. Council of Health Insurance, Riyadh, Saudi Arabia. 2023.
- Top Ten Researchers Award, 18th Annual Research Conference, Riyadh Second Health Cluster, Riyadh, Saudi Arabia. 2023.
- Best quality improvement project. Quality Day at King Fahad Medical City 2023
- Best and 3rd place oral presentation Award: Research Center 18th Annual Research Symposium, R2.
- Building Saudi human genomic Database.
- GPM lab operation to be a CAP Accredited Lab (Commercialization project)

Committees, Memberships, and Team Formation Orders (TFO)

- Drug Discovery and Targeted Therapy
- Research Center Quality Improvement committee
- EPIC- Research Center Team
- Virology Research Group
- Annual Research Symposium Organizing Committee
- Research Integrity Management TFO
- Training and Volunteering Management TFO
- Biomedical Research Administration and Pathology and Clinical Laboratory Medicine Administration TFO
- Targeted Therapy TFO
- Research Center Volunteers TFO
- Research Center Recruitment Team TFO
- Biobank TFO
- Research Awards opportunities for Research Center and Researchers TFO
- Member of the American society of human genetics
- Member of the Association for Research in Vision and Ophthalmology
- Biophysical Society
- American Heart Association
- Anatomy Research Group
- Oncology Research Group
- Biomedical Research Group
- Medical and Human Ethics Committee

Committees, Memberships, and Team Formation Orders (TFO)

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- Biophysical Society
- American Heart Association
- Anatomy Research Group
- Oncology Research Group
- Biomedical Research Group
- Medical and Human Ethics Committee



Main Facility KFMC Research Committees

- Biomedical Engineering Research Committee
- Children Specialized Hospital
- Comprehensive Cancer Center
- Faculty of Medicine
- Family Medicine & Employee Health Department Sub-Committee
- Infection Control Administration
- Main Hospital Research Committee
- Medical Ancillary Services / Respiratory Care Research Committee
- Medical Imaging Administration, Interventional Radiology Department
- National Neuroscience Institute
- OEMC Research Committee
- Pathology and Clinical Laboratory Medicine
- Pharmacy Research Committee
- King Salman Heart Center
- Rehabilitation Hospital
- Women Specialized Hospital
- Emergency Medicine Administration
- Anesthesiology Department
- Critical Care Unit
- Dentistry Department of Research Committee
- Dentistry Administration
- Executive Administration of Clinical Care Excellence
- physical therapy department
- Nursing Affairs
- Laboratories

R2 Research Committees:

- Prince Mohammed Bin Abdulaziz Hospital
- Al Yamamah Hospital
- Dental Center C2
- Primary Health care centers
- Al Zulfi general hospital
- King Khaled Hospital in Al Majma'ah
- Al Artawiyah General Hospital
- Rumah General Hospital
- Tamir General Hospital
- Al Ghaat General Hospital
- Hawtat Sudair Hospital
- King Salman Center for Kidney Diseases



1. Research education and training program

Description

The research center has developed the research education and training program for health care providers (HCPs) in research to build essential skills and knowledge required in conducting scientific research. Improving HCPs knowledge, attitudes, and experience will increase ultimately the

Strategic Objectives

- Optimize research and education training.
- Enhance effective communication and knowledge sharing.
- Build research capacity.
- Promote research environment and culture.

Highlights

- 984 Attendees of the research courses and workshops.
- 35 Research education activities.
- 6 Training courses for residents.
- 5 Good clinical practice guidelines workshops.
- Educational Outreach Activities:
 - _ 20 Biomedical research.
 - _ 23 Genomic research.
 - _ 26 Scientific writing.

2. Automation of Research Services and IRB Submission

Description

- The automation of Research Services and IRB Submission employs the application of technology for effectively leveraging the utilization of the existing research center services and IRB submission services and reduce turnaround times.

Objectives

- Maximize utilization of research resources.
- Provide the best customers satisfaction results.
- Streamline processes.
- Improve stakeholders' experience.
- Increase research support services.

Highlights

- In-house development of Research Submission gate software is in-progress.



3. Establishment of Medical and Scientific Journal

Description

Establish a non-profit, open access, and international journal that follows a double-blind peer-review process to advancing the current understanding of diseases and therapy from both medical and public health perspectives. The journal publishes research in all areas of medicine, medical law,

Objectives

To foster the advancement of medical and public health practices, with a particular focus on practice-changing information, the development of health law, and the impact of health policies on public health. Promote research environment and culture.

Highlights

Lunching the Journal of Medicine, Law & Public Health (ISSN Print 9815-2788, ISSN Online 791-2788X). The journal can be accessed through: <https://www.jmlph.net/index.php/jmlph/about>

The screenshot shows the homepage of the Journal of Medicine, Law & Public Health (JM L&P HEALTH). The header features the journal's logo on the left, the title "The Journal of Medicine, Law & Public Health" in the center, and a navigation bar on the right with "Register" and "Login" buttons. Below the header is a dark navigation bar with links: ABOUT, SUBMISSIONS, POLICIES, ISSUES, INDEXATIONS, and ANNOUNCEMENTS, along with a search icon. The main content area has a large banner with the journal's logo and the text "تجمع الرياض الصحي الثاني Riyadh Second Health Cluster". Below the banner, it says "Open Access, No Processing Fees" and "Knowledge for All - Freely Accessible". To the right of the banner, there is a "MAKE A SUBMISSION" button and a list of journal details: PUBLICATION FREQUENCY: Quarterly; ISSN (P): 2788-9815; ISSN (E): 2788-791X; REVIEW TYPE: Double-blind Peer-review; JOURNAL TYPE: Open Access; AREA OF PUBLICATION: Medicine, Public health and Medical law/ethics; ACCEPTANCE RATE: 55%. At the bottom right, there is a "Need Assistance? Click below" link and a "Contact us" button.

To effectively disseminate the research regulations among KFMC staff and adopt a unified approach to the roles and responsibilities of the Research Center.

- **Coverage of Publication and Editing Charges (CPP No. 174-1432)**

This policy supports article processing and editing fees for publications in journals indexed in the following databases: JCR, Medline, PubMed, EMBASE, SCOPUS, and open-access journals.

- **Sponsor-Initiated Research (CPP No. 31-1432)**

This policy outlines the requirements for industry-sponsored research, including laboratory studies, clinical trials, device evaluation, and observational studies. This policy applies to both investigator-initiated and sponsor-initiated research.

- **Intramural Research Fund (CPP No. 07-1433)**

This policy describes the R2 Intramural Research Fund (IRF), which was created to provide financial research support to R2 staff, according to their merit, to enhance R2's research productivity.

- **Authorship (CPP No. 160-1432)**

This policy defines the mechanism of publication authorship that is followed by R2 as per international regulations.

- **Outsourcing Research Services (CPP No. 25-1435)**

This policy streamlines the process of outsourcing biostatistics, and scientific writing and editing services, to cover shortages of skills or expertise in these fields.

- **Plagiarism in Clinical Research (CPP No. 09-1433)**

This policy ensures compliance with national and international regulations concerning plagiarism and research intellectual property.

- **IRB Protected Health Information for Research Subjects (CPP No. 08-1433)**

This policy establishes a standard rule to protect the privacy of health information that might lead to the identification of subjects involved in clinical research.

- **Research-Protected Time (CPP No. 30-1436)**

This policy streamlines the process of protected time for eligible R2 staff to conduct research.

- **IBN SINA research mentorship program incentives (CPP No. 16-1438)**

This policy describes the different stages of the mentorship program that aims to increase research capacity among R2 junior staff.

- **Research Monitoring of Funded Projects (CPP No. 26-1439)**

This policy ensures the validity and reliability of data upon verification with source documents, in addition to PI compliance with the guidelines set by the International Council for Harmonization and Good Clinical Practice (ICH-GCP).



- **Archiving Research Records for Intramural and Extramural Studies (CPP No. 27-1439)**

This policy describes the process and procedures for archiving all research documents related to clinical research conducted at R2.

- **Biostatistics Services and Consultations (CPP No. 23-1439)**

This policy aims to provide regulations and procedures for the biostatistics services available to R2 researchers.

- **Knowledge management within KFMC (CPP No. 010–1444)**

This policy aims to develop an efficient health knowledge management, system for collection, dissemination, and utilization of knowledge for improving the quality of health service, information technology, training and research.

- **Monitoring of ongoing intramural research projects (CPP No. 26-1439)**

This policy ensures that the rights, safety, and well-being of human subjects enrolled in clinical research are protected, ensures the credibility and accuracy of research data, and ensures study investigator's adherence with the research project work plan and timetable.

- **Use of Facilities of the Research Laboratories Department (CPP No. 20-1439)**

This policy defines the regulatory approval process of performing clinical research in the research laboratories under Biomedical Research Administration.

- **Research Clinic (CPP No. 116-1441)**

This policy regulates, provides, and maintain high quality of research for investigators through utilization of outpatient research clinic by eligible and qualified staff.

- **Biobanking biological samples- biorepository Department (CPP No. 175-1441)**

This policy describes the procedures for the efficient and effective management of the lab team of the biobank department for specimens.

R2 System-Wide Policies and Procedures

To effectively disseminate the research regulations among R2 staff and adopt a unified approach to the roles and responsibilities of the Research Center.

- Biobanking Biological Samples
- Authorship
- Intramural Research Fund
- Research Protected Time
- Biostatistics Services and Consultations
- Use of Facilities of the Research Laboratories

Research Priorities

- Mental Health
- Cardiovascular Disease
- Musculoskeletal Disorders
- Diabetes mellitus
- Cancer
- Wellbeing and management of cancer patients
- Population priority: the elderly
- Vaccines
- Antimicrobial resistance
- Healthcare-associated infections
- Endemic diseases
- Emerging-remerging diseases
- Mass gathering diseases
- Microbial genetics
- Healthcare policies impact
- Healthcare system integration
- Access to healthcare services
- Healthcare financing



Research Center Organizational Chart



The Research Center provides the necessary research support for investigators throughout the entire research pathway from research question generation to publication. The organizational charts for the Research Center help to streamline its functions and responsibilities.

The following office and departments have to report to the Executive Director of the Research Center:

- Research Grant Management Department
- Human Research Protection Administration
- Research services and applied Administration
- Satellite Research Administration
- Biomedical Research Administration
- Research Operational Department
- Administrative Support

Administrative support

Core Services

The main responsibility of the chairperson, the office of the vice president of the Research Center is to look after administrative and managerial issues for the executive director and the entire Research Center. These include liaising between the Research Center and Human capital administration and other administrations. Also, supervising sectorial tasks and looking after Tamheer trainees.

Vice President and Executive Director of Research Center Highlighted Publications

Alkhalaf S, Alqahtani N, AbuAlnaja A, Alhassoun S, Alkhatir A, Al-Jaroudi D. Prevalence of congenital malformation among neonates born after the use of progesterone for luteal support during IVF and ICSI cycles. *The Journal of Medicine, Law & Public Health*. 2023 Nov 6-280:(3)3;12.

Abstract

Objective: The purpose of this study is to assess the safety of progestin-primed ovarian stimulation (PPOS) protocol regarding the neonatal outcomes and congenital malformations in babies born after in vitro fertilization (IVF) and frozen embryo transfer (FET). **Methods:** In this large retrospective cohort study, a total of 16,493 infants born between 1 September 2013 and 31 July 2021 from IVF and FET cycles after treatment with either PPOS (n = 15,245) or gonadotropin-releasing hormone antagonist (GnRH-ant) (n = 1,248) were finally enrolled. The primary outcome measure was the incidence of congenital malformations. The secondary outcome measures were rates of low birth weight (LBW), very low birth weight (VLBW), preterm birth (PTB), very preterm birth (VPTB), and early neonatal death. **Results:** Birth characteristics for both singletons and twins regarding the sex of infants, gestational age, birth weight, and birth length were comparable between the PPOS group and the GnRH-ant group. Rates of LBW, VLBW, PTB, VPTB, and early neonatal death were also similar. The reanalysis using propensity score matching (PSM) and multivariable logistic regression indicated that the PPOS protocol could not increase the risk of adverse neonatal outcomes compared with the GnRH-ant protocol. Furthermore, no significant difference was observed in the overall incidence of congenital malformations in live-born babies. After PSM and controlling for all confounders, the results remained insignificant with an adjusted odds ratio of 0,66 [%95 confidence interval (CI) 1,34–0,32] and 2,43 [%95 CI 6,06–0,97], respectively, for singletons and twins. **Conclusions:** Our study suggests that compared with GnRH-ant treatment for IVF, the PPOS protocol could not produce a negative effect on the newborn population in terms of neonatal outcomes and congenital malformations.

- Fadailu ME, Al Obaid S, Kaddour O, AlQahtani F, Al-Jaroudi D. Experiences of patients undergoing IVF treatment during the COVID-19 pandemic. JBRA Assisted Reproduction. 2023 Jul;463:(3)27.

Abstract

Objective: To assess the willingness of patients with infertility to continue with them in vitro fertilization (IVF) treatment during the COVID-19 pandemic. **Methods:** This cross-sectional survey was conducted in the reproductive, endocrine, and infertility medicine department (REIMD) at King Fahad Medical City (KFMC), Riyadh, Saudi Arabia. Patients that were planned to undergo IVF treatment at REIMD were contacted and asked about whether they would like to start IVF treatment during the COVID-19 pandemic from August 2020 to August 2021. Data was analyzed using the SPSS version 24. Statistics obtained as means and standard deviations from continuous variables correlated with the Chi-square test and results were considered significant at $p \leq 0,05$. **Results:** Of the 400 participants, (%61,25) 245 were between the ages of 39-30 years. About %42,75(n= 171) of the patients had 10-6 years of infertility, and %18(n= 72) had at least one pregnancy but no living children. While %64,7(n= 259) of the participants responded on the first call, %83(n= 332) agreed to continue their treatment. Of those, %13(n= 43) preferred to book appointments as soon as possible; %29,8(n= 99) preferred booking within three months; while %57,2(n= 190) chose to book after three months. From our sample, %86,8(n= 59) were afraid to contract the virus and the choice to delay the IVF treatment correlated with the patient's age ($p < 0,001$) and duration of infertility ($p = 0,007$). **Conclusions:** The COVID-19 pandemic affected IVF treatment courses, and many patients were afraid to be infected during this pandemic.

- Baradwan S, Alharbi D, Bashir MS, Saleh A, Al-Jaroudi D. Short and long-term reproductive outcomes after hysteroscopic adhesiolysis for infertile women. JBRA Assisted Reproduction. 2023 Apr;191:(2)27.

Abstract

Objective: To evaluate reproductive outcomes after hysteroscopic adhesiolysis for patients with Asherman syndrome (AS) who presented with infertility and/or subfertility.

Methods:

A retrospective study was conducted in the Women's Specialized Hospital, King Fahad Medical City, from December 2010 to December 2018. The medical records were reviewed for all infertile women who had hysteroscopic adhesiolysis. The specific study's main reproductive outcomes included: [1] the overall rate of conception, [2] the overall rate of conception according to the severity degree of intrauterine adhesions (IUA), [3] the reproductive methods for achieving conception, and [4] pregnancy outcomes. Reproductive methods for conception included spontaneous conception, ovulation induction (OI), intrauterine insemination (IUI), and in-vitro fertilization (IVF) with/without intracytoplasmic sperm injection (ICSI). Outcomes of pregnancy included ectopic pregnancy, miscarriage, and live birth events. **Results:** Forty-one patients (n= 41) were analyzed. Their mean age was $4,6 \pm 32,2$ years. The most common menstrual pattern amongst these patients was hypomenorrhea %46,4. All patients resumed regular menstrual cycles after the adhesiolysis procedure. The overall conception rate during the 24-month follow-up was %53,6, and the overall live birth rate was %34,2. Of the 22 patients who conceived, 12 patients (%29,2) conceived spontaneously, (%4,9) 2 with IUI, and (%19,5) 8 with IVF-ICSI. The patients with minimal IUAs had a significantly higher pregnancy rate (%71,4) when compared to those with moderate (%47) and severe (%40) IUA (two-tailed log-rank test, $p = 0,041$). **Conclusions:** The spontaneous cumulative conception rate following hysteroscopic adhesiolysis was higher in patients with minimal IUAs than those with moderate and severe IUAs.

- Rafique M, Al-Jaroudi D, Al-Badr A, Thompson JY. Effectiveness of Bupivacaine as Pre-emptive Pudendal Block among Patients Undergoing Vaginal Surgeries: A Systematic Review. International Journal of Medical Reviews. 2023 Mar 39-419:(1)10;1.

Abstract

Background: Pre-emptive analgesia using pudendal nerve block (PNB) with bupivacaine is commonly used in clinical practice during perineal, pelvic floor, or vaginal surgeries. However, its effectiveness is unclear. We conducted this review to synthesize short- and intermediate-term outcomes of pre-emptive analgesia using pudendal nerve block with bupivacaine. **Methods:** We searched the CENTRAL, PubMed, ClinicalTrials.gov, Google Scholar, and Open Grey from inception until April 2020. Randomized controlled trials (RCTs) of women who underwent perineal, pelvic floor or vaginal surgeries and received pre-emptive analgesia using a pudendal nerve block were included. Two authors independently screened, selected and performed data extraction as well as quality assessment on eligible trials. Disagreements were resolved via consensus. Data were narratively synthesized; when possible, data were pooled in Rev Man 5 using the random-effects model. **Results:** Four RCTs with a total of 349 participants were eligible for inclusion. We found evidence of improvement in postoperative pain scores; requirements for opioids, standardized mean difference (SMD): -0,89 (%95 CI: -0,59- ,1,19) and nonsteroidal anti-inflammatories SMD -1,04 (%95 CI: -0,43- ,1,64) in favor of the PNB versus control group. The risk ratio for adverse effects of postoperative nausea and vomiting, 0,42 (%95 CI: 0,99 ,0,18) favored PNB. There was no significant difference between groups for the length of hospital stay, mean difference -0,82 (%95 CI: -3,69 ,5,34) and return to regular activity. **Conclusion:** We found limited evidence that pre-emptive pudendal block using bupivacaine improves postoperative pain and recovery in perineal, pelvic floor or vaginal surgeries. However, due to the heterogeneous nature of evidence, well-designed RCTs are required.

Office of the Vice President and Executive Director of Research Center Expertise

Name	Position	Specialization Area Keywords			
Dr. Dania AlJaroudi (daljaroudi@kfmc.med.sa) (dania@dohaim.com)	Vice President, Research Center/Executive Director, Research Center	Research	Infertility	Women's Health	Lifestyle medicine
Ms. Reem AlHakim (ralhakim@kfmc.med.sa)	Chairperson, Office of the Vice President/ Chairperson, Office of the Executive Director	Management	Key performance indicators	Human resources	
Alhanouf A. Alift (aalift@kfmc.med.sa)	Executive Secretary	Administrative support	Management		

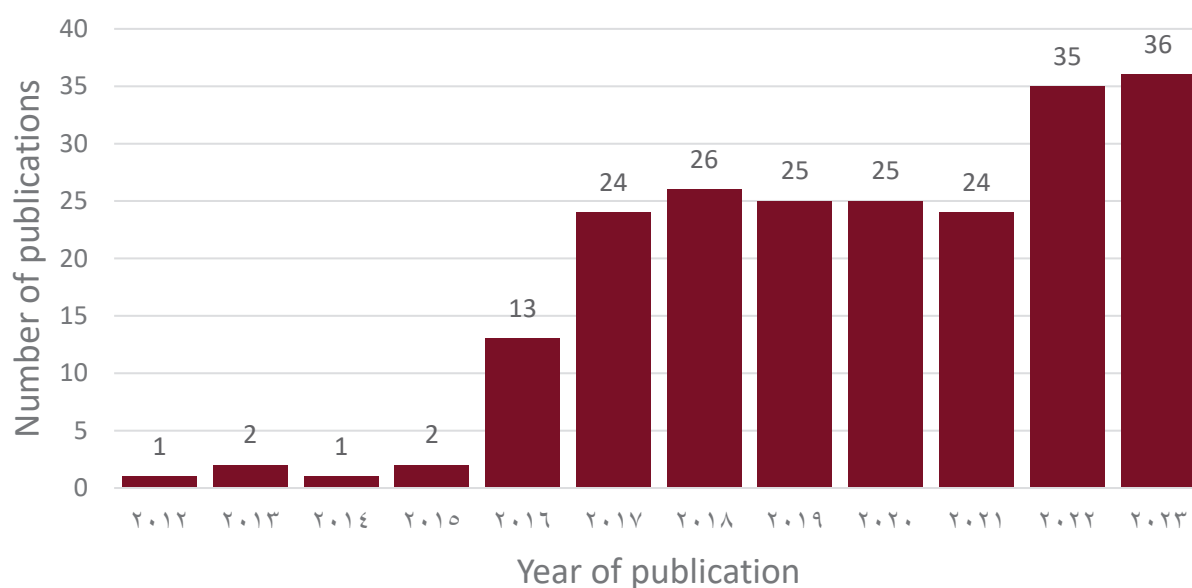
The Grant Management Department (GMD) is responsible for providing financial support to R2 researchers to enhance research productivity.

