الجمعية تحت إشراف
الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

SAUDI SOCIETY FOR CLINICAL CHEMISTRY
الجمعية السعودية للكيمياء السريرية

18 CME ACCREDITED

ABSTRACT BOOK

7TH INTERNATIONAL MEETING
ON CLINICAL CHEMISTRY AND LABORATORY MEDICINE

11TH ANNUAL CONFERENCE
SAUDI SOCIETY FOR CLINICAL CHEMISTRY

1~3 DEC, 2025

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CROWNE PLAZA,
RIYADH RDC

INTRODUCTION AND WELCOME

A message from the President of the Saudi Society for Clinical Chemistry

Dr. Anwar Abdullah Borai, PhD, FAACC, FIBMS, MLS (ASCP)

Dear Colleagues,

It is our great pleasure to welcome you to the 7 th International Meeting in Clinical Chemistry & Laboratory Medicine and the 11th Annual Meeting of the Saudi Society for Clinical Chemistry (SSCC), taking place from December 1–3, 2025, Crown Plaza RDC, Riyadh.

This comprehensive event features a robust educational and scientific program, complemented by focused industry workshops. It is strategically designed to meet the advanced professional development needs of laboratory professionals specializing in Clinical Chemistry, Toxicology, Laboratory Leadership, Laboratory Management, and Clinical Chemistry Board Programs.

The scientific agenda features leading experts from the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), the United States, Ireland, Lebanon, Turkey, the Middle East, and Saudi Arabia, who will share the latest research, innovations, and best practices. Attendees will have a unique opportunity to listen to, network with, and learn from experts and peers in the field.

The program highlights include:

- ✓ Pre-conference workshops on Newborn Screening and Metabolic Disorders, Diagnostic Toxicology, and Point-of-Care Testing.
- ✓ Keynote presentations covering critical updates in quality control, quality indicators, and diabetic management.
- ✓ Dedicated sessions for Young Scientists and poster presentations.
- ✓ Industry workshops showcasing the newest technologies.

This meeting serves as a vital platform for knowledge sharing and collaboration, enabling laboratory workers to advance their professional capabilities and develop practical solutions for daily laboratory practice.

On behalf of the SSCC, we extend our sincere gratitude to the Saudi Commission for Health Specialties, our esteemed speakers, moderators, and all participating sponsors for their essential contributions.

We wish you a highly successful and productive meeting.

INTRODUCTION AND WELCOME

A message from the Chairman of The Scientific committee of the Saudi Society for Clinical Chemistry

Dr. Salam Mohammed Saadeddin, PhD, MT (ASCP)

We are delighted to welcome you at the SSCC 7th International Meeting in Clinical Chemistry & Laboratory Medicine and the 11th Annual Meeting in Riyadh from December 1 through December 3, 2025. The scientific committee for the conference is eager to create a stimulating scientific agenda that covers the most important trends and innovations in laboratory clinical chemistry and patient care.

The fundamental goal of the conference has been to enhance medical knowledge in clinical chemistry through a carefully structured system of scientific education. The scientific committee worked hard to create an amazing, challenging and inspiring program. A scientific program addressing the present and future developments in clinical chemistry, emerging Lab technologies, updated diagnostic technologies, discussion of health issues, and contemporary quality applications. Attendees will enjoy an amazing scientific program.

The titles and speakers of the sessions are displayed and will cover the themes of; Newborn screening/Metabolic Disorders, Diagnostic Toxicology, Updates in Point of Care Testing (POCT), Artificial Intelligence in Clinical Laboratories, Lab Accreditation, Population Health Management, New Biochemical Markers, Updates in the Preanalytical Phase, and Updates in Clinical Laboratory.

The conference will provide the attendees opportunity to make significant improvements, refresh their scientific knowledge with excellent experience, and build new personal ties within the area and the world via sharing of experiences, information, and skills. Also, the conference will promote the development of clinical chemistry and laboratory medicine. We sincerely hope you will have the opportunity to exchange experiences, to network, and to participate in the most cutting-edge research in clinical laboratory medicine.

All our international and national participants attending our conference will undoubtedly have a rewarding and memorable experience.

MANAGEMENT BOARD FOR SAUDI SOCIETY FOR CLINICAL CHEMISTRY

2025 -2029

Prof. Anwar Borai, *Jeddah, KSA*	President (*SSCC representative to IFCC)*
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Prof. Anwar Borai	Member
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Dr. Zaed Asiri	Member

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Dr. Hatoon Alamri	Dr. Amani Gusti

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Prof. Ghada M.A. Ajabnoor	Dr. Heba Kary

SCIENTIFIC SPEAKERS - WORKSHOP

DR. AHMED AL FARIS, *King Faisal Specialist Hospital and Research Centre, Riyadh, KSA*

DR. ABDULLAH AL SHEHRY, *King Fahad Medical City, Riyadh*

PROF. MOHAMMED ELSAMMAK, *Temple Street University Children Hospital, Dublin, Ireland*

MR. ABDULRAFIQ KHAN, *National Guard Health Affair, Riyadh, KSA*

DR. SEHAM ALAMEER, *King Abdulaziz Medical City- Western Region, Jeddah, KSA*

DR. SAIF AL HARTHI, *King Abdulaziz University, Jeddah, KSA*

DR TORKI ZUGHABI, *King Abdulaziz University, Jeddah, KSA*

DR AHMED AL-ASMARI, *AL Faisal University, Riyadh, KSA*

MS. SALMA ALSAYED, *Prince Mohammed Bin Abdul-Aziz Hospital, Al-Madinah al-Munawwara*

PROF. ADIL KHAN, *Temple University -USA*

DR. MALAK ALMASHALI, *Prince Sultan Military Medical City, Riyadh, KSA*

DR SULTAN AL HAMMADI, *King Fahad Medical City, Riyadh, KSA*

DR. DUAA ALAHDAL *King Abdullah bin Abdulaziz University Hospital, Riyadh, KSA*

DR. CHRISTIAN HADDAD, *Arab Federation of Clinical Biology, Lebanon*

SCIENTIFIC SPEAKERS DAY #1

DR. ABDURRAHMAN COSKUN, *IFCC / Acibadem University School of Medicine, Turkey*

DR. LAILA ABDEL-WARETH, *Acting Executive Director, National Reference Lab/Cleveland Clinic, Abu Dhabi, UAE*

DR. OLA ELGADDAR. *Fakeeh Care group, Jeddah, KSA*

DR. AMANI GUSTI, *King Fahd Armed forces Hospital, Jeddah, KSA*

PROF. ADIL KHAN, *Temple University -USA*

DR. FUAD AL DAYEL, *King Faisal Specialist Hospital and Research Centre, Riyadh, KSA*

MR. MOHAMMED AL GHAMDI, *Saudi Accreditation Center, Riyadh, KSA*

DR. SULTAN AL ONAIZ, *Saudi Commission for Health Specialties, Riyadh, KSA*

SCIENTIFIC SPEAKERS DAY #2

DR. RAED ALDAHASH, *National Guard Health Affair, Riyadh, KSA*

DR. SAUD AL DUBAYAN, *Enigma Genomics, Dammam, KSA*

DR. MANAR SAMMAN, *Ministry of Health, Riyadh, KSA*

DR. MOHAMMED. HABBAB, *Council of Health Insurance, Riyadh, KSA*

DR. NOURAH ALKHALDI, *King Fahad Military Medical Complex, Dharan, KSA*

DR. SUMAYAH ALJENEDIL, *King Faisal Specialist Hospital and Research Centre, Riyadh, KSA*

DR. ZAED ASIRI, Medical *Services for Ministry of Defense, Riyadh, KSA*

DR. MYRNA GERMANOS, *Arab Federation of Clinical Biology / Lebanese Syndicate of Clinical Pathologists, Lebanon*

DR. NAFILAH AL RIYAMI, *Sultan Qaboos University Hospital, Oman*

MR. ABOBAKER YAGOOT, *King Abdulaziz Medical City, Jeddah, KSA*

Dr. MOHAMMED ALMANNAI, *National Guard Health Affair, Riyadh, KSA*

Prof. RANA HASANATO, *King Saud University Medical City, Riyadh, KSA*

DR. ABDULHADI BIMA, *King Abdul-Aziz University Hospital, Jeddah, KSA*

MODERATORS

DR. ALI AL OTHAIM, *Deputy Chairman Laboratory Operations, KAMC, MNGHA, Riyadh, KSA*

DR. AHMED AL-ASMARI, *President of Saudi Scientific Working Group for Forensic Toxicology, King Abdul-Aziz Hospital, Jeddah, KSA*

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Prof. WALEED AL TAMIMI, *Head of Toxicology/Clinical Chemistry, Department of Pathology & Laboratory Medicine, KAMC, MNGHA, Riyadh, KSA*

DR. ALI M AL-SHANGITI, *Immunology Consultant / SSCC Board Member*

DR. SALAM SAADEDDIN, *SSCC Chairman of the Scientific Committee and Administrative Board Member*

INDUSTRY WORKSHOP SPEAKERS

MR. OMAR ALANSARI, *Abbott*

MR. AHMED SHEHATA, *Head of Product Management, Beckman Coulter*

DUSANKA KASAPIC, *Medical Affairs Lead, Roche Diagnostics Int*

MR. SAMEH MOHARRAM, *POCT Cardiac Marketing Lead for MEA at Siemens Healthineers*

IPEK CINAROGLU, Medical Affairs *Manager Middle East and Turkey "ME&T", Specimen Management*

SCIENTIFIC PROGRAM

Day 1 Schedule - PRE-CONFERENCE WORKSHOP
Monday, 1st December 2025

TIME	TOPICS	SPEAKER
08:00 am – 09:00 am	Registration	
SESSION #1 – NEWBORN SCREENING/METABOLIC DISORDERS Moderator: Dr. Ali Al Othaim		
09:00 am – 09:20am	Next-generation metabolic screening" (NGMS)	Dr. Ahmed Al Faris *KFSH&RC, Riyadh*
09:20 am – 09:40 am	Newborn Screening of Lysosomal Storage Disorders: Advances in DBS-Based Biomarkers	Dr. Abdullah Al Shehry *KFMC, Riyadh*
09:40 am – 10:00 am	Irish perspective and international comparison of NBS program	Prof. Mohammed Elsammak *NNBLS, Ireland*
10:00 am – 10:10 am	Questions and Answers	
10:10 am – 10:25 am	Coffee Break	
10:25 am – 10:45 am	Organic Acid Analysis in Urine Samples by Different Methods	Mr. Abdulrafiq Khan *MNGHA, Riyadh*
10:45 am – 11:05 am	Next Generation Sequencing Versus Biochemical Testing: An integrated approach	Dr. Seham Al Ameer *MNG-HA, Jeddah*
11:05 am – 11:25 am	Questions and Answers	
11:25 am – 12:40 am	Lunch and Prayers	
SESSION #2 - DIAGNOSTIC TOXICOLOGY Moderator: Dr. Ahmad Al Asmary		
12:40 pm – 01:00 pm	The Clinical and Diagnostic Implications of PFAS Exposure in Healthcare Setting: A Focus on Biomonitoring and Patient Management	Dr. Saif Al Harthi *KAU, Jeddah*
01:00 pm – 01:20 pm	Direct Analysis in Real Time (DART) Application in Forensic Toxicology	Dr Torki Zughabi *KAU, Jeddah*
01:20 pm – 01:40 pm	Applications of High-Resolution Mass Spectrometry in Non-Targeted and Targeted Analysis	Dr Ahmed Al-Asmari & Mr Eid Alenazi *(KFSH -Riyadh)*
01:40 pm – 02:00 pm	Accreditation in Workplace Drug Testing: Ensuring Excellence in Forensic Toxicology Practices	Ms. Salma Alsayed *(PMBAH-Al Madinah)*
02:00 pm – 02:10 pm	Questions and Answers	
02:10 pm – 02:25 pm	Coffee Break	
SESSION #3 - UPDATES IN POINT OF CARE TESTING (POCT) Moderators: Dr. Malak Almashali & Dr. Duaa Al Ahdal		
02:25 pm – 02:45 pm	How Point- of- care testing can Bridge the Disparity Gap in Health Care	Prof. Adil Khan *Temple University, USA*
02:45 pm – 03:05 pm	Transforming POCT Workflow Through Smart Connectivity	Mr. George Saad Roman *(Siemens)*
03:05 pm – 03:25 pm	Development of POCT for New and Emerging Infectious Diseases	Dr Sultan Al Hammadi *KFMC, Riyadh*
03:25 pm – 03:45 pm	Clinical Utilization of POCT-PLGF in Preeclampsia	Dr. Duaa AlAhdal *KAAUH, Riyadh*
03:45 pm – 04:05 pm	POCT implementation targets and challenges	Dr. Christian Haddad *AFCB, Lebanon*
04:05 pm – 04:15 pm	Questions and Answers	

SCIENTIFIC PROGRAM

DAY 2 Schedule - CONFERENCE
Tuesday, 2nd December 2025

TIME	TOPICS	SPEAKER
8:00 am	Registration	
SESSION #4 - ARTIFICIAL INTELLIGENCE IN CLINICAL LABORATORIES Moderators: Dr. Ola Elgaddar & Dr. Amani Gusti		
09:00 am – 09:20 am	The Growing Role of AI in the Clinical Laboratory	Dr. Layla AbdelWareth *NRL, UAE*
09:20 am – 09:40 am	Lab Medicine and ChatGPT: Reliability Trust Debate	Dr. Ola Elgaddar *FCG, Jeddah, KSA*
09:40 am – 10:00 am	Machine Learning for Enhancing Quality in Laboratory Testing: Towards a Smarter and More Reliable Lab	Dr. Amani Gusti *KFAFH, Jeddah*
10:00 am – 10:20 am	Data to Diagnostics: The AI-powered Clinical Chemistry Lab	Prof. Adil Khan *Temple University, USA*
10:20 am – 10:30 am	Questions and Answers	
10:30 am – 10:45 am	Coffee Break	
SESSION #5 - OPENING SESSION Moderator: DR. Abdullah Al Meshary		
10:45 am – 10:50 am	Introductory Remarks	Prof. Anwar Al Borai *President, SSCC*
10:50 am – 10:55 am	Arab Federation of Clinical Biology Remarks	Dr. Christian Haddad *President- AFCB*
10:55 am – 11:40 am	Keynote lecture "Measurement Uncertainty: A Unifying Tool for Laboratory Harmonization"	Prof. Abdurrahman Coskun *IFCC, Turkey*
11:40 am – 11:45 am	Questions and Answers	
SESSION #6 - YOUNG INVESTIGATOR PRESENTATIONS Moderators: Prof. Khalid Al Harbi, Dr. Abdulrahman Al Suliman. (Evaluators: Prof. Mohammed Elsammak & Prof. Suhad Bahijri)		
11:45 am – 12:00 pm	Interference of Thyroglobulin Antibodies with Thyroglobulin Levels by Immunoassay in Patients with Thyroid Cancer	Sarah Aljunidel *MNGHA - Riyadh*
12:00 am – 12:15 pm	Optimization and Validation of Delta Check in the Auto-Verification at King Fahad Medical City	Hadi Kuriri *KFMC – Riyadh*
12:15 am – 12:30 pm	Comparative In-Silico Docking and ADME Profiling of Vitamin D And Its Analogs with Key Metabolic Proteins	Alfaf Albar *KAU - Jeddah*
12:15 pm – 01:30 pm	Lunch and Prayers	
SESSION #7 - LAB ACCREDITATION Moderators: Dr. Nashat Nafouri & Dr. Zaed Asiri		
01:30 pm – 01:50 pm	Quality Management System	Dr. Fuad Al Dayel, *KFSH, Riyadh*
01:50 pm – 02:10 pm	Fundamental Principles Elevate the Laboratory to a new level of quality	Mr. Mohammed Al Ghamdi *Saudi Accreditation Center*
02:10 pm – 02:30 pm	SCFHS Program Accreditation	Sultan Al Enezi, *SCFHS, Riyadh*
02:30 pm – 02:50 pm	Questions and Answers	
02:50 pm – 03:00 pm	Coffee Break	
SESSION #8 - INDUSTRY WORKSHOP Moderators:		
03:00 pm – 03:20pm	Revolutionizing Diagnostics: The New Era of Clinical Chemistry & Immunoassay solutions	Mr. Ahmed Shehata *(BECKMAN COULTER)*
03:20 pm – 03:40 pm	How to improve patient care by AI in the lab	Dr. Yaser Al Shaikh *(ABBOTT)*
03:40 pm – 04:00 pm	Clinical Application of Mass Spectrometry: The expanding role of mass spectrometry in endocrinology	Mr. Dusanka Kasapic *(ROCHE)*
04:00 pm – 04:20 pm	Emergency department Preanalytical challenges	Ms. Ipek Cinaroglu *(BD)*
04:20 pm – 04:40 pm	Biomarkers in Renal Health: A New Era in CKD Management	Mr. Ahmed Elbarbary *(Siemens)*
04:40 pm – 05:00 pm	Questions and Answers	
08:00 am – 04:00 pm	Visiting Exhibition & Poster Viewing (Poster presenters will be available from 01:30 pm to 02:00 pm to answer questions related to their posters)	

SCIENTIFIC PROGRAM

DAY 3 Schedule - CONFERENCE
Wednesday, 3rd December 2025

TIME	TOPICS	SPEAKER
8:00 am	Registration	
SESSION #9 - POPULATION HEALTH MANAGEMENT Moderator: Dr. Abdulhadi Bema		
09:00 am – 09:20 am	Precision Prevention: Multi-Omics Screening of Chronic Diseases at the Population Level	Dr. Saud Al Dubayan *(Enigma Genomics- Dammam)*
09:20 am – 09:40 am	2030 Vision Regarding Laboratory Medicine	Dr. Manar Samman *(MOH-HSSH - Riyadh)*
09:40 am – 10:00 am	Council of Health Insurance Accreditation Standards	Dr. Mohammed. Habbab *(CHI- Riyadh)*
10:00 am – 10:20 am	Type I Diabetes Screening: Benefit or Burden	Dr. Hisham Shamas *(Delta Medical Laboratories)*
10:20 am – 10:30 am	Questions and Answers	
10:30 am – 10:40 am	Coffee Break	
SESSION #10 - Keynote lecture (2) Moderator: Prof. Waleed Al Tamimi		
10:40 am – 11:25 am	Keynote lecture (2): Diabetic Management from Clinician Perspective	Dr. Raed Aldahash *(MNGHA – Riyadh)*
11:25 am – 11:30 am	Questions and Answers	
SESSION #11 – NEW BIOCHEMICAL MARKERS Moderators: Dr. Waleed Al Omaim and Dr. Zuhir Awan		
11:30 am – 11:50 am	Traumatic Brain Injury biomarkers	Dr. Nourah Alkhaldi *(KFMMC, Dharan)*
11:50 am – 12:10 am	Beyond LDL: Unmasking the Atherogenic Power of Lipoprotein(a)	Dr. Sumayah Aljenedil *(KFSH, Riyadh)*
12:10 am – 12:30 am	Innovative Aβ1-42 Detection: Aptamer-Based Electrochemical Technology for Alzheimer's	Dr. Zaed Asiri *(MSD, Riyadh)*
12:30 am – 12:35 am	Questions and Answers	
12:35 pm – 01:35 pm	Lunch and Prayers	
SESSION #12 - UPDATES IN THE PREANALYTICAL PHASE Moderator: Prof. Waleed Al Tamimi		
11:20 am – 11:40am	Preanalytical variables in Coagulation Tests	Dr. Myrna Germanos *(AFCB, Lebanon)*
11:40 am – 12:00 pm	Preanalytical factors affecting Common Biochemical Assays: an overview	Dr. Nafilah Al Riyami *(SQUH, Oman)*
12:00 pm – 12:20 pm	Digitalizing Pre Analytical to Enhance Efficiency and Sample Traceability for Clinical Lab Excellence	Mr. Abobaker Yagoot *(MNGHA, Jeddah)*
12:20 pm – 12:30 pm	Questions and Answers	
12:30 pm – 01:30 pm	Coffee Break and Prayers	
SESSION #13 - UPDATES IN CLINICAL LABORATORY Moderator: Dr. Ali Shangiti		
01:30 pm – 01:50 pm	Low ALP: A silent Signal of Hypophosphatasia	Dr. Mohammed Almannai *(NGH, Riyadh)*
01:50 pm – 02:10 pm	Achieving Sustainability Through Automation	Prof. Rana Hasanato *(KSU, Riyadh)*
02:10 pm – 02:30 pm	When Fat Matters: How Obesity Alters Lab Results	Dr. Abdulhadi Bima *(KAU, Jeddah)*
02:30 pm – 02:40 pm	Questions and Answers	
SESSION #14 - GENERAL EVENTS Moderators: Dr. Salam Saadeddin and Dr. Ali Al Othaim		
02:40 pm – 03:00 pm	General Assembly	Prof. Anwar Al Borai *(SSCC, President)*
03:00 pm – 03:20 pm	Awards Presentation	Dr Salam Saadeddin *(SSCC, Chairman of the Scientific Committee)*
03:20 pm – 03:40 pm	*Lucky Draw for Attendees*	Panel members
03:40 pm – 03:50 pm	Sponsor Appreciation	Dr. Ali Shangiti *(SSCC, Chairman Corporate Taskforce Committee)*
03:50 pm – 04:00 pm	Closing	Prof. Anwar Al Borai *(SSCC, President)*
08:00 am – 01:30 pm	Visiting Exhibition & Poster Viewing Poster presenters will be available from 01:30 pm to 02:00 pm to answer questions related to their posters	

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. AHMED AL FARES
Deputy Executive Director, Centre for Genomic Medicine
King Faisal Specialist Hospital and Research Centre
Riyadh, KSA

NEXT-GENERATION METABOLIC SCREENING (NGMS)

Next-generation metabolic screening (NGMS) is transforming newborn screening by integrating advanced technologies such as high-resolution mass spectrometry and genomics. Unlike conventional approaches limited to predefined panels, NGMS enables simultaneous, comprehensive analysis of metabolic profiles, uncovering both known and novel disorders. This presentation will explore the principles of NGMS, its potential to enhance diagnostic accuracy and early intervention, and the challenges of implementation, including data interpretation, cost, and ethical considerations.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. ABDULLAH AL SHEHRI
Section Head, Clinical Biochemistry, Biochemical Genetics & Toxicology
Pathological and Clinical Laboratory Medicine Administration (PCLMA)
King Fahad Medical City
Riyadh, KSA

NEWBORN SCREENING OF LYSOSOMAL STORAGE DISORDERS: ADVANCES IN DBS-BASED BIOMARKERS

Lysosomal storage diseases (LSDs) are a group of inherited metabolic disorders caused by deficiencies in specific lysosomal enzymes, transmembrane proteins, or transport proteins leading to the accumulation of undegraded substrates and progressive cellular damage. LSDs are individually rare or ultra-rare conditions, with a collective incidence of approximately 1 in 5,000 live births. Early identification through newborn screening (NBS) is crucial, as timely intervention can significantly improve clinical outcomes and reduce long-term disease burden. Recent advances in mass spectrometry, and optimized enzymatic assays have enhanced the sensitivity, specificity, and multiplexing capabilities of biochemical screening for LSDs.