Core Services

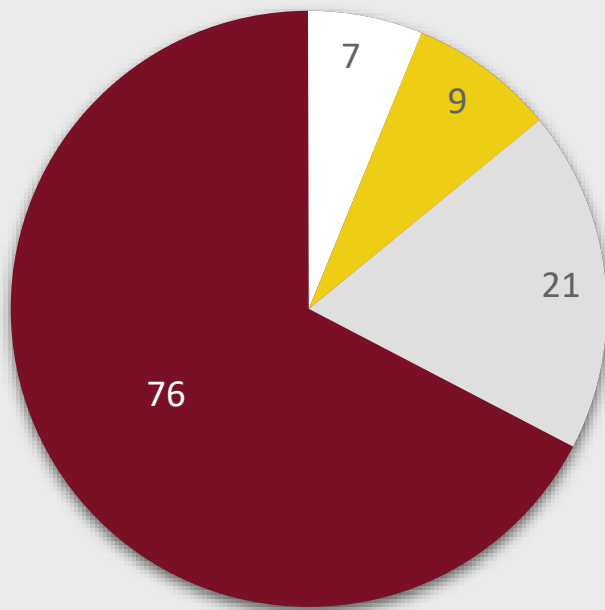
- Providing financial support to R2 researchers on a competitive basis, to facilitate the conduct of research and to enhance research productivity.
- Review all intramural funding applications through a standardized and efficient process of peer review.
- Broadcasting all upcoming internal and external grant opportunities within R2.
- Oversee the efficient and appropriate use of grant funds.
- Assist R2 researchers with extramural fund submission.
- Provide training workshops, one-to-one consultation on all aspects of the submission process, grant writing proposals, budgeting criteria, and updated policies.

Achieved Performance Indicators

- 36 Publications from the IRF projects.
- 35 Projects were funded by GMD.
- 3,836,778 SAR Is the total amount of allocated funds for research proposals.
- 3,434,000,29 SAR Released for IRF-approved proposals.
- 5 Projects funded by international external funding agencies.
- 879,724,68 SAR Is the total amount of funds from external research agencies.
- 37 Research educational, awareness, outreach, and consultation activities were given.
- 76 Consultation sessions were provided.



Number of published IRF studies per year



- ☐ Outreach
- ☐ Educational
- ☐ Awareness
- ☒ Consultation

Consultation and educational activities

Agreement and Collaborations

- GMD keeps updating the external review panel regularly.
 - GMD contacted 85 external reviewers' experts and highly competent in their respective fields.
- GMD collaborates with 14 institutions nationally and internationally for the peer-review process:

- _ Cleveland University
- _ King Abdullah International Medical Research Centre
- _ King Saud Bin Abdul-Aziz University
- _ Taif University
- _ King Khalid University
- _ King Abdul-Aziz University
- _ Jazan University
- _ Prince Sultan Military Medical City
- _ Al-Faisal University
- _ King Abdullah University of Science and Technology
- _ King Faisal Specialist Hospital and Research Centre
- _ Ministry of the National Guard
- _ Al-Baha University
- _ Imam Abdulrahman Bin Faisal University



Highlighted Publications

- AlQahtani A, Kazi M., Alharbi M, Ahmad A, Hussain MD, Alotheid H, Aldughaim MS. (2023) The Development and Optimization of Lipid-Based Self-Nanoemulsifying Drug Delivery Systems for the Intravenous Delivery of Propofol. *Molecules*. 1492:(3)28;3.

Abstract

Objective: Propofol is a relatively short-acting potent anesthetic lipophilic drug used during short surgical procedures. Despite the success of propofol intravenous emulsions, drawbacks to such formulations include inherent emulsion instability, the lack of a safe vehicle to prevent sepsis, and concern regarding hyperlipidemia-related side effects. The aim of the current investigation was to develop a novel, lipid-based self-nanoemulsifying drug delivery system (SNEDDS) for propofol with improved stability and anesthetic activity for human use. **Methods:** A series of SNEDDS formulations were developed using naturally obtained medium-chain/long-chain mono-, di-, and triglycerides, glyceryl monocaprylate, and water-soluble cosolvents with hydrogenated castor oil constructing ternary phase diagrams for propofol. The developed SNEDDS formulations were characterized using visual observation, particle size analysis, zeta potential, transmission electron microscopy, equilibrium solubility, in vitro dynamic dispersion and stability, and in vivo sleeping disorder studies in rats. The in vivo bioavailability of the SNEDDSs in rats was also studied to compare the representative formulations with the marketed product Diprivan®. **Results:** Medium-chain triglycerides (M810) with mono-diglycerides (CMCM) as an oil blend and hydrogenated castor oil (KHS15) as a surfactant were selected as key ingredients in ternary phase diagram studies. The nanoemulsifying regions were identified from the studies and a number of SNEDDSs were formulated. Results from the characterization studies demonstrated the formation of efficient nanosized particles (45-28 nm globule size, 0,20-0,10 PDI) in the optimized SNEDDS with a drug loading of 50 mg/g, which is almost 500-fold higher than free propofol. TEM analysis showed the formation of spherical and homogeneous nanoparticles of less than 50 nm. The dissolution rate of the representative SNEDDS was faster than raw propofol and able to maintain %99 propofol in aqueous solution for around 24 h. The optimized liquid SNEDDS formulation was found to be thermodynamically stable. The intravenous administration of the SNEDDS in male Wistar rats induced a sleeping time of 88-73 min. The mean plasma concentrations after the IV administration of propofol nano-formulations PF2-SNEDDS and PF8-SNEDDS were $27,31 \pm 1348,07$ and $44,97 \pm 1138,66$ µg/mL, as compared to $26,05 \pm 891,44$ µg/mL ($p = 0,05$) observed after the IV administration of raw propofol. **Conclusion:** Propofol-loaded SNEDDS formulations could be a potential pharmaceutical product with improved stability, bioavailability, and anesthetic activity.



- Sajid Durrani, Athba AlQahtani, Faris hamadi, Anas alghamdi, Khalid al Wadi, Saad al Rashidi, Shomaila Akbar, Alaa Aldhaefi (2023) Determination of management and outcome of locally advanced endometrial cancer and its impact on progression free survival in Saudi population.

Abstract

Endometrial cancer presents a significant health burden, particularly affecting postmenopausal women, with the majority of cases occurring in those over fifty. Recent data from the Saudi Cancer Registry underscores a distinctive demographic distribution, positioning endometrial cancer as the second most common gynecological malignancy and the fourth most frequent female malignancy among Saudi women. Early diagnosis contributes to a favorable prognosis, with %80 of cases detected at the initial stage boasting a 5-year survival rate exceeding %95. However, the discrepancy in survival rates between localized and advanced cases highlights the critical importance of early detection and the challenges posed by regional or distant spread. Risk stratification factors, including lymphovascular invasion, patient age, and histopathological grade, are essential for predicting local and systemic recurrence in this heterogeneous disease. Despite advancements, the global incidence of endometrial cancer is on the rise, necessitating effective risk assessment, early detection, and optimized treatment modalities. The management landscape involves a multifaceted approach integrating traditional histopathological features with molecular insights, as recommended by leading oncology societies. Ongoing debates persist regarding the optimal treatment strategies, especially in the high-intermediate stage, with combination therapies like concurrent chemo-radiotherapy showing promise in managing advanced cases. However, challenges remain in defining the optimal sequence of adjuvant therapies and balancing treatment efficacy with minimizing toxicity. The integration of molecular markers further refines risk stratification, paving the way for precision medicine. Our retrospective study aims to delineate the presentation stages, treatment patterns, and recurrence profiles of endometrial cancer patients treated at King Fahad Medical City, offering valuable insights into the evolving landscape of endometrial cancer management in our population.

- Alotheid H, Al-Anazi MR, Al-Qahtani AA, Colak D, Yusuf A, Aldughaim MS, Mahzari AM, Habibullah MM, Alarifi S, Alkahtani S, Al-Qahtani AA. Exposure to Cadmium Telluride Quantum Dots and Gene Expression Profile of Huh-7 Hepatocellular Carcinoma Cell Line. Dose Response. 2023 Aug (3)21;24.

Abstract

Nanoparticles have shown promising potential for efficient drug delivery, circumventing biological interferences like immunological and renal clearance and mechanical and enzymatic destruction. However, a handful of research papers have questioned the biomedical use of metal-based nanoparticles like cadmium telluride quantum dots (CdTe-QDs) for their cytotoxic, genotoxic, and carcinogenic potential. Herein, we examined the effects of CdTe-QD NPs on gene expression profile of hepatocellular carcinoma (Huh-7) cell line. Huh-7 cells were treated with CdTe-QD NPs (10 µg/ml for 12, 6, and 24 hours, and 25 µg/ml for 6 and 12 hours), and transcriptomic analysis was performed using microarray to evaluate the global gene expression profile. Differential expressed genes (DEGs) were observed for both the doses (10 and 25 µg/ml) of CdTe-QD NPs at different time points. Gene ontology (GO) analysis revealed that genes involved in molecular function of cell cycle, organizational injury and abnormalities, cell death and survival, gene expression, cancer, organismal survival, and cellular development were differentially expressed. Overall, we have demonstrated differential expression of several genes, involved in maintaining cell survival, metabolism, and genome integrity. These findings were confirmed by RT-qPCR study for some canonical pathway genes signifying possible implication in NP toxicity-mediated cell survival and inhibition of cell death.

- Kazi M, Khan MF, Nasr FA, Ahmed MZ, Alqahtani AS, Ali MM, Aldughaim MS. Development of Curcumin and Piperine-Loaded Bio-Active Self-Nanoemulsifying Drugs and Investigation of Their Bioactivity in Zebrafish Embryos and Human Hematological Cancer Cell Lines. Int J Nanomedicine. 2023 Apr ;6 1808-18:1793.

Abstract

Objective: Curcumin (CUR) and piperine (PP) are bioactive compounds with prominent pharmacological activities that have been investigated for the treatment of various diseases. The aim of the present study is to develop Bio-SNEDDS for CUR and PP as a combined delivery system for cancer therapy. **Methods:** CUR and PP-loaded Bio-SNEDDSs with varying compositions of bioactive lipid oils, surfactants, and cosolvents were prepared at room temperature. Bio-SNEDDSs were characterized using a Zetasizer Nano particle size analyzer and further examined by transmission electron microscopy (TEM) for morphology. The in vivo toxicity of the preparations of Bio-SNEDDS was investigated in wild-type zebrafish embryos and cytotoxicity in THP-1 (human leukemia monocytic cells), Jurkat (human T lymphocyte cells) and HUVEC (non-cancerous normal) cells. **Results:** Bio-SNEDDSs were successfully developed with black seed oil, Imwitor 988, Transcutol P, and Cremophor RH40 at a ratio of 50/10/20/20 (%w/w). The droplet size, polydispersity index and zeta potential of the optimized Bio-SNEDDS were found to be 42,13 nm, 0,59, and -19,30 mV, respectively. Bio-SNEDDS showed a spherical structure evident by TEM analysis. The results showed that Bio-SNEDDS did not induce toxicity in zebrafish embryos at concentrations between 0,40 and 30,00 µg/mL. In TG (fli1: EGFP) embryos treated with Bio-SNEDDS, there was no change in the blood vessel structure. The O-dianisidine staining of Bio-SNEDDS treated embryos at 48 h post-fertilization also showed a significant reduction in the number of blood cells compared to mock (DMSO %0,1 V/V) treated embryos. Bio-SNEDDS induced significant levels of cytotoxicity in the hematological cell lines THP-1 and Jurkat, while low toxicity in normal HUVEC cell lines was observed with IC50 values of 0,23±18,63 µg/mL, 1,5 ± 26,03 µg/mL and 0,22 ± 17,52 µg/mL, respectively. **Conclusion:** Bio-SNEDDS exhibited enhanced anticancer activity and could thus be an important new pharmaceutical formulation to treat leukemia

Research Grant Management Department Expertise

Name	Position	Specialization Area Keywords			
Dr. Athba M. Al-Qahtani	Clinical Research Specialist I	Oncology	Cancer therapy		
Ms. Shuaa Al Shammari (szalshammari@kfmc.med.sa)	Clinical Research Specialist	Immunology	Medical sciences		

Human Research Protection Administration



Chief Executive Officer

Executive Administration
of Research Center
Organizational Chart
Number: 17-00-000-000
Update: 10/07/2023

Executive Administration Of Research Center

Human Research Protection Administration

Administrative Support

Research Ethics Department

Research Monitoring Department

Prepared by:

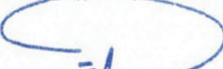
Dr. Dania Hassan AlJaroudi
Executive Director of Research Center
King Fahad Medical City

Review by:

Dr. Dania Hassan AlJaroudi
Vice President of Research Center
Riyadh Second Health Cluster

Recommended by:

Abdullah Mohammed AlSweed
Chairperson of Organizational
Structure Committee
Riyadh Second Health Cluster

Approved by:

Dr. Fahad Saleh AlGhobain
Chief Executive Officer
King Fahad Medical City

The Human Research Protection Administration provides leadership in the protection of the rights, welfare, and well-being of human subjects involved in research conducted or supported by the R2 establishments.

The administration consists of the following departments:

1. Research Ethics Department
2. Research Monitoring Department

Research Ethics Department

The department was established to protect the rights, privacy, and welfare of human subjects participating in research performed at R2 guided by the National Committee of Biomedical Ethics and international regulations.

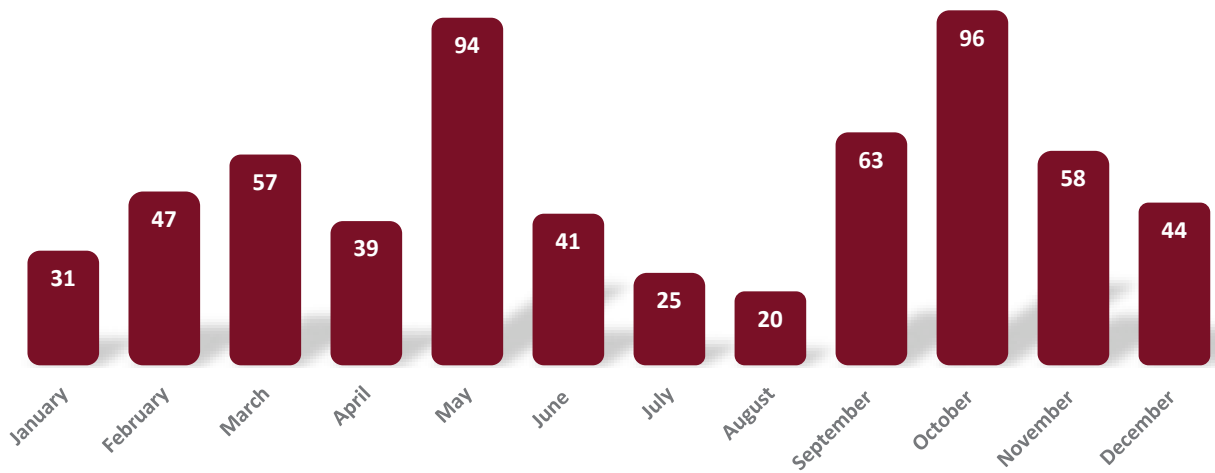
Core Services

- To develop written policies and procedures for the submission and review process for all research proposals guided by Belmont Report and national rules and regulations.
- To review before initiating, modifying, or extending any research involving human subjects conducted at R2 premises regardless of the source of funding of the study.
- To approve, disapprove, or request modifications to research proposals based on principles that protect the rights, privacy, and welfare of research subjects.
- To ensure integrity in research by addressing conflict of interest, data ownership, and authorship issues.
- To monitor ongoing research projects based on the submission of progress reports by the investigators no less than once per year.
- To observe study performance, examine the informed consent process, and audit the progress of any study under its jurisdiction.
- To suspend, terminate or impose restrictions on previously approved ongoing research projects, if the protocol is violated.
- To review, approve, disapprove, request modifications, and audit all financial aspects between R2 staff and industry funding sources.
- To notify the principal investigator in writing of the IRB decision.
- To ensure that the scientific question being asked within a protocol is relevant and that the design of the protocol is appropriate to answer that question.

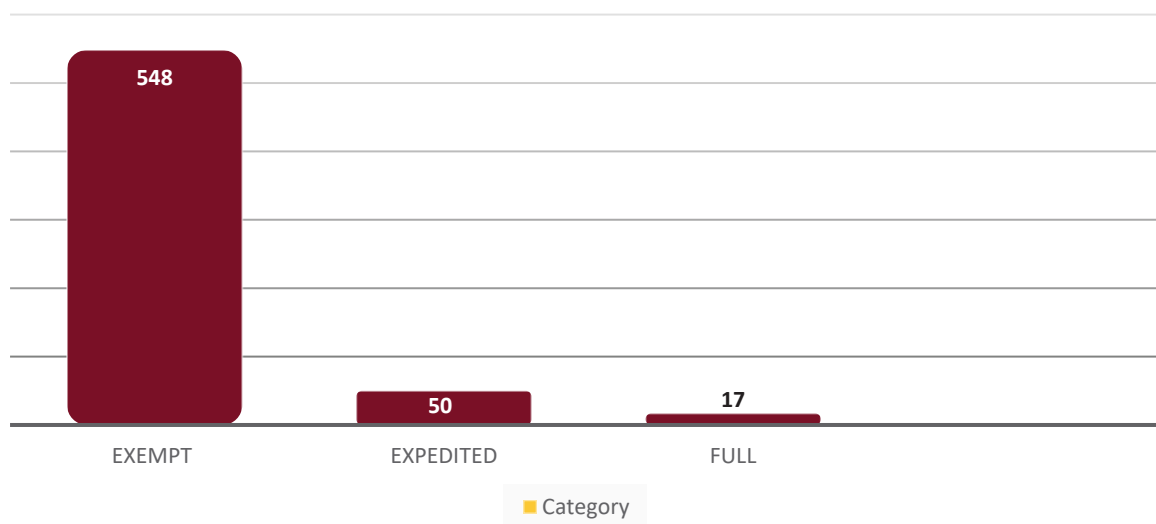
Achieved Performance Indicators

- 721 Research proposal submitted to IRB.
- 615 Research proposal approved by IRB.

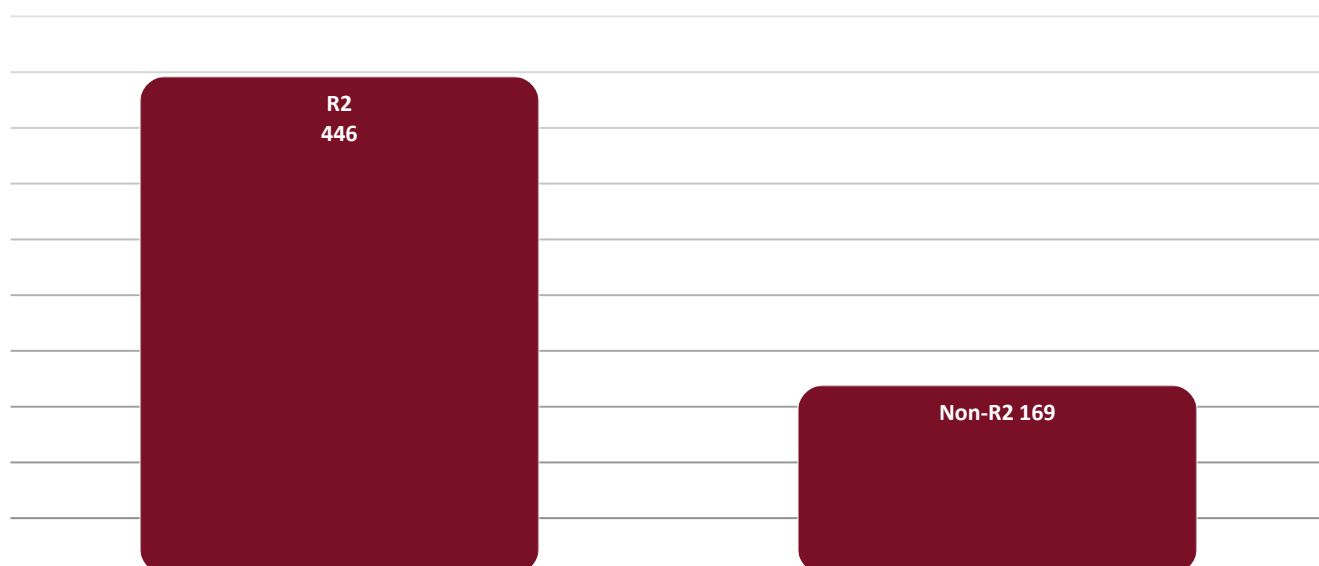




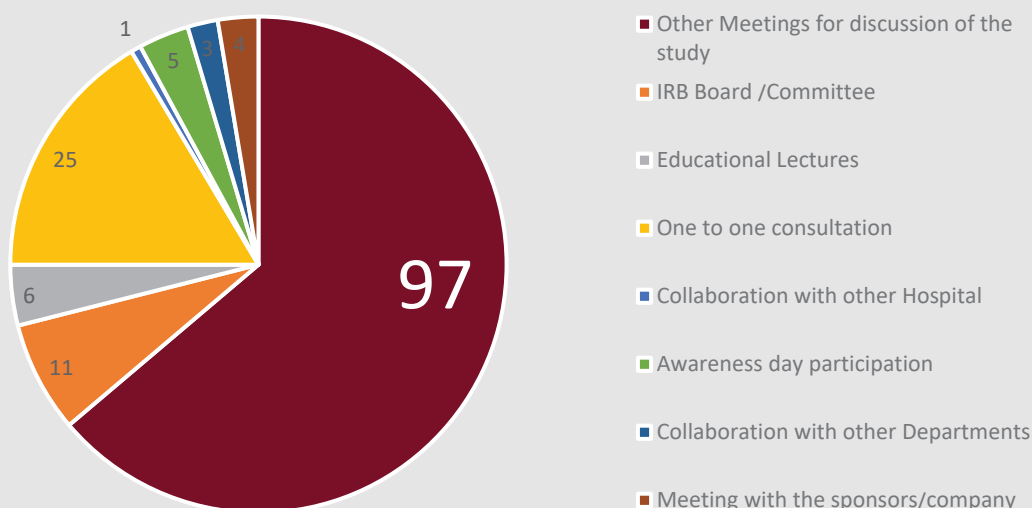
Number of research proposal approved by IRB.



Research types of approved proposals.



Number of approved proposals categorized by R2 and non-R2 investigators



IRB Activities, Consultations and Collaborations.

Research Monitoring Department

Research Monitoring Department (RMD) was established in 2017 to ensure that clinical research is conducted in compliance with the approved study protocols, amendments, good clinical practice (GCP) guidelines, and applicable regulations. RMD provides support to R2 staff for high compliance with best research conduct standards.

Core Services

- Monitor investigator-initiated clinical trials.
- Monitor industry-sponsored clinical research.
- Manage and ensure compliance with Human Research Protection standards of JCI.
- Manage Research Center Quality Improvement Committee.
- Ensure that the rights and well-being of human subjects are protected.
- Ensure that the reported trial data are accurate, complete, and verifiable from source documents.
- Monitor each funded research project by R2 twice (upon submission of progress and final reports).
- Manage Ibn-Sina Research Mentorship program to enhance research productivity and allow experienced researchers to mentor junior staff who have no research experience.
- Provide a wide range of research education courses and workshops.
- To provide training workshops on GCP guidelines for R2 researchers.
- Provide research consultations for R2 staff.

Achieved Performance Indicators

- 42 Industry-sponsored studies were monitored.
- 50 IRF
- Funded studies were monitored.
- 5 GCP guidelines workshops were provided.
- 275 R2 staff certified with GCP guidelines
- More than 50 research education hours.



Highlighted Publications

- Al-Tannir M, AlFayyad I, Altannir M, Alosaimi A, Alonazi A, Alqarni A. Long-term impact of post COVID-19 pandemic quarantine on eating habits changes among adult residents of Riyadh, Saudi Arabia. *Frontiers in Nutrition*. 10;2023

Abstract

Background: COVID-19 outbreak and quarantine measures clearly had an impact on the population's eating habits-related behavior. **Objective:** This study aimed to explore the long-term impact of the COVID-19 pandemic and physical quarantine on eating habits after quarantine among Riyadh city residents, Saudi Arabia. **Methods:** A cross-sectional study was conducted through an online survey between December 2022 and April 2023 on a convenient sample of Saudi adults in Riyadh, Saudi Arabia. A valid questionnaire was used to measure study outcomes. A comparison between dietary habits before and after COVID-19 was performed to identify the changes in dietary habits. **Results:** 1,451 Saudi adults residing in Riyadh completed the online survey. The majority (88,6%) of the respondents reported changes in dietary habits after COVID-19. About 50% had 3–1 dietary habits changes and slightly more than one-third had 7–4 dietary habits change. About 33,8% of the participants reported stable weight during the COVID-19 pandemic. However, 40,9% reported weight gain, and 20,7% reported weight loss. The participants reported several unhealthy dietary changes most commonly eating fast food (33%), eating junk food/fast food due to boredom/distress/disappointment (29,8%), and high sugar such as sweet porridge, pastry, sweets, and chocolate (28,5%). On the other side, the participants showed healthy dietary habits such as having a balanced healthy ingredients diet (34,4%), an increase in the consumption of fruits and vegetables, and a decrease in the intake of junk foods (28,9%). Males were more likely to exhibit unhealthy dietary habits than females (Odd Ratio:1,43, $p = 0,038$, CI: 2,02–1,02). Increasing age was associated with a reduction in the likelihood of exhibiting unhealthy dietary habits (OR: 0,98, $p = 0,011$, CI: 0,99–0,96). Moreover, participants who reported stable weight or weight loss during COVID-19 were 0,29 ($p = 0,96–0,09$, 0,043) and 0,34 ($p = 0,79–0,07$, 0,020), respectively, less likely to have unhealthy dietary habits. **Conclusion:** Although healthy dietary habits have been reported in this study, such as consumption of fruits and vegetables, COVID-19 confinement has also led to negative dietary behaviors reflected by high consumption of fast/junk food and sugar intake resulting in weight gain, a potential adverse impact on the population wellbeing.

- Monitor each funded research project by R2 twice (upon submission of progress and final reports).
- Manage Ibn-Sina Research Mentorship program to enhance research productivity and allow experienced researchers to mentor junior staff who have no research experience.
- Provide a wide range of research education courses and workshops.
- To provide training workshops on GCP guidelines for R2 researchers.
- Provide research consultations for R2 staff.

Human Research Protection Administration Expertise

Name	Position	Specialization Area Keywords			
Dr. Hussam Sakkijha (hsakkijha@kfmc.med.sa)	Chairperson, Research Ethics Department	Intensive care unite	Pulmonary	Sleep	
Ms. Belinda Ortega (Ortegabcortega@kfmc.med.sa)	Medical Secretary II	Medical	Clinical research	Administrative support	Institutional review board
Mohammed AlTannir (maltannir@kfmc.med.sa)	Chairperson, Research Monitoring Department	Epidemiology and public health	Research education and training	Research ethics and regulations	Research business development and strategic planning

Research Operations Department

This department has been recently established to improve the Research Center's daily operations including human capital, finance, purchasing, research and development (R&D), and quality activities to ensure smooth, efficient, well-coordinated, and productive practices of the Research Center's administrations.

Organizational Chart



Chief Executive Officer

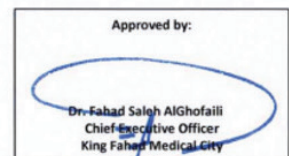
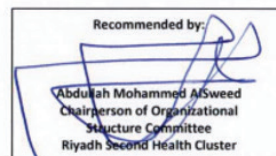
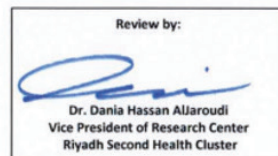
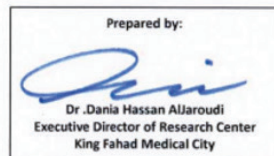
Executive Administration Of Research Center

Research Operations Department

Research Excellence Section

Research Operation and Management Section

Executive Administration
of Research Center
Organizational Chart
Number: 17-00-000-000
Update: 10/07/2023



Core Services

- Enhance research operations geared towards operational excellence to improve work quality, productivity, and efficiency in support of R2's mission.
- Provide operational advice and support pertinent to enhancing operational work performances and effective and efficient delivery of high-quality operations.
- Support better management reporting and workflow between Research Center directors and other R2 entities

The department consists of the following sections:

- Research Excellence Section.
- Research Operations and management Section.

Research Excellence Section: supporting the management of day-to-day clinical research operations and services of the research center and achieving the objectives of strategic activities and reporting of key performance indicators and performance indicators of research center. In addition, ensures the implementation of and compliance with clinical research governance; research services delivery, clinical research innovation, and change management.

Research Operations and management Section: achieving the objectives of operational and management research activities, and standardizing and improving core services of the research center, human resources, financial management.

Highlighted Publications

- AlNahedh A, BinRusayyis A, Al-Tannir M, AlFayyad I. Prevalence of Depression and Burnout among Family Medicine Residents in Riyadh City, Saudi Arabia. Health Psychology Research, 11 ,2023.

Abstract

Background: The mental health of healthcare workers, particularly family medicine residents, is an area of growing concern, more so in the context of the COVID-19 pandemic. High levels of burnout and depression among these professionals can affect their well-being and patients' quality of care. **Objectives:** The study aimed to determine the prevalence of depression and burnout among family medicine residents in Riyadh, Saudi Arabia. **Methods:** A cross-sectional study was conducted among 213 family medicine residents, using a self-administered survey. The survey included the Maslach Burnout Inventory and the Patient Health Questionnaire (PHQ)-9 to assess burnout and depression. Descriptive statistics were used to summarize participants' characteristics, and regression model was developed to explore predictors of burnout and depression. **Results:** The mean age of participants was $1,42 \pm 26,85$ years, and 53,3% were males. The study found a high prevalence of emotional exhaustion (EE) and depersonalization (DP) among participants, with mean scores of $9,38 \pm 21,10$ and $7,69 \pm 15,44$, respectively, indicating moderate to high levels. Similarly, a high level of personal accomplishment (PA) was reported, with a mean score of $6,33 \pm 11,46$. Around 10% of participants reported moderately severe and severe depression, with a mean PHQ-9 scale score of $5,10 \pm 6,03$. Gender and depression severity were significantly associated with burnout ($p = 0,001$ and $p < 0,001$, respectively). **Conclusion:** The study underscores a significant prevalence of burnout and depression among family medicine residents in Riyadh, with notable variations across different demographic and professional characteristics. This necessitates tailored mental health interventions for this population, especially in challenging times like the ongoing pandemic.

Research Operations Department Expertise

Name	Position	Specialization Area Keywords			
Mr. Issam AlFayyad (ialfayyad@kfmc.med.sa)	Chairperson, Research Operations Department	Clinical research	Research education and training	Clinical research management	Bioethics

Organizational Chart



Chief Executive Officer

Executive Administration
of Research Center
Organizational Chart
Number: 17-00-000-000
Update: 10/07/2023

**Executive Administration
Of Research Center**

**Research Services and
Applied Clinical Administration**

Administrative Support

**Clinical Research Training
and Education Department**

**Scientific Writing and Biostatistics
Department**

Clinical Research Department

Prepared by:

Dr. Dania Hassan AlJaroudi
Executive Director of Research Center
King Fahad Medical City

Review by:

Dr. Dania Hassan AlJaroudi
Vice President of Research Center
Riyadh Second Health Cluster

Recommended by:

Abdullah Mohammed AlSweed
Chairperson of Organizational
Structure Committee
Riyadh Second Health Cluster

Approved by:

Dr. Fahad Saleh AlGhofaili
Chief Executive Officer
King Fahad Medical City

This administration provides research support services, enabling researchers to conduct high-caliber research. It has the following departments:

- Scientific Writing and Biostatistics Department
- Clinical Research Department
- Clinical Research Training and Education Department

Scientific Writing Department and Biostatistics Department

Our efforts in Scientific Writing Department and Biostatistics Department were expanded to create a strong research environment. Providing a timely and efficient services that includes scientific editing, rewriting, proofreading, statistical analysis, sample size calculation, consultations, and training were our utmost priority to ensure that it is a reliable department that R2 staff puts their trust in.

Core Services

- Publishing guidance to assist authors in turning their research manuscript into a published article through either the internal team or with the aid of outsourced scientific editing and writing services.
- Helping to identify the relevant journal for publication and submission guidelines.
- Guiding authors on how to respond to journal reviewers' comments.
- Preparing the R2-Research Center annual report.
- Reimbursing the scientific writing/editing and publication coverage charges.
- Design of studies and experiments.
- Sample size and power calculation.
- Grant proposal preparation and review.
- Randomization, data management, and data entry and analysis.
- Choice and application of statistical methods suitable for the study design and groups.
- Graphs and tables generation.
- Teaching statistical courses to all levels (beginners and advanced) with practical application to the SPSS program to R2 staff and others.

Automated Services

Protocol and manuscript writing/editing services

Through scientific editing and writing services, the scientific writing department assists authors in transforming their research manuscripts into published articles. • 615 Research proposal approved by IRB.

Financial manuscript/publication charges services

The scientific writing department covers editing service fees and publication coverage for R2 staff as per the R2 policies.

Journal credibility and selection

The scientific writing and biostatistics department assists the authors in determining how to choose a reputable journal based on the field of the manuscript.

Biostatistics services

The department provides statistical analysis services, sample size calculation, consultations, and training to R2 staff.

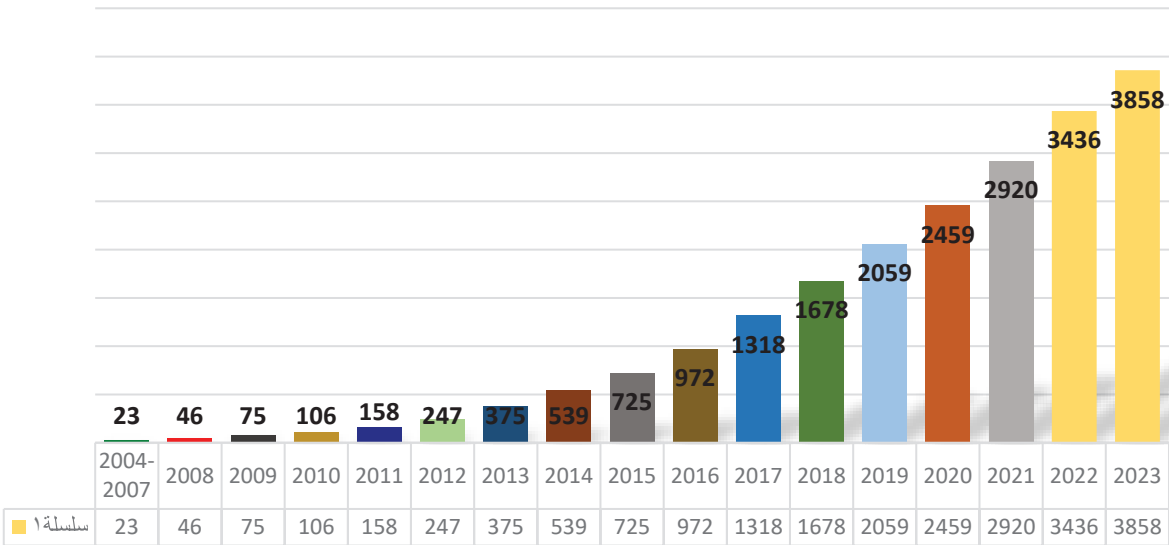
General Inquiry

The scientific writing and biostatistics department responds to general questions from authors about scientific writing and other research inquiries.

Achieved Performance Indicators

- 50 Editing and writing services
- 39 Scientific writing and biostatistics awareness activities
- 32 Educational outreach lectures
- 31 Scientific writing and biostatistics educational activities
- 17 Publications by SWD staff
- 85 One-to-one consultations
- 55 Served fellows and residents
- 218 Studies served for biostatistics
- 544 Statistical services
- 127 Sample size calculations
- 463 Statistical analyses.
- 33 Statistical analysis provided for IRF projects.

Cumulative Number of Publications 2023-2004



Agreements and Collaborations

- King Faisal Specialist Hospital and Research Center.

Ongoing Projects

- A Goat Epistaxis Model: Hemostatic Effect of Stop Nosebleeds Device.

Clinical Research Training and Educational Department

The department is responsible for the educational principles of research foundations among R2 staff through continuous training and educational activities.

Core Services

- Running continuous updated educational programs.
- Organize research education and training courses.
- Develop and provide relevant training programs for research activities compliance with good science, relevant regulations, and updated guidelines.
- Provide outreach theoretical and practical research training lectures and courses to different hospitals, centers, residency training programs, and administrations.

Achieved Performance Indicators

- 17 Educational calendar activities.
- 552 Attendees of the research courses.
- 10 Workshops.
- 28 hours for outreach educational activities outside R2.
- 6 Research training course for residents.
- 5 Research awareness days

Annual Scheduled Activities

A calendar of activities, including lectures and workshops on different topics, was conducted and attracted many attendees.

Annually scheduled research educational activities for 2023 were as follows:



How to Write a Successful Research Proposal?

The goal of this 3-hour workshop was to systematically teach the process by which a conceptual idea for a clinical research project is converted into a research proposal or grant application. A detailed description of the anatomy of a proposal was given, as well as tips on how to write a successful grant proposal. Particular emphasis on budget calculation and reviewers' considerations was also given.

How to Write Research Manuscript?

The purpose of this workshop was to educate investigators about the overall organization of a manuscript, and the structure and function of each of the components. The workshop described the research path, starting with the development of a good scientific question, through a well-structured proposal, to the manuscript itself. Participants learned about the journey of manuscript submission and the peer review process and received tips and guidance on how to respond to reviewers' comments. This workshop aimed to encourage investigators to produce a complete and polished manuscript that is suitable for submission to a peer-reviewed journal.

Biostatistics and SPSS package in the clinical, laboratory, and health setting

The use of biostatistics is essential in understanding evidence-based medicine and modern medical approaches. It is also pivotal in clinical, non-clinical, and quality control research in the healthcare sector. The objective of this workshop was to learn the concepts of biostatistics and the basic statistical techniques to healthcare professionals through the utilization of the commonly used statistical package i.e. SPSS (Statistical Package for the Social Sciences).

Clinical Research Training Course (CRTC) for Healthcare Providers

This course contained four lectures and three workshops spread over two consecutive half-days. It focused on the different study designs used in clinical research, with an emphasis on the advantages and disadvantages of each, as well as basic epidemiological measurements. Basics in biostatistics cover all the relevant topics.

How to do a Systematic Review and Meta-Analysis Training

Systematic review & meta-analysis is important in the decision-making process.

The objective of this course was to define the elements of systematic review protocol writing and to describe the systematic review process by employing RevMan software for pooling out the results of the included studies

DNA and RNA extraction and purification

This activity was intended to take the participants on a journey into the molecular biology world. It was designed to address different topics that cover the subject matter and link the theories to the experiments. By the end of the workshop, the participants were able to plan and execute any experiment implying the use of DNA or RNA.