This presentation highlights recent progress in DBS-based biomarkers and discuss the translation of emerging research into validated screening panels. Practical considerations, including analytical validation, quality control, and ethical challenges in the context of population screening, will be addressed. Additionally, the feasibility of implementing LSDs screening programs in the Kingdom of Saudi Arabia (KSA) will be highlighted.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

PROF. MOHAMMED ELSAMMAK
Director of the Irish National screening Laboratory, Dublin, republic of Ireland
Temple street University Children Hospital
Dublin, Ireland

IRISH PERSPECTIVE AND INTERNATIONAL COMPARISON OF NBS PROGRAM

The Irish National Newborn Screening Program has achieved major progress in the past decade, evolving from screening nine to eleven disorders, including six metabolic conditions (PKU, galactosaemia, MSUD, HCU, GA-I, MCADD) and three non-metabolic disorders (CF, CHT, ADA-SCID). Recent approvals have extended testing to full SCID and spinal muscular atrophy. Guided by the Wilson and Jungner criteria, the inclusion of new disorders follows a structured national process involving open calls, Health Technology Assessment and National Screening Advisory Committee (NSAC) approval NSAC. This presentation compares Ireland's performance and disorder panel with European programs, highlighting potential expansion to include lysosomal storage diseases (LSDs) such as Pompe, Gaucher, Fabry, Hurler (MPS-I), and metachromatic leukodystrophy (MLD). Advances in methodology—particularly tandem mass spectrometry (MS/MS) and digital microfluidics fluorometry—have enabled high-throughput, multiplex enzyme assays on dried blood spots.

Emerging gene therapy and enzyme-replacement options further support the inclusion of treatable LSDs. Despite the promise of molecular next-generation sequencing (NGS) in NBS, challenges remain in variant interpretation, cost, and automation. Ireland's evolving NBS program demonstrates strong diagnostic accuracy and readiness to adopt new technologies, reflecting a balanced, evidence-based approach aligned with international best practices.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. ABDULRAFIQ KHAN
Supervisor, Biochemical Metabolic Laboratory
Ministry of National Guard Health Affairs
Riyadh, KSA

ORGANIC ACID ANALYSIS IN URINE SAMPLES BY DIFFERENT METHOD AND INSTRUMENTS

Organic acids (OA) are water-soluble compounds with one or more carboxyl groups along with other keto or hydroxyl functional groups. OA are intermediates of a large number of biochemical pathways and elevation of specific OAs is due to defect in certain metabolic pathway because of low or diminished enzyme activity. Broad range of metabolic disorders including inborn error of metabolism in amino acids, fatty acid, vitamins, neurotransmitters, sterol, carbohydrate, mitochondrial energy, purine and pyrimidine metabolism are detected by organic acid analysis (UOA).

Early testing and diagnosis play significant role in prevention of irreversible damage, diagnosis and follow up of remarkable newborn screening results. Gas chromatography mass spectrometry (GC-MS) has been used as a gold standard method with well-defined sample preparation and interpretation of results. Recently several other analytical techniques such as liquid chromatography tandem mass spectrometry (LCMSMS), gas chromatography tandem mass spectrometry (GCMSMS) and high-resolution quadrupole time of flight platforms have been utilized to improve the workflow, turnaround time, increase number of molecules detected as well as qualitative results. This presentation will summarize different analytical techniques and software used for UOA, interpretation guideline, most common technical problems and challenges.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SIHAM ABDULKARIM ALAMIR
Consultant Inborn Error of Metabolism
King Abdulaziz Medical City- Western Region
Jeddah, KSA

NEXT GENERATION SEQUENCING VERSUS BIOCHEMICAL TESTING: AN INTEGRATED APPROACH

Advancements in molecular diagnostics have revolutionized the landscape of genetic and metabolic disease evaluation. My talk explores the complementary roles of Next Generation Sequencing (NGS) and traditional biochemical testing in clinical diagnostics. While NGS offers high-throughput, detailed insights into genomic variations, biochemical testing remains essential for functional assessment and real-time metabolic profiling. The presentation will highlight the strengths and limitations of each modality, case-based scenarios illustrating diagnostic challenges, and how an integrated approach can improve diagnostic accuracy, guide treatment decisions, and optimize patient outcomes. Emphasis will be placed on when and how to combine both methods to achieve a cost-effective and clinically relevant workflow in personalized medicine.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SAIF ABDULLAH TURKI ALHARTHI
Assistant Professor of Toxicology and Clinical Chemistry
Department of Medical Laboratory Sciences, Faculty of Applied Medical Sciences
King Abdulaziz University
Jeddah, KSA

THE CLINICAL AND DIAGNOSTIC IMPLICATIONS OF PFAS EXPOSURE IN HEALTHCARE SETTING: A FOCUS ON BIOMONITORING AND PATIENT MANAGEMENT

Per- and polyfluoroalkyl substances (PFAS) are a group of persistent synthetic chemicals with widespread environmental and occupational exposure, increasingly recognized as a public health concern. In healthcare settings, exposure to PFAS can occur through contaminated water, medical devices, and occupational contact, posing potential risks to both patients and healthcare workers. This session explores the clinical and diagnostic implications of PFAS exposure, emphasizing its relevance to chronic disease risk, endocrine disruption, immunotoxicity, and cancer development. Special attention will be given to biomonitoring strategies, including serum PFAS quantification and interpretation of exposure biomarkers, as well as current diagnostic guidelines for at-risk populations. Evidence-based patient management approaches will be discussed, focusing on exposure mitigation, risk communication, and integration of PFAS-related considerations into routine clinical practice. By bridging toxicology, diagnostics, and patient care, this session aims to equip healthcare professionals with the knowledge and tools necessary for effective detection, assessment, and management of PFAS-related health risks.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. TORKI ZUGHAIBI
Associate Professor (Forensic Science)
Faculty of Applied Medical Sciences, Department of Medical Laboratory Sciences
King Abdul Aziz University
Jeddah, KSA

DIRECT ANALYSIS IN REAL TIME (DART) APPLICATION IN FORENSIC TOXICOLOGY

Forensic toxicology plays a critical role in criminal justice and public health by identifying and quantifying drugs, toxins, and their metabolites in biological samples. Traditional analytical methods, while robust, often involve extensive sample preparation and can be time-consuming. Direct Analysis in Real Time (DART) is an ambient ionization technique that offers a rapid, high-throughput alternative. This workshop will provide a comprehensive overview of DART's application in forensic toxicology. We will explore the fundamental principles of DART-mass spectrometry (MS), its advantages over conventional methods, and its specific applications, including the rapid screening of a wide range of illicit and prescription drugs, new psychoactive substances (NPS), and other toxicants directly from various matrices such as blood, urine, and hair. Case studies will be presented to illustrate the practical utility of DART in real-world forensic investigations, demonstrating its potential to streamline workflows, reduce turnaround times, and enhance the efficiency of forensic laboratories.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

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Riyadh, KSA

High-resolution mass spectrometry (HR-MS) underpins modern forensic toxicology by enabling both targeted and non-targeted analysis of drugs, metabolites, and emerging new psychoactive substances (NPS). This presentation focuses on how Q-TOF and Orbitrap platforms are applied across the toxicology workflow—from broad screening to confirmation and structural elucidation.

Targeted applications exploit accurate mass measurements, narrow retention-time windows, and ion-ratio criteria to verify identity, quantify analytes, and differentiate critical isomers. Non-targeted workflows use data-independent acquisition and high-resolution full-scan data to flag unexpected peaks, mine spectral libraries, and support elemental composition and structure proposals when reference standards are unavailable.

Case examples illustrate the added value of HR-MS in resolving co-elution, clarifying ambiguous GC-MS or LC-MS/MS findings, and integrating with FTIR and NMR for court-defensible interpretations. Practical aspects, including instrument settings, data handling, and in-house library curation are discussed in the context of routine casework and early-warning systems.

Overall, the session demonstrates how HR-MS provides a scalable, high-throughput, and scientifically robust platform that strengthens both targeted confirmation and non-targeted discovery in contemporary forensic toxicology across diverse forensic matrices.

Keywords: High resolution, LC/MS/MS, Forensic, Toxicology.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

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Prince Mohammed Bin Abdul-Aziz Hospital, Ministry of National Guard Health Affairs
Al-Madinah Al-Munawwarah, KSA

ACCREDITATION IN WORKPLACE DRUG TESTING: ENSURING EXCELLENCE IN FORENSIC TOXICOLOGY PRACTICES

Workplace drug testing is a cornerstone of occupational health, public safety, and organizational accountability. The credibility of results in forensic toxicology laboratories depends on strict compliance with accreditation requirements that encompass international standards, national regulatory frameworks, and professional guidelines. Accreditation ensures technical reliability, legal defensibility, and ethical responsibility across the testing process.

Core elements include comprehensive method validation and verification, quality control, chain of custody, proficiency testing, staff training and competency, documentation, and robust quality management systems. Adherence to these requirements enhances transparency, reinforces stakeholder confidence, and safeguards against procedural or analytical errors that could compromise both scientific validity and legal outcomes.

Integrating accreditation across workplace drug testing programs supports continuous improvement and sustainability in laboratory practice. By embedding rigorous quality assurance processes and aligning with forensic toxicology accreditation standards, laboratories uphold excellence, ensure defensible results, and contribute to safer and more accountable workplaces.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

PROF. ADIL KHAN
Professor of Pathology & Medical Director of POCT and Clinical Chemistry
Temple University
Philadelphia, USA

HOW POINT- OF- CARE TESTING CAN BRIDGE THE DISPARITY GAP IN HEALTH CARE

Point-of-care testing (POCT) is one of the fastest growing areas of the diagnostic industry. The ease at which tests can be done and results obtained, the lack of reliance on hospital infrastructure, are some of the advantages that have accelerated their use by both healthcare workers and by the general public. Their use by physicians in rural areas helps them in monitoring and treating patients with chronic diseases who are unable to go to larger urban center hospitals for check-ups. However, technologically, POCT devices are very sophisticated using the principles of physics and chemistry in their detection of specific analytes. Therefore, education is important in their use because being laboratory tests, they are still vulnerable to pre-analytical, analytical and post-analytical errors. Understanding these aspects is key in providing good patient care based upon quality results. This presentation will provide an overview of the how point-of-care testing can be used to provide quality healthcare to the community the physician's serves.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

MR. GEORGE SAAD ROMAN
Product Manager for Point-of-Care (POC) and informatics
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POCT IN EMERGENCY DEPARTMENTS: RAPID RESPONSE TOOLS

Point-of-Care Testing (POCT) devices are integral to enhancing the diagnostic efficiency within emergency departments. POCT facilitates immediate testing at the patient's bedside, thereby minimizing diagnostic turnaround times, which is critical for time-sensitive emergency interventions. Key POCT modalities include glucose monitoring for glycemic control, troponin assays for myocardial infarction detection, and blood gas analysis for assessing respiratory status etc. The implementation of POCT has been shown to improve patient outcomes by expediting therapeutic decisions, which correlates with higher patient satisfaction scores. Additionally, it streamlines clinical workflows, thereby increasing physician satisfaction and operational efficacy. However, the deployment of POCT faces challenges such as ensuring analytical accuracy, maintaining rigorous quality control, and compliance with regulatory frameworks. Successful POCT programs have reported reduced hospital lengths of stay and decreased mortality rates. Regulatory adherence is essential to ensure the safety, efficacy, and reliability of POCT devices, thereby upholding the integrity of emergency care delivery.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SULTAN ALHAMMADI
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Riyadh, KSA

DEVELOPMENT OF POCT FOR NEW AND EMERGING INFECTIOUS DISEASES

The ongoing threat of new and emerging infectious diseases underscores the urgent need for effective point-of-care testing (POCT) solutions that enable rapid diagnosis and timely public health response. A focus on the development of innovative POCT methodologies designed to address emerging pathogens, emphasizing their capacity for swift detection directly at the site of care. A new technology that emerged recently will help to overcome this issue such as POCT with real time PCR which provide rapid results without the need for complex laboratory infrastructure. Case studies of recent outbreaks, such as those caused by SARS-CoV-2 and Ebola, shows the effectiveness of these POCT systems in enhancing clinical management and controlling disease spread. Furthermore, in addition, POCT can help on the data analysis to support real-time surveillance and decision-making. POCT in strengthening global health security and preparedness for future infectious diseases.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. DUAA MOHAMMED ALAHDAL
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PREECLAMPSIA - (PLACENTAL GROWTH FACTOR - PLGF)

Background: Preeclampsia remains a leading cause of maternal and perinatal morbidity and mortality worldwide. Early and accurate diagnosis is crucial to guide clinical management. Placental Growth Factor (PlGF), an angiogenic biomarker, is significantly reduced in women who develop preeclampsia, reflecting impaired placental vascular development.

Objective: To highlight the role of PlGF measurement through point-of-care testing (POCT) in improving early detection and risk stratification of preeclampsia.

Methods & Technology: Recent POCT platforms allow rapid, bedside quantification of PlGF, either as a single marker or in combination with soluble fms-like tyrosine kinase-1 (sFlt-1). These assays provide results within 15–30 minutes, enabling timely clinical decisions compared to central laboratory methods.

Findings: PlGF-based POCT demonstrates high negative predictive value in ruling out preeclampsia within 1–2 weeks in symptomatic women, thereby reducing unnecessary hospital admissions and improving resource allocation. Furthermore, integration of PlGF POCT with clinical assessment supports risk stratification and monitoring of disease progression.

Conclusion: PlGF POCT represents a promising diagnostic adjunct in obstetric care, offering rapid, reliable, and actionable results. Its adoption may enhance early identification of women at risk of preeclampsia, optimize patient management, and improve maternal–fetal outcomes.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. CHRISTIAN HADDAD
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POINT OF CARE TESTING (POCT): OBJECTIVES AND LIMITATIONS

Point-of-Care Testing (POCT) is rapidly transforming diagnostics by moving testing closer to the patient, enabling faster clinical decisions and improving outcomes, particularly in emergency and resource-limited settings. Unlike traditional centralized laboratories, POCT offers rapid, user-friendly testing with minimal sample preparation and immediate results. Applications span acute care, chronic disease monitoring, infectious disease detection, and home-based testing, supported by advances in biosensors, microfluidics, and mobile health technologies. However, challenges remain in accuracy, operator training, quality assurance, data integration, and equitable access. As healthcare evolves, POCT must be strategically integrated with central laboratories, guided by international standards and robust governance. The global POCT market is projected to grow significantly, reinforcing its role as a cornerstone of future patient-centered healthcare.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

PROF. DR. ABDURRAHMAN COSKUN, MD
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MEASUREMENT UNCERTAINTY: A UNIFYING TOOL FOR LABORATORY HARMONIZATION

Uncertainty is an inseparable part of all types of measurements and therefore no measurement result is perfect. Every measurement involves a certain degree of uncertainty, depending on the measurement conditions. The calculation of measurement uncertainty (MU) requires a detailed analysis of all factors influencing the measurement, and these factors must be considered during MU estimation. MU can be determined using different approaches, most commonly the bottom-up and top-down methods. In the bottom-up approach, all known factors contributing to MU are included using complex statistical models. In contrast, the top-down approach relies primarily on data collected from quality control procedures to estimate MU. In medical laboratories, the top-down approach is more pragmatic and can be applied to almost all measurands. To define acceptable limits for MU, the within-subject biological variation (CVi) of the measurand is often used, and typically the CVi is accepted as the permissible limit for the expanded MU. Accurately calculated MU can serve as a quality indicator for the measurement procedures; however, reporting MU with individual patient results is not recommended.

In modern healthcare systems, patient samples for the same measurands may be analyzed on different instruments and in different laboratories. Consistency among instruments and laboratories plays a crucial role, particularly in the monitoring of patients. When instruments and laboratories are harmonized, they can be regarded as a single instrument or laboratory. As a result, patient samples can be analyzed interchangeably across different instruments and laboratories as if measured on a single platform. Furthermore, the same or similar reference intervals can be applied to all harmonized instruments.

Since MU reflects nearly all types of variations affecting measurement results, it can also be used as a tool for harmonizing instruments and laboratories. For this purpose, the internal quality control (IQC) data of a given measurand, obtained from different instruments and laboratories, should be combined and treated as a single dataset, from which MU is then calculated. If the calculated MU is within the acceptable limit, it can be concluded that all laboratories involved may be considered as operating as a single laboratory, thereby enabling the reporting of harmonized patient test results. Conversely, if the MU calculated from the combined dataset exceeds the acceptable limit, data analysis should be performed separately for each laboratory to identify those that measure differently. These laboratories should then be corrected to achieve harmonization.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. LAILA O. ABDEL-WARETH, MBBCh, FRCPC, FCAP, EMHCA
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THE GROWING ROLE OF AI IN THE CLINICAL LABORATORY

Artificial intelligence (AI) is rapidly transforming clinical pathology, from early rule-based systems to today's advanced machine learning (ML) and deep learning (DL) architectures. This manuscript provides a structured, comprehensive overview of AI in pathology, beginning with fundamental definitions, classifications, and learning paradigms, including supervised, unsupervised, and reinforcement learning. The distinction between generative and non-generative AI is explored in depth, with applications ranging from image classification and biomarker discovery to large language models (LLMs) and generative adversarial networks (GANs) for synthetic data creation. Clinical use cases are presented for both paradigms, highlighting their capabilities, limitations, and performance evaluation. Regulatory and legal considerations are examined, addressing device approval pathways, data protection, patient privacy, and evolving liability frameworks. Ethical dimensions; including bias mitigation, transparency, explainability, and equitable access will be discussed.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. OLA HUSSEIN ELGADDAR
Executive Director of Laboratory Services
Fakeeh Care Group
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LAB MEDICINE AND CHATGPT: RELIABILITY TRUST DEBATE

Artificial intelligence (AI) and large language models such as ChatGPT are rapidly transforming healthcare, including laboratory medicine. Their ability to generate comprehensive explanations, summarize literature, and support education has demonstrated significant potential in enhancing efficiency and accessibility. However, concerns remain about reliability, accuracy, ethical use, and the risks of bias or over-simplification in clinical decision-making. This presentation explores the debate around ChatGPT's role in laboratory medicine, highlighting both opportunities and limitations. It reviews published evidence, ethical implications, and future directions for AI integration in diagnostic workflows, aiming to equip healthcare professionals with a balanced perspective on adopting ChatGPT as a supportive tool rather than a replacement for human expertise.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. AMANI MOHAMMED TAIB GUSTI
Medical Laboratory/Consultant Clinical Biochemistry
King Fahd Armed Forces Hospital-Ministry of Defense Health Services
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MACHINE LEARNING FOR ENHANCING QUALITY IN LABORATORY TESTING: TOWARDS A SMARTER AND MORE RELIABLE LAB

Artificial Intelligence (AI) and Machine Learning (ML) are emerging as powerful tools to advance quality in laboratory medicine. By moving beyond traditional retrospective error detection, ML enables predictive quality control, early anomaly detection, and optimization of workflows that directly enhance patient safety and efficiency. This talk will highlight practical applications of ML in laboratory testing, including predictive QC algorithms, error reduction, and AI-driven process improvements that support Lean and Six Sigma practices. Special emphasis will be placed on integrating AI into current laboratory systems while addressing challenges of data integrity, compliance, and readiness.