Protein Purification: Strategies and Techniques

This a rerun of a course that was held twice before, and the turnout showed that there was a huge demand for such activity. From the recommendations of the last run this year the course was expanded to three days. The theoretical part of the workshop covered the recent advances in the protein biochemistry world. By the end of the workshop, the participant was being able to purify and measure the activity of any individual protein.

Biosafety and Biosecurity in Research Laboratories

This course provided an overview of the critical aspects of biosafety, biosecurity, and biocontainment and aimed to increase behavioral compliance with biosafety procedures. Participants learned how to assess risks for biohazards in the laboratory setting and the strategies to appropriately manage these risks.

Other Educational Activities

KFMC Pediatrics Residency

Research Course R2/R3

In collaboration with the Research Center
King Fahad Medical City

Course Description:

This course is designed to introduce residents to quantitative and qualitative methods for conducting meaningful inquiry and research.

2023 Classroom Faculty or Instructor Time
23 Jan - 02 Feb 360
16 Feb - 02 Mar 360
10 - 30 Apr 360
30 Apr - 1 May 360

Objectives:

- Learn how to do research in a scientific and practical way
- Motivate the candidates to build their own research work
- Increase the experience about health research and its importance for future career
- Increase number and quality of research conducted in Saudi Arabia
- Highlight the importance of research and how it can save the health field and community
- Create a competitive atmosphere in health research between participants

Target Groups:

The target groups include all those who are interested in conducting research in different aspects of medical, pharmaceutical and other health related programs. The course is designed to address the needs of different education levels. Participating applicants might include residents and fellows of different Saudi Board Programs.

Subjects to instructions from the Ministry of Health

Registration Fee: 2,500 SAR (including VAT 5%)

Accreditation:

For more information and inquiries:
Administration: Continuous Professional Development Administration Support Department
Email: CPD@KFMC.MEED.SA Tel: 10941, 10945, 10949
Email: ATACCP@RC2.MEED.SA Tel: 800277000

الجمعية السعودية لطب الأطفال
Saudi Society of Pediatricians

المركز الطبي الثاني للصحة العامة
Second Health Cluster / Center of Region

برنامج منسّق الأبحاث الإكلينيكية

أهداف البرنامج

- توجيه وتطوير وتأهيل الباحثين في التخصصات المختلفة لتطبيق البحوث الإكلينيكية
- إكساب المشاركين المهارات البحثية والعمل على مشاريع البحوث الإكلينيكية
- مواكبة التطور في مجالات البحث الإكلينيكي بالعمل مع فرق متعددة التخصصات
- مساعدة الأطباء والباحثين في تطوير مهاراتهم البحثية وتطبيقها في العمل السريري

محاور البرنامج

- برامج البحوث في المدن الصحية
- برامج البحوث في الجامعات الحكومية والخاصة
- شركات الأدوية الخدمية
- صناعات الأدوية الخدمية

رسوم البرنامج
٢٤٠٠ ريال

عدد الدورات
سنة التعليميين مرتين فقط
الدورة الأولى: يناير ٢٠٢٣
الثانية: يوليو ٢٠١٩

شروط القبول

- أن يكون المتقدم حاصلًا على بكالوريوس في العلوم الطبية الحيوية أو الحاسوب أو الصيدلة أو الهندسة المدنية أو الكيمياء أو الفيزياء أو الطب البشري أو غيره من المجالات ذات الصلة بالعلوم الطبية الحيوية
- أن لا يقل عن ٥ سنوات عمل
- أن لا يكون له سجل جنائي
- أن لا يكون له سجل مرضي مزمن
- أن لا يكون له سجل مرضي نفسي

يوم التقديم
من ٢٧ أغسطس ٢٠٢٢ إلى ٢٠ أكتوبر ٢٠٢٢

المستندات المطلوبة

- صورة الهوية الوطنية
- صورة جواز السفر
- صورة بطاقة التأمين الصحي
- صورة شهادة الميلاد
- صورة وثيقة التخرج والحاصل الأكاديمي

للحصول على البرنامج من خلال البريد الإلكتروني kfmc.med.sa

للتواصل عبر الرقم: ٨٠٠٢٧٧٠٠٠ الجوال: ١٠٩٤١، ١٠٩٤٥، ١٠٩٤٩

مواقع التواصل الاجتماعي:
Facebook | Twitter | LinkedIn | YouTube | Instagram

Research Summer Course

In Collaboration with Research Center

13-31 August, 2023 **9:00 – 16:00** King Fahad Medical City Outpatient Building 2nd Floor (3rd floor)

OBJECTIVES

- Describe the basic concepts in epidemiology and biostatistics.
- Apply SPSS statistical software.
- Define research question and hypothesis.
- Practice research proposal and manuscript writing.
- Identify regulations of research ethics.
- Practice literature update searches.

COURSE CONTENT

- How to formulate a research question?
- Literature review and critical appraisal
- Basic measurements of epidemiology
- Study designs
- GCP in clinical research
- Basic Biostatistics
- Writing a grant application
- Interpretation and presentation of results
- Writing a manuscript

TARGET PARTICIPANTS

HEALTH CARE STUDENTS (Medicine & Allied Health Science)

REGISTRATION FEES: 2,500 / (15% VAT included) Limited Seats (100)

For Information, please contact:
Continuous Professional Development Administration
CPO - Support Department
E-mail: CPO@KFMC.MEED.SA Tel: 10941, 10945, 10949
For Inquiries, please Contact:
E-mail: ATACCP@RC2.MEED.SA / Tel No.: 800277000

For Registration QR Code

Clinical Research Coordinator Program (CRC)

The CRC program was established due to the massive shortage of Saudi citizens working in the research field. This project covered the actual need at our research center and other departments where there is a big demand for CRC graduates. Additionally, it was established to meet Riyadh's second health cluster and MOH requirements.

The clinical Research Coordinator (CRC) program provides foundational and advanced role-based training for clinical research professionals. The one-year program covers information directly connected to clinical research, Good Clinical Practice (GCP), epidemiology, clinical trials, and statistical analysis. This prepared those prospective individuals with the proper qualification to be CRC.

This program was designed for competent Saudi national graduates who are resilient and able to cope with challenges. The focus was on practical issues to allow research coordinator graduates to cover cluster two demands. It is expected that the graduates will work as clinical research coordinators.

This project is updated annually with a comprehensive education on how to utilize the most recent technologies in research conduction.

About the CRC Program

The program was initially planned to accept a maximum of 30 candidates. The candidates are considered as “clinical research students” having full access as a Clinical Research Coordinator III. They are officially qualified as Clinical Research Coordinator III after they successfully pass the course in all modules and have completed fully their research projects.

Each candidate was expected to complete at least one clinical study in cooperation with the main researcher and work on at least one research project independently as a principal investigator of the study.

Objectives of the CRC program

- To fill the massive shortage in R2 with Saudi citizens capable of working independently in a research institution.
- To prepare and qualify Clinical Research Coordinators to work inside and outside the organization.
- To take the lead in conducting clinical research in Saudi Arabia through comprehensive and up-to-date research education and clinical training.
- Teach the foundation of research that would be included within curriculum guidelines



Modules taught in the CRC program

There are over a dozen modules taught in the CRC course including clinical trials, epidemiology, evidence-based medicine, etc. Before the start of the main modules, students are taught intensive English language and data management modules to bring the students from different educational levels to roughly an equal level in terms of their English capabilities and computer skills. The students also study medical terminology, which is covered in the English module. Below is an illustration of the modules taught in the CRC course along with the start and end date of each module:

- Intensive medical and scientific terminology English course.
- Introduction to CRC program and modules format.
- Clinical epidemiology.
- Study design.
- Research Bioethics.
- Pharmacology.
- Clinical trials.
- Bioinformatics.
- Experimental and lab.
- Scientific and Medical Writing.
- Evidence-based medicine.
- Data Management & Biostatistics I and II.
- Primary care.
- Research Project finalization / Manuscript presentation.

CRC Attendees 2023 – 2019

- 8 Students in 2023-2022
- 10 Students in 2021-2020
- 17 Students in 2020-2019

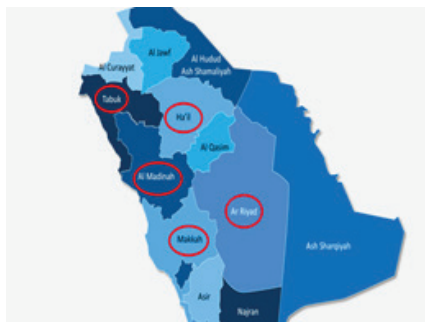
Research Methodology Course for Pediatric Residents

- The course aimed to improve the awareness and understanding of young trainees in basic research principles.
- This course contained different sessions and provided an overview of how to plan and conduct a research project.
- Major topics included identifying research questions, techniques of literature search, basic principles of research methods, types of study designs, measures of disease frequency and association, questionnaire development, ethical issues involved in human subject research, and data and bibliography management.



Research Summer Course

The Clinical Research Summer Course aimed to build the research capacity among future healthcare workers by enhancing their research critical thinking and scientific writing skills to increase research productivity. The teaching methodology of this event was a mixture of virtual presentations, hands-on training, and mentoring during the different stages of the research pathway. This course was intended for interns, medical students, dental students, and allied healthcare students.



Clinical Research Department (CRD)

The primary aim of the Clinical Research Department (CRD) was to conduct research projects that conforms to the highest standards for the protection of human research subjects offering world-class clinical solutions and accelerating the delivery of innovative treatments to improve the health and wellness of people everywhere. Additionally, this department streamlines the cycle time of clinical trials.

Core Services

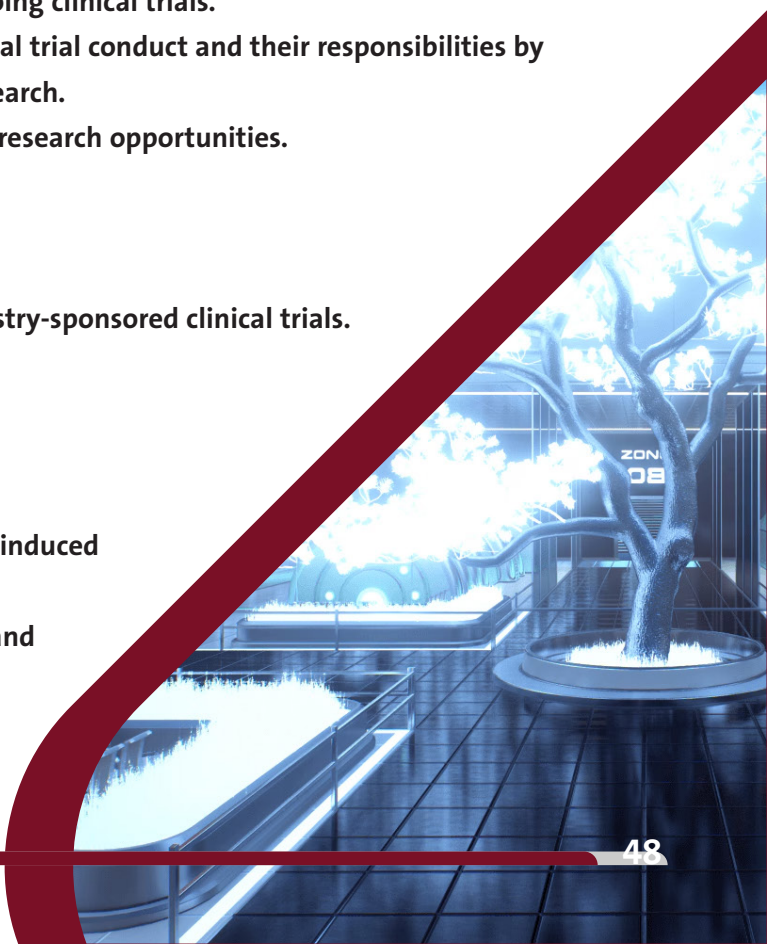
- To manage all clinical trials conducted at R2.
- To encourage the pharmaceutical industry, biotechnology, and other national and international agencies to conduct clinical trials at R2.
- Negotiating clinical trial agreements and budgets.
- To assign clinical research specialists to assist in ongoing clinical trials.
- To enhance the investigators' understanding of clinical trial conduct and their responsibilities by providing educational training courses in clinical research.
- To liaise clinicians with different R2 departments for research opportunities.

Achieved Performance Indicators

- 44 Ongoing industry-sponsored clinical trials.
- 1,846,253,00 SAR total revenue generated from industry-sponsored clinical trials.
- 8 New industry-sponsored studies were initiated.
- 11 awareness activities about clinical trials.

Ongoing projects

- The impact of Lactoferrin on the lithium-pilocarpine-induced seizures in rat model.
- Cytokine profile in Saudi multiple sclerosis patients and its relationship with disease disability.



Highlighted Publications

- AlMaghlouth AA, Shaheen AK, Alkhamis HS, Alswied RA, Aloraini NA. The Impact of Nigella sativa on Oral Health: A Scoping Review. The Journal of Medicine, Law & Public Health. 2023 Dec 8-293:(3)3;9.**Core Abstract**

Background: Nigella sativa (NS) has been shown to improve periodontal health by reducing alveolar bone resorption and lowering periodontal indices and subgingival bacterial counts. However, public health and safety concerns are emerging, and there have been a few reported adverse effects associated with the use of NS. Thus, the current study aims to review clinical studies on the effectiveness NS for oral health conditions. **Methods:** The databases PubMed and Google Scholar were used to search the literature; the year of publication was not restricted in the search. Studies conducted in animal models in laboratories, as well as those involving an intervention of NS in combination with other herbs, were excluded. **Results:** A total of thirteen human clinical studies that used NS as an intervention for treating different types of oral health conditions were included in this review. Improvement in clinical parameters was reported in all the included studies, although the statistical significance varied. **Conclusion:** Although the studies show that NS is beneficial in the treatment and management of oral health conditions, there is still a need for more rigorous research in this area, particularly in the application of NS in real-world clinical settings.

- Bashir MS, Lalithabai DS, ALOtaiby S, Abu-Shaheen A. Health care professionals' knowledge and attitudes toward telemedicine. Frontiers in Public Health. 2023 Feb 11:957681 ;16.

Abstract

The utilization of modern communication technology in the healthcare field is known as telemedicine, and it represents an advancement in the healthcare industry. For effective implementation of these technologies, healthcare professionals must possess the appropriate knowledge and hold a positive perspective toward the implementation of telemedicine. The current study aims to evaluate the knowledge and perspective of healthcare professionals in King Fahad Medical City, Saudi Arabia toward telemedicine. This study was carried out in a diverse hospital, King Fahad Medical City, Saudi Arabia and it was a cross-sectional study. The study took place from June 2019 until February 2020, during which 370 healthcare professionals, including physicians, nurses, and other healthcare professionals participated. The data was gathered by using a structured self-administered questionnaire. The analysis of the data revealed that the majority of the healthcare professionals who participated in the study, (%63,7) 237, had limited knowledge of telemedicine. About (%11) 41 participants had a good understanding of the technology, and 94 participants (%25,3) had extensive knowledge. The overall attitude of the participants toward telemedicine was positive, with a mean score of 3,26. The mean attitude scores varied significantly ($P < 0,001$) among the different professions, with physicians scoring 3,69, allied healthcare professionals scoring 3,31, and nurses scoring 3,07. The coefficient of determination (R^2) was used to evaluate the variation in attitude toward telemedicine and it was found that education (%12,4) and nationality (%4,7) had the least impact on the attitude toward telemedicine. Healthcare professionals are crucial to the successful implementation and continuity of telemedicine. However, despite their positive attitude toward telemedicine, most of the healthcare professionals who participated in the study had limited knowledge of it. There were differences in attitude among different groups of healthcare professionals. As a result, it is necessary to create specialized educational programs for healthcare professionals to guarantee the proper implementation and continuation of telemedicine.

- Al-Hussaini A, Troncone R, Alobaid S, Bashir MS. Status of vitamins and minerals in children with screening-identified celiac disease: A case-control study. *Journal of Pediatric Gastroenterology and Nutrition*. 2024.

.Abstract

Micronutrient deficiencies characterize classical “late-diagnosed” celiac disease (CeD). This study aimed to identify the prevalence of micronutrient deficiencies among children with “early-diagnosed” screening identified CeD to determine the clinical value of routine testing for deficiencies in those patients. A case-control study was conducted on screening-identified CeD patients diagnosed during a mass screening study (84 patients, mean age $2,6 \pm 11,3$ years). The controls (443 children, mean age $2,5 \pm 10,8$ years) were negative for celiac disease serological screening. Hemoglobin, serum levels of iron, ferritin, folate, vitamin B12, vitamin A, vitamin E, 25-OH vitamin D, zinc, and selenium were measured. The mean serum levels of hemoglobin, iron, ferritin, vitamin D, zinc, copper, and selenium were significantly lower in CeD patients than in healthy controls (hemoglobin 12,56 vs. 13,02 g/dL [$p = 0,04$]; iron 10,61 vs. 17,6 $\mu\text{mol/L}$ [$p < 0,001$], ferritin 25,7 vs. 48,3 $\mu\text{g/L}$ [$p < 0,001$], vitamin D 29,1 vs. 37,5 nmol/L, zinc 11,9 vs. 21,7 $\mu\text{mol/L}$, copper 18,9 vs. 32,5 $\mu\text{mol/L}$, selenium 1,04 vs. 1,36 $\mu\text{mol/L}$; $p < 0,001$). Patients with celiac and severe intestinal damage (Marsh IIIb and IIIc) had significantly lower serum ferritin and vitamin A levels than patients with mild intestinal damage (Marsh II and IIIa) (ferritin 15 vs. 22 $\mu\text{g/L}$, $p < 0,025$; vitamin A 0,85 vs. 1,35 $\mu\text{mol/L}$, $p = 0,007$). Micronutrient deficiencies are still detectable in “early-diagnosed” screening-identified CeD cases, a clinically relevant result that strongly supports efforts for screening and early diagnosis of CeD.

- Assiry F, Hafiz T, Dandachi I, Wani T, Alghofaili FA, Alsughayir AH, Alhatlani B, Aleid AA, Aljabr W. Seroprevalence of Hepatitis A antibodies among Blood Donors at a tertiary care hospital, Saudi Arabia. *Journal of infection and public health*. 2024 Jan 4-143:(1)17;1.

.Abstract

The majority of the study subjects were males, from the Saudi nationality, and are below thirty years of age. Out of 411 samples collected, (18,2) 75 were positive for Anti-Hepatitis-A IgG and only one was positive for Anti-Hepatitis-A IgM. The prevalence of HAV decreases with age, with the majority being below forty years of age ($P < 0,001$). Furthermore, anti-HAV IgG seroprevalence was significantly higher in Saudis versus Non-Saudis ($P < 0,001$). The seroprevalence of anti-HAV IgG was higher in males versus females, however, this difference was not statistically significant ($P = 0,29$).

- Almutairi A, Alqubaishi FA, Alsolm EA, Wani T, Ababtain A, Abu-Safieh L. Factors that influence a patient's decision to engage in genetic research. *Frontiers in Public Health*. 2023 May 11:865786 ;22..

Abstract

In total, 470 patients were interviewed for this study, with 341 being successfully recruited for the face-to-face interview, and the other patients being refused owing to time constraints. The majority percentage of the respondents were females. The respondents' mean age was 30, and 52,6 reported having a college degree. The survey results from 388 participants illustrated that around 90 of the participants, participated voluntarily due to a good understanding of genetics studies. The majority held positive attitudes toward being part of genetic research, which exceeded the reported motivation score of >75. The survey indicated that >90 of individuals were willing to participate to acquire therapeutic benefits or to receive continued aftercare. However, 54,6 of survey participants were worried about the side effects and the risks involved in genetic testing. A higher proportion (71,4) of respondents reported that lack of knowledge about genetic research was one of the barriers to rejecting participation.

- Chin, A. H. B., Al-Balas, Q., Ahmad, M. F., Alsomali, N., & Ghaly, M. (2023). Islamic Perspectives on Polygenic Testing and Selection of IVF Embryos (PGT-P) for Optimal Intelligence and Other Non–Disease-Related Socially Desirable Traits. *Journal of Bioethical Inquiry*, 8-1.

Abstract

In recent years, the genetic testing and selection of IVF embryos, known as preimplantation genetic testing (PGT), has gained much traction in clinical assisted reproduction for preventing transmission of genetic defects. However, a more recent ethically and morally controversial development in PGT is its possible use in selecting IVF embryos for optimal intelligence quotient (IQ) and other non–disease-related socially desirable traits, such as tallness, fair complexion, athletic ability, and eye and hair color, based on polygenic risk scores (PRS), in what is referred to as PGT-P. Artificial intelligence (AI) and machine learning–based analysis of big data sets collated from genome sequencing of specific human ethnic populations can be used to estimate an individual embryo’s likelihood of developing such multifactorial traits by analyzing the combination of specific genetic variants within its genome. Superficially, this technique appears compliant with Islamic principles and ethics. Because there is no modification of the human genome, there is no tampering with Allah’s creation (*taghyr khalq Allah*). Nevertheless, a more critical analysis based on the five maxims of Islamic jurisprudence (*qawa'id fihiyyah*) that are often utilized in discourses on Islamic bioethics, namely *qa d* (intention), *yaqin* (certainty), *arar* (injury), *arūra* (necessity), and *`urf* (custom), would instead reveal some major ethical and moral flaws of this new medical technology in the selection of non–disease-related socially desirable traits, and its non-compliance with the spirit and essence of Islamic law (*shariah*). Muslim scholars, jurists, doctors, and biomedical scientists should debate this further and issue a fatwa on this new medical technology platform.



- Aldhoayan MD, Aljubran Y. Prediction of ICU Patients' Deterioration Using Machine Learning Techniques. *Cureus*. 2023 May (5)15;7: e38659. doi: 10.7759/cureus.38659. PMID: 37288226; PMCID: PMC10242424..

.Abstract

Background: Assessing vital sign measurements within hospital settings presents a valuable opportunity for data analysis and knowledge extraction. By generating adaptable, personalized prediction models of patient vital signs, these models can yield clinically relevant insights not achievable through population-based models. This study aims to compare several statistical forecasting models to determine their real-life applicability. **Objectives:** The primary objectives of this paper are to evaluate whether the following measurements: blood pressure, oxygen saturation, temperature and heart rate can predict deterioration in Intensive Care Unit (ICU) patients. Additionally, we aim to identify which of these measurements contributes most significantly to our prediction. Lastly, we seek to determine the most accurate data mining technique for real-life data applications. **Methods:** This retrospective chart review study utilized data from patients admitted to the ICU at a tertiary hospital between January and December 2019. Data mining techniques for prediction included logistic regression, support vector machine classifier, k-nearest neighbors (KNN), gradient boosting classifier, and Naive Bayes classifier. A comprehensive comparison of these techniques was performed, focusing on accuracy, precision, recall, and F-measure. **Results:** To achieve the research objectives, the SelectKBest class was applied to extract the most contributory features for prediction. Blood pressure ranked first with a score of 9,98, followed by respiratory rate, temperature, and heart rate. Analysis of 653 patient records indicated that 129 patients expired, while 542 patients were discharged either to their homes or other facilities. Among the five training models, two demonstrated the highest accuracy in predicting patient deterioration or survival at 88,83 and 84,72, respectively. The gradient-boosting classifier accurately predicted 115 out of 129 expired patients, while the KNN correctly predicted 109 out of 129 expired patients. **Conclusion:** Machine learning has the potential to enhance clinical deterioration prediction compared to traditional methods. This allows healthcare professionals to implement preventative measures and improve patients' quality of life, ultimately increasing average life expectancy. Although our research focused exclusively on ICU patients, data mining techniques can be applied in various contexts both within and outside the hospital setting

- AlOtaiby S, Alqahtani A, Saleh R, Mazyad A, Albohigan A, Kutbi E. Comprehension of premarital screening and genetic disorders among the population of Riyadh. *Journal of Taibah University Medical Sciences*. 2023 Aug 30-822:(4)18;1..

Abstract

Objective:, unfortunately, does not cover all possible genetic diseases, such as deafness and congenital heart diseases, diabetes mellitus, and hypertension, nor does it cover unknown genetic mutations that may cause severe defects in subsequent generations. However, the Saudi population has limited knowledge regarding premarital screening tests, which do not detect all genetic disorders or diseases. Hence, we aimed to explore the knowledge and attitudes among the population of Riyadh toward premarital screening. **Methods:** A cross-sectional observational study was conducted with a self-administered designed questionnaire. The survey included questions regarding sociodemographic data, genetics, genetic testing, and premarital screening. All data were entered and analyzed in the statistical package SPSS version 22. **Results:** A total Premarital of 385 participants responded to the questionnaire, and good knowledge among most participants was significantly associated with education level ($p < 0,001$), sex ($p < 0,001$), and prior screening ($p = 0,001$). The overall attitude was positive toward premarital screening, and significant associations of sex and social/marital status with a positive response to premarital screening were observed. **Conclusion:** Knowledge and attitudes among the population of Riyadh toward premarital screening must be improved through national awareness programs. In light of our results, a need exists to provide more information and education regarding screening. Further studies must be conducted in urban areas to investigate the level of satisfaction with existing programs.

- Almazrou SH, Almoajil H, Alghamdi S, Althenyan G, Alqahtani A, Amer YS. Assessing Barriers and Facilitators for Implementing Clinical Practice Guidelines in Middle Eastern and North African Region: Delphi Study. *Journal of Clinical Medicine*. 2023 Aug 5113:(15)12;3.

Abstract

Background: Clinical practice guidelines (CPGs) improve clinical decision-making and patient outcomes, but CPG implementation is poor. The success of CPGs is influenced by several factors related to barriers and facilitators. For this reason, it can be extremely useful to explore key barriers and facilitators of CPG implementation in the Middle East and North Africa (MENA). **Methods:** A three-round Delphi study was performed using the input of 30 experts involved in the clinical practice guidelines. In the first two rounds, participants were asked to score each statement relevant to barriers or facilitators for CPG implementation on a five-point Likert scale. These statements were identified from existing systematic reviews and expert input. In round three, participants ranked the most important barriers and facilitators identified from rounds one and two. A descriptive analysis was conducted on the barrier and facilitators statements using frequencies, percentages, and medians to summarize the variables collected. **Results:** We identified 10 unique barriers and 13 unique facilitators to CPG implementation within the MENA region. The two highest-ranked barriers related to communications and available research and skills. The most important facilitator was the availability of training courses for healthcare professionals. **Conclusions:** Key barriers and facilitators to the implementation of clinical practice guidelines seem to exist in professional, organizational, and external contexts, which should all be taken into account in order to increase implementation success within MENA region. The results of this study are useful in the design of future implementation strategies aimed at overcoming the barriers and leveraging the facilitators.

- Allehebi R, Hamdan AJ. Impact of the GINA asthma guidelines 2019 revolution on local asthma guidelines and challenges: special attention to the GCC countries. *Exploration of Asthma & Allergy*. 2023 Oct 25-115:(4)1;10.

Abstract

The Global Initiative for Asthma (GINA) provides the most comprehensive and frequently updated guidelines for the management of asthma. The primary aim of guidelines is to bridge the gap between research and current medical practice by presenting the best available evidence to aid clinical decision-making, thereby improving patient outcomes, quality of care, and cost-effectiveness. Guidelines are particularly useful in situations where scientific evidence is limited, multiple treatment options exist, or there is uncertainty about the best course of action. However, due to variations in healthcare system structures, many countries have developed their own local guidelines for the management of asthma. Adoption of GINA recommendations into local guidelines has been uneven across different countries, with some embracing the changes while others continue to follow older approaches. This review article will explore the impact of the noteworthy changes in GINA guidelines, particularly in the 2019 version, on local guidelines and some of the challenges associated with implementing them.



Research Services and Applied Clinical Administration Expertise

Name	Position	Specialization Area Keywords			
Dr. Adnan Ali S. AlMaghlouth (aalmaghlouth@kfmc.med.sa)	Director of Research Services Administration (KFMC/ R2)	Grafts	Recessions	Gingiva	Sensitivity
Ms. Amani K. Abu Shaheen (aabushaheen@kfmc.med.sa)	Chairperson, Scientific Writing and Biostatistics Department	Epidemiology	Clinical research	Maternal and child health	Validity and reliability
Ms. Alaa Ashraf B. AlQurashi (aalqurashi@kfmc.med.sa)	Clinical research Specialist I	Public health	Infectious epidemiology	Health promotion	
Mr. Tariq Ahmed Wani (tawani@kfmc.med.sa)	Biostatistics Specialist I	Study design	Sample size determination	Statistics analysis plan	Data analysis
Mr. Mohammed Salman Bashir (mbashir@kfmc.med.sa)	Biostatistics Specialist I	Biostatistics	Clinical research	Survival analysis	
Ms. Shahed AlOtaiby (sotaiby@kfmc.med.sa)	Clinical research Specialist I	Biomedical	Clinical research	Drug delivery	
Dr. Ahmad M. Saleh a saleh@kfmc.med.sa	Chairperson, Training & Education	Research	Infertility	Women's Health	
Mr. Ali Hassan AlMahraqi (aalmahraqi@kfmc.med.sa)	Administrative Specialist I	Financial support	Policies	Quality	
Ms. Maram AlShammari (msaalshammari@kfmc.med.sa)	Administrative Specialist I	Administrative support	Education	Courses and workshops	
Dr. Riyadh O. AlLehebi (rallehebi@kfmc.med.sa)	Chairperson, Clinical Research Department	Pulmonologist	Epidemiologist	Clinical trials	
Dr. Nimah Alsomali (nialsomali@kfmc.med.sa)	Senior Clinical Research Specialist	Health care policy	Neuroscience	Bio-ethics Neuro-ethics	Molecular Biology
Mr. Yosra AlJubran (yaljubran@kfmc.med.sa)	Clinical Research Specialist	Public health	Health Informatics	Clinical trials	Project management
Mr. Abdulhadi M. Alqahtani (amohalqahtani@kfmc.med.sa)	Clinical Research Specialist	Pharmacy	Bioethics	Clinical trials	Risk assessment and management

Organizational Chart



Chief Executive Officer

Executive Administration
Of Research Center

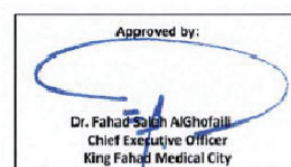
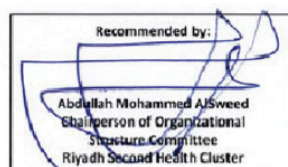
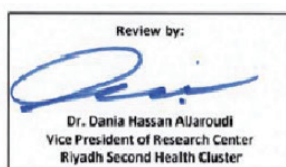
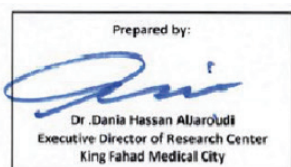
Biomedical Research
Administration

Administrative Support

Research Collaboration
Department

Clinical Research Groups
Department

Epidemiology and Population
Health Research Department



Executive Administration
of Research Center
Organizational Chart
Number: 17-00-000-000
Update: 10/07/2023

The Satellite Research Administration was created to enhance research capacity through the development of and support of research groups, units, and departments within R2 hospitals, centers as well as administrations.

The administration consists of the following departments:

1. Clinical Research Groups Department
2. Research Collaboration Department
3. Epidemiology and Public Health Research Department



Clinical Research Groups Department

Create clinical research groups from R2 hospitals and centers' researchers to provide an infrastructure for R2 researchers to brainstorm, share, advance, and produce ideas on research projects.

Core Facilities

Clinical Research Groups provided very advanced study in functional MRI and scanned 64 patients for pre-surgical planning for brain tumors and epilepsy patients.

Achieved Performance Indicators

- Three IRFs were submitted.
- Seven IRBs approved.
- One published paper.
- Three submitted papers.
- Six consultations in Neuroscience research.
- Six proposals were submitted to RDIA.
- Neuroscience Research Day.
- 10 Residents/fellows were trained.
- Trained 40 undergraduate students.
- Seven Lectures were conducted in the NNI MRI suit.
- One Ph.D. student.
- Two master students.
- Abstract submitted in Biophysical Society conference.
- Presentation CHOC conference at the University of California Irvine.
- Talk in SNIH for research visibility and impact.

Agreement and Collaborations

- Collaboration with Liverpool University
- Collaboration with New York University
- KAIMRC
- King Saud University
- Qassim University

Ongoing projects

- Gray matter volume and cognitive performance during normal aging.
- Neurophysiological and motor behavioral effects of combining transcranial direct current stimulation (IDCS) and modified constraint-induced movement therapy (mCIMT) on upper limb function recovery in patients with stroke.
- Investigating the efficacy of combining virtual reality-based mirror therapy and transcranial direct stimulation to improve upper limb recovery in patients with stroke.
- The correlation between cognitive function and functional brain MRI in ADHD's patients.



Epidemiology and Public Health Department

The Epidemiology and Public Health Department (EPHD) mission is leading research, analytics, and professional networking that improves health and well-being through multidisciplinary epidemiologic and public health studies, across the spectrum of public health, clinical practice, and population health to generate evidence-based scientific data, leading to positive changes in policy and practice across clinical, public, and population health of important priority to a stakeholder in Saudi Arabia. More, bringing together policymaking, clinical practice, public, and population health management, through research, and research networking using epidemiology, statistics, economics, qualitative methods, and clinical science, by applying newly gained knowledge to reduce disease burden and cost, improve access to care, and outcome. Next, aid in transformation Progress through critical data-driven decision-making (operational, financial, supply chain). Thus, supporting strategy Progress, transformation, accountable care organizations, financial sustainability, operational progress, risk and challenges mitigation through funding, leadership support, human capital, and overall growth.

Core Services

- Lead practice-based national research.
- Maintain population health management-based disease registries.
- Epidemiology, public, and population outreach education conferencing and lecturing.
- Supervise and train research volunteers at the research center.
- Provide research methodology consultation for the family medicine department and others.
- National lead on lifestyle medicine therapeutic intervention research.
- National lead on Chronic disease interventional studies.
- National lead on chronic disease mapping.
- Professional academic writing and textbook authoring training.
- Collaborative research in CAM, nutrition, Saudi Arabia determinant of illness and wellness.

Achieved Performance Indicators

- 12 Research awareness activities about services provided by EPHD staff.
- 8 Epidemiological studies initiated by EPHD staff.
- Initiated research groups



Agreement and Collaborations

The department has numerous research collaborations with various institutions and universities throughout Saudi Arabia, listed below:

Riyadh

- Primary healthcare centers of the First Health Cluster.
- Primary healthcare centers, and the family medicine department of R2.
- Primary healthcare centers of the Third Health Cluster.
- Saudi Health Council.
- Al-Faisal University College of medicine.
- Weqayah: Public health authority.
- King Saud University Family medicine department.
- National Center for Complementary and Alternative Medicine.
- Assistant Deputy Minister for Primary Health Care.

Jeddah

- Samir Abbas Hospital
- King Fahad Specialized Hospital
- King Abdulaziz University

AlQssim

- Sulaiman AlRajhi University
- Endocrine and Diabetes Center
- King Fahd Specialist Hospital, Burayah
- King Saud hospital, Unayzah
- The Salam Veterinary Hospital, Buraydah

Madinah

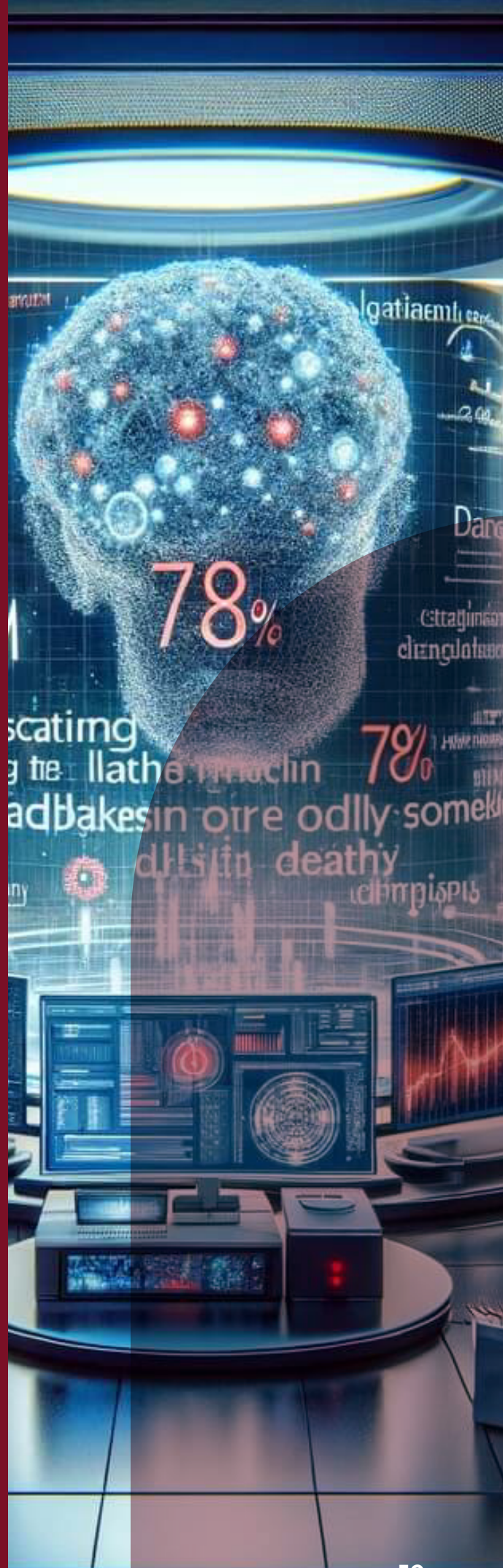
- Taibah University
- Directorate of Health Affairs
- Madinah health cluster

Hail

- Hail health cluster
- Hail University
- German Saudi Hospital
- Directorate of Health Affairs

Jazan, Tabuk

- Jazan University
- Tabuk university



Ongoing projects

- High blood pressure mapping in Saudi Arabia, a pilot study.
- Diabetes type II mapping in Saudi Arabia, a pilot study.
- Pre-diabetes mapping in Saudi Arabia, a pilot study.
- Hyperlipidemia mapping in Saudi Arabia, a pilot study.
- Overweight and obesity mapping in Saudi Arabia.
- Intensive lifestyle intervention in diabetes type II in Saudi Arabia.
- Intensive lifestyle intervention in pre-diabetes in Saudi Arabia.
- Intensive lifestyle intervention in hyperlipidemia in Saudi Arabia.
- Intensive lifestyle intervention in obesity in Saudi Arabia.
- Intensive lifestyle intervention in high blood pressure type II in Saudi Arabia

Research Collaboration Department

The department supports multidisciplinary collaborations including collaboration between national and international academic and governmental institutions.

Core Facilities

- To provide a link between centers and hospitals at R2 and Research Centre services.
- To encourage researchers at R2 to use the Research Centre services, manuscript writing, and statistics service and encourage researchers to apply for funding from the Research Centre.

Achieved Performance Indicators

- 3 National and International collaborations with hospitals and health institutions.
- Provided support to 57 external researchers.
- 14 Research Day Activities for Hospitals/Centers/Administrations.
- 8 CRC meeting per year for Hospitals, Centers.
- 7 Meeting per year for Administration.
- 18 Hospitals/centers/Administrations active research committees.
- 20 Awareness activities.