Aligned with the Kingdom's Vision 2030 healthcare transformation, this session will present a forward-looking roadmap toward the intelligent laboratory—one that leverages AI to deliver smarter, more reliable, and patient-centered diagnostic services.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

PROF. ADIL KHAN
Professor of Pathology & Medical Director of POCT and Clinical Chemistry
Temple University
Philadelphia, USA

DATA TO DIAGNOSTICS: THE AI-POWERED CLINICAL CHEMISTRY LAB

AI is revolutionizing clinical chemistry by transforming raw data into actionable diagnostics. This session explores how machine learning and intelligent automation are enhancing biomarker interpretation, streamlining lab workflows, and improving diagnostic precision. Real-world applications—from anomaly detection to predictive modelling will be discussed alongside ethical and regulatory considerations. Attendees will gain insights into the operational impact of AI and its role in shaping the future of diagnostic medicine.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

MR. MOHAMMED HAMED ALGHAMDI
Director, Medical Laboratory Accreditation Department
Saudi Accreditation Center
Riyadh, KSA

FUNDAMENTAL PRINCIPLES ELEVATE THE LABORATORY TO A NEW LEVEL OF QUALITY

Medical laboratories play a vital role in patient care, yet their true value depends on the reliability, accuracy, and integrity of their results. This presentation, "Fundamental Principles Elevate the Laboratory to a New Level of Quality," explores how applying key quality principles—such as standardization, critical decision limits, traceability, risk management, and continual improvement—can transform laboratory operations and elevate performance to the next level.

Accreditation with an internationally recognized and well-established standard such as ISO 15189 provides laboratories with the reliability and credibility needed to be recognized as trusted partners in healthcare. By embedding these principles into daily practice, laboratories not only achieve compliance with ISO 15189:2022 but also reinforce confidence among physicians, patients, and decision-makers. The session will showcase practical approaches to integrating quality into routine operations, demonstrating how a strong quality framework enhances performance and safeguards patient safety.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SULTAN R. AL ENEZI
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Saudi Commission for Health Specialties (SCFHS)
Riyadh, KSA

SCFHS PROGRAM ACCREDITATION

"Program Accreditation" provides a comprehensive overview of the accreditation framework established by the Saudi Commission for Health Specialties (SCFHS) for medical training programs, with a particular focus on the Clinical Biochemistry specialty.

Accreditation is a systematic, independent process aimed at ensuring that training programs meet established standards of quality and consistency. Accreditation serves as a mechanism for continuous improvement, helping programs align with international best practices, achieve global recognition, and enhance the quality of healthcare training across Saudi Arabia.

Institutional accreditation highlights the organizational structure and governance required for compliance. It outlines the roles and responsibilities of the Designated Institutional Official (DIO), Program Director, and the Institutional Training Committee (ITC) in maintaining oversight and ensuring adherence to SCFHS standards. Regular internal reviews and effective communication among trainers and trainees are essential to demonstrate a robust quality assurance system.

The program accreditation section delves into the evaluation criteria used to assess the quality and readiness of training programs. These criteria include program governance, training resources, ensuring sufficient clinical rotations, facilities, and case exposure for effective learning.

Programs are classified according to their level of compliance, Fully Accredited Programs, Partially Accredited Programs, or Conditionally Accredited Programs.

The accreditation survey Process involves document reviews, interviews with institutional leaders, program directors, trainers, and trainees, and an evaluation of academic and clinical resources. Reviewers assess the implementation of the CanMEDS competency framework, the alignment of curricula with SCFHS requirements, and the effectiveness of trainee assessments.

Survey teams identify strengths, areas for improvement, and non-compliance with the accreditation standards. The findings then will be summarized in a formal survey report.

Following the review, programs may receive one of several decisions: Full Accreditation (4 years), for programs that meet nearly all standards, Conditional Accreditation (12-24 months) for programs requiring limited improvements, Warning for Freezing (6 months) – if serious deficiencies are found, Freezing or Withdrawal – for continued non-compliance after multiple warnings.

The final section applies these principles specifically to Clinical Chemistry training programs, ensuring alignment with SCFHS curricula and the CanMEDS framework. It emphasizes evidence-based education, structured rotations, and continuous evaluation of both trainees and trainers.

Overall, the presentation underscores accreditation as a vital mechanism for assuring quality, promoting excellence, and maintaining accountability in postgraduate medical education in Saudi Arabia. It demonstrates how rigorous standards, consistent evaluation, and structured governance together foster a culture of continuous improvement within clinical biochemistry and other medical specialties.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. RAED ALDAHASH
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King Abdulaziz Medical City - National Guard Health Affair
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DIABETIC MANAGEMENT FROM CLINICIAN PERSPECTIVE

This presentation provides an extensive update on the contemporary management of type 2 diabetes mellitus (T2DM), emphasizing the growing global and regional burden of the disease and the importance of early, individualized intervention. Rising diabetes prevalence, escalating healthcare expenditures, and substantial morbidity and mortality highlight the urgency of optimized clinical strategies. The presentation reviews core pathophysiological defects of T2DM – including insulin resistance, β-cell dysfunction, impaired incretin effect, and increased hepatic glucose production – which collectively drive disease progression and complications. Evidence from multiple cohort studies demonstrates that delays in treatment intensification are common and strongly associated with poor glycemic outcomes, increased microvascular complications such as retinopathy, and reduced goal attainment.

The talk underscores the value of lifestyle modification, particularly weight loss and increased physical activity, as a foundational intervention for both diabetes prevention and management. Current guidelines from major diabetes associations are summarized, with emphasis on A1C monitoring frequency, the use of continuous glucose monitoring metrics such as Time in Range (TIR), and a patient-centered approach to therapy selection. Pharmacologic updates highlight metformin as first-line therapy, while GLP-1 receptor agonists and SGLT-2 inhibitors are prioritized for patients with cardiovascular disease, chronic kidney disease, or heart failure due to demonstrated outcome benefits. Overall, the presentation advocates for timely, individualized, and proactive therapeutic strategies to improve long-term glycemic control and reduce diabetes-related complications.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SAUD ALDUBAYAN
Founder and Chief Scientific Advisor
Enigma Genomics
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PRECISION PREVENTION: MULTI-OMICS SCREENING OF CHRONIC DISEASES AT THE POPULATION LEVEL

Chronic diseases such as diabetes, heart disease, and cancer are among the leading causes of illness and death worldwide. Conventional prevention strategies often overlook individual differences in genetic and molecular risk. Precision prevention applies multi-omics approaches, genomics, proteomics, metabolomics, and microbiomics, integrated with clinical and lifestyle data to enable early identification of at-risk individuals. At the population level, this strategy allows for accurate risk stratification and tailored interventions, shifting healthcare from a reactive to a proactive model. Multi-omics screening has the potential to reduce the burden of chronic diseases, improve population health outcomes, and create more sustainable healthcare systems.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. MANAR SAMMAN
Executive General Director of Laboratory Operations
Health Services Support Center, Ministry of Health
Riyadh, KSA

2030 VISION REGARDING LABORATORY MEDICINE

Saudi Arabia's Vision 2030 is driving a comprehensive transformation of the healthcare sector, positioning laboratory medicine at the heart of this evolution. Laboratories are no longer limited to diagnostic support; they are becoming strategic enablers of preventive, personalized, and value-based care. This presentation will explore how laboratory medicine contributes to achieving the goals of Vision 2030 through integration, innovation, and localization.

Key themes include:

- Transformation & Integration: Establishing unified laboratory networks and data-driven systems that enhance efficiency, reduce duplication, and strengthen decision-making.
- Localization & Sustainability: Reducing reliance on external testing through national initiatives to localize advanced diagnostics, genomics, and molecular technologies.
- Innovation & Patient-Centered Care: Leveraging digital health, automation, and precision medicine to improve turnaround times, expand accessibility, and personalize care pathways.
- Preparedness & Public Health: Strengthening laboratory operations to ensure resilience during national health challenges such as pandemics and Hajj seasons.

By aligning laboratory medicine with Vision 2030 priorities, Saudi Arabia is redefining the role of laboratories as a cornerstone of a modern, integrated, and patient-focused healthcare system. This talk will highlight current progress, national projects, and the future roadmap for laboratories in supporting the Kingdom's ambitious healthcare transformation.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. MOHAMMED ALI HABBAB, MD, FACP, FACC, FCCP, FACA
Senior Consultant Cardiologist & Electrophysiologist
Riyadh, Saudi Arabia

HEALTHCARE PROVIDER ACCREDITATION BY COUNCIL OF HEALTH INSURANCE

Council of health insurance (CHI) is an independent governmental entity established to oversee the implementation of the Cooperative Health Insurance System. The mission of CHI is to enable accessible, efficient & high-quality healthcare through a transparent and innovative ecosystem that serves beneficiaries, empowers providers, and accommodates for employers. The vision of CHI is to be a catalyst in empowering person-centric & value-based care in the health ecosystem. The Council is mandated to enforce mandatory health insurance, define the groups subject to compulsory coverage, accredit and qualify healthcare service providers to deliver services to beneficiaries, supervise their compliance, and oversee the operation of the NPHIES platform. NPHIES is a unified digital platform in Saudi Arabia that connects healthcare providers, insurance companies, and government entities to manage and exchange health and administrative data securely. The goal of NPHIES is to modernize the healthcare sector by improving efficiency, transparency, and data accuracy.

CHI Healthcare provider accreditation refers to the process for healthcare providers to obtain official accreditation to operate within the Saudi health insurance system. This is achieved by showing compliance with CHI accreditation standards. Requirements include a valid Ministry of Health license, commercial registration, and accreditation from the Saudi Center for Accreditation of Health Facilities (CBAHI). Providers must also meet other conditions, such as having a valid Zakat and Income certificate and paying the annual accreditation fee. Each Healthcare provider accreditation standard is designated an acronym that reflects the name of the chapter followed by the standard number in sequence. The standard statement reflects the quality dimension to be achieved from implementing the standard. The sub-standards follow the standard and compliance with the sub-standards reflects the overall compliance with the standard. The standard's intent explains why we need the standard and how the organization can comply with the standard. Evidence of compliance is reflected by set of documents required from the organization that reflects their compliance with the intent statement and sub-standards. Healthcare provider accreditation od hospitals includes 40 standards and 168 sub standards. The total score of healthcare provider survey is 110, which is obtained from compliance with the sub-standards in the areas of governmental regulations, organizational excellence, learning & sustainability and quality & beneficiary care. Healthcare providers accreditations will be classified according to their achieved score into learning, improving, advanced, outstanding and market leader. All classifications will be published in CHI website with social media.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

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TRAUMATIC BRAIN INJURY BIOMARKERS

Traumatic brain injury (TBI) presents diagnostic and prognostic challenges that extend beyond imaging and clinical assessment. Laboratory medicine has become increasingly important in this domain through the identification and validation of blood-based biomarkers. Biomarkers such as glial fibrillary acidic protein (GFAP), ubiquitin C-terminal hydrolase-L1 (UCH-L1), S100B, can be detected using immunoassays, electrochemiluminescence, and high-sensitivity platforms, allowing quantification of astrocytic, neuronal, and axonal injury. Clinical laboratories play a crucial role in standardizing assays, defining reference intervals, and assessing pre-analytical variables such as sample type (serum vs. plasma), timing of collection, and stability. Despite progress, challenges remain in assay harmonization, cutoff determination for clinical decision-making, and integration into emergency and critical care workflows. The future of laboratory medicine in TBI will likely involve multiplex biomarker panels, integration with clinical algorithms to improve triage, prognostication, and monitoring of secondary brain injury.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. SUMAYAH ALJENEDIL
Medical Biochemist, Consultant
King Faisal Specialist Hospital and Research Center
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BEYOND LDL: UNMASKING THE ATHEROGENIC POWER OF LIPOPROTEIN(A)

While low-density lipoprotein cholesterol (LDL-C) has long been the primary target in atherosclerotic cardiovascular disease (ASCVD) risk reduction, emerging evidence highlights the significant, yet often overlooked, role of lipoprotein(a) [Lp(a)] in residual cardiovascular risk. Lp(a) is a genetically determined lipoprotein particle with pro-atherogenic, pro-inflammatory, and pro-thrombotic properties, independent of LDL-C levels. Elevated Lp(a) is now recognized as a causal and independent risk factor for ASCVD. This presentation explores the pathophysiology of Lp(a), its clinical implications, and its impact across diverse patient populations, including those with premature ASCVD and familial hypercholesterolemia. We will review current methods of Lp(a) measurement, the limitations of standard lipid-lowering therapies in addressing elevated Lp(a), and emerging therapeutic strategies specifically targeting Lp(a) reduction. By shifting focus "beyond LDL," this talk aims to raise awareness of Lp(a) as a critical, yet underappreciated, driver of ASCVD and to underscore the importance of integrating Lp(a) assessment into routine cardiovascular risk stratification and personalized care.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. ZAED AHMED ASIRI
Director of Laboratories
Health Services of the Ministry of Defence (MODHS)
Riyadh, KSA

INNOVATIVE AB1-42 DETECTION: APTAMER-BASED ELECTROCHEMICAL TECHNOLOGY FOR ALZHEIMER'S

Alzheimer's disease is characterized by the accumulation of amyloid-β (Aβ) peptides, particularly $A\beta_{1-42}$, making their sensitive detection essential for early diagnosis and disease monitoring. In this work, we developed an electrochemical aptasensor for $A\beta_{1-42}$ detection using screen-printed carbon electrodes (SPCEs) modified with gold nanoparticles and functionalized with 6-(ferrocenyl)hexanethiol (FcHT). The FcHT layer provided a redox-active and conductive interface that enhanced electron transfer while supporting stable aptamer immobilization with reduced steric hindrance.

The sensor demonstrated a wide dynamic detection range (0.001–1000 pg/mL) with a low detection limit, offering high reproducibility and compatibility with biological matrices. Performance evaluation in spiked serum and cerebrospinal fluid (CSF) samples confirmed reliable signal suppression trends consistent with calibration in buffer. These results highlight the analytical sensitivity, matrix compatibility, and stability advantages provided by FcHT, underscoring its potential in the development of point-of-care diagnostic platforms for Alzheimer's disease.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. MYRNA GERMANOS
President, Lebanese Syndicate of Clinical Pathologists
Co-Vice President of the International Francophone Federation of Medical Biology and Laboratory Medicine
Co-President of the Scientific Committee of the Arab Federation of Clinical Biology
Beirut, Lebanon

PREANALYTICAL VARIABLES IN COAGULATION TESTS

Accurate and reliable coagulation testing is fundamental to the diagnosis and management of bleeding and thrombotic disorders and begins longer before the analytical phase. The preanalytical phase remains a major source of variability and potential error in hemostasis laboratories. This presentation will review key preanalytical factors that influence coagulation assays and may compromise result validity.

Topics will include patient preparation, venipuncture technique, type and ratio of anticoagulant, sample mixing and filling, transport and storage conditions, centrifugation parameters, and time to analysis. The impact of common interferences such as hemolysis, lipemia, and icterus will also be addressed. Current recommendations and guidelines from international bodies (e.g. ISTH) will be discussed to highlight best practices and standardization strategies.

A clear understanding and control of preanalytical variables are essential for ensuring the accuracy, reproducibility, and clinical relevance of coagulation testing. Laboratory professionals play a pivotal role in maintaining quality throughout the preanalytical process to support optimal patient care

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. NAFILA BAZDAWI MOHAMMED AL-RIYAMI
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Muscat, Oman

PREANALYTICAL FACTORS AFFECTING COMMON BIOCHEMICAL ASSAYS: AN OVERVIEW

Pre-analytical factors significantly influence the accuracy and reliability of common biochemical laboratory tests, yet they often remain underappreciated in clinical diagnostics. Past and more recent research highlights how variables such as specimen collection, handling, storage, and timing can cause variability in test outcomes, potentially impacting diagnosis and patient management. This review consolidates the latest findings on the effects of these pre-analytical factors, emphasizing the need for standardized procedures to improve test validity. Understanding and controlling these variables are crucial for enhancing laboratory quality and ensuring optimal patient care.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

MR. ABOBAKER YAGOOT
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King Abdulaziz Medical City
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DIGITALIZING PRE ANALYTICAL TO ENHANCE EFFICIENCY AND SAMPLE TRACEABILITY FOR CLINICAL LAB EXCELLENCE

The pre-analytical phase remains one of the most error-prone yet least digitalized parts of the clinical laboratory workflow. Currently, samples arriving from collection sites often lack critical information such as who collected them, when they were collected, transport duration, and any temperature fluctuations during transit. This lack of visibility affects sample integrity, delays processing, increases manual verification, and results in unnecessary use of biohazard bags and paperwork.

This presentation introduces a digital pre-analytical solution that enables complete traceability from sample collection to laboratory receipt. Using smart digital tools, the system records essential data in real time—collection details, transport conditions, and timestamps—providing laboratories with full visibility before samples even arrive.

By digitizing this critical phase, laboratories can save time during sample receiving, reduce manual handling and errors, and enhance quality assurance. Additionally, the solution supports sustainability by minimizing waste and packaging materials. Overall, it marks a key step toward a more efficient, transparent, and sustainable diagnostic laboratory ecosystem.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. MOHAMMED ALMANNAI
Consultant Genetics and Metabolic
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Riyadh, KSA

LOW ALP: A SILENT SIGNAL OF HYPOPHOSPHATASIA

Hypophosphatasia (HPP) is a rare, inherited metabolic disease associated with compromised bone mineralization that may manifest as fractures and pseudofractures. HPP is caused by loss of function variants in the ALPL gene, which encodes tissue-nonspecific alkaline phosphatase (ALP). Deficient ALP activity leads to accumulation of key substrates (Pyridoxal 5'-phosphate (PLP), Inorganic pyrophosphate (PPi), and Phosphoethanolamine (PEA)) resulting in an array of clinical manifestations involving multiple organ systems. Disease manifestations, which may occur at any age, range in severity from life-threatening in infants to imposing significant functional burden in adults. HPP can be misdiagnosed, as signs and symptoms may overlap with those of other disorders. Persistently low age- and sex-adjusted ALP activity is the diagnostic hallmark of HPP. Due to the heterogeneity of HPP, a multidisciplinary care team is important for effective management of this disorder. Enzyme replacement therapy with Asfotase alfa has been shown to improve pulmonary function, calcium homeostasis / bone health, and survival in individuals with hypophosphatasia.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. RANA HASANATO
Corporate Director Medical Laboratories and Blood Bank
Professor of Clinical Biochemistry, College of Medicine
King Saud University Medical City
Riyadh, KSA

ACHIEVING SUSTAINABILITY THROUGH AUTOMATION

Sustainability in healthcare is increasingly important as institutions work to reduce environmental impact. The Department of Medical Laboratories at King Saud University Medical City (KSUMC), performing over 17 million tests annually, implemented Total Laboratory Automation (TLA) and green initiatives aligned with the Saudi Green Initiative (SGI) and Vision 2030 to enhance efficiency and environmental responsibility.

A phased strategy introduced TLA and sustainability practices through a multidisciplinary committee, workflow redesign, sustainable procurement, and energy-efficient facility upgrades. Middleware improved data integration, while staff training promoted a culture of sustainability. Additional initiatives included solar energy use, water-saving systems, LED lighting, optimized equipment operation, and waste-reduction programs. The integrated approach significantly reduced environmental and operational burdens: carbon emissions decreased to 34,646 tons, water use by 450,000 liters, and energy consumption by 42,537.6 kWh annually. Waste-reduction efforts eliminated 1 million sample tubes and 9,000 disposable cups, with 15% of waste recycled. TLA improved turnaround times by 62.5%, reduced analytical errors, and lowered operating costs by 30%, saving SAR 20 million over five years.

KSUMC Laboratories demonstrate that automation and sustainability can coexist to enhance quality, efficiency, and environmental stewardship. This model offers a scalable framework for laboratories aiming to advance sustainable healthcare, with future plans including AI integration and expanded green initiatives.