Research Days

List of conducted research days at R2 2023

#	Research Day	Event Date
1	Oncology Research Day 5th	2023/01/31
2	Simulation Department	2023/04/14
3	Ancillary Administration	2023/09/11
4	Pharmacy Research Day	2023/09/25
5	Dental	2023/09/27
6	Infection Control	2023/10/16
7	Children Hospital Research Day	2023/11/28
8	Alyammamah Hospital	2023/11/28
9	OMEC Research Day	2023/11/30
10	Almajmaa Hospital	2023/12/12
11	Prince Mohammed Bin Abdulaziz Hospital	2023/12/14
12	Neuroscience Research Day	2023/12/20
13	Rehabilitation Hospital	2023/12/21
14	ER Research Day	2023/12/28



Agreement and Collaborations

- Scientific writing 3 agreements on national level
- Training and Education 2 Funding and 1 learning agreements on national level
- Molecular Biology Lab 12 agreements with publication outcome. 9 on national level and 3 on international level.
- Clinical Research Groups 5 agreements with publication outcome. 3 on national level and 2 on international level.
- Grant Management Department 17 agreements with publication and funding outcome on national and international level.
- Precision Medicine Department 18 agreements 15 with publication and 2 PhD supervision outcome; 16 on national level and 1 on international level.
- Biobanking Department 9 agreements 8 with publication and 1 facility use agreements; 5 on national level and 4 on international level.
- Clinical Research Specialist II, Clinical Research Department, 12 publication agreements on 2 funding agreements on national level.
- Epidemiology and Public Health Department, 26 agreements on national level.

Ongoing projects

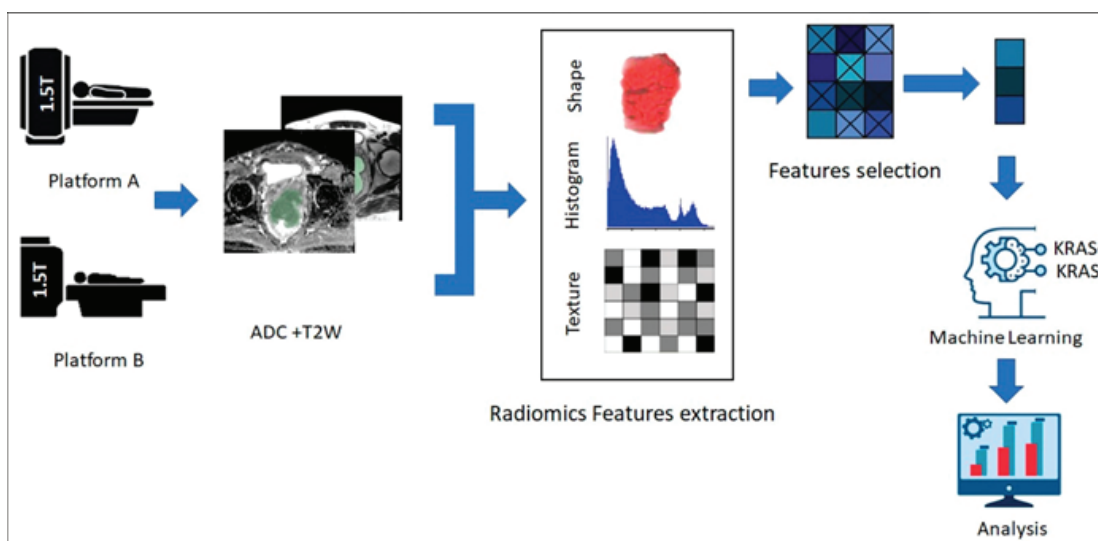
- Activate R2 Research Committees.
- Managing R2 External Researchers.
- R2 Research Awareness
- R2 Research Days
- Facilitate Research Agreements

Highlighted Publications

- Alshuhri MS, Alduhyim A, Al-Mubarak H, Alhulail AA, Alomair OI, Madkhali Y, Alghuraybi RA, Alotaibi AM, Alqahtani AG. Investigating the Feasibility of Predicting KRAS Status, Tumor Staging, and Extramural Venous Invasion in Colorectal Cancer Using Inter-Platform Magnetic Resonance Imaging Radiomic Features. *Diagnostics*. 2023 Nov 3541:(23)13;27

Abstract

Background: Colorectal cancer is the third most common type of cancer with a high mortality rate and poor prognosis. The accurate prediction of key genetic mutations, such as the KRAS status, tumor staging, and extramural venous invasion (EMVI), is crucial for guiding personalized treatment decisions and improving patients' outcomes. MRI radiomics was assessed to predict the KRAS status and tumor staging in colorectal cancer patients across different imaging platforms to improve the personalized treatment decisions and outcomes. **Methods:** Sixty colorectal cancer patients (35M/25F; avg. age $12,9 \pm 56,3$ years) were treated at an oncology unit. The MRI scans included T2-weighted (T2W) and diffusion-weighted imaging (DWI) or the apparent diffusion coefficient (ADC). The manual segmentation of colorectal cancer was conducted on the T2W and DWI/ADC images. The cohort was split into training and validation sets, and machine learning was used to build predictive models. **Results:** The neural network (NN) model achieved %73 accuracy and an AUC of 0,71 during training for predicting the KRAS mutation status, while during testing, it achieved %62,5 accuracy and an AUC of 0,68. In the case of tumor grading, the support vector machine (SVM) model excelled with a training accuracy of %72,93 and an AUC of 0,7, and during testing, it reached an accuracy of %72 and an AUC of 0,69. **Conclusions:** ML models using radiomics from ADC maps and T2-weighted images are effective for distinguishing KRAS genes, tumor grading, and EMVI in colorectal cancer. Standardized protocols are essential to improve MRI radiomics' reliability in clinical practice.



- Bany Hamdan A, AlBanyan N, Alwuhayd I, AlOtaibi A, Orfali R, AlNajjar F, Alharbi M. Dose Rounding and Cost Reduction of Anticancer Agents at King Fahad Medical City, Saudi Arabia: A 1-Year Feasibility Study. *Saudi Journal of Health Systems Research*. 2023 Oct 8-162:(4-1)3;20.

Abstract

Introduction: The exponential increase in the price of anticancer drugs has warranted looking for a cost-saving measure to counter their price rise. We aim to study the impact of dose rounding of biological and anticancer agents within a range of %10 of the ordered dose. **Method:** The study involved patients treated with anticancer agents between January 2018 and December 2018 at King Fahad Medical City's (KFMC) comprehensive cancer center. An anticancer medication database was created for data collection and processing. All the eligible orders were processed by hematology and oncology physicians. A performance improvement methodology was used. The dose rounding was based on the patient's preprinted order and the nearest available vial size. The potential impact on cost was measured in Saudi Riyals (SAR). Descriptive statistics were applied for data analysis and interpretation of the results. **Results:** A total of 26 anticancer medications were used for treating cancer patients, and 208 prescriptions were found to be eligible for dose rounding. Brentuximab was among the drugs, showing the highest cost saving at an estimated 20,600 SAR. In addition to reducing wastage and the cost of medications, 7 minutes were saved per preparation episode in the post-intervention period. **Conclusion:** Data reflected that dose rounding of chemotherapy and biological agents up to a limit of %10 is a feasible approach and could potentially save extra cost and wastage of medications in the comprehensive cancer center of KFMC

- Nam YW, Rahman MA, Yang G, Orfali R, Cui M, Zhang M. Loss-of-function KCa_{2,2} mutations abolish channel activity. *Am J Physiol Cell Physiol*. 2023 Mar (3)324;1:C658-C664.

Abstract

Small-conductance Ca²⁺-activated potassium channels subtype 2 (KCa_{2,2}, also called SK₂) are operated exclusively by a Ca²⁺-calmodulin gating mechanism. Heterozygous genetic mutations of KCa_{2,2} channels have been associated with autosomal dominant neurodevelopmental disorders, including cerebellar ataxia and tremor in humans and rodents. Taking advantage of these pathogenic mutations, we performed structure-function studies of the rat KCa_{2,2} channel. No measurable current was detected from HEK293 cells heterologously expressing these pathogenic KCa_{2,2} mutants. When co-expressed with the KCa_{2,2}_WT channel, mutations of the pore-lining amino acid residues (I360M, Y362C, G363S, and I389V) and two proline substitutions (L174P and L433P) dominant negatively suppressed and completely abolished the activity of the co-expressed KCa_{2,2}_WT channel. Co-expression of the KCa_{2,2}_I289N and the KCa_{2,2}_WT channels reduced the apparent Ca²⁺ sensitivity compared with the KCa_{2,2}_WT channel, which was rescued by a KCa_{2,2} positive modulators.

- Orfali R, Albanyan N. Ca²⁺-Sensitive Potassium Channels. *Molecules*. 2023 : 28(28):885 .

Abstract

The Ca²⁺ ion is used ubiquitously as an intracellular signaling molecule due to its high external and low internal concentration. Many Ca²⁺-sensing ion channel proteins have evolved to receive and propagate Ca²⁺ signals. Among them are the Ca²⁺-activated potassium channels, a large family of potassium channels activated by rises in cytosolic calcium in response to Ca²⁺ influx via Ca²⁺-permeable channels that open during the action potential or Ca²⁺ release from the endoplasmic reticulum. The Ca²⁺ sensitivity of these channels allows internal Ca²⁺ to regulate the electrical activity of the cell membrane. Activating these potassium channels controls many physiological processes, from the firing properties of neurons to the control of transmitter release. This review will discuss what is understood about the Ca²⁺ sensitivity of the two best-studied groups of Ca²⁺-sensitive potassium channels: large-conductance Ca²⁺-activated K⁺ channels, KCa_{1,1}, and small/intermediate-conductance Ca²⁺-activated K⁺ channels, KCa_{2.x}/KCa_{3,1}.

- Orfali R, Alfaiz A, Rahman MA, Lau L, Nam Y-W, Zhang M. KCa₂ and KCa_{3,1} Channels in the Airways: A New Therapeutic Target. *Biomedicines*. 1780:(7)11 ;2023.

Abstract

K⁺ channels are involved in many critical functions in lung physiology. Recently, the family of Ca²⁺-activated K⁺ channels (KCa) has received more attention, and a massive amount of effort has been devoted to developing selective medications targeting these channels. Within the family of KCa channels, three small-conductance Ca²⁺-activated K⁺ (KCa₂) channel subtypes, together with the intermediate-conductance KCa_{3,1} channel, are voltage-independent K⁺ channels, and they mediate Ca²⁺-induced membrane hyperpolarization. Many KCa₂ channel members are involved in crucial roles in physiological and pathological systems throughout the body. This article discusses different subtypes of KCa₂ and KCa_{3,1} channels and their functions in respiratory diseases. Additionally, the pharmacology of the KCa₂ and KCa_{3,1} channels and the link between these channels and respiratory ciliary regulations will be explained in more detail. In the future, specific modulators for small or intermediate Ca²⁺-activated K⁺ channels may offer a unique therapeutic opportunity to treat muco-obstructive lung diseases.



- Altuwayjiri, Abdullah; Alshuraim, Renad; Albanayan, Nurah; Orfali, Razan; Alsaleem, Badr; Mathkour, Mujeeb. Metoclopramide as a continuous intravenous infusion in home parenteral nutrition. Saudi Journal of Clinical Pharmacy (4)2: p 148-147, October-December 2023. | DOI: 10,4103/sjcp.sjcp_28_23.

Abstract

Background: Metoclopramide is a dopamine receptor antagonist used in the management of gastrointestinal disorders such as nausea and vomiting. We hereby present a case of a 9-month-old girl, preterm (30 weeks), with congenital ileal atresia, short bowel syndrome type 1, and persistent vomiting. The patient was started on parenteral nutrition (PN) and metoclopramide 0,05 mg/kg three times daily. **Case Presentation:** A 9-month-old girl, preterm (30 weeks), weighing 7 kg, with congenital ileal atresia being restricted and anastomosed, short bowel syndrome-type 1 underwent multiple surgeries that resulted in resection of 80 cm of small bowel with ileocecal valve resection with remaining 25 cm of the small bowel and viable colon, and persistent vomiting, the patient was started on PN and metoclopramide 0,05 mg/kg, three times daily and planned for discharge, the patient was on home PN and was given an ampule of metoclopramide (5 mg/mL) and instruct the family to infuse 0,2 mL (1mg) inside PN with gentle shaking of the bag then to infuse it as cyclic over 20 h. After several months of using metoclopramide within the PN solution, no physical or chemical incompatibilities were noticed, while vomiting resolved spontaneously without any reported side effects. **Conclusions:** Adding metoclopramide into the PN solution was safe and more effective than intermittent dosing while reducing the family’s manipulation of Central Venous Access Devices (CVAD).

Satellite Research Administration Expertise

Name	Position	Specialization Area Keywords			
Dr. Adnan Al Watban (aalwatban@kfmc.med.sa)	Director, Satellite Research Administration (KFMC/ R2	MRI	Neuroscience	Biomedical Physics	
Dr. Habeeb Ali Saleh AlHabeeb (halhabeeb@kfmc.med.sa)	Chairperson, Research Collaboration Department	Obesity	Lifestyle medicine	Gut hormones	Appetite and contribute to weight maintenance
Ms. Hala Aljashi (haljishi@kfmc.med.sa)	Clinical Research Specialist	Health Science	Research Collaboration	Public Health	
Dr. Abdullah Alotaibi (amalotaibi@kfmc.med.sa)	Chairperson clinical research groups	Neuroimaging	MRI	Functional MRI	Data analysis
Dr. Razan Orfali (rorfali@kfmc.med.sa)	Pharmacist II	Pharmacy	Neuropharmacology	Drug Discovery	
Ms. Roaa Alsharif (ralsharif@kfmc.med.sa)	Clinical research Specialist I	Research	Nursing	Clinical Leadership	

Organizational Chart



Chief Executive Officer

**Executive Administration
Of Research Center**

**Biomedical Research
Administration**

Administrative Support

**Molecular and Translational
Research Department**

**Bioinformatics and Computational
Biology Department**

**Genomics and Precision
Medicine Department**

Biobanking Department

Executive Administration
of Research Center
Organizational Chart
Number: 17-00-000-000
Update: 10/07/2023

This administration assists and supports R2 clinicians and scientists in developing and conducting innovative biomedical research initiatives. The administration consists of the following departments:

- Biobanking Department
- Molecular and Translational Research Department
- Bioinformatics and Computational Biology Department
- Genomics and Precision Medicine Department

80 C Freezer



The Biobanking Department is a major division of the Biomedical Research Administration. This department consists of two sections: Research Data Management (database management system), and Biological Specimen Banking (biobanking).

The Research Data Management is to improve the quality, productivity, and efficiency of medical research conducted at R2 using the CAISIS Data Management System. The system encourages researchers to develop disease databases and interrogate data within cohort studies, clinical trials, imaging, and genetic data together with patient records which offers excellent potential for the development of more effective diagnostics and therapeutics, identification of public health risks, and gaining new insights into health and diseases. The department organized a course to train principal investigators on how to use CAISIS and delivered several talks to different hospitals and centers in R2.

The Biobanking section is a biospecimen management system that includes specimen processing, storage, and retrieval services. Biospecimen information is linked to the patient clinical information case report form, which is the hallmark of biobanking.

Biospecimen management system

Liquid Nitrogen tank



Core Services

- To improve the productivity and efficiency of the translational and clinical research conducted at R2 through the use of a unified platform (database) that integrates data within cohort studies or disease registries, including clinical, imaging, and genetic data, together with patient records.
- To offer great potential to develop more effective diagnostics and therapeutics, identify public health risks, and gain new insights into health and diseases.

Infrastructure

- Fresh Breast and Colorectal Tissues Biobank
- Developed an informed consent for Biobanking, approved by IRB
- Allocated room for Liquid Nitrogen (LN)
- Liquid Nitrogen tanks
- 2 Fridges, 2 Freezers
- 1 Biosafety Cabinet
- Developed standard operation procedure for LN
- Barcoded system for each freezer
- Labeling and tracking system
- Developed SPP for Biobank

Educational and Research Activities

- Invited speaker by world health organization (WHO) to the Quadripartite Global Technical Meeting on MERS-CoV and Other Emerging Zoonotic Coronaviruses.
- Big Data: Coronaviruses at Multiple Scales” Workshop.
- CRC Program.
- Princess Norah University Training Program Students.
- King Saud University Training Program Students
- Proteomics in Medicine.
- A public talk: Emerging and Re-Emerging Infectious Diseases.
- Polymerase Chain Reaction as a powerful tool in the diagnosis of COVID-19.
- Basic Pediatric Residency Course.
- Advanced Pediatric Residency Course.
- Supervision Master's and Ph.D. students.
- Histology training.
- EPIC training.
- Co-supervising 5 Ph.D. students from the University of Liverpool, United Kingdom.
- Members in reviewing panels of many journals.

Agreement and Collaborations

- Qatar Biobank
- University of Liverpool
- Cambridge University
- Oxford University
- King Abdullah University of Science and Technology
- Agency for Science, Technology, and Research (A-STAR)
- King Abdulaziz University
- Qassim University
- United States-Food and Drug Authority
- Coalition for Epidemic Preparedness Innovations (CEPI)
- King Saud University
- Imam Mohammad Ibn Saud Islamic University
- Princess Nourah Bint Abdulrahman University
- Alyamamah Hospital
- ELI LILLY company
- UK-ICN

Ongoing projects

- Research Base for Severe Coronavirus Infection for The Rapid Characterization of These Viruses in Humans and Systems for Medical Countermeasure Development and Evaluation.
- Investigation of IL-6 Action Mechanism in Eliciting Inflammation in Covid-19 Patients.
- Prevalence of Common Respiratory Viruses in Children at A Tertiary Care Hospital in Saudi Arabia.
- Expression Signature and Prognostic Relevance of Immune Checkpoint Molecules in Human Papillomavirus-Driven Cancers.
- Seroprevalence of Hepatitis A in Blood Donors from Saudi Arabia.
- Molecular Evidence for a Causal Suspect Role of Oncogenic Viruses in Human Breast Cancer Using Transcriptomic Expressions of Viral Oncogenes and Their Effect on Human Tumor Suppressor Genes.
- Advanced NSCLC Cases in Saudi Arabia: A Six-Year Cross-Sectional Study
- Differences in Clinical, Epidemiological, and Pathological Features of Breast Cancer in Saudi Population a Single Institution Study
- Characterization of The Immune Microenvironment in Hepatocellular Carcinoma in Saudi Arabia.

The need for Bioinformatics and Computational Biology (BCB) services will increase over the upcoming years due to technological proliferation that generates biological data and a move toward carrying out translational research projects. The Bioinformatics and Computational Biology Department's main function is to provide Bioinformatics and Computational Biology services through the Research Center for scientific research projects that are geared to improve healthcare services within R2. The main aim within the Bioinformatics and Computational Biology department is to expand its infrastructure to accommodate the needs of entities within the R2 pertaining to Computational Biology and Bioinformatics services. Furthermore, the BCB department is striving to commercialize its services to external entities as a revenue point for R2.