SCIENTIFIC ORAL PRESENTATION ABSTRACT

DR. ABDULHADI BIMA
Chemical Pathology Consultant
King Abdul-Aziz University Hospital
Jeddah, KSA

WHEN FAT MATTERS: HOW OBESITY ALTERS LAB RESULTS

Obesity is a major public health concern and a key confounder in laboratory medicine. Excess body fat alters metabolic, endocrine, and inflammatory pathways, often distorting common laboratory results and complicating clinical interpretation. Elevated triglycerides, insulin resistance, and chronic low-grade inflammation can lead to misleading findings in glucose tolerance tests, lipid profiles, liver enzymes, and hormonal assays. These distortions may obscure true disease states or prompt inappropriate treatments.

Recent studies show that targeted nutritional strategies – particularly low-carbohydrate diets – can help correct these abnormalities. By improving insulin sensitivity, reducing hepatic fat, and normalizing triglyceride and HDL levels, such interventions restore the reliability of several biomarkers.

This session will examine how obesity affects results across clinical chemistry, endocrinology, and hematology, illustrating the mechanisms driving these changes. It will also highlight how lifestyle and dietary modifications can recalibrate metabolic balance and enhance diagnostic accuracy. Understanding the laboratory signatures of obesity and their potential reversibility enables clinicians and laboratory professionals to interpret results more precisely, avoid diagnostic errors, and design better-informed treatment plans that improve patient outcomes.

INDUSTRIAL ORAL PRESENTATION ABSTRACT

MR. AHMED SHEHATA
Head of Product Management
Beckman Coulter

REVOLUTIONIZING DIAGNOSTICS: THE NEW ERA OF CLINICAL CHEMISTRY & IMMUNOASSAY SOLUTIONS

In response to the increasing complexity of modern healthcare and the rising operational pressures placed upon clinical laboratories, Beckman Coulter remains committed to delivering advanced diagnostic solutions that enhance efficiency, precision, and clinical confidence. This session will present two of the organization's latest innovations designed to support laboratories of varying sizes in meeting today's performance and workflow demands.

The DxI 9000 Access Immunoassay Analyzer represents a significant advancement in high-throughput immunoassay testing. Incorporating "Zero Daily Maintenance" and the proprietary PrecisionVision technology for real-time process verification, the system provides exceptional analytical sensitivity, a broad assay menu, and the capability to deliver up to approximately 450 tests per hour. Its design ensures robust accuracy, minimized downtime, and consistent result quality across diverse clinical applications.

Complementing this platform, the DxC 500i Integrated Chemistry and Immunoassay System offers Six Sigma-level analytical performance, making it particularly suitable for low- to medium-volume laboratories. Its comprehensive test menu includes essential therapeutic-drug-monitoring assays, notably on-board antipsychotic drug testing, enabling faster clinical decision-making and reducing reliance on external reference laboratories. Continuous reagent loading and an optimized operational design further support sustained workflow efficiency.

Together, these systems exemplify Beckman Coulter's dedication to providing reliable, scalable, and clinically impactful diagnostic technologies.

INDUSTRIAL ORAL PRESENTATION ABSTRACT

DR. YASER AL SHAIKH
Clinical Consultant
Abbott Saudi Arabia Trading LLC

HOW TO IMPROVE PATIENT CARE BY AI IN THE LAB?

Artificial Intelligence (AI) is transforming clinical laboratories by overcoming persistent challenges such as high sample volumes, manual errors, and complex data interpretation. These issues often delay diagnoses and impact patient outcomes. AI technologies – including machine learning, image recognition, predictive analytics, workflow automation, and natural language processing—introduce innovative solutions to enhance efficiency and accuracy. By automating result interpretation and streamlining operations, AI accelerates diagnostic processes, minimizes human error, and enables personalized medicine through advanced data analysis. Predictive algorithms further support early risk detection, facilitating timely interventions and improving patient safety. Practical applications include digital pathology slide analysis, automated microbiology culture reading, and integration with Laboratory Information Systems for seamless data exchange. Despite its benefits, successful implementation requires attention to data quality, regulatory compliance, staff training, and ethical considerations such as bias and privacy. Looking forward, AI-driven laboratories will play a central role in precision medicine and telehealth, delivering faster, individualized, and cost-effective healthcare solutions that significantly improve patient care.

INDUSTRIAL ORAL PRESENTATION ABSTRACT

DR. MONER RAGAS
Regional Product Manager
Roche Diagnostics Int.

COBAS MASS SPEC - ENTER A NEW DIMENSION IN MASS SPECTROMETRY

Enter a new dimension in mass spectrometry. Introducing the cobas® Mass Spec solution as an integrated, fully automated, fully integrated liquid chromatography-tandem mass spectrometry (LC-MS/MS) system designed to overcome the critical operational barriers preventing the widespread use of gold-standard mass spectrometry testing in routine clinical chemistry laboratories.

Mass spectrometry offers superior sensitivity, specificity, and accuracy compared to many traditional immunoassays, making it the preferred method for measuring difficult analytes, such as steroid hormones and certain therapeutic drugs (TDM) and vitamins (e.g., Vitamin D). However, conventional LC-MS/MS setups are often limited by high operational complexity, extensive hands-on time for lab-developed tests (LDTs), manual sample preparation, and lack of integration into high-throughput laboratory automation systems. These factors contribute to high labor costs and unpredictable turnaround times (TAT). The cobas® Mass Spec solution from Roche is seamlessly integrated into the cobas® pro integrated solutions. This system achieves full automation from paramagnetic particle-based sample preparation to final result interpretation. It features random access operation, high throughput (up to 100 injections/hour), and ready-for-use, IVDR-compliant Ionify® reagents with a broad, consolidated menu covering key areas like TDM, Steroid Hormones, and Drugs of Abuse Testing (DATs).

INDUSTRIAL ORAL PRESENTATION ABSTRACT

MS. İPEK ÇINAROĞLU
Medical Affairs Manager
BD ME&T

EMERGENCY DEPARTMENT PREANALYTICAL CHALLENGES

Emergency Departments (EDs) worldwide face persistent challenges related to overcrowding, prolonged waiting times and increasing clinical complexity. Given that more than two-thirds of ED patients undergo at least one laboratory test1, the preanalytical phase holds a decisive influence on diagnostic accuracy, workflow efficiency and patient safety. Especially high-stress work areas such as the ED and ICU have higher error rates.2,3 High hemolysis rates, insufficient mixing, incorrect order of draw, patient identification errors and blood collection through peripheral venous catheters are well-recognized contributors to sample rejection and repeated venipuncture. These issues prolong laboratory turnaround time (TAT) and length of stay (LoS), further intensifying ED congestion. Evidence indicates that even a one-minute improvement in TAT may meaningfully reduce LoS as 0.5 minutes4, supporting faster decision-making in time-critical scenarios such as stroke, acute coronary syndrome and sepsis.

Current literature highlights the strong impact of blood collection techniques, tube characteristics and catheter-related factors on sample quality, as well as the importance of minimizing blood exposure and needlestick injuries. Evidence-based approaches, including optimized tube selection pathways, safer blood collection devices and targeted staff training, have shown potential in improving specimen integrity, enhancing workflow efficiency and supporting timely clinical care. Difficult Vein Access (DVA), is significantly more common in ED, poses a risk in delayed patient care, and increased sample quality issues. Strengthening preanalytical practices and choosing appropriate equipment remains essential for improving outcomes for both patients and healthcare professionals in the emergency care setting.

INDUSTRIAL ORAL PRESENTATION ABSTRACT

MR. AHMED ELBARBARY
Business Manager – Specialty
Siemens Healthineers MEA

BIOMARKERS IN RENAL HEALTH: A NEW ERA IN CKD MANAGEMENT

Chronic kidney disease (CKD) is a progressive condition associated with high morbidity and mortality, often diagnosed late due to limitations of traditional biomarkers such as serum creatinine and estimated glomerular filtration rate (eGFR). Beta-trace protein (BTP) is emerging biomarkers offer improved sensitivity for early detection and risk stratification. It has shown strong correlation with measured GFR and superior diagnostic accuracy compared to creatinine. Furthermore, BTP demonstrates predictive value for adverse cardiovascular outcomes in dialysis patients, highlighting its role in comprehensive risk assessment. Integration of BTP with other novel biomarkers such as cystatin C and multi-omics approaches could enable earlier intervention and improved CKD management outcomes.

ORAL PRESENTATION ABSTRACT

Abstract # 1

Interference of Thyroglobulin Antibodies with Thyroglobulin Levels by Immunoassay in Patients with Thyroid Cancer

Sarah Aljunidel, Amal Bin Amer, Sawsan Alghamdi, Amal Alsughayyir, Dalal Albaqami, Haya Aldawsari, Huda Almutairi, Ghadah Alahmari, Khalid Alzahrani, Fahd Alsufiani, Waleed Tamimi

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College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences,
King Abdullah International Medical Research Center, Riyadh, Saudi Arabia

Background: Thyroglobulin (Tg) is a glycoprotein produced by the follicular cells of the thyroid. The Tg test is commonly used to determine if cancer treatment is successful and monitor the recurrence of the cancer. Thyroglobulin antibodies (TgAb) may also produce in autoimmune disease and may interfere with Tg assay. These immunoassay methods are essential with high sensitivity and specificity to evaluate Tg levels. These methods must be accurate and sensitive with minimal interferences. In this study we have evaluated the Tg immunoassay with TgAb assay to explore any interferences.

Methods: A total of 40 blood samples were collected from patients with either newly diagnosed with thyroid cancer at King Abdulaziz Medical City, Riyadh, Saudi Arabia. Tg levels were measured by immunoassay method Roche Cobas E411 (ECLIA). The normal range for Roche Cobas e411 TG is in the range of 3.5-77 ng/ml. The TgAb assay was measured by Maglumi Snibe Chemiluminescence Immunoassay with cutoff value for Tg-Ab is ≤ 95.0 IU/ml. The significance of the p-value was set at 0.05 cutoff. The statistics were calculated by the Microsoft Excel Sheet using student's T. Test.

Results: The mean of age of the patients was found to be 50±14 year with 87.5% (n=35} were female. The mean for Tg was found to be 22.5±18 for Roche method. Among 40 samples, 15% (n=6) have shown high results of thyroglobulin antibody above the cutoff. The possibility of interference by high Tg-Ab were estimated to be 15% (n=6), however, it has been confirmed to be clinically compatible.

Conclusion: The thyroglobulin immunoassay has been evaluated successfully with free thyroglobulin antibody interferences in the blood of patients with thyroid cancers or thyroidectomy.

ORAL PRESENTATION ABSTRACT

Abstract # 2

Optimization And Validation of Delta Check in the Auto-Verification at King Fahad Medical City.

Hadi Kuriri1, Abdullah Alshehri, Walid Alharbi1, Mohammed Alyousif1, Hanouf Almuhaini1, Safia Banajh 1, Naif Almutairi1, Abdulmajeed Alabdan1 and Turki Alamri1

Department of Pathology and Clinical Laboratory Medicine Administration,
King Fahad Medical City, Riyadh, Saudi Arabia.

Background: Delta checks is an essential patient-based quality control tool that compare current and previous laboratory results to detect errors such as specimen misidentification, pre-analytical variation, or analytical errors. Delta checks alerts utility have been limited by often generate excessive false alerts, leading to delayed turnaround time (TAT) and high manual review workload. With the advancement of laboratory automations and middleware's, the integration of delta checks into auto-verification rules become a promising approach to improve patient safety while maintaining workflow efficiency. This project aims to optimize and validate delta check limit based on Reference Change Values (RCVs) and assess their impact on error detection, auto-verification performance, and turnaround time (TAT) within the Abbott Alinity system.

Methods: The Delta check limit RCV% were calculated using the Abbott Alinity analytical imprecision (CVA) and within-subject biological variation (CVI) for 53 biochemistry analytes and the Delta check time intervals was defined within a range of 1 to 7 days. A 1-year historical data from April 2024 to April 2025 was collected and cleaned to include results for adults between 18 years and 60 years, the normality of each test based on it reference range, and retain consecutive results within 7 days for a same patient. A simulation process using around 787658 consecutive results for the 53 analytes were conducted to identify the optimal RCV% and time intervals. Another dataset that collected from May 2025 to June 2025 were used to validate of the optimal RCV% and time intervals rules using total of 105612 consecutive results for all 53 analytes. Data cleaning and analysis were conducted using SPSS, R-project CRAN and Microsoft Office Excel.

Results: Implementation of optimized RCV-based delta check rules significantly improved error-detection performance across analytes, reducing false-positive alerts to 1.23%. Auto-verification rates increased from ~70% to ~90%. The PPV of delta check alerts improved from ~28.6% to ~74.3%. Manual review burden on workload decreased from ~30% to ~10%, without compromising detection of clinically significant discrepancies, and TAT shows an improvement by 1%.

Conclusion: The integration of the optimized delta check limits into the Abbott Alinity auto-verification system at KFMC significantly improved operational efficiency, reduced false alerts, and enhanced patient safety by maintaining error detection while decreasing manual review. This project demonstrates the feasibility and impact of evidence-based delta check optimization in high-throughput clinical laboratories.

ORAL PRESENTATION ABSTRACT

Abstract # 3

Comparative In-Silico Docking and ADME Profiling of Vitamin D And Its Analogy with Key Metabolic Proteins

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[2] Department of Pathology & Laboratory Medicine, King Abdulaziz Medical City-Jeddah

Background: Vitamin D deficiency is recognized as a worldwide health problem, but it is particularly common in the Middle East. In this region, it plays a major role in rickets, bone fragility, and secondary hyperparathyroidism (SHPT). Calcitriol, the main active metabolite of vitamin D, is widely used in clinical practice, yet its prescription is limited by the risks of hypercalcemia and hyperphosphatemia. To reduce these drawbacks, several synthetic analogs, Paricalcitol, Doxercalciferol, and Falecalcitriol have been developed. Despite their increasing clinical use, these compounds have rarely been compared directly in terms of molecular and pharmacokinetic characteristics.
Methods: To address this gap, we performed in-silico analysis of Calcitriol and its analogs. In this study, we looked at how Calcitriol and its analogs interact with vitamin D binding protein (VDBP), the vitamin D receptor (VDR), and three enzymes that are central to vitamin D metabolism: CYP2R1, CYP27B1, and CYP24A1. Docking was carried out using the SeamDock platform. For interpretation, values below −9 kcal/mol were taken as strong binding, whereas values close to −6 kcal/mol were viewed as relatively weak. In addition, pharmacokinetic features such as gastrointestinal absorption and cytochrome P450 inhibition were predicted with SwissADME.
Results: The results showed differences among the compounds. Paricalcitol interacted most strongly with VDBP (−10.5 kcal/mol), a property that could account for its extended presence in the bloodstream. The data indicated that Calcitriol binds strongly to CYP2R1 (−8.5 kcal/mol), in line with its established role in activating vitamin D. In contrast, Falecalcitriol showed weaker binding to VDR (−6.8 kcal/mol), which might indicate reduced receptor signaling. Pharmacokinetic predictions suggested that calcitriol, Paricalcitol, and Doxercalciferol are well absorbed in the gastrointestinal tract, whereas Falecalcitriol is less efficiently absorbed. All analogs were predicted to inhibit CYP3A4, a class effect that might complicate co-therapy, and Doxercalciferol showed additional inhibition of CYP2C9, raising a higher risk of interactions.
Conclusion: To conclude, the study indicates clear differences among vitamin D analogs. Paricalcitol stands out, showing both strong binding and favorable absorption, which might explain its better performance compared to the other compounds. Doxercalciferol, however, presents greater potential for drug–drug interactions, and Falecalcitriol is limited by weaker receptor activity and low absorption. By comparing four compounds across several molecular targets, this work goes beyond single-compound evaluations and suggests Paricalcitol as a suitable candidate for further experimental validation, while caution is advised when prescribing Doxercalciferol.

POSTER PRESENTATION ABSTRACTS

Abstract # 1

Optimizing GST-Tagged PER3 Expression for Functional Studies in Circadian-Based Therapeutics

Sarah Alanezi and Raquel Arribas

Department of Biological Sciences, University of Edinburgh, United Kingdom

Background: The circadian rhythm is a tightly regulated 24-hour biological cycle governing physiological functions such as hormone secretion, metabolism, and cardiovascular dynamics. Molecularly, it is controlled by transcriptional-translational feedback loops involving CLOCK, BMAL1, CRY, and PER proteins. While PER1 and PER2 are well-characterized, PER3 remains underexplored due to its poor recombinant solubility, limiting its use in mechanistic studies[1]. Understanding PER3 function is crucial as it has been associated with circadian-linked pathologies, including cancer, metabolic disorders, and cardiovascular diseases[2]. This project aimed to overcome the technical limitations in PER3 expression and purification to support functional studies and its translational potential in chronotherapy.

Methods: The Per3 gene was cloned into the p3E vector using In-Fusion® HD cloning and transformed into E. coli NEB 5-alpha. Positive clones were screened by colony PCR and confirmed by Sanger sequencing. The construct was expressed in E. coli BL21 (DE3) cells induced with IPTG at 18 °C, 25 °C, and 37 °C. Post-induction, cells were lysed, and soluble proteins were isolated. Purification was carried out through GST-affinity chromatography followed by size-exclusion chromatography. Protein purity was assessed using SDS–PAGE and native PAGE. Concentration was quantified via the Bradford assay.

Results: Expression trials identified 25 °C as the optimal condition for soluble protein yield. Transformation efficiency reached 2.292×10^8 colonies/µg DNA. Purification produced a dominant peak around 138 mL on size-exclusion chromatography, with a distinct ~72 kDa band observed via SDS–PAGE, consistent with the expected GST-tagged PER3 protein[3]. Native PAGE confirmed correct folding and oligomeric stability. The optimized workflow yielded highly pure, stable protein suitable for downstream assays, such as protein–protein interaction studies with CRY and BMAL1.

Conclusion: This study successfully established a reproducible, cost-effective workflow for expressing and purifying soluble PER3 protein in E. coli. This platform enables mechanistic studies on PER3 function and its interaction within the circadian feedback loop. Given the growing interest in chronotherapy, timing drug administration with biological rhythms, this expression system may support advances in treatment strategies for cancer and cardiovascular disease,

.

POSTER PRESENTATION ABSTRACTS

Abstract # 2

. Evaluation of critical values reporting policy among governmental hospitals in Al-Qassim Province, KSA

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Introduction: Effective critical value reporting is evidence of GPL to ensure patient safety and clinical outcome achievement. The aim of the study is to evaluate the current performance of the critical value reporting policy across the governmental hospitals in Qassim, KSA and provide recommendations for future improvement, standardization, and national development.
Methods: This occurred through conducting a specified survey to governmental hospital laboratories in Qassim, KSA. The survey included a set of questions covering the whole process. The survey was sent online; data was gathered and analyzed.
Results: 386 web-based questionnaires were returned, and the majority confirmed the presence of written policy with most of their staff received orientation about with presence of a defined critical values list that differ significantly in the number of tests included and sources of the pre-settled critical values. 58.5% said that there was no difference in practice between inpatients and outpatients with considerable inter-laboratory variation in reporting practice for outpatients' critical results. Although the majority confirmed documentation of the critical results reporting but there is a significant difference in how they document it. Timely reporting of critical results is respected but differs significantly in a predefined time interval. While 90.9% confirmed the improvement of the related quality indicators concerning critical results reporting, they showed different indicators for monitoring.
Conclusions: Although the critical policy is a mandatory accreditation bodies requirement, it shows high variability concerning the whole practices. The study offered an insight into some challenges encounter the process and insisted on the importance of presence of nationally standardized established policy needed to be adopted across the whole hospitals with respect to different clinical settings to ensure best handling of critical results.

POSTER PRESENTATION ABSTRACTS

Abstract # 3

MMTV virus detection, survival analysis, and prognostic relevance of six tumor genes in patients with breast cancer

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Background: Breast cancer remains the most frequently diagnosed malignancy among women worldwide and represents a significant global health burden. The genes associated with tumor suppression (p53, BRCA1 and BRCA2), telomere length maintenance (TERT), DNA damage response (FGFR2) and DNA repair (CHD1) are recognized for their intricate function in tumor genesis and progression.

Methods: This study includes 125 formalin-fixed, paraffin-embedded (FFPE) tissue specimens taken from BC patients. In addition to 25 tissue samples of benign breast lesions were incorporated as controls. The mRNA expression levels of six genes, namely p53, BRCA1, BRCA2, TERT, FGFR2, and CHD1, were quantified in FFPE tissue samples using quantitative polymerase chain reaction (qPCR). The correlation between gene expression and prognostic characteristics, and the probability of recurrence-free survival (RFS) and overall survival (OS), were assessed.

Results: The results do not indicate an association between MMTV and breast cancer, as the virus was not detected in any of the tissue samples analyzed. We observed a significant differential expression in five of the six studied genes between BC and non-cancerous breast tissue, with significant downregulation of BRCA1, BRCA2, CHD1, and TERT, significant upregulation of p53, and unchanged levels of FGFR2. Among BC patients, p53 and BRCA1 expression levels emerged as significant prognostic factors for both RFS (32 vs 24 months; 34 vs 26 months) and OS (28.5 vs 24 months; 31 vs 28 months), respectively. Kaplan-Meier survival analysis of p53 expression displayed a trend favoring low expression for better survival and showing relatively stable RFS and OS survival curves of p53 until 43 and 54 months of the follow-up period, respectively.

Conclusions: When comparing cancer to non-cancer patients, only p53 and BRCA1 expression levels emerged as significant prognostic factors for both RFS and OS in the entire cohort, with p53 displaying a trend favoring low expression for better survival.

POSTER PRESENTATION ABSTRACTS

Abstract # 4

Evaluation of Circulating miR518-b as a Potential Early Biomarker for Preeclampsia: A Case-Control Study

Mona Kamal El Deeb [1,2], Marwa Anwar Mohammed [2], Rasha Abd El-Mottleb El-Tahan[3], Hesham Hosny El Gammal[4]

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Background: Preeclampsia presents significant risks to maternal and fetal health, necessitating early detection and effective management strategies. To advance our understanding of potential biomarkers for this condition, this study evaluates the serum levels of miR-518b in Egyptian pregnant females. By assessing miR-518b's association with clinicopathological conditions in preeclampsia, the study aims to elucidate its diagnostic or prognostic value.

Methods: Gene expression analysis of miR-518b's using quantitative real time polymerase chain reaction (qRT - PCR) was done on serum obtained from fifty pregnant women, who were evenly divided into preeclampsia and control groups. The studied group also underwent comprehensive clinical evaluations, including BMI, CBC, renal function tests, liver enzymes, blood pressure, and heart rate.

Results: CBC parameters displayed no significant variations in hemoglobin and white blood cell count; thrombocytopenia characteristic of preeclampsia was observed. Renal function tests indicated elevated uric acid levels and increased proteinuria in the preeclampsia group, consistent with known markers of the condition. Notably, miR-518b expression was significantly higher in the preeclampsia group, suggesting its potential as a biomarker for the condition. Correlation analyses further supported this notion, revealing associations between miR-518b expression and various clinical parameters.

Conclusion: miR-518b gene expression emerges as a promising biomarker for preeclampsia, offering diagnostic potential validated through ROC curve analysis. These findings deepen our understanding of preeclampsia's molecular mechanisms and present avenues for early diagnosis and intervention to enhance maternal and fetal outcomes.

POSTER PRESENTATION ABSTRACTS

Abstract # 5

Interplay Between Enteroendocrine Hormone (Leptin) and Adipokines (Ghrelin and Adiponectin) with Gastric Expression of FTO and MC4R Genes

Mohamed Hany[1], Anwar Ashraf Abouelnaser[2], Mona K ElDeeb[3,4], Noha A El-Banna[4], Sahar M Omar[4], Ehab Elmongui[5], Sara A Shaker[6], Rasha A ElTahan[6]

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[5] Independent Biostatistical consultant, Alexandria Egypt
[6] Assistant professor in Biochemistry Department, Medical Research Institute, Alexandria University

Background: Obesity is a complex, multifactorial disease influenced by genetic, hormonal, and metabolic factors. The fat mass and obesity-associated (FTO) and melanocortin 4 receptor (MC4R) genes have been implicated in body weight regulation through gut–brain signaling and their interactions with adipokines and enteroendocrine hormones.

Methods: This study investigated the association between gastric expression of FTO and MC4R genes and circulating levels of leptin, adiponectin, and ghrelin in individuals with and without obesity. We conducted a case–control study including 50 patients with obesity undergoing sleeve gastrectomy and 50 controls undergoing diagnostic endoscopy. Gastric tissue gene expression was assessed by qRT-PCR, and serum hormone levels were quantified using ELISA.

Results: Inverse propensity score weighting was used to adjust for age and sex. Gastric FTO expression was significantly upregulated in patients with obesity (fold-change: 5.8 vs 1.0, $p < 0.001$), and positively correlated with adiponectin and BMI. In contrast, MC4R expression was significantly downregulated (fold-change: 0.1 vs 1.0, $p < 0.001$), and positively associated with HOMA-IR and fasting blood glucose. Adiponectin levels were paradoxically elevated in the obesity group and correlated with both BMI and HDL. Leptin and ghrelin levels showed no significant group differences.

Conclusion: These findings suggest that altered gastric expression of FTO and MC4R may contribute to obesity-related metabolic disturbances through peripheral adipokine pathways. Further investigation into tissue-specific gene–hormone interactions may inform novel therapeutic strategies for obesity.

POSTER PRESENTATION ABSTRACTS

Abstract # 6

Pilot Evaluation of V-PRO® Rapid Serum Tubes Versus V-PRO® Serum Separator Tubes in Clinical Chemistry Testing

Safiah Almushawwah [1], AbdulAziz Alhosawi [2], Khalaf Almutairi [3], Shahad Albahli [2], Jamal Yousif [3], Somaya Alqattan[1].

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[2] Sales Department -Advance Medical Company, Riyadh – Saudi Arabia
[3] Quality & Regulatory Affairs Department -Advance Medical Company, Riyadh – Saudi Arabia

Background: Pre-analytical variability significantly influences laboratory test accuracy. Among biological samples, serum is most often used for laboratory analysis. V-PRO® Rapid Serum Tubes (V-PRO®RST) are designed to accelerate clotting and enable faster serum separation compared to conventional V-PRO® Serum Separator Tubes (V-PRO®SST). This study aimed to evaluate the analytical compatibility of V-PRO®RST with V-PRO®SST for routine clinical chemistry and immunoassay parameters.

Methods: A total of 12 mL of blood from a healthy volunteer was collected into V-PRO®RST and V-PRO®SST tubes and analyzed at Delta Laboratory for a broad panel of biochemical, hormonal, immunological, and metabolic markers using standard procedures.

The V-PRO®SST tube served as the reference. Analytical differences were interpreted as follows: V-PRO®RST higher performance than V-PRO®SST when (>+0.5), V-PRO®SST higher performance than V-PRO®RST when (<−0.5), and comparable when values fell within (−0.5 to +0.5).

Results: Comparative analysis of analytes between V-PRO®RST and V-PRO®SST showed overall agreement, with only minor differences observed. Liver function tests showed comparable performance for total protein, globulin, ALP, and ALT; V-PRO®SST outperformed V-PRO®RST for albumin, A/G ratio, bilirubin, and AST, while V-PRO®RST performed better for GGT. In the anemia panel, V-PRO®RST showed higher performance for folic acid and ferritin, while iron and UIBC were comparable, and V-PRO®SST outperformed V-PRO®RST for TIBC. For kidney function, V-PRO®SST performed better for urea nitrogen (BUN), whereas V-PRO®RST performed better for creatinine.

In the electrolytes and minerals panel, V-PRO®RST performed better for potassium, phosphorus, and calcium (total, ionized, corrected), while V-PRO®SST performed better for sodium and magnesium; chloride was comparable. For the thyroid profile, V-PRO®SST outperformed V-PRO®RST for free T4 and TSH, while V-PRO®RST performed better for free T3. In the hormone panel, V-PRO®RST showed higher performance for prolactin and total testosterone. For vitamins, V-PRO®SST performed better for 25-hydroxycholecalciferol (vitamin D), while V-PRO®RST performed better for vitamin B12. In rheumatologic and immune markers, V-PRO®RST performed better for CRP, V-PRO®SST for rheumatoid factor, and uric acid was comparable. For the diabetes panel, V-PRO®RST demonstrated higher performance for glucose and insulin. In the lipid profile, VLDL and HDL cholesterol were comparable, V-PRO®SST outperformed PRO®RST for LDL cholesterol, and V-PRO®RST performed better for triglycerides.

Conclusion: V-PRO®RST demonstrated a markedly shorter clotting time than V-PRO®SST. This pilot study suggests that V-PRO®RST tubes may be suitable for selected clinical chemistry tests, whereas V-PRO®SST may remain advantageous for others. Larger-scale validation with multiple replicates and diverse patient populations is required to substantiate these preliminary findings.

POSTER PRESENTATION ABSTRACTS

Abstract # 7

Prevalence And Trends of Vitamin D Deficiency Among Patients at The Maternity and Children Hospital, Dammam, Eastern Province of Saudi Arabia (2023–2025)

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Background: Vitamin D deficiency (VDD) is common throughout the Middle East despite abundant sunlight. Saudi Arabia has some of the highest reported burdens across age groups, and multiple national surveys and cohorts document very high combined VDD and insufficiency, particularly among girls and adolescents. Lifestyle factors, including limited sun exposure, indoor living and low physical activity, are consistently implicated. Women of reproductive age also show high rates of hypovitaminosis D, largely attributable to low sun exposure and poor dietary intake. Earlier evidence from the Eastern Province recorded very low circulating 25-hydroxyvitamin D despite coastal latitude, suggesting that behavioral and cultural factors outweigh geographic advantage. More recent series hint at modest improvements in some regions, but heterogeneity remains.

Methods: We retrospectively reviewed all serum 25-hydroxyvitamin D [25(OH)D] results from the laboratory information system at the Maternity and Children Hospital in Dammam from 1 January 2023 through 31 August 2025. For each calendar year one index observation per patient was retained. Concentrations were reported in nanomoles per liter (nmol/L). Status categories were prespecified: severe deficiency < 17.5 nmol/L, deficiency < 50 nmol/L, insufficiency 50–74 nmol/L and sufficiency ≥ 75 nmol/L. We calculated prevalence overall and by age group, sex and year, with 95 % confidence intervals. Temporal change was assessed using Cochran–Armitage trend tests and logistic regression adjusted for age and sex. Sensitivity analyses evaluated repeat testing and handling of results below the analytical limit of detection.

Results: The analytic cohort comprised 14 370 index measurements; approximately 74 % were aged younger than 20 years, and 58 % were female. Overall, 48.1 % of results fell below 50 nmol/L and 27.9 % were between 50 and 74 nmol/L; only about 21.8 % reached at least 75 nmol/L. Adolescents (10–19 years) had the highest deficiency, at approximately 52.6 %, with females lower than males. Infants and toddlers also showed substantial deficiency. Among antenatal requests most results were insufficient or deficient. Median 25(OH)D increased modestly from roughly 47.1 nmol/L in 2023 to 50.5 nmol/L in the first eight months of 2025, while month-to-month variation was small. These changes parallel recent Saudi trends and data from settings where awareness and supplementation are higher.

Conclusions Vitamin D deficiency and insufficiency remain very common in this Eastern Province maternity–child service. Adolescents, particularly girls, and pregnant women are most vulnerable. Routine counselling on safe sun exposure and vitamin D supplementation during pregnancy and early childhood, alongside sustained food fortification and public-awareness programs, are warranted. Future research should incorporate anthropometry, diet, supplement use, sun exposure and genetic factors to refine targeted interventions.

POSTER PRESENTATION ABSTRACTS

Abstract # 8

Pilot Study on the Shelf-Life of V-PRO® Blood Collection Tubes: Comparison of New and Expired Lots by Tube Type

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Background: The shelf-life stability of blood collection tubes is a critical determinant of accurate laboratory testing. The aim of this pilot study was to evaluate the impact of shelf-life on the performance of different V-PRO® blood collection tube types.

Method: Two production lots of V-PRO® blood collection tubes were evaluated: Tube A (reference, within the 24-month shelf-life) and Tube B (test, three months post-24-month shelf-life), both stored under controlled conditions. Clinical chemistry testing was conducted at Delta Medical Laboratories using V-PRO® tubes with EDTA K_2, EDTA K_3, sodium citrate, sodium heparin, and sodium fluoride.

Results: Comparative analysis revealed that expired EDTA K2 tubes produced slight increases in RBC count, hematocrit, MCV, platelets, neutrophils, monocytes, basophils, with decreases in hemoglobin, MCH, MCHC, and lymphocytes, while RDW-CV and eosinophils were unaffected. In contrast, expired EDTA K3 tubes showed modest increases in RBC count, hemoglobin, hematocrit, MCHC, platelets, lymphocytes, monocytes and eosinophils, accompanied by decreases in MCV, RDW-CV, neutrophils, and basophils, with MCH remaining unchanged. Pilot evaluation of sodium citrate tubes indicated that expired (1.8 mL) tubes showed stable PTT values, with slightly reduced PT and INR relative to the new lot, whereas expired 4.5 mL tubes exhibited elevated PTT, PT, and INR. Expired sodium fluoride (2 mL) tubes exhibited a slight increase in glucose levels compared with the new lot. Comparison of expired and new sodium heparin (4 mL) tubes showed identical sodium levels, with minor increases in chloride, potassium, and urea nitrogen, and decreases in creatinine and random glucose.

Conclusion: This pilot study showed that V-PRO® blood collection tubes maintained stable performance across additives, even beyond expiration, with only minor variations observed in expired EDTA K_2/K_3 tubes, while coagulation testing with sodium citrate tubes depended on adherence to the 24-month V-PRO® shelf-life. Larger-scale validation studies are required to substantiate and confirm these results.

POSTER PRESENTATION ABSTRACTS

Abstract # 9

Comparison Of Analytical Accuracy of NBCL Intraoperative Parathyroid Hormone POCT assay Versus Automated Chemiluminescent Immunoassay Abbott Alinity

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Background: Primary hyperparathyroidism is a common endocrine disorder characterized by the excessive secretion of parathyroid hormone (PTH), often due to parathyroid adenomas.[1] Surgical excision of the hyperfunctioning gland remains the definitive treatment. Therefore, intraoperative monitoring of intact PTH (iPTH) levels plays a critical role in confirming the complete removal of hypersecreting tissue and minimizing the risk of persistent or recurrent disease.[2] The use of Point-of-care testing (POCT) devices for intraoperative ioPTH measurement can offer rapid turnaround time by producing results within minutes and facilitating real-time surgical decision-making.3 These devices aim to provide surgeons with immediate feedback on the success of the procedure, reducing the need for extended operative time and potential re-exploration.[2] The accuracy of POCT devices is often questioned compared to gold-standard central laboratory methods like the Abbott Alinity i, as result differences can impact surgical decisions and patient outcomes. This study aims to compare the analytical accuracy of the Novel Biomarkers Catalyst Lab (NBCL), Netherlands ioPTH POCT device against the Abbott Alinity, USA, method, assessing their agreement and potential interchangeability in the surgical management of hyperparathyroidism3. The aim of this study was to compare and evaluate the ioPTH level results accuracy of NBCL Point of care ioPTH with that obtained from Abbott Alinity i immunoassay in the Central Laboratory.

Methods: This study enrolled 9 patients scheduled for parathyroidectomy surgery and obtained 30 venous samples in SST tube and 30 whole blood samples in EDTA tube. Whole Blood venous samples were collected simultaneously from each participant for measuring of ioPTH using point-of-care devices (NBCL) and sent to the central laboratory instrument (Abbott Alinity i). Samples were run intraoperative as follows: Pre-operative, Pre-excision, post-excision 5 minutes, post-excision 10 minutes, post-excision 20 minutes, post-excision 30 minutes. The venous samples were collected by anesthesiologist during the operation and sent to the laboratory immediately after sample collection.

Results: For the method comparison, analysis was based on the CLSI EP09-A2 protocol Deming and regular regression analysis was performed to compare the NBCL Intraoperative Intact PTH (ioPTH POCT Device) against the laboratory method Abbott Alinity i.[3] The Evaluation Criteria included the Allowable Total Error: TEa ±30% (CLIA, WSLH, AAB, API) CLIA: CLIA – Federal Register, WSLH: Wisconsin State Laboratory of Hygiene; AAB: American Association of Bioanalysts; API: American Proficiency Institute. The Correlation Coeff (r)= 0.9866 with slope=0.9385 and intercept=1.4169 at TAE of 30%. The total agreement between the two analyzers was found to be 80%. This agreement was reduced to 66.7% at lower levels below 11 pg/ml, however, it was improved to 89% above this cutoff. The majority of disagreement values were observed in the post-excision time (75%).

Conclusion: The PTH results appeared to be influenced by surgical manipulation reaching a peak then a steady decline post extraction. As a result of the study, iPTH had a good comparison agreement and pass Accuracy-Correlation with reference laboratory and clinical acceptance from the surgeons that the results have met their expectations.

POSTER PRESENTATION ABSTRACTS

Abstract # 10

Correlation Between HgbA1c and Fasting Blood Glucose Levels in Normal, Prediabetic and Diabetic Patients.

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Background: Hemoglobin A1C (HbA1c), measures a person's average blood glucose level over previous 3 months. It measures the percentage of hemoglobin proteins in the blood that are associated with sugar (glycated). Higher A1C levels indicate poorer blood glucose control and an increased risk of diabetes complications. We have compared the results for Glu F and HgbA1c in three different populations.

Methods: 126 samples were collected from patients and divided into three groups normal, prediabetic, diabetic based on the HgbA1c results. All samples were analyzed by methods HPLC for HgA1c and colorimetric enzymatic (hexokinase) for Glu F to determine whether the methods are equivalent within Total Allowable Error (TAE) of 12%.

Results: 27 specimens from normal controlled patients were compared over a range of 3.7%-5.6%. The difference between two methods was within the TAE for 21/27 specimens (78%; p= 0.0195). The prediabetic 19 specimens were compared over a range of 5.5%-6.9%. The difference between two methods was within TAE for 15/19 specimens (79%; p<0.00001). For diabetic patients 15 were compared over a range of 6.9%-17.3%. The difference was within TAE for 6/15 specimens (40%) with coefficient correlation of 0.6125 (p<0.00001). The overall correlation regression in all groups was 0.8316 (p<0.00001). 64 results (50.8%) were not concordance with each other. The coefficient correlation was 0.5294 (p<0.00001) when all results were combined.

Conclusion: A good agreement was observed between HgbA1c and Glu F at normal controlled and prediabetic patients. Moderate agreement was detected in diabetic patients. High rate of discrepancy between the two methods was observed.

POSTER PRESENTATION ABSTRACTS

Abstract # 11

Assessing The Triglyceride/High-Density Lipoprotein Cholesterol Ratio and Triglyceride-Glucose Index as Glycemic Control Predictors in Type 2 Diabetes Patients

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Background: Diabetes prevalence continues to rise in Saudi Arabia, with poor glycemic control being particularly common in the Hail region. Given the limitations and overuse of HbA1c, managing glycemic control presents challenges for healthcare services. The triglyceride-to-high-density lipoprotein cholesterol (TG/HDL-C) ratio and the triglyceride–glucose (TyG) index have emerged as cost-effective and accessible markers for diabetes management. To our knowledge, this is the first study in Saudi Arabia to assess and define cut-off values for the TG/HDL-C ratio and TyG index as potential predictors of glycemic control among patients with type 2 diabetes mellitus (T2DM).

Methods: We conducted a retrospective, cross-sectional study of 1,340 patients diagnosed with T2DM who visited King Salman Specialist Hospital in the Hail region between 2019 and 2024. Participants were stratified into groups based on good or poor glycemic control. Demographic data, medication history, clinical conditions, comorbidities, complications, and biochemical parameters were collected, including TG/HDL-C ratio and TyG index calculations. Correlation analysis, comparison tests, logistic regression, and receiver operating characteristic (ROC) curve analysis were performed.

Results: The prevalence of poor glycemic control among study participants was 74%. The TG/HDL-C ratio and TyG index were significantly correlated with HbA1c, with significantly higher median values observed in the poor glycemic control group compared with the good glycemic control group (TG/HDL-C: r = 0.135, median: 3.09 vs 3.45; TyG: r = 0.364, median: 8.93 vs 9.34, respectively). The association with poor glycemic control was stronger and more independent for the TyG index, even after adjusting for confounders (area under the curve [AUC]: 0.686, odds ratio [OR]: 3.10, cut-off: 8.915) compared with the TG/HDL-C ratio (AUC: 0.572, OR: 1.12). Stratified regression analysis revealed a significant interaction for the TyG index with anti-diabetic and lipid-lowering medications. Stratified ROC curve and sensitivity analyses confirmed the robustness of the TyG index among patients treated with oral anti-diabetic agents but not receiving lipid-lowering therapy.

Conclusion: The TyG index outperformed the TG/HDL-C ratio and may serve as an affordable biomarker for glycemic management, particularly in low-resource clinics. Its use may be especially beneficial among patients receiving oral anti-diabetic therapy without lipid-lowering agents. Moreover, its application could support the goals of Saudi Vision 2030 to improve population health and reduce the socioeconomic burden of diabetes in Saudi society.