Core Services

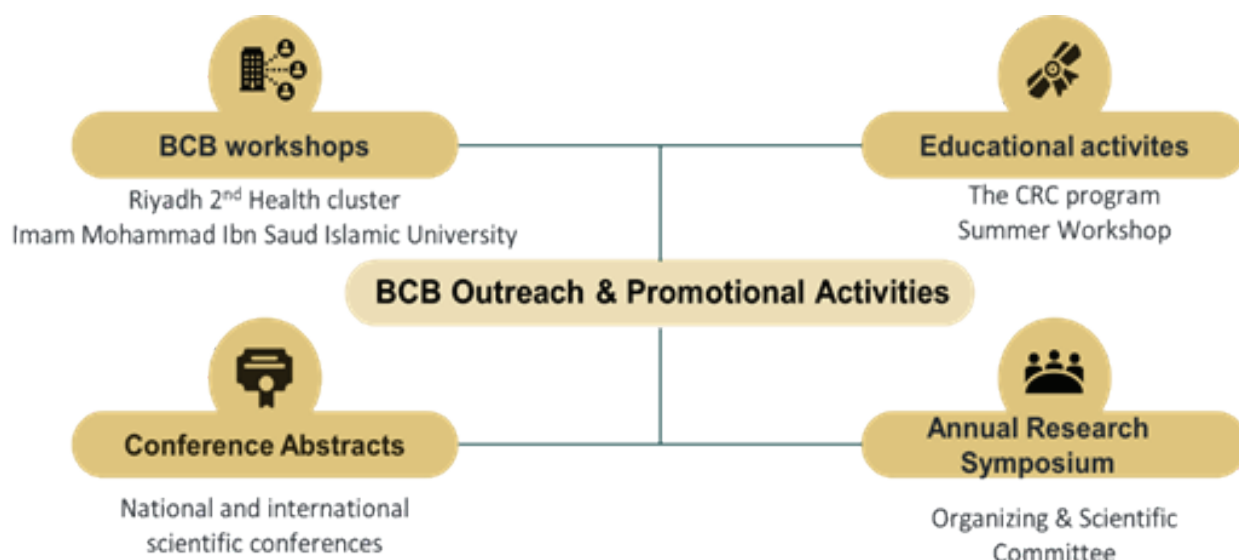
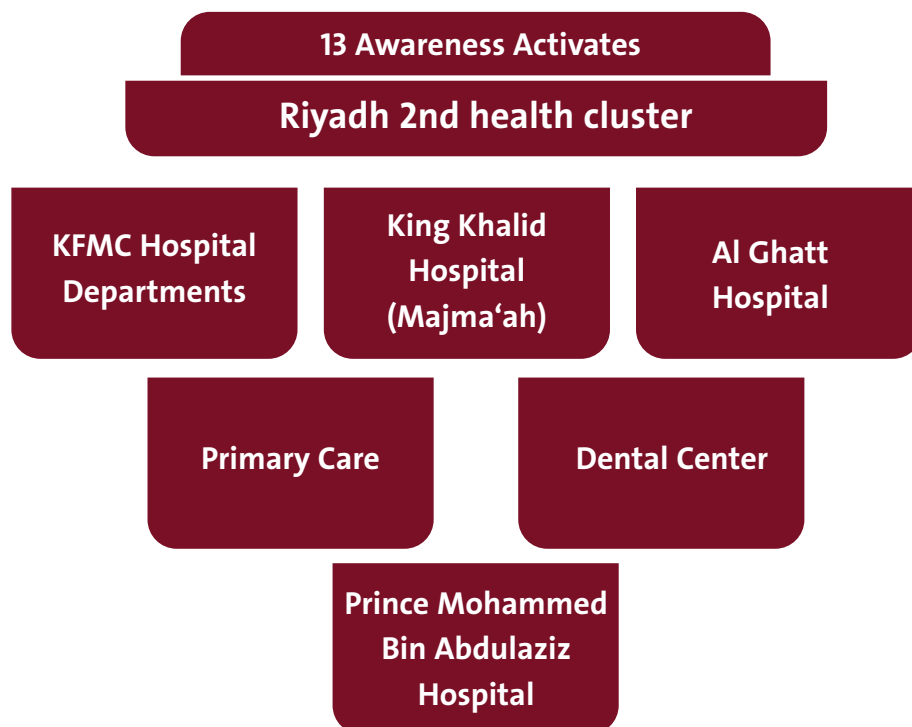
- Affymetrix microarray platform.
- Aiding in computational biological data analysis.
- Bioinformatics and computational biology consultation on best approach and practices for the analysis of biologic genomics and proteomics.
- Provision of scientific support to scientific researchers through methodology consultations and data analytics services.
- Provision of consultation services to R2 scientific researchers.
- Supporting/Expanding computational infrastructure to accommodate future researchers within R2.
- Produce high-value scientific research in the field of bioinformatics and computational biology.
- BCB Knowledge transfer and dissemination to scientific researchers and the community to enhance scientific outlook and output.

Achieved Performance Indicators

- Supplement the Research Center's educational activities with Bioinformatics and Computational Biology week in the CRC program.
- 7 Research Studies supporting the BCB department infrastructure.
- 6 Studies utilizing BCB infrastructure Services.
- 31 Consultation Services to R2 researchers.
- 13 Awareness Activities.
- 26 BCB Outreach/Promotional Activities.
- 8 BCB Scientific Research Published Studies.
- 5 Approved IRBs for BCB Initiated Research
- Chaired the organizing committee for the 18th Annual Research conference

Bioinformatics and Computational Biology Department

200 attendees
in total



Agreement and Collaborations

- King Saud University Medical City
- King Faisal Specialist Hospital and Research Center
- Swiss Institute of Bioinformatics
- Imam Mohammad Ibn Saud Islamic University
- University of Lausanne Switzerland
- Northern Border University
- Princess Nourah Bint Abdulrahman University
- King Abdulaziz University

Ongoing projects

- Investigating the role of circulating miRNA associated with triple-negative breast cancer in Saudi women.
- Reanalysis of Next Generation Sequencing (NGS) data of unsolved cases for inherited diseases.
- Genetic characterization of syndromic and nonsyndromic retinal dystrophies in the Saudi population.
- Elucidation of Genetic Differences Underlying Congenital Structural Heart Defects with a Particular Focus on Ventricular Septal Defects (VSD) and tetralogy of Fallot (ToF) in Saudi Arabia.
- Genetic etiology of lethal birth defects.
- TRPV4 Channel Modulator as a drug Candidate for Cystic Fibrosis.
- New molecular dynamic insights into NPHS2 mutations in children with Nephrotic Syndrome or Insilco
- Drug. Response Studies in Nephrotic Syndrome Children.
- Tracing De Novo Metabolites Produced by Fungal Co-culture from Diabetic Lower Limb Wounds.
- The Role of KCa Channels in Respiratory Diseases.





The Molecular and Translational Research Department is one of the divisions under the Biomedical Research Administration that promotes and encourages R2 researchers to develop and conduct innovative biomedical research initiatives either in basic medical science or translational medical research.



There are three research laboratories located on the fourth floor of the Faculty of Medicine. These laboratories are fully equipped with state-of-the-art equipment/instruments to provide an outstanding healthy and safe environment of support for researchers to conduct their research. The Molecular lab (MC020-4) is dedicated mainly to infectious disease research and is equipped with Genetic Sequencer, Flouro-Spectrophotometry, as well as Real-Time and conventional Polymerase Chain Reaction techniques.

The Biochemistry (MC018-4) and General lab (MC019-4) are equipped with cutting-edge technologies such as atomic absorption Spectroscopy, ultrahigh-performance liquid chromatography, high-performance liquid chromatography, Analytical Flow Cytometry, Agilent Technologies Cary 60 UV-Vis, as well as Enzyme-Linked Immunosorbent Assay (ELISA) and protein purification equipment. Our laboratories are also equipped with all necessary and updated supplementary equipment such as; shaker incubator, refrigerated and unrefrigerated centrifuges, vortexes, cell counter, water bath and dry incubator shakers ...etc. Our labs also house entirely isolated 2 cell culture facilities that are equipped to conduct any molecular and cell biology procedures.



Core facilities

- To translate basic biomedical research into clinical science and knowledge.
- To conduct and support all biomedical research projects and educational activities.

Achieved Performance Indicators

- 8 Published papers in medical journals.
- 13 translational studies funded by IRF and fully initiated by Biomedical Laboratory staff.
- More than 35 ongoing translational research projects are being conducted at the research labs.
- 11 Translational research awareness campaigns for residents (Half day research activities).
- 76 Trainees/Volunteers from different national institutions.
- Organized the 2nd Translational Research Summer Course



Agreement and Collaborations

Signed 3 MTA agreements

**OXFORD
UNIVERSITY**

Comparative system serology profiling of the humoral immune response between MERS-CoV infected and ChAdOx1 vaccinated individuals



**QATAR
UNIVERSITY**

Towards a pan-coronavirus vaccine: Exploring broadly neutralizing anti-coronavirus antibodies in MERS-Co-V following COVID-19 infection and vaccination



**GUANGZHOU
UNIVERSITY**

A 10 years long-lived cellular and humoral MERS-CoV immunity cross-recognizing SARS-CoV-2: a potential one-way MERS-CoV cross-protection towards a pan-coronavirus vaccine.



National and International Collaborations



Ongoing department projects

No.	Primary-Investigator	Study Title
1	Dr. Deema Fallatha	Origin, prevalence, and virulence of BKV genotypes among post-Bone Marrow Transplant (BMT) recipients in Saudi Arabia.
2	Dr. Fawziya Barnawi	Humoral and Cellular Immune Durability of Different COVID-19 Vaccine Platforms Following Homologous/Heterologous Boosters: One-Year Post Vaccination.
3	Dr. Saad Alamri	Expression signature and prognostic relevance of immune checkpoint molecules in human papillomavirus-driven cancers
4	Dr. Reham Alahmadi	Molecular genotyping and gene profiling associated with the immunopathology of noncervical HPV-related cancers
5	Mr. Haitham Alkadi	Identification of Potential Liver Cancer Biomarkers in Diabetic Patients through Investigation of Biological Effects of Advanced Glycation End Products on Cancer Cell Surface and Cytoplasmic Protein Expression
6	Dr. Maaweya Elaeed	Human Papillomavirus-Associated Cervical Cancer and Immune Escape: The Role of the Tumor Microenvironment Transcriptome in Patients' Prognosis and Disease Progression
7	Dr. Maaweya Elaeed	Impact and association of hematological factors and genetic disorders among asymptomatic individuals infected with blood-borne viruses (HBV, HCV, and HIV) and risk factors in Saudi Arabia: A multi-year large national study
8	Dr. Bandar Alosaimi	Design of an Epitope-Based Peptide Viral Vaccine Candidate Using Reverse Vaccinology Approach; Preclinical evaluation of efficacy, immunogenicity, and safety in an animal model
9	Hadel Alsaran	The role of the tumor microenvironment transcriptome of redox genes in Hepatitis Virus-Associated Hepatocellular Carcinoma (HCC)
10	Mr. Haitham Alkadi	Effects of advanced glycation end-products on human colorectal adenocarcinoma HT29 and metastatic SW620 cell lines
11	Dr. Saad Alamri	Determining molecular evidence for a causal suspect role of Mouse Mammary Tumor Virus (MMTV) in human breast cancer using transcriptomic expressions of viral oncogenes and their effect on human tumor suppressor genes.
12	Dr. Bandar Alosaimi	Development of a Novel Peptide-Based Viral Vaccine Candidate Using Reverse Vaccinology and Computational Immuno-Bioinformatics: Preclinical Evaluation of Efficacy, Immunogenicity and Safety in Vitro and Animal Model
13	Mr Abdullah Alanazi	Expression profiling and prognostic utility of autophagy-related genes and proteins in Epstein–Barr virus-associated malignancies



New infrastructure

Introducing new research lab platforms:

- Renewal of two software's annual licenses we have at our data analysis room: (1) sequencer (lifetime license); (2) Prism (annual); (3) Biorender (annual).
- Materials Online Database: Integrated research materials such as chemicals, reagents, and kits in one online database.
- Hematopoietic stem cells (HSC) isolation (Procedure): Operating and calibrating the flow cytometry machine.
- Ingenuity pathway analysis (IPA) software: IPA Quotation and Training.
- ELISpot technique and Peripheral blood mononuclear cell (PBMC) isolation protocol.
- Installation of Water purification system: NOVA EU10 Laboratory Ultra-Pure Water.
- Adding new supplementary instruments to our labs:
 - _ Purchased: Shaker incubator, Micro-centrifuge, nanodrop and PH meter.
 - _ Equipment upgrade: the following equipment were requested to be upgraded such as: Fragment Analyzer System, Thermal Cycler, Spectrophotometer, Inverted Microscope, and FACS Caliber.

Capacity building

We have several ongoing capacity-building projects that aim to enhance the skills and capabilities of the staff in the Molecular and Translational Research Department. These projects cover a wide range of areas, including scientific research, supervision, and technical expertise.

• Supervising PhD and Master Students:

Currently, we are supervising 5 exceptional Ph.D. students and one Master's student who are conducting cutting-edge research in disease mechanisms, host-pathogen interactions, vaccine development, antiviral strategies, molecular diagnostics and biomarkers, tumor microenvironment, and cancer immunity signaling pathways. These students receive scientific training, and mentorship from our experienced staff, and have access to state-of-the-art research facilities. Through close supervision and guidance, our goal is to develop their research skills, foster critical scientific thinking abilities, and expand their advanced knowledge. We aim to prepare them to become future scientists in the biomedical field and to make a positive impact on society.

• Research Project Funding (IRF):

We have successfully secured funding for 13 research projects. These projects cover a range of subjects and address critical challenges and emerging areas in the molecular and translational field.

• Research, Development and Innovation Authority (RDIA):

Recently, we have submitted 4 research projects to the RDIA. These projects are the result of our staff's hard work to improve our understanding of infectious diseases and cancers and develop new strategies for diagnosis and treatment.

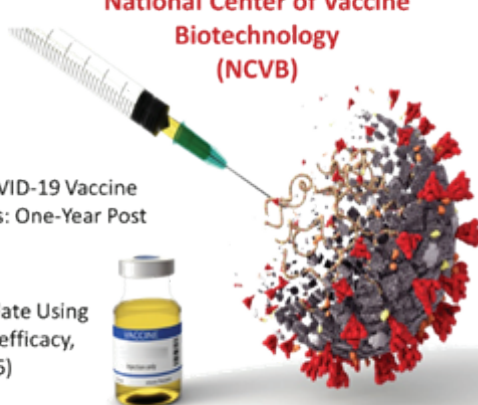
1. Vaccine biotechnology initiative

The establishment of a National Center for Vaccine Biotechnology

We started the process with 3 IRF projects

- Evaluation of Seasonal Influenza Vaccine's Clinical Effectiveness and mismatch with Circulating Strains in Saudi Arabia (IRF 021-003)
- Humoral and Cellular Immune Durability of Different COVID-19 Vaccine Platforms Following Homologous/Heterologous Boosters: One-Year Post Vaccination (IRF 022-032)
- Design of an Epitope-Based Peptide Viral Vaccine Candidate Using Reverse Vaccinology Approach; Preclinical evaluation of efficacy, immunogenicity and safety in animal model (IRF 022-006)

National Center of Vaccine Biotechnology (NCVB)

An illustration showing a glass vial with a yellow liquid and a syringe with a green plunger. To the right is a large, complex, spherical virus particle with red and grey components. The syringe is positioned as if it is about to inject the virus particle.

2. Virology Journal Club

The Journal Club activity is one of the activities under the Virology and Vaccine Biotechnology Research Group. The group purpose is to connect R2 experts to conduct clinical and translational research on all aspects of infectious diseases research including viral immunology, vaccinology and viral oncology. This activity was conducted 6 times during 2023. The speaker presents a published paper on viral host interaction, emerging and reemerging infectious diseases, biotechnology and vaccine development, and molecular studies on virus evolution.

3. R2 Half-Day Research Activity

We started the activity from 2023/06/01 to 2023/10/25 and repeated the activity 11 times. It was attended by 191 residents across R2. Residency programs included Anesthesia, Pediatrics, Radiology, General Surgery, Plastic and Reconstructive Surgery, Family Medicine, internal Medicine, Palliative care, oncology, hematology, and radiation oncology programs. Residents attended in person from KFMC and via zoom from other R2 components such as Prince Mohammed bin Abdulaziz Hospital, Alyamamah, and Alzolfi Hospital.

Conferences and external training

Dr Bandar Alosaimi presented at the 42nd Annual Meeting of the American Society for Virology (ASV) June 2023, 28 – 24 in Athens, Gorgias, USA.

Genomic and precision Medicine Research Department

The Genomic and precision medicine Research Department and Saudi Human Genome Satellite Lab at KFMC are focused on combining biological and translational research in genomics. Specifically focused on studying mechanisms for cancers, predisposition to familial cancer syndromes, monogenic disorders, complex disorders, and developing clinical genomic tests for KFMC patients using cutting-edge tools with the highest quality standards. The Genomic and precision medicine Research Department is focused on combining biological and translational research in genomic medicine to deliver tailored treatment informed by genetic/molecular profile data, and to develop targeted gene therapy.

Core facilities

- To create the foundation for personalized medicine in the kingdom to accelerate the pace of healthcare innovation
- To build a Saudi human genome database for disease prediction and prevention.
- To build infrastructure and capacity in the rapidly advancing field of genomics and precision medicine.
- To create a knowledge base of gene variants, both normal and disease-causing to build more effective therapeutic strategies.
- Apply integrated multi-omics research approach (Genomics, Transcriptomic, Proteomics, and Metabolomics) to accelerated cancer biomarkers discovery.

Achieved Performance Indicators

- 13 IRB-approved genomic and drug delivery studies.
- Around 11 projects are funded from either KFMC internal research fund or as part of collaborative funded research projects with different institutions including KSU, PNU, and KACST.
- 8 papers were published in high-impact factor journals in collaboration of different national and international collaboration.
- Wide network of local, national, and international scientific collaborations. This include collaboration with KSU, PNU, King Abdullah University of Science and Technology, King Khaled Eye Specialist Hospital, King Faisal Specialist Hospital & Research Center, Albaha University, and Pfizer (Ireland).
- More than 21 junior researchers and trainees including Residents and fellows trained to date.
- Supervised MSc and future PhD projects.
- Around 8 research projects that serve and support the service line and models of care.
- Won a quality project award, King Fahad Medical City.
- Involved in educational lectures, awareness activities, and workshops in genomics and drug discovery.
- Provided one-to-one consultation to individuals from R2 and other local entities.
- Lead the scientific committee for the 18th Annual Conference of King Fahad Medical City, Riyadh Second Health Cluster.



Ongoing projects

- Development of different anti Tyrosine Kinase Receptors for the treatment of different type of cancer.
- The use of a novel peptide to deliver cytotoxic molecules to tumor sites.
- Study the Effects of Fisetin on Gene Expression and DNA Methylation of Cancer-Related Genes in Different Colorectal Cancer Cell Lines
- The Role of hnRNP proteins in AML.
- The Genetic Landscape of Neuroblastoma in Saudi Arabia
- Solidified self-nanoemulsifying drug delivery system of cabozantinib malate for the treatment of hepatocellular carcinoma.
- Investigating the function and regulation of Genetic Suppressor Element 1 (GSE-1) with histone deacetylase I (HDAC1) in hepatocellular carcinoma.
- Emerging Health Threat from Multidrug-Resistant *Acinetobacter baumannii* in the Riyadh Region, Saudi Arabia.
- Role of Human Cytomegalovirus (HCMV) in the carcinogenesis of high-grade gliomas and Medulloblastoma as a therapeutic target.
- Multidrug-Resistant *Staphylococcus Capitis*: An Emerging Challenge in Clinical Settings Found in Adult Patients in Saudi Arabia.
- Prevalence of Medulloblastoma tumors adults VS children in Saudi Arabia.
- The concurrence of pituitary adenoma among MS patients at KFMC.
- Identification of S100A4 Binding Partners in AML.

Highlighted Publications

- Awadalla ME, Alkadi H, Alarjani M, Al-Anazi AE, Ibrahim MA, ALOhali TA, Enani M, Alturaiki W, Alosaimi B. Moderately Low Effectiveness of the Influenza Quadrivalent Vaccine: Potential Mismatch between Circulating Strains and Vaccine Strains. *Vaccines*. 2023 May 10;50(6):11;31.

Abstract

The annual seasonal influenza vaccination is the most effective way of preventing influenza illness and hospitalization. However, the effectiveness of influenza vaccines has always been controversial. Therefore, we investigated the ability of the quadrivalent influenza vaccine to induce effective protection. Here we report strain-specific influenza vaccine effectiveness (VE) against laboratory-confirmed influenza cases during the 2020/2019 season, characterized by the co-circulation of four different influenza strains. During 778, 2020–2019 influenza-like illness (ILI) samples were collected from (39%) 302 vaccinated ILI patients and (61%) 476 unvaccinated ILI patients in Riyadh, Saudi Arabia. VE was found to be 28% and 22% for influenza A and B, respectively. VE for preventing A(H3N2) and A(H1N1) pdm09 illness was 37.4% (95% CI: 54.3–43.7) and 39.2% (95% CI: 28.9–21.1), respectively. The VE for preventing influenza B Victoria lineage illness was 71.7% (95% CI: –3–0.9), while the VE for the Yamagata lineage could not be estimated due to the limited number of positive cases. The overall vaccine effectiveness was moderately low at 39.7%. Phylogenetic analysis revealed that most of the Flu A genotypes in our dataset clustered together, indicating their close genetic relatedness. In the post-COVID-19 pandemic, flu B-positive cases have reached three-quarters of the total number of influenza-positive cases, indicating a nationwide flu B surge. The reasons for this phenomenon, if related to the quadrivalent flu VE, need to be explored. Annual monitoring and genetic characterization of circulating influenza viruses are important to support Influenza surveillance systems and to improve influenza vaccine effectiveness.