POSTER PRESENTATION ABSTRACTS

Abstract # 12

Systematic Bias in Albumin Estimation: Comparison of Bromocresol Green and Serum Protein Electrophoresis

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Background: Albumin is the most abundant circulating protein found in plasma and is used as a biomarker for the status of nutrition, inflammation, and disease prognosis. Most clinical laboratories assay albumin in plasma or serum samples by dye-binding methods (BCG), primarily bromocresol green and (BCP) bromocresol purple. BCG typically overestimates albumin, while BCP is slightly more specific and yields lower values. These discrepancies have important clinical implications, especially for the calculation of corrected calcium, where false albumin measurement may lead to misclassification of calcium measurements and impact patient management. harmonization and the accuracy of albumin measurement is critical for reliable and effective clinical interpretation.
Methods: A retrospective analysis was conducted on 1,507 serum samples, with albumin measured by bromocresol green (BCG, Abbott Alinity) and serum protein electrophoresis (SPE, Sebia Capillarys). Subgroup analyses were performed in patients with chronic kidney disease (CKD) and multiple myeloma. Statistical evaluation included nonparametric tests, correlation, and Bland–Altman analysis.
Results: BCG albumin strongly correlated with SPE ($r = 0.93$, $R^2 = 0.87$, $p < 0.0001$). Bland–Altman analysis demonstrated excellent agreement (bias 0.000 g/L; 95% limits of agreement –0.244 to +0.244 g/L), although BCG slightly overestimated albumin overall (+0.8 g/L, $p < 0.0001$). Subgroup analysis revealed clinically relevant differences: BCG underestimated albumin in multiple myeloma (–4 g/L, $p < 0.0001$) but slightly overestimated values in CKD (+1.7 g/L, $p = 0.062$). When applied to corrected calcium calculations, these discrepancies had minimal clinical impact, with a negligible bias (+0.018 mmol/L) and narrow limits of agreement (–0.069 to +0.106 mmol/L), well within typical reference range variability.
Conclusion: The variability of Albumin measurements significantly impacts the clinical interpretation, such as therapeutic decisions and medication dosing for protein-bound drugs (e.g., phenytoin), which often rely on the accuracy of albumin readings. Specific albumin methods, such as (BCP, SPE), are recommended in high-risk populations, while the use of BCG is still acceptable for routine use if clinicians remain cautious of its limitations. Standardization of albumin measurement and context-based method selection are essential to minimize misclassification and ensure appropriate patient management.

POSTER PRESENTATION ABSTRACTS

Abstract # 13

Systematic Review of Vancomycin Stability in Whole Blood, Plasma, And Serum at Room Temperature

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Background: Therapeutic drug monitoring (TDM) is essential in precision medicine to optimize dosing and prevent toxicity, especially for vancomycin, which has a narrow therapeutic index and risk of nephrotoxicity. The accuracy of TDM depends on pre-analytical factors such as sample type, storage, and processing time. While vancomycin is usually measured in serum or plasma, transport and laboratory delays often leave samples stored as whole blood, raising concerns about stability and reliability of results. Evidence on vancomycin stability across whole blood, plasma, and serum is limited and inconsistent, highlighting the need for a systematic review to guide clinical practice.

Methods: A systematic review was conducted by searching PubMed, Scopus, and Web of Science for studies that examined vancomycin stability at room temperature in whole blood, plasma, or serum. Data extracted included sample type, storage duration, and reported stability outcomes.

Results: Findings demonstrated differences in vancomycin stability across sample types. Whole blood showed the greatest preservation, with Gopalakrishnan et al. reporting stability for up to 72 hours and Moorthy et al. observing no degradation even after 12 days. Plasma studies generally indicated intermediate stability: vancomycin remained stable for 48–72 hours under ambient conditions, with some reports of minor degradation thereafter. Serum studies demonstrated the most limited stability, with Garza et al. and Liu et al. reporting preservation up to 24 hours, Cao et al. up to 48 hours, and Zhou et al. documenting degradation after 72 hours. Overall, stability was highest in whole blood, moderate in plasma, and lowest in serum.

Conclusions: This review demonstrates that vancomycin stability is matrix-dependent, with the longest preservation observed in whole blood (up to 12 days), moderate stability in plasma (48–72 hours), and the shortest duration in serum (24–48 hours) before degradation occurs. These findings highlight critical pre-analytical considerations for therapeutic drug monitoring, as inaccurate stability may lead to underestimation of drug concentrations and compromise patient safety.

POSTER PRESENTATION ABSTRACTS

Abstract # 14

Validation of FTIR Method For Kidney Stone Analysis in Clinical Chemistry Laboratory

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Background: Kidney stone analysis is essential for accurate diagnosis and treatment planning. Fourier Transform Infrared Spectroscopy (FTIR) is considered one of the most reliable techniques to identify the chemical composition of stones quickly and precisely, supporting better clinical decisions.

Method: Cleaning stones from any debris or blood using distilled water, then drying them completely. Performing FTIR analysis using the Nicolet Apex FTIR. 6 scans were taken for both the sample and the background. The NICODOM IR Kidney Stones library was used for spectral matching

Results: Method validation for stone analysis using the new FTIR system showed excellent performance, with within-run and between-run reproducibility both achieving 100% across five consecutive days and no discrepancies between repeated measurements. Comparison with the existing FTIR reference method using 25 clinical samples (7 negative, 18 positive) demonstrated 100% overall agreement (95% CI: 86.7–100%), with both positive and negative agreement at 100%. McNemar's test revealed no significant differences, and Cohen's Kappa was 1.0, confirming perfect agreement. These findings indicate that the new FTIR method is reliable, precise, and fully comparable to the reference system, supporting its use in routine diagnostic practice.

Conclusion: FTIR analysis using the Nicolet Apex instrument proved to be a reliable, fast, and accurate method for routine kidney stone analysis in clinical laboratories. It is recommended as a standard testing method.

POSTER PRESENTATION ABSTRACTS

Abstract # 15

Evaluating The Effect of Air Exposure Duration on Carbon Dioxide (CO_2) Levels in Serum Samples

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Background: The carbon dioxide (CO_2) buffering system plays a crucial role in maintaining acid-base balance and stabilizing blood pH. Accurate measurement of CO_2 in serum samples is essential for assessing a patient's acid-base status. However, pre-analytical errors in the laboratory can significantly impact bicarbonate levels. For instance, prolonged exposure of uncapped serum samples to air allows CO_2 to escape, resulting in a decrease in the measured CO_2 concentration. This study aim to evaluating the effect of air exposure duration on carbon dioxide (CO_2) levels in serum samples.

Methods: This study was conducted in the Clinical Chemistry Laboratory at Prince Sultan Military Medical City (PSMMC). A total of 60 blood samples were collected using serum separator tubes (SST). After clotting, the samples were centrifuged to obtain serum. The serum aliquots were then exposed to air at room temperature (22–24 °C), and CO_2 levels were measured at four-time intervals: 0, 30, 60, and 120 minutes. All measurements were performed using the Cobas 702 automated chemistry analyzer, in accordance with standard laboratory protocols. Statistical analysis was carried out using SPSS. Differences in mean CO_2 values across time points were assessed using the Friedman test. When a significant overall difference was detected, post hoc test was performed. A p-value < 0.05 was considered statistically significant.

Results: Mean baseline CO_2 concentration among samples ($N = 60$) was 21.67 µmol/L. After 30 minutes, there was a significant decrease in concentration to 19.62 µmol/L ($p < 0.001$). The concentration continued to decline at 60 minutes, reaching 18.31 µmol/L ($p < 0.001$). By 120 minutes, CO_2 levels further decreased significantly to 16.78 µmol/L ($p < 0.001$). These results indicate a consistent and progressive decline in CO_2 concentration with increased exposure time.

Conclusion: This study demonstrates that prolonged exposure of serum samples to ambient air at room temperature leads to a significant, time-dependent decrease in measured CO_2 levels. These findings underscore the critical need to minimize pre-analytical handling errors to ensure the accuracy of laboratory results. Implementing strict sample handling protocols—such as keeping serum tubes capped and storing them under appropriate conditions—can help preserve CO_2 integrity and improve the reliability of acid-base assessments in clinical settings.

POSTER PRESENTATION ABSTRACTS

Abstract # 16

The Therapeutic Effect of a Low-Carb, High-Fat Diet in Combination with Metformin in a Mouse Model of Multiple Sclerosis

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Background: Multiple sclerosis (MS) is a chronic neurological disease characterized by demyelination and neurodegeneration. Immune dysregulation, mitochondrial dysfunction, and oxidative stress contribute to disease progression. A Low-Carbohydrate, High-Fat (LCHF) diet and Metformin have shown potential neuroprotective effects. The aim of this study is to evaluate the therapeutic effect of a low-carb, high-fat diet in combination with Metformin in a mouse model of multiple sclerosis.

Methods: Forty-five male Swiss mice were divided into five groups: control, MS-induced, MS with LCHF diet, MS with Metformin, and MS with both treatments. Cuprizone (CPZ) was used to induce MS over five weeks, followed by a two-week treatment phase. Behavioral tests, histological assessments, and immunohistochemical analysis were conducted.

Results: Preliminary results showed MS mice experienced weight loss and reduced grip strength. The LCHF diet and Metformin improved body weight and motor function, with Metformin showing the most significant grip strength recovery. Histological analysis indicated remyelination, particularly in the hippocampus for Metformin-treated mice and combined group and in the corpus callosum for LCHF-treated mice. Immunohistochemistry showed reduced astrocyte activation, especially in the LCHF and combined therapy groups.

Conclusion: Both interventions exhibited neuroprotective effects, with Metformin improving motor recovery and the LCHF diet attenuate astrocytes activation. Combination therapy demonstrated promising results, suggesting further studies to explore long-term benefits and clinical applications.

POSTER PRESENTATION ABSTRACTS

Abstract # 17

Point-Of-Care Urea Breath Test for Helicobacter Pylori: Validation and Implementation at King Faisal Specialist Hospital & Research Centre

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Background: Helicobacter pylori (H. pylori) is a prevalent pathogen associated with peptic ulcer disease and gastric malignancy. Accurate, timely diagnosis is essential for effective management. The 13C-urea breath test (13C-UBT) offers a non-invasive, highly accurate method for detecting active infection, but laboratory-based protocols are limited by delayed turnaround times. This study aimed to validate and implement a point-of-care (POC) 13C-UBT at King Faisal Specialist Hospital & Research Centre (KFSHRC) to improve diagnostic efficiency and patient outcomes.

Methods: A local validation study was conducted to compare POC 13C-UBT results with histopathology in fasting patients who underwent endoscopic biopsy. Exclusion criteria included recent antibiotic, bismuth, proton pump inhibitor, or H2 blocker use. Breath samples were collected and analyzed immediately after ingestion of 13C-urea. Diagnostic performance metrics—sensitivity, specificity, precision, and carry-over—were assessed. Additionally, hospital workflow metrics before and after implementation were analyzed.

Results: Of 37 patients enrolled, 36 (97%) showed concordant results between 13C-UBT and histopathology; the single discordant case was attributed to sampling from a non-colonized area. All validation metrics met predefined acceptance criteria. Implementation of the POC UBT reduced turnaround time by 95% (7 days to 35 minutes), decreased average patient visits by 25%, and lowered laboratory sample volumes by 60%. Virtual consultations further optimized patient access and resource use.

Conclusion: POC 13C-UBT demonstrated diagnostic accuracy comparable to histopathology and significantly improved workflow efficiency and patient experience at KFSHRC. Its rapid, non-invasive nature supports decentralization of H. pylori diagnostics, reduces reliance on invasive endoscopy, and aligns with value-based care objectives. Broader adoption in primary and outpatient settings could enhance accessibility, enable timely treatment, and optimize healthcare resource utilization. Further real-world studies are warranted to confirm long-term cost-effectiveness and clinical impact.

POSTER PRESENTATION ABSTRACTS

Abstract # 18

Optimizing The Auto-Verification Process with Reflex Testing in Clinical Biochemistry within the Laboratory Information System

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Background: Clinical laboratories rely on automation to sustain quality management, especially in a high-throughput environment. Auto-verification process plays a critical role by allowing results that meet predefined rules to be released without manual review. However, borderline or abnormal results often require manual verification, which can lead to delays in result reporting and an increased workload. Reflex testing, where initial results automatically trigger follow-up tests, offers a promising tool to reduce manual interventions. Nevertheless, reflex testing should be carefully implemented to avoid unnecessary repeat testing and resource overutilization. This work aims to optimize reflex thresholds and rules, and assess the impact by measurable improvements in key performance indicators (KPIs).

Methods: A one-year historical dataset, spanning from April 2024 to April 2025, was collected and cleaned to include results for adults aged 18 to 60 years. The simulation process tested multiple reflex thresholds using ROC analysis, reference range limits, percentile-based cutoffs, and guideline-recommended thresholds to evaluate their effect on diagnostic sensitivity, specificity, and predictive value. Algorithmic rules were built and integrated into the laboratory information system (LIS) workflows after identifying the optimal threshold. The implementation was evaluated before and after to measure performance in terms of test positive predictive value (PPV), sensitivity, specificity, auto-verification rate, and unnecessary reflex rate. Data cleaning and statistical analysis were conducted using SPSS and Microsoft Excel.

Results: The optimized reflex testing rules produced significant improvements in the Auto-verification rates that increased from ~72.1% to ~93.2%, representing a marked reduction in the proportion of results requiring manual review. Sensitivity improved from ~48.5% to ~77.4%, specificity from ~81.2% to ~97.4%, and PPV from ~28.6% to ~74.3%, ensuring fewer missed reflex opportunities and enhancing diagnostic reliability. Furthermore, unnecessary reflex testing declined dramatically from ~40% to ~8%, reflecting improved efficiency and better management of laboratory resources. Together, these improvements resulted in faster reporting, reduced staff burden, and a more consistent application of clinical reflex protocols.

Conclusion: This work revealed that optimizing reflex testing thresholds within LIS can enhance laboratory efficiency and diagnostic accuracy. By focusing on key performance indicators, the initiative showed noticeable improvements in auto-verification, sensitivity, specificity, and reflex PPV, while sharply reducing unnecessary reflex testing. These results highlight the value of simulation-driven optimization and automated rule integration in modern laboratory practice. Reflex tests can be extended to add more analytes or scenarios across laboratories to harmonize the reflex testing practice.

POSTER PRESENTATION ABSTRACTS

Abstract # 19

Improving The Efficiency Performance In Emergency Laboratory For Hematology Tests by Sigma Metrics

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Background: Six-Sigma is a quality management tool for process improvement. The clinical technologist can directly intervene to improve the quality of test reporting during the Analytical Phase of the total testing process in the medical laboratory. Sigma metrics analysis indicates; the level Quality Control has achieved and how far a given process deviates from perfection. In Emergency laboratory-KFAFH, we decided to optimize our QC system by applying Six Sigma concept on analytical testing. Though the concept is not new to quality and utility, its implementation in the Emergency laboratory is still in its nascent stages. The purpose was to assess the performance of individual Hematological parameters during the analytical testing process and compare the utility of sigma metrics as a comprehensive quality control tool in Emergency laboratory against the current quality tools of Internal Quality Control (IQC) and External quality assurance scheme on Hematology analyzers.

Methods: This was a retrospective-prospective study carried out in Emergency laboratory of KFAFH, from May 2021 to September 2022. A retrospective secondary data analysis of eight months duration was carried out in an ED laboratory with a follow-up prospective study for more than six months. During this period, 47 analytes were tabulated to analyze the Internal Quality Control (IQC) coefficient of variation percentage and external Quality Control (CAP) Bias%) and total error allowable for the same analytes were obtained on monthly basis and the sigma metrics was calculated for each analyte. Standardized QC sigma charts were established with these parameters.

Results: All data assessed those Sigma metrics and determined which assays were 4 Sigma and better at critical decision levels. Those assays which meet these criteria are now considered to be verified. The method decision chart showed that out of total 18 analyses, 22.2 % demonstrated at a world class performance of 6 sigma level, whereas 16.6 % showed a good performance of 4 sigma level, while 61.1 % showed poor performance of <4 sigma at the QC levels. From root cause analysis, the source of error was detected and corrected. For all analyses <4 sigma level, indicating the area requiring improvement. In contrast, the SQC control rules have been redesigned for the improvement. The laboratory has achieved excellent to world class performance for four analyses (MCV, PLT, RBC and, EOS). Sigma QC rules were applied and modifications proposed to the existing internal QC protocols to reduce the number of rejections.

Conclusion: The hematology analytes which listed was recommended by Westgard QC, Inc. to re verify the Sigma-performance to reach the goals of analytical quality by using long shelf life IQC. Sigma metric analysis is found helpful to evaluate and improvement the performance. A marked decrease in number of QC runs, implicating a reduction in costs. An increase in the number of rule violations. These violations were restricted to a few parameters with low sigma-metrics. Before implementation these violations were more spread across several parameters in conclusion, we demonstrated that implementing Six Sigma could possibly lead to a higher quality with lower costs.

POSTER PRESENTATION ABSTRACTS

Abstract # 20

Reducing Emergency Department Specimens Rejection Rates By Focus-Pdca Methodology

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Background: Laboratory-generated data drive up to 70% of clinical decisions in Emergency Departments (ED). High specimen rejection rates delay patient care, increase costs, and expose patients to repeat venipuncture. Our internal Ada'a dashboard showed an ED specimen rejection rate of 3.3%, exceeding the Ministry of Health Ada'a program benchmark of <2%. This quality improvement project aimed to reduce ED specimen rejection rates using the systematic FOCUS-PDCA methodology within a six-month timeframe.

Methods: A multidisciplinary team of 11 members was formed including laboratory staff, emergency department personnel, and quality specialists. The FOCUS-PDCA methodology was systematically implemented from February to June 2025. Root cause analysis using fishbone diagrams and affinity mapping identified hemolysis (60% of rejections), blood clotting (27%), and insufficient volume (13%) as primary rejection causes. Evidence-based interventions were prioritized through team voting: comprehensive phlebotomy training for ED staff, process optimization for sample transportation, and implementation of standardized collection procedures. Data collection utilized Care Ware system and Ada'a program reports for daily monitoring.

Results: Pre-intervention baseline analysis revealed 3.3% total rejection rate with 231 monthly specimen rejections from approximately 7,000 samples. Post-intervention monitoring showed reduction to 2.6% total rejection rate. Hemolysis-related rejections decreased from 60% to 48% of total rejections. Staff training completion achieved 98% compliance rate. The intervention demonstrated measurable improvement in specimen acceptance rates, though the target benchmark of <2% was not fully achieved during the project timeline.

Conclusion: The FOCUS-PDCA methodology effectively reduced ED specimen rejection rates through systematic problem identification, root cause analysis, and targeted interventions. Comprehensive staff

POSTER PRESENTATION ABSTRACTS

Abstract # 21

Analysis of the Influence of Air Exposure Period on Sodium (Na+) Concentration in Blood Serum

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Background: Sodium (Na^+) is a vital electrolyte in the human body, playing a crucial role in maintaining fluid balance, nerve function, and muscle contraction. Accurate measurement of serum sodium levels is essential for diagnosing and managing various medical conditions, including dehydration, kidney disease, and electrolyte imbalances. However, the reliability of laboratory test results can be significantly influenced by pre-analytical variables, such as sample handling, storage conditions, and exposure to environmental factors. The aim of this study is to evaluate the effect of air exposure duration on sodium (Na^+) levels in blood serum samples.

Methods: In this study, blood sample analysis was conducted within the Clinical Chemis-try Laboratory at Prince Sultan Military Medical City (PSMMC). A total of 50 samples were collected using serum separator tubes (SST). After allowing the blood to clot, each sample underwent centrifugation to separate the serum. Once separated, the serum was di-vided into aliquots and left exposed to ambient air at a room temperature ranging from 22 to 24 °C. Sodium (Na^+) concentrations were then measured at four specific time intervals: immediately following centrifugation (0 minutes), and after 30, 60, and 120 minutes of air exposure. Sodium levels were measured using the Cobas 8000 ISE automated chemistry an-alyzer, following the laboratory's standardized procedures. Data collected from the samples were statistically analyzed using SPSS software. To determine whether there were signifi-cant changes in sodium concentrations over time, the Friedman test was applied. Where significant variation was identified, post hoc tests were conducted to pinpoint specific dif-ferences. A p-value of less than 0.05 was considered statistically significant.

Results: The average baseline sodium (Na^+) concentration in the samples ($N = 50$) was 138.98 mmol/L. A statistically significant increase was observed after 30 minutes, with levels rising to 140.58 mmol/L ($p < 0.001$). This upward trend continued at 60 minutes, where the concentration reached 142.58 mmol/L ($p < 0.001$), and further increased to 145.58 mmol/L at 120 minutes ($p < 0.001$). These findings demonstrate a steady and significant rise in sodium levels corresponding with longer durations of air exposure.

Conclusion: The findings of this study indicate that extended air exposure of serum samples at room temperature results in a significant and progressive increase in sodium (Na^+) concentrations over time. Sodium levels were notably elevated at each time point—30, 60, and 120 minutes—compared to baseline. This suggests that air exposure is a critical pre-analytical factor that can affect the accuracy of sodium measurements.

POSTER PRESENTATION ABSTRACTS

Abstract # 22

Predictive Value of Hemoglobin A1c And Simple Metabolic Indices for Type 2 Diabetes Complications: One Size Does Not Fit All

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Background: Diabetes mellitus poses a serious health challenge and may lead to severe clinical complications. Glycated hemoglobin (HbA1c) is the most commonly used marker for assessing glycemic control in clinical practice; however, it does not fully capture the risk of vascular complications. Recent studies demonstrated that lipid-based indices such as the triglyceride-to-high-density lipoprotein cholesterol (TG/HDL-C) ratio, the triglyceride–glucose (TyG) index, non-high-density lipoprotein cholesterol (non-HDL-C), and total cholesterol-to-high-density lipoprotein cholesterol (TC/HDL-C) serve as potential biomarkers for the early detection and risk stratification of microvascular and macrovascular complications. However, evidence remains unclear as to whether one marker is superior to others for different groups of complications.

Methods: This was a retrospective, cross-sectional study including 69 subjects with type 2 diabetes (T2DM), equally selected and divided based on complication status: no complications, microvascular complications, and macrovascular complications. Patients receiving lipid-lowering therapy were excluded from the analysis. Laboratory parameters (lipid profile, fasting blood glucose, HbA1c) were collected, and lipid indices were calculated. Statistical analyses, including group comparisons, receiver operating characteristic (ROC) curve analysis, and classification models, were performed.

Results: Patients with microvascular complications showed the most adverse metabolic profiles, as indicated by HbA1c, TG/HDL-C, TyG, and TC/HDL-C ratios. Unexpectedly, macrovascular patients had lower median levels of total cholesterol and non-HDL-C compared to other groups. Comparative analyses confirmed significant differences between groups for HbA1c, TG/HDL-C, TyG, TC/HDL-C, and non-HDL-C (all $p < 0.001$). ROC analysis revealed that HbA1c best identified patients without complications (AUC = 0.95), while the TC/HDL-C ratio was most predictive of microvascular complications (AUC = 0.84). For non-HDL-C, the highest AUC was observed in discriminating macrovascular complications (AUC = 0.83). Linear Discriminant Analysis achieved an overall classification accuracy of 81% ($\varkappa = 0.72$), with excellent sensitivity for no complications (96%) and good performance for the microvascular (83%) and macrovascular (65%) groups. Random Forest analysis consistently ranked HbA1c, TC/HDL-C, and non-HDL-C as the most important discriminators.

Conclusion: Our findings suggest that integrating HbA1c, TC/HDL-C, and non-HDL-C into routine assessments may be beneficial for early identification and may provide complementary value depending on the complication subtype in T2DM patients. Interestingly, non-HDL-C best discriminated macrovascular complications but showed unexpectedly lower levels. While elevated non-HDL-C is traditionally associated with higher cardiovascular risk, other reports have described a potential U-shaped relationship. Future studies involving larger, externally validated cohorts are needed to confirm these findings.

POSTER PRESENTATION ABSTRACTS

Abstract # 23

Nanoparticle-Enhanced Cytotoxicity of Beta Vulgaris Extract Against Triple Negative Breast Cancer Cells

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Background: Cancer remains the foremost cause of mortality worldwide. Among its subtypes, triple-negative breast cancer (TNBC) is particularly aggressive and presents limited therapeutic options. Conventional treatments, such as chemotherapy, are often associated with adverse side effects and the development of resistance, underscoring the urgent need for more effective strategies. Nanotechnology offers a sustainable and innovative approach to cancer treatment. Beta vulgaris, commonly known as beetroot, contains bioactive compounds with potential anticancer properties. This study investigates the combined effects of Beta vulgaris extracts and silica nanoparticles to evaluate their cytotoxic and anti-proliferative potential, aiming to enhance therapeutic efficacy against TNBC.

Methods: This study evaluated the cytotoxic effects of Beta vulgaris extracts combined with silica nanoparticles on MDA-231 cell lines. Beta vulgaris were sourced locally, freeze-dried, and extracted using four polar solvents: distilled water, normal saline, 70% ethanol, and 100% ethanol. Extracts were filtered, dried, and stored as stock solutions, then diluted for cell treatment. TNBC cell line MDA-MB-231 was cultured in DMEM. Cells were seeded in 96-well plates and treated with Beta vulgaris extracts and silica nanoparticles, both individually and in combination. Silica nanoparticles—pure and treated variants—were prepared in sterile water and characterized. Cytotoxicity and anti-proliferative effects were assessed using MTT and BrdU assays across multiple incubation periods.

Results: All Beta vulgaris extracts demonstrated inhibitory effects on MDA cancer cell growth and proliferation, with variations depending on the extraction solvent. The distilled water solvent extract showed the highest inhibition of cell growth (48.3%) and proliferation inhibition (88%) after 72 hours. Absolute ethanol and 70% ethanol solvent extracts exhibited slightly lower effects, while NaCl solvent extract showed the least inhibition (40%). BrdU assay results confirmed that distilled water solvent extract had the strongest anti-proliferative effect, followed by absolute ethanol, NaCl, and 70% ethanol. These findings suggest that the choice of solvent influences the anticancer potency of the extracts. When combined with silica nanoparticles, the inhibitory effects were significantly enhanced. Absolute ethanol solvent extract with silica nanoparticles showed the highest inhibition of cell growth (58.2%), followed by distilled water (55.4%), normal saline (54.6%), and 70% ethanol solvent extract (49.0%). These combination treatments outperformed individual treatments, indicating a synergistic interaction. Proliferation assays also confirmed that the combination of silica nanoparticles with Beta vulgaris extracts resulted in stronger anti-proliferative effects.

Conclusion: The findings demonstrate that Beta vulgaris extracts possess notable anticancer properties, particularly when combined with silica nanoparticles. The effects observed suggest that the solvent plays a crucial role in enhancing therapeutic efficacy. These results support the potential of integrating plant-based nanotechnology as a promising strategy for treating TNBC.

POSTER PRESENTATION ABSTRACTS

Abstract # 24

Modernizing Reference Intervals for Laboratory Tests in Saudi Arabia Using Refiner and Real-World Data

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Background: Reference intervals (RIs) are fundamental to laboratory test interpretation. In Saudi Arabia, most laboratories still adopt manufacturer-provided RIs derived from Western populations. Genetic, environmental, and lifestyle differences may cause clinically significant shifts in analyte distributions, risking diagnostic misclassification. Establishing Saudi-specific RIs is therefore essential to improving diagnostic accuracy and healthcare efficiency. Our project, submitted for funding to the Saudi National Institutes of Health under its priority of Translating Population Health Research to Practice, seeks to modernize RIs for Saudi Arabia through indirect estimation methods applied to large-scale real-world data.

Methods: To illustrate feasibility, we conducted a proof-of-concept simulation using refineR. Free protein S was chosen as an analyte of clinical concern in pregnancy.

- A reference population of 10,000 healthy women was simulated from a Gaussian distribution such that the 2.5th and 97.5th percentiles matched the manufacturer's RI (60-150 IU/dL).
- A "diseased" subpopulation (n = 500; 5%) was simulated with protein S levels reduced by either 50% or 25%.
- Healthy and diseased populations were mixed to mimic real-world laboratory data.
- refineR was applied to estimate RIs from the mixed distributions.
- Both normal and log-normal distributions were evaluated.

Results: Across all conditions, refineR successfully recovered the original healthy RI despite admixture with diseased cases.

Simulation Condition	Lower Limit (2.5%)	95% CI (Lower)	Upper Limit (97.5%)	95% CI (Upper)
Normal, 50% Reduction	60.2	57.7-68.0	150.1	148.6-151.1
Normal, 25% Reduction	59.3	57.1-66.6	150.5	143.5-152.1
Log-Normal, 50% Reduction	57.9	52.3-61.6	142.2	126.4-150.5
Log-Normal, 25% Reduction	58.9	58.3-59.9	147.8	137.7-150.4

The recovered limits remained very close to the manufacturer's RI (60-150 IU/dL), even under substantial perturbation and skew.

Conclusions: This simulation demonstrates that *refine*R can robustly recover healthy RIs from mixed patient populations, even in the presence of substantial diseased admixture or distributional skew. These findings provide a methodological proof-of-concept for the forthcoming multicenter initiative to establish Saudi-specific RIs using real-world laboratory data. By leveraging existing records rather than costly recruitment, this project aligns with Saudi Vision 2030's Health Sector Transformation Program to deliver population-appropriate, evidence-based laboratory standards.

POSTER PRESENTATION ABSTRACTS

Abstract # 25

Pan-Cancer Analysis Reveals Kruppel-Like Factor 6 (KLF6) As A Potential Diagnostic and Prognostic Biomarker in Bladder Urothelial Carcinoma (BLCA) And Lung Squamous Cell Carcinoma (LUSC)

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Background: Kruppel-like factor 6 (KLF6) is a transcription factor involved in regulating cell growth, differentiation, and apoptosis. Emerging evidence suggests a tumor-suppressive role for KLF6; however, its diagnostic, prognostic, and immunological significance across cancers remain insufficiently understood. This study aimed to evaluate KLF6 expression patterns, diagnostic and prognostic potential, and association with immune infiltration across human cancers using large-scale public datasets.

Methods: A comprehensive pan-cancer analysis of KLF6 was conducted using The Cancer Genome Atlas (TCGA) and validated through multiple bioinformatics platforms, including TIMER, GEPIA, UALCAN, Kaplan–Meier Plotter. Additional external validation was performed using datasets from the Gene Expression Omnibus (GEO). Expression differences, survival outcomes, and correlations with immune cell infiltration were assessed.

Results: KLF6 was significantly downregulated in several cancers, with consistent reductions observed in BLCA, BRCA, KICH, LUAD, LUSC, and UCEC across databases. Survival analyses demonstrated that high KLF6 expression was significantly associated with poor overall survival in BLCA ($p < 0.05$) and LUSC ($p < 0.05$). Furthermore, KLF6 expression showed positive correlations with immune cell infiltration, including $CD8^+$ T cells, $CD4^+$ T cells, macrophages, neutrophils, and dendritic cells, particularly in LUSC. GEO validation confirmed downregulation of KLF6 in BLCA and LUSC.

Conclusion: KLF6 demonstrates diagnostic value by differentiating tumor from normal tissues and prognostic value through its association with overall survival in BLCA and LUSC. Its correlation with immune infiltration suggests a role in modulating the tumor microenvironment. These findings support KLF6 as a promising diagnostic and prognostic biomarker and a candidate for future mechanistic and therapeutic investigations.

POSTER PRESENTATION ABSTRACTS

Abstract # 26

solving the difficulty of 24/7 two labs coverage through smart lab practice: outside-the-box strategies to unlock efficiency

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Background: Maintaining seamless, high-quality, 24-hour coverage across two demanding laboratories using traditional 8-hour shift rotations has become increasingly challenging. Problems included scheduling complexity, frequent shift handovers leading to communication errors, staff shortages, and burnout. To address these issues, the Clinical Chemistry Laboratory at King Abdulaziz Medical City in Jeddah transitioned from an 8-hour to a 12-hour work schedule. This study aims to evaluate the impact of this transition on staffing resources, laboratory efficiency, and employee satisfaction.

Methods: The transition followed organizational policies and review of literature regarding optimal Rota systems in healthcare. Based on staff feedback and shortage considerations, a 4 ON / 3 OFF schedule was implemented with a standby system to cover increased off days. This design reduced overtime reliance while ensuring continuous coverage. Change in Performance was monitored and staff feedback was recorded.

Results: Operational benefits included a reduction in shift handovers (from three to two per day), improved continuity of care, enhanced accountability, and more efficient scheduling across two laboratories. Staff reported improved work-life balance, more consecutive days off, reduced commute burden, and higher job satisfaction. Financially, overtime hours were reduced by -58.3%, and overall labor costs decreased by -22.7% after integrating the standby system, since its hourly rate is lower compared to overtime.

Conclusion: Transitioning to a 12-hour Rota significantly improved operational efficiency, reduced high-risk handover points, lowered labor costs, and enhanced staff satisfaction. This model provides a sustainable solution for maintaining 24/7 laboratory coverage in healthcare institutions.

POSTER PRESENTATION ABSTRACTS

Abstract # 27

Sensitivity Of Hba1c Tested in The First Trimester in The Prediction of Gestational Diabetes Mellitus Among Saudi Pregnant Women

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Background: HbA1c is one of the tools used to diagnose diabetes mellitus. There is still debate about the cut off value of HbA1c to label pregnant women screened in the first trimester as suffering from gestation diabetes mellitus (GDM).
Aim of the study: to evaluate the sensitivity of HbA1c tested in first trimester in predicting the GDM.
Methods: Pregnant women who underwent a 75 gm OGTT between 24-28 weeks of gestation and had FBS, and HbA1c measured in the first trimester between January till December 2022 were retrospectively reviewed. Women with pre-existing diabetes, HbA1c 6.5%, FBS 7 mmol/L or on anti-diabetic medication were excluded from the study. The main outcome is to find out the correlation between the first trimester HbA1c levels and OGTT at 24-28 weeks' gestation for the diagnosis of GDM.
Results: Data of 552 women who met the inclusion criteria were analyzed. A total of 183 (33%) of woman's had GDM diagnosed by OGTT at 24-28 weeks of gestation. 107 (19.4%) individuals of the total cohort had abnormal HbA1c at the prediabetes range at the first trimester, 59 women (54%) had proven GDM, while 46 women (46%) had falsely high HbA1c in the first trimester with normal OGTT. A multivariant analysis showed HbA1c 6.1 ± 0.32% (p=0.001), and FBS 5.39 ± 1.47mmol/L were statistically significant in predicting future GDM.
Conclusion: First trimester HbA1c may aid in early identification of at-risk women. A prospective well-designed study might be needed to elaborate factors affecting using such tool for early detection of GDM in Saudi population.

POSTER PRESENTATION ABSTRACTS

Abstract # 28

The Association Between NT-proBNP and A1c Measurements in Type 2 Diabetes Mellitus in Developing Cardiovascular Disorder

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Background: It was recently reported that the prevalence of type 2 Diabetes Mellitus (T2DM) in Saudi Arabia is 23.7% (1). The most of diabetic patients develop complications of which cardiovascular diseases is one the most common. Cardiovascular diseases affect approximately one-third of all people with T2DM and account for half of all deaths in this population despite major advances in the treatment of the disease. Hyperglycemia itself plays a key role in the pathogenesis of atherosclerosis which are critical mechanisms in the development of cardiovascular disease. Awareness of this relationship between diabetes and cardiovascular disease is crucial in the early diagnosis and prevention of adverse cardiovascular events in patients with T2DM. The aim of the study is to investigate and correlate the association between hemoglobin A1c (HbA1c) and natriuretic peptides (NT-proBNP) in developing cardiac disorder patients diagnosed with type 2 diabetes mellitus.

Method: In this retrospective study historical data was collected for patient medical record of laboratory information system including criteria was for patient age between 18-65 how have T2DM All selecting data is measured by Bio-Rad d100 analyzer and Abbott Alinity ci analyzer. The measurements for concentration were conducted by High Performance Liquid Chromatography ion exchange and spectrophotometric analysis. Statistical analysis was conducted using the software (SPSS version 25, Chicago, USA). P-value ≤0.05 is considered as significant.

Results: Our findings suggest that there is a positive relationship between HbA1c and NT-proBNP levels, the patients with high HbA1c and NT-proBNP levels have a high risk in developing cardiovascular diseases.
However, the patients who have prediabetic and normal measurements of HbA1c show low risk for developing cardiovascular disorder in an association to normal NT-proBNP. Elevated NT-proBNP (>300) was more frequent in diabetes (65.1%) compared to pre-diabetes (11.5 %) and normal (6.1%). The highly significant p-value <0.001, majority of patients were transferred to cardiology across all groups around 75-85%.

Conclusion: Our findings suggest that there is relationship between increased level of HbA1c and heart disease. That highlights increasing level HbA1c is an alarming bell for cardiovascular disease in diabetes patients. Both HbA1c and natriuretic peptide levels may provide a more thorough method for managing cardiovascular. risk in diabetic patients, potentially leading to earlier and more focused interventions to prevent cardiovascular issues.

POSTER PRESENTATION ABSTRACTS

Abstract # 29

Estimation and Verification of Cut-Off Values for Dried Blood Spot Newborn Screening Using Newobase 2 Reagent Kit and Its Comparison with Chromsystem

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Background: Newborn screening program (NBS) identifies potentially fatal and disabling conditions that may lead to death or mental disability. A wide range of biomarkers and analytes are detected with LC-MS/MS kits in a single run. In this study, we estimated cut off values and several important ratios using Non Derivatized NeoBase 2 reagent kit and the results were compared with our previously published data with chromsystem reagents (1-2). To the best of our knowledge, no cut off values and such comparison study were conducted before with NeoBase 2 kit in Saudi Arabia. This study aims for the determination of population-based cut-off values with several analyte ratios with NeoBase 2 reagents in Saudi Arabia.

Method: About 18000 dry blood spot samples were received from six different hospitals and tested in our biochemical metabolic lab by using NeoBase 2 reagent on QSIGHT mass spectrometer. The results of normal patients were reviewed and statistical analysis were performed to establish cut off values by calculating different percentiles (95, 99, 99.5, 99.9%) for amino acids, acylcarnitine and their ratios. These values were verified by analyzing true positive patients and CDC proficiency testing samples.

Results: The cut-off values for Cit, Leu/Isleu, Meth, Phe, Tyr, C5, C5:1, C5DC and C8 were lower with NeoBase 2 reagent kit when compared with previously published cut-off data with chromsystem kit. The false positive rates were 0.34 for C5OH, 0.29 for C3, 0.2 for C14:1, 0.08 for C0 Low, 0.02 for C5 and Phenylalanine, 0.12 for Methionine and 0.05 for Leucine/Isoleucine & valine. The overall false positive rate was doubled when compared with previously reported data. CDC proficiency testing sample were successfully tested and passed which shows good sensitivity and specificity of the kit. Prevalence of disease was 1:2200 which is higher in Saudi Arabia than other country. Positive predictive value was >85% for all analytes.

Conclusion: We have established population based cut off values and several analytes ratio for amino acids and acylcarnitine by using NeoBase 2 kit in Saudi Arabia.

POSTER PRESENTATION ABSTRACTS

Abstract # 30

Serum Arginine-Derived Metabolites and Their Association with Insulin Resistance: An LC-MS/MS-Based Study

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Background: Insulin resistance and impaired insulin secretion are key mechanisms underlying diabetes mellitus. Arginine-derived metabolites, such as asymmetric dimethylarginine (ADMA) and symmetric dimethylarginine (SDMA), are endogenous inhibitors of nitric oxide synthase. These metabolites are associated with endothelial dysfunction and metabolic disturbances. Despite these associations, data are limited on their relationship with insulin resistance in clinical populations. The present study investigated serum concentrations of arginine, homoarginine, citrulline, ornithine, ADMA, SDMA, and NG-Monomethyl-L-arginine (LNMMA) in individuals with and without insulin resistance, using a validated liquid chromatography–tandem mass spectrometry (LC-MS/MS) method.

Methods: We enrolled 87 participants diagnosed with diabetes mellitus and classified them as insulin-resistant (n=44) or non–insulin–resistant (n=43) according to HOMA-IR criteria. We measured serum concentrations of arginine-derived metabolites using an API 3200 LC-MS/MS method that we developed and validated in accordance with international bioanalytical guidelines. We performed statistical analyses with SPSS version 26.0 and used the Mann-Whitney U test to compare non-parametric groups. In addition, receiver operating characteristic (ROC) curve analyses were performed to evaluate the diagnostic performance of each metabolite and metabolite ratio in distinguishing insulin-resistant from non–insulin–resistant individuals.

Results: Compared to the non-insulin-resistant group, individuals with insulin resistance exhibited significantly higher levels of SDMA, citrulline, SDMA/ADMA, citrulline/arginine, and citrulline/ADMA ($p < 0.05$). However, the insulin-resistant group displayed significantly lower concentrations of homoarginine, ornithine, homoarginine/ADMA, and the global arginine bioavailability ratio (GABR).

ROC curve analysis revealed that among the arginine-derived metabolites, homoarginine (AUC = 0.746) and homoarginine/ADMA ratio (AUC = 0.779) demonstrated the highest ability to distinguish insulin-resistant from non-insulin-resistant individuals. In comparison, ornithine (AUC = 0.670) and the global arginine bioavailability ratio (AUC = 0.641) demonstrated moderate predictive value. By contrast, ADMA, SDMA, L-NMMA, citrulline, and total methylated arginine performed poorly as diagnostic markers (AUC < 0.50). Altogether, these results suggest that homoarginine-related parameters may be stronger biomarkers of insulin resistance than traditional nitric oxide synthase inhibitors.