- Marar S, Hamza MA, Ayyash M, Abu-Shaheen A. Development and validation of an instrument to assess the knowledge and perceptions of predatory journals. *Heliyon*. 2023 Nov (11)9;1.

Abstract

Objective: The main aim of this study is to develop a valid and reliable instrument to assess levels of knowledge and perceptions of predatory journals. **Methods:** The current study employed successive methods framework including (1) item generation through a literature review and theoretical framework development, (2) validity testing in terms of face, content, and construct validity for perceptions construct as well as item analysis for knowledge scale, and (3) reliability testing in terms of Cronbach's alpha, Kuder-Richardson (KR-20), item-to-total correlations, corrected item-to-total correlations, Cronbach's alpha if item deleted, and test-retest reliability. A total of 304 participants were recruited from King Fahad Medical City (KFMC) in Riyadh, Saudi Arabia to evaluate its construct validity and reliability. This was established using exploratory factor analysis (EFA) with principal axis factoring (PFA) and varimax rotation as well as confirmatory factor analysis (CFA) for perception construct. **Results:** An instrument was developed from this study called the "Predatory Journals KP Assessment Questionnaire". The results of EFA and CFA confirmed the construct validity of the perception construct. Item analysis confirmed the construct validity of the knowledge scale. The internal consistency and test-retest reliability were achieved for the knowledge scale items, consisting of 13 items. The results of EFA confirmed the measured constructs of perceptions toward predatory journals. The results of EFA and CFA for perception construct resulted in only one factor with 9 items. **Conclusion:** This study has successfully developed a valid and reliable questionnaire to measure knowledge and perceptions of predatory journals among researchers in the clinical and health disciplines. This instrument serves as a valuable guide for future studies that aim to assess researcher's knowledge and perceptions about predatory journals and examine the differences in these measured constructs according to their demographic and professional characteristics.

- Louis NE, Hamza MA, Engku Baharuddin PN, Chandran S, Latif NA, Alonazi MA, Jamalis J, Warsy A, Amran SI. Assessing the structural dynamics of the glucose-6-phosphate dehydrogenase dimer interface using molecular dynamics simulation and ligand screening using computer-aided drug discovery. *Molecular Simulation*. 2024 Jan 74-63:(1)50;2.

Abstract

Glucose-6-phosphate-dehydrogenase deficiency is the most common enzymopathy. Current therapies for G6PD deficiency are unable to treat a broad range of pathogenic variants. In this study, we assess the structural dynamics of six G6PD variants using molecular dynamics simulation to correlate their genotypic and phenotypic attributes. G6PD multimerization is highly influenced by its ligands G6P and NADP, where the former disrupts dimer formation, and the latter facilitates tetramerization. Results of our simulation demonstrate that the WT and a relatively stable variant (G131V), were found to have greater NADP binding occupancy and hydrogen bonds between β N sheet of each monomeric subunit, thereby increasing the stability of the dimer interface. G6PD protein structures with high structural integrity at the dimer interface were found to be compact, characterized by low radius of gyration values, and increased surface area or high solvent-accessible surface area at the tetramer salt bridge residues. Using mutational clustering methods, a critical G6PD region at the β K- β L loop was identified and may serve as a potential target for treatment. We further extend this study to identify chemical compounds that induce modulatory effects on the protein using computer-aided drug discovery which warrant further studies and future testing.

- Al-Anazi AE, Alanazi BS, Alshanbari HM, Masuadi E, Hamed ME, Dandachi I, Alkathiri A, Hanif A, Nour I, Fatani H, Alsaran H. Increased Prevalence of EBV Infection in Nasopharyngeal Carcinoma Patients: A Six-Year Cross-Sectional Study. *Cancers*. 2023 Jan 643:(3)15;19.

Abstract

Epstein Barr Virus (EBV) is implicated in the carcinogenesis of nasopharyngeal carcinoma (NPC) and currently associated with at least 1% of global cancers. The differential prognosis analysis of NPC in EBV genotypes remains to be elucidated. Medical, radiological, pathological, and laboratory reports of 146 NPC patients were collected retrospectively over a 6-year period between 2015 and 2020. From the pathology archives, DNA was extracted from tumor blocks and used for EBV nuclear antigen 3C (EBNA-3C) genotyping by nested polymerase chain reaction (PCR). We found a high prevalence of 96% of EBV infection in NPC patients with a predominance of genotype I detected in 73% of NPC samples. Histopathological examination showed that most of the NPC patients were in the advanced stages of cancer: stage III (38,4%) or stage IV-B (37,7%). Only keratinized squamous cell carcinoma was significantly higher in EBV-negative NPC patients compared with those who were EBV-positive (OR = 95, 0,01CI = (0,32–0,004; p = 0,009)), whereas the majority of patients (91,8%) had undifferentiated, non-keratinizing squamous cell carcinoma, followed by differentiated, non-keratinizing squamous cell carcinoma (7,5%). Although NPC had metastasized to 16% of other body sites, it was not associated with EBV infection, except for lung metastasis. A statistically significant reverse association was observed between EBV infection and lung metastasis (OR = 95, 0,07CI = (0,51–0,01; p = 0,008)). Although 13% of NPC patients died, the overall survival (OS) mean time was 5,59 years. Given the high prevalence of EBV-associated NPC in our population, Saudi could be considered as an area with a high incidence of EBV-associated NPC with a predominance of EBV genotype I. A future multi-center study with a larger sample size is needed to assess the true burden of EBV-associated NPC in Saudi Arabia.



- Alakbaree M, Abdulsalam AH, Ahmed HH, Ali FH, Al-Hili A, Omar MS, Alonazi M, Jamalis J, Ab Latif N, Hamza MA, Amran SI. A computational study of structural analysis of Class I human glucose-6-phosphate dehydrogenase (G6PD) variants: Elaborating the correlation to chronic non-spherocytic hemolytic anemia (CNSHA). *Computational biology and chemistry*. 2023 Jun 104:107873 ;1.

Abstract

Glucose-6-phosphate dehydrogenase (G6PD) deficiency is the most common human enzyme defect that affects more than 500 million people worldwide. Individuals affected with G6PD deficiency may occasionally suffer mild-to-severe chronic hemolytic anemia. Chronic non-spherocytic hemolytic anemia (CNSHA) is a potential result of the Class I G6PD variants. This comparative computational study attempted to correct the defect in variants structure by docking the AG1 molecule to selected Class I G6PD variants [G6PDNashville (Arg393His), G6PDAlhambra (Val394Leu), and G6PDDurham (Lys238Arg)] at the dimer interface and structural NADP⁺ binding site. It was followed by an analysis of the enzyme conformations before and after binding to the AG1 molecule using the molecular dynamics simulation (MDS) approach, while the severity of CNSHA was determined via root-mean-square deviation (RMSD), root-mean-square fluctuation (RMSF), hydrogen bonds, salt bridges, radius of gyration (Rg), solvent accessible surface area analysis (SASA), and principal component analysis (PCA). The results revealed that G6PDNashville (Arg393His) and G6PDDurham (Lys238Arg) had lost the direct contact with structural NADP⁺ and salt bridges at Glu419 - Arg427 and Glu206 - Lys407 were disrupted in all selected variants. Furthermore, the AG1 molecule re-stabilized the enzyme structure by restoring the missing interactions. Bioinformatics approaches were also used to conduct a detailed structural analysis of the G6PD enzyme at a molecular level to understand the implications of these variants toward enzyme function. Our findings suggest that despite the lack of treatment for G6PDD to date, AG1 remains a novel molecule that promotes activation in a variety of G6PD variants.

- Alyami A, AlJurayyan A, Alosaimi B, Alkadi H, Alkhulaifi F, Al-jurayb H, Osman A, Christmas S, Alomar S, Al-Bayati Z. The correlation between soluble human leukocyte antigen (sHLA-G) levels and+ 3010 polymorphism. *International Journal of Immunogenetics*. 2024 Feb;46-39:(1)51.

Abstract

Human leukocyte Antigen-G (HLA-G) is classified as non-classical HLA, located in the short arm of chromosome 6 and composed of seven introns and eight exons. The HLA-G gene has a lower frequency polymorphism in the coding area and higher variability at the regulatory 5' - and 3' -untranslated regions linked to HLA-G microRNA regulation. HLA-G molecule is known to have an immunomodulatory and tolerogenic features role. In 199 Saudi individuals, we examined the association between plasma soluble HLA-G (sHLA-G) levels and eight polymorphic different sites, including 14 bp ins/del/+3003T-C/+3010C-G/+3027C-A/+3035C-T/+3142C-G/+3187A-G/+3196C-G single nucleotide polymorphisms (SNPs) in exon 8 in the HLA-G gene. Our results revealed higher frequency for rs17179101C (%97), rs1707T (%92) and rs9380142A (%73) alleles. Greater frequencies for the tested genotypes were observed in 3027C/C (rs17179101) (%93), 14 bp (rs1704) ins/del (%92), +3003T/T (rs1707) (%85) and +3035C/T (rs17179108) (%79) SNP genotypes. Moreover, we observed a significant association of sHLA-G with +3010G/C (rs1710) SNP. In conclusion, we showed a significant association between 3010G/C (rs1710) SNP and the sHLA-G level among our sample for Saudi populations. Our findings demonstrated that specific SNP within the HLA-G gene is linked to sHLA-G molecule secretion, suggesting sHLA-G levels may be regulated genetically.

- Yusuf A, Almotairy ARZ, Henidi H, Alshehri OY, Aldughaim MS. Nanoparticles as Drug Delivery Systems: A Review of the Implication of Nanoparticles' Physicochemical Properties on Responses in Biological Systems. *Polymers (Basel)*. 2023 Mar 15;15(7):23.

Abstract

In the last four decades, nanotechnology has gained momentum with no sign of slowing down. The application of inventions or products from nanotechnology has revolutionized all aspects of everyday life ranging from medical applications to its impact on the food industry. Nanoparticles have made it possible to significantly extend the shelf lives of food product, improve intracellular delivery of hydrophobic drugs and improve the efficacy of specific therapeutics such as anticancer agents. As a consequence, nanotechnology has not only impacted the global standard of living but has also impacted the global economy. In this review, the characteristics of nanoparticles that confers them with suitable and potentially toxic biological effects, as well as their applications in different biological fields and nanoparticle-based drugs and delivery systems in biomedicine including nano-based drugs currently approved by the U.S. Food and Drug Administration (FDA) are discussed. The possible consequence of continuous exposure to nanoparticles due to the increased use of nanotechnology and possible solution is also highlighted.

- Ghida M. Murished, Iman Dandachi and Waleed Aljabr. Side effects of COVID-19 vaccines in the middle eastern population *Front. Immunol.*, 03 November 2023Sec. Vaccines and Molecular Therapeutics Volume 2023 - 14

Abstract

The COVID-19 pandemic has caused severe worldwide health concerns since its first description as the SARS-COV-2 virus in December 2019. The wide dissemination of this virus, together with the lack of treatment, prompted vaccine development within a short period of time to elicit a protective immunity against COVID-19. Due to their rapid development, potential subsequent side effects of COVID-19 vaccines were overlooked, which might lead to many health concerns. This is especially true for patients at a greater risk of harm from COVID-19, such as pregnant women, children, and patients with pre-existing chronic diseases. In this review, we provide a summary of common to rare side effects of administrated COVID-19 vaccines in a Middle Eastern population. We have found that the distinction between side effects from COVID-19 vaccines in terms of frequency and severity is attributed to the differences in study populations, gender, and age. Pain at the injection site, fever, headache, fatigue, and muscle pain were the most common reported side effects. Vaccinated subjects with previous COVID-19 infection exhibited an equivalent neutralizing response after just one dose compared to two doses of vaccine. Consequently, individuals who experienced more side effects had significantly higher antibody levels. This indicates that having better immunity correlates with higher antibody levels, leading to a higher frequency of vaccine side effects. Individuals with underlying comorbidities, particularly having known allergies and with illnesses such as diabetes and cancer, might be more prone to post-vaccination side effects. Studies of a high-risk population in Middle Eastern countries are limited. Future studies should be considered to determine long-term side effects, side effects after booster doses, and side effect differences in cases of heterologous and homologous vaccination for better understanding and proper handling of high-risk populations and patients who experience these side effects.



- Al-Shehri, Amal, Saleh, Ahmed, Khan, Mohammad Aatif, Dandachi, Iman; AlJabr, Waleed Prevalence of Common Respiratory Viruses in Children at a Tertiary Care Hospital in Saudi Arabia. The Pediatric Infectious Disease Journal

Abstract

Acute lower respiratory viral infections are significant contributors to morbidity/mortality in children less than 2 years of age. In this retrospective study conducted at a major hospital, between 2017 and 2019, it was observed that rhinovirus, respiratory-syncytial-virus and influenza virus are the most frequently detected with the seasonal distribution. Mortality rate was significantly higher in children less than 12 months and significantly increased in males and in those requiring intubation. To date, lower respiratory infections (LRTIs) remain one of the main causes of death in children.¹ LRTIs can present as bronchiolitis, croup, exacerbations of wheezing or asthma as well as pneumonia;² with most of these latter being of viral origin.³ The most common viruses implicated in LRTIs in children include influenza A/B, parainfluenza virus, adenovirus and respiratory-syncytial-virus (RSV).³ Although most infected children with acute LRTIs fully recover, a subset develop chronic respiratory symptoms.¹ However, mild disease can be managed with supportive treatment; moderate and severe cases need hospital admission. Depending on climatic conditions, season, geographical location as well as demographic patterns and the country's health care system, the degree of involvement of each respiratory virus in the annual disease outbreaks varies.⁴ Despite the significance of viral LRTIs, little is known about the epidemiology of different respiratory viruses in Saudi children. The aim of this study is thus to explore the viral etiology of LRTIs in children less than 2 years of age, who were admitted to the emergency pediatric unit of a major tertiary care center in Riyadh, Saudi Arabia.

- Bader Y Alhatlani, Waleed Aljabr, Fatimah S Alhamlan, Ahmad Almatroudi, Mohd Azam, Mansour Alsaleem & Khaled S Allemailem. Identification of host factors that bind to the 5' end of the MERS-CoV RNA genome. FUTURE VIROLOGYVOL Journal, Published Online:22 May 2023<https://doi.org/10.2217/fvl-0070-2023>

Abstract

Objective: The aim of this study was to identify host factors that interact with the 5' end of the MERS-CoV RNA genome. **Methods:** RNA affinity chromatography followed by mass spectrometry analysis was used to identify the binding of host factors in Vero E6 cells. **Results:** A total of 59 host factors that bound the MERS-CoV RNA genome in non-infected Vero E6 cells were identified. Most of the identified cellular proteins were previously reported to interact with the genome of other RNA viruses. We validated our mass spectrometry results using western blotting. **Conclusion:** These data enhance our knowledge about the RNA–host interactions of coronaviruses, which could serve as targets for developing antiviral therapeutics against MERS-CoV.



- Ali H. Aldoukhi, Panayiotis Bilalis, Dana M. Alhattab, Alexander U. Valle-Pérez, Hepi H. Susapto, Rosario Pérez-Pedroza, Emiliano Backhoff-García, Sarah M. Alsawaf, Salwa Alshehri, Hattan Boshah, Abdulelah A. Alrashoudi, Waleed A. Aljabr, Manal Alaamery, May Alrashed, Rana M. Hasanato, Raed A. Farzan, Roua A. Alsubki, Manola Moretti, Malak S. Abedalthagafi, and Charlotte A. E. Hauser. using Peptide Epitopes for Advanced Multiplex Serological Testing for SARS-CoV-2 Antibody Detection. *ACS Bio Med Chem Au* ,1 ,4 ,2024 52–37 Publication Date: August 2023 ,30

Abstract

The tragic COVID-19 pandemic, which has seen a total of 655 million cases worldwide and a death toll of over 6,6 million seems finally tailing off. Even so, new variants of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) continue to arise, the severity of which cannot be predicted in advance. This is concerning for the maintenance and stability of public health, since immune evasion and increased transmissibility may arise. Therefore, it is crucial to continue monitoring antibody responses to SARS-CoV-2 in the general population. As a complement to polymerase chain reaction tests, multiplex immunoassays are elegant tools that use individual protein or peptide antigens simultaneously to provide a high level of sensitivity and specificity. To further improve these aspects of SARS-CoV-2 antibody detection, as well as accuracy, we have developed an advanced serological peptide-based multiplex assay using antigen-fused peptide epitopes derived from both the spike and the nucleocapsid proteins. The significance of the epitopes selected for antibody detection has been verified by *in silico* molecular docking simulations between the peptide epitopes and reported SARS-CoV-2 antibodies. Peptides can be more easily and quickly modified and synthesized than full-length proteins and can, therefore, be used in a more cost-effective manner. Three different fusion-epitope peptides (FEPs) were synthesized and tested by enzyme-linked immunosorbent assay (ELISA). A total of 145 blood serum samples were used, comprising 110 COVID-19 serum samples from COVID-19 patients and 35 negative control serum samples taken from COVID-19-free individuals before the outbreak. Interestingly, our data demonstrate that the sensitivity, specificity, and accuracy of the results for the FEP antigens are higher than for single peptide epitopes or mixtures of single peptide epitopes. Our FEP concept can be applied to different multiplex immunoassays testing not only for SARS-CoV-2 but also for various other pathogens. A significantly improved peptide-based serological assay may support the development of commercial point-of-care tests, such as lateral-flow-assays.



Biomedical Research Administration Expertise

Name	Position	Specialization Area Keywords			
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Dr. Bandar AIOsaimi (balosaimi@kfmc.med.sa)	Chairperson, Research Laboratory Department	Virology	Molecular Biology	Sequencing	Biotechnology
Dr. Maaweya Elaeed Hamed Awad Alla (mawadalla@kfmc.med.sa)	Senior Clinical Research Specialist	Virology	Immunology	Vaccinology	Molecular Biology
Ms. Hadeel Alsaran (halsaran@kfmc.med.sa)	Clinical Research Specialist	Molecular Biology	Hepatitis	Flow Cytometry	Western Blotting
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Dr. Nawal S. Alshammari (nalshammari@kfmc.med.sa)	Chairperson, Genomics Research Department	Genetic oncology	Genetic oncology Neuro-oncology and bioinformatics	Translation medicine	
Dr. Leen AbuSafieh (lsafieh@kfmc.med.sa)	Clinical Research Consultant	Molecular Genetics	Inherited genetic disorders	Next Generation Sequencing NGS	Ocular Genomics
Dr. Bader Alanazi (bsalanazi@kfmc.med.sa)	Senior Clinical Research Specialist	Cancer genetics	Specialized in utilizing an integrative multi-omics platforms	Genetics, Genomics Transcriptomic	Personalized medicine
Dr. Mohammed AIDhugaim (maldugaim@kfmc.med.sa)	Clinical Research Consultant	Tumors Targeted Therapeutics	Drug Delivery Systems	Cellular and Molecular Medicine	Drug Discovery
Afnan Alsharm (aalsharm@kfmc.med.sa)	Research specialist II	Biotechnology & Genome	DNA and RNA extraction and quantification, cell culture techniques	Biomedical Science	Genomics
Ms. Ebtehal A. Alsolm (ealsolme@kfmc.med.sa)	Clinical Research Specialist	Molecular genetics	Biomedical Science	NGS platform, NGS bioinformatics, Tissue culture	Personalized medicine
Dr. Ali A. AlFaiz (aalfaiz@kfmc.med.sa)	Chairperson, Bioinformatics and Computational Biology Department	Bioinformatics	Next Generation Sequencing NGS Data analysis	Omics	High-Performance Computing (HPC)
Dr. Dalia Alghamdi (daaalghamdi@kfmc.med.sa)	Clinical Research Specialist	Bioinformatics	Genomic standards	Biobank knowledge engineering	Genomics data federation

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