Conclusion: Our findings suggest that alterations in arginine-derived metabolites are closely linked to insulin resistance. While classical NOS inhibitors such as ADMA, SDMA, and L-NMMA showed limited diagnostic performance, homoarginine and the homoarginine/ADMA ratio demonstrated superior discriminative power. These results suggest that homoarginine-related parameters, together with GABR and ornithine, may serve as more reliable biomarkers of insulin resistance. Incorporating these metabolites into clinical evaluation could provide novel insights into the metabolic mechanisms of diabetes and support the development of improved diagnostic and preventive strategies.

POSTER PRESENTATION ABSTRACTS

Abstract # 31

Effects of Methanol Extract of Boswellia elongata Resin on Antiproliferative, Proapoptotic, Cell Cycle, and DNA Damage in Different Cancer Cell Lines

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Background: Cancer is a global health problem marked by uncontrolled growth, faulty apoptosis, and genetic instability. Recently, natural products have gained importance in anticancer research due to their low toxicity and potential benefits. Boswellia species demonstrate diverse biological activities. This study investigates the effect of Boswellia elongata methanol extract on various cancer cell lines.

Methods: The Boswellia elongata resin used in this study was obtained from Socotra Island, Yemen. An extract was prepared from the resin using methanol as a solvent and was used in experimental applications. The prepared extract was applied to human head and neck squamous cell carcinoma (HNSCC), prostate cancer (DU145), pancreatic cancer (PANC-1) cells, and a healthy kidney cell line (HEK-293). Extract doses ranging from 180–280 µg/mL were applied to HNSCC cells, and 120–200 µg/mL to DU145 and PANC-1 cells. Cell proliferation was assessed using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Ki-67 immunostaining was performed to evaluate proliferative activity. Apoptosis, cell cycle, and DNA damage parameters were analyzed using the Guava Muse Cell Analyzer (Luminex, Austin, TX, USA).

Results: The effects of the methanol extract of Boswellia elongata resin on cancer cells were examined after 24 and 48 hours of treatment. IC_{50} values were calculated based on cell viability. After 24 hours, the extract exhibited IC_{50} values of 245.1 µg/mL in HNSCC cells, 151.6 µg/mL in DU145 cells, and 125.4 µg/mL in PANC-1 cells. For healthy HEK-293 kidney cells at these concentrations, cell viability was 67.15%, 53.53%, and 46.45%, respectively. These results demonstrate the extract's selective cytotoxic effects.

After the viability assays, Ki-67 immunostaining was used to assess proliferative activity. This analysis showed that proliferation was significantly suppressed in all cancer cells. Ki-67(+) rates were 5.85% for HNSCC, 5.12% for DU145, and 5.92% for PANC-1 cells. Negative rates exceeded 94%. Apoptosis analysis showed significant induction in cells treated with the extract at IC_{50} doses. Early and late apoptosis rates were 26.40% and 27.85% in HNSCC cells, 28.41% and 27.13% in DU145 cells, and 21.95% and 20.80% in PANC-1 cells, respectively.

Cell cycle analysis revealed that the extract induced cell type-specific phase changes. In HNSCC cells, most cells were in the G0/G1 phase (52.3%). DU145 cells accumulated in S (22.2%) and G2/M (22.2%), while in PANC-1 cells, G0/G1 decreased to 16.7%, with S and G2/M increasing to 36.8% and 30.9%.

In addition to these cell cycle findings, the genotoxic effects of the extract were also revealed in the DNA damage analysis. Total DNA damage was determined to be 13.73% in HNSCC cells, 17.92% in DU145 cells, and 14.42% in PANC-1 cells. In particular, double-strand breaks, pATM, and γH2A.X positivity showed that the extract caused DNA damage.

Conclusion: This study demonstrated that the methanol extract of Boswellia elongata exhibits antiproliferative, proapoptotic, cell cycle-regulating, and genotoxic effects in the examined cancer cells. The findings suggest that the extract may be a potential anticancer agent and should be supported by further mechanistic and clinical studies.

POSTER PRESENTATION ABSTRACTS

Abstract # 32

Evaluating The Effects of Early Blood Sampling on the Accuracy Of Newborn Screening for Congenital Hypothyroidism

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Background: Thyroid stimulating hormone (TSH) it has an important role as it is secreted by the pituitary gland in the brain that stimulates the thyroid gland to secrete its own hormones (T3 and T4) that affect the body's metabolism. Infants with congenital hypothyroidism, if untreated during the initial development phase, risk intellectual disability and stunted growth. Timely thyroid hormone supplementation can effectively mitigate these complications. Often, these symptoms are indistinct or absent at birth, even though TSH levels typically surge during the first day postpartum.

Methods: We executed a retrospective analysis at the newborn screening laboratory of Prince Sultan Military Medical City. The cohort consisted of infants screened between January 2019 and August 2025. TSH concentrations were ascertained using the Genetic Screening Processor (Perkin Elmer, Finland). Initial dried blood spot specimens were procured 24-72 hours post-birth. Preliminary remarkable results were first validated by a second (recall) sample before final confirmation. To discern the underpinnings of the false positives, we meticulously analyzed these remarkable results, comparing them against the program's database, guidelines, protocols, and policies.

Results: Of the 182,387 infants screened, there was a 100% coverage rate. Initial screenings rendered 308 noteworthy results. Subsequent tests confirmed congenital hypothyroidism in 44 cases, leaving 264 as false positives. Notably, all false-positive samples were obtained prematurely, specifically within 24 hours post-birth.

Conclusion: Our results clearly indicate that, to reduce false positives, dried blood samples for congenital hypothyroidism screening should be collected accurately within 24 hours of birth. Adherence to this timing is essential for improving program performance indicators.

POSTER PRESENTATION ABSTRACTS

Abstract # 33

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LCMSMS Method Development, Validation and Reference Interval Verification for The Simultaneous Quantitation Of 22 Amino Acids in Plasma Samples

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Background: Amino acids are fundamental building blocks of protein which plays critical role in biological function. These acids involve as intermediates in various metabolic pathways, such as the urea cycle and the citric acid cycle. Classical HPLC method with ninhydrin derivatization has longer run time, unstable peaks, bad resolution and lack of population-based reference interval (1-2). This study aims for in house method development, Validation and reference interval verification of amino acids in plasma using Xevo-TQD mass spectrometer.

Method: 25µL of plasma sample was mixed with 25µL of internal standard and 400µL precipitation reagent. The mixture was vortexed for 10 minutes, centrifuged and supernatant was transferred into HPLC vials for injection into the LC system. The separation was performed on 1.7 µL x 2.1mm x 100mm amid UPLC column from Waters USA.

Results: The developed method was compared with Biochrom 30 amino acid analyzer as well as with LCMSMS method from Chromsystem, Germany. The co-relation coefficient was > 0.950 for 22 amino acids except aspartic acid and glutamic acid where the co-relation coefficient was < 0.90 due to hydrolysis of amid linkage into corresponding acid. Day to day and same day precision was < 12% and < 10% respectively. Comparison with ERNDIM proficiency and CAP samples were successfully passed. The method was linear from 10 to 750µmol/L and no significant carry over was found. Age dependent reference intervals (1week - 4 months, 4 month - 2 years, 2 - 10 years, 10 years - 18 years and > 18 years) for 22 amino acids were also were verified.

Conclusion: We have developed and validated plasma amino acid method on Xevo-TQD with reference interval calculation and verification for local population in Saudi Arabia.

POSTER PRESENTATION ABSTRACTS

Abstract # 34

Utility and Pitfalls of Urine Drug Screening in Acute Care: A Retrospective Audit

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Background: Urine Drug Screens (UDS), typically immunoassay panels, are frequently ordered in acute care settings, primarily the Emergency Department (ED), to aid in the diagnosis and initial management of patients with altered mental status or suspected substance-related illness. However, these screening tools are known to be vulnerable to cross-reactivity, which can lead to clinically misleading false-positive results. This study aimed to evaluate the patterns of UDS utilization, characterize the primary clinical indications, and quantify interpretative limitations within a single institutional setting.

Methods: This retrospective audit analyzed 150 consecutive UDS tests ordered over a specific period at Department od pathology and blood bank in Suhar hospital. Patient data, including requesting department, clinical indication, and a complete medication history, were reviewed from the electronic medical record. The data was categorized to determine the frequency of UDS requests and to identify instances of presumptive positive results potentially caused by documented prescription medication cross-reactivity. The Emergency Department (ED) was the source for the majority of requests, accounting for 65% of the total orders.

Results: Of the 150 total UDS tests analyzed, the primary clinical indications were consistent with acute diagnostic needs, such as Altered Mental Status (AMS), unresponsiveness, and suspected overdose. The audit confirmed the UDS's utility in guiding acute management decisions, such as the administration of the opioid antagonist naloxone. A significant finding was the confirmation of common cross-reactivity pitfalls. Specifically, a notable percentage of positive results for Tricyclic Antidepressants (TCA) were identified in patients who were receiving the anticonvulsant Carbamazepine. Other documented cross-reactions observed included Bupropion causing false-positive Amphetamine results and Dextromethorphan potentially causing false-positive PCP results, reinforcing the test's interpretive challenges.

Conclusion: The UDS remains a valuable, rapid screening tool for acute medical diagnosis, but its results are presumptive and susceptible to false positives, particularly from common prescribed medications like Carbamazepine. The audit underscores the necessity of strict clinical correlation and the requirement that any positive result influencing significant patient management, social, or legal outcomes must be confirmed with a definitive gold-standard technique such as GC-MS or LC-MS. Targeted education for clinical staff on these prevalent cross-reactants is essential to ensure appropriate test interpretation and minimize misdiagnosis and potential patient harm.

POSTER PRESENTATION ABSTRACTS

Abstract # 35

From an Audit Perspective: A Holistic Approach to Standardization of Medical Biochemistry Laboratories Through The "Den-iz" Project in Türkiye

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Background: Ensuring national-level standardization and quality in medical laboratory services is fundamental for patient safety and public health. To achieve this, the Turkish Ministry of Health has developed the "Den-iz" system, a centralized platform for inspecting and evaluating laboratories. The objective of this study is to examine the methodological structure of the "Medical Laboratory Inspection Inquiry and Administrative Sanction Form" which forms the basis of Den-iz, with a focus on the Medical Biochemistry discipline, thereby demonstrating the system's potential to standardize, improve and enhance the transparency and accountability of the national laboratory quality.

Methods: This study employs a descriptive document analysis methodology: the inspection form used by the Den-iz, which is based on the official Turkish Medical Laboratory Regulations (published on June 4, 2024 on the Turkish Federal Register). The form is composed of seven main sections for a holistic evaluation: 1) Building and Service Standards, 2) Operating Principles, 3) Personnel Standards, 4) Medical Device and Equipment Standards, 5) Internal and External Quality Assessment Program Standards, 6) Information Systems and Data Protection, and 7) Safety. The analysis focuses on the criteria within these sections which are directly relevant to the Medical Biochemistry laboratories.

Results: The analysis of the form's methodology revealed several key results regarding the system's capabilities for standardization. Den-iz enforces standardization of physical infrastructure, including biochemistry-specific conditions like ventilation and biosafety measures. Also the system's criteria comprehensively cover the Total Testing Process by evaluating pre-analytical (e.g., sample acceptance/rejection criteria), analytical (e.g., quality control), and post-analytical (e.g., critical values) stages. Furthermore, resource standardization is achieved by defining a mandatory minimum equipment inventory for biochemistry and enforcing personnel qualification standards. Den-iz establishes modern data management standards, requiring compliance with data protection laws, LIS integration, and secure data archiving.

Conclusion: The Den-iz Provides a strategic management tool and a national framework for quality and standardization in Medical Biochemistry, rather than just being a simple inspection checklist. However, we propose that to enhance the technical accuracy and consistency of the audit, certain criteria should be exclusively answered by the Medical Biochemistry specialist on the audit team. Its structured methodology allows for the objective evaluation of laboratories and systematic identification of deficiencies, and it enables the creation of a national map of laboratory quality. The system ensures that audits are objective and consistent, regardless of the individual auditor or the time of inspection, thereby establishing a national standard. Moreover, its capacity for real-time monitoring by central health authorities facilitates immediate intervention, enhancing the strategic management of laboratory resources nationwide. The project supports the Ministry of Health's vision for evidence-based health policies and holds significant potential to elevate the standards of laboratory medicine in Türkiye.

POSTER PRESENTATION ABSTRACTS

Abstract # 36

From Troponin T to Troponin I: Overcoming Diagnostic Challenges and Building Clinician Confidence Through a Structured Transition Plan

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Background: Cardiac troponins are central to the diagnosis of acute coronary syndromes (ACS). High-sensitivity assays for Troponin I (cTnI) and Troponin T (cTnT) are widely used, but they differ in methodology, reference cut-offs, and susceptibility to comorbid conditions. As such, their results are not interchangeable, and transitions between assays present both technical and clinical challenges. In particular, cTnT is more frequently positive in patients with renal dysfunction or muscle disease, while cTnI tends to show a steeper incremental rise once positive. These differences can create diagnostic uncertainty and hesitation among clinicians. To address these barriers, we evaluated assay concordance in a hospital setting and implemented a Structured Transition Plan to facilitate safe and acceptable transition. To assess concordance between cTnI and cTnT assays in emergency patients, identify sources of discrepancy, and implement a structured stepwise plan to support assay transition and clinician acceptance.

Methods: A total of 275 patients were tested simultaneously for cTnI and cTnT. Cut-offs were applied as follows: cTnT <14 ng/L and cTnI <17.5 ng/L were considered normal. Patients were classified as both positive, both negative, or discrepant. Alongside analytical comparison, a Structured Transition Plan was designed and rolled out in six stages: (1) awareness and education sessions for clinicians; (2) local validation studies comparing both assays; (3) communication of standardized cut-offs and clear clinical algorithms; (4) pilot testing in selected departments with feedback loops; (5) phased hospital-wide implementation; and (6) post-implementation audits with continuous support and re-training.

Results: The mean age of patients was 55.7 years (range 10–105). Of the 275 patients, 94 (34.2%) were positive in both assays, 142 (51.6%) were negative in both, and 39 (14.2%) showed discrepant results. Of the discrepant group, 36 were cTnT positive/cTnI negative, while 3 were cTnI positive/cTnT negative. cTnI generally showed a steeper incremental rise once positive, whereas cTnT positivity was strongly associated with renal impairment and muscle disease. Importantly, two cases of dermatomyositis were cTnT positive but cTnI normal, suggesting possible false positivity with cTnT. Implementation of the Structured Transition Plan led to high clinician acceptance and a smooth transition, with improved confidence in interpreting assay differences.

Conclusion: Our findings confirm that cTnI and cTnT are not interchangeable and that discrepancies, particularly in renal and muscle disease, require careful interpretation. The Structured Transition Plan proved highly effective, providing transparency, staged validation, and multidisciplinary consensus, which resulted in strong clinician buy-in and a smooth transition process. This model demonstrates that assay transition is not only a technical change but also a cultural and clinical shift. By combining local evidence with structured implementation, institutions can improve diagnostic accuracy, enhance clinician confidence, and ensure that assay changes ultimately benefit patient care.

POSTER PRESENTATION ABSTRACTS

Abstract # 37

Circulating Fertility- and Obesity-Regulating MicroRNAs Before and After Laparoscopic Sleeve Gastrectomy in Women

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Background: Obesity and overweight increase morbidity, mortality, and healthcare costs, and negatively affect female fertility. Obese women face difficulties conceiving naturally, higher rates of pregnancy complications, miscarriages, and congenital anomalies. Overweight subfertile or infertile women often experience delayed conception, lower spontaneous pregnancy rates, and higher failure rates in infertility treatments. Laparoscopic sleeve gastrectomy (LSG) is a common bariatric procedure to reduce obesity, yet its impact on fertility-regulating and obesity-related circulating microRNAs (miRNAs) remains underexplored. These miRNAs are implicated in ovarian function, granulosa cell quality, and pregnancy outcomes.

Methods: This prospective observational study included 12 obese married women (BMI >40 kg/m^2) undergoing LSG and 10 healthy female controls (BMI ~25 kg/m^2). Blood samples were collected preoperatively and three months post-LSG. Participants had no comorbidities, psychiatric disorders, or drug abuse history. Circulating miRNAs associated with obesity and female infertility were measured, alongside reproductive hormones (AMH, FSH). Paired comparisons evaluated changes in miRNA expression and hormonal profiles after surgery.

Results: Pre-LSG obese women showed significantly lower AMH and FSH levels, indicating impaired subfertility. Six miRNAs (miR-23a, miR-27b, miR-122-5p, miR-200, miR-146a, miR-221-3p) were highly upregulated preoperatively, consistent with associations to premature ovarian failure, granulosa cell apoptosis, polycystic ovary syndrome, endometriosis, reduced estradiol production, and lower implantation and pregnancy rates. Post-LSG, significant deregulation occurred: miR-23a, miR-27b, miR-103, miR-122-5p, miR-146a, and miR-200 were downregulated, while let-7f-5p, miR-20b-5p, miR-205-5p, miR-221-3p, and miR-375 were upregulated. These changes suggest improved granulosa cell function, oocyte quality, ovarian reserve, steroidogenesis, and increased potential for implantation and pregnancy. Notably, miR-200 downregulation may reduce anovulation and polycystic ovary syndrome incidence, while suppression of miR-23a, miR-27b, miR-103, miR-122-5p, and miR-146a may prevent premature ovarian failure and granulosa cell apoptosis.

Conclusion: LSG effectively modulates fertility- and obesity-related circulating miRNAs, correlating with improved reproductive hormone profiles and subfertility status. These molecular changes indicate enhanced ovarian function, oocyte quality, and potential fertility improvement post-surgery. Circulating miRNAs hold promise as a non-invasive diagnostic panel for early prediction of infertility risk in obese women, supporting personalized reproductive care. Future studies should validate these miRNAs for clinical applications in fertility management.

POSTER PRESENTATION ABSTRACTS

Abstract # 38

Assessing Iron Deficiency Anemia Among Female University Students in A Single Centre

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Background: Gynecological and nutritional factors are key contributors to the development of iron deficiency anemia in women. Therefore, this study was conducted to assess iron deficiency anemia (IDA) among female university students in Saudi Arabia.

Methods: A cross-sectional study was conducted among 1100 female university students and staff at Princess Nourah bint Abdulrahman University from August 2024 to November 2024. The study was approved by the institutional review board of King Abdullah bin Abdulaziz University Hospital (KAAUH). Participants (n=1081, aged 18-35) completed questionnaires, excluding those with diagnosed medical conditions known to cause anemia, pregnant or breastfeeding women, women who previously had children, recent blood transfusion, inability to understand or complete the study procedures due to language barriers or cognitive limitations. Blood samples (5 mL each in EDTA and SST tubes) were analyzed for CBC, hemoglobin, MCV, MCH, iron, UIBC, ferritin, and TIBC using Beckman Coulter instruments at the CAP-accredited KAAUH lab. The data were analyzed using JMP 18 for descriptive and chi-square statistics.

Results: The study included 1081 participants, predominantly aged 18-25 (95%), Saudi nationals (98%), undergraduates (77%) and single (99%). Iron deficiency was prevalent (60%), with 20 % reporting anemia. Of the 20% with confirmed anemia, 84.3%were iron deficient; only 15.7% had normal serum iron levels with different type of anemia. Menstrual patterns varied, with 83% experienced regular cycles, 97% reported monthly frequency, and 88% observed normal flow. Menstrual frequency and duration significantly impacted iron status and anemia types ($p < 0.05$). Also, dietary intake significantly influenced iron status, with regular meat consumers showing higher normal iron levels (43%), while green leafy vegetable consumers had higher iron deficiency (59%).

Conclusion: Prompt clinical intervention for conditions such as increased menstrual frequency and prolonged menstrual duration, coupled with the inclusion of iron-rich dietary sources, particularly meat, is critical for the prevention of IDA

POSTER PRESENTATION ABSTRACTS

Abstract # 39

Real-Time Quality Intelligence in Emergency Labs: A Shift from Six Sigma to Predictive Analytics

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Background: While Six Sigma metrics have revolutionized analytical quality control in clinical laboratories, the increasing demand for real-time, high-reliability results in emergency and critical-care settings necessitates a more proactive model. Traditional quality control systems detect errors only after they occur; emerging predictive analytics now enable laboratories to anticipate and prevent deviations before patient impact. This study introduces a Predictive Quality Intelligence (PQI) model that expands Six Sigma principles into a real-time, risk-based framework for early error detection and process optimization.

Methods: A retrospective–prospective quality improvement data (2021–2024) was conducted at the Emergency STAT Laboratory, KFAFH. Using the DMAIC methodology, the internal quality control (IQC) process was redesigned by integrating Six Sigma metrics, Defects Per Million (DPM) analysis, and a Moving Average (MA) algorithm embedded within Abbott Alinity-ci systems. Performance of 29 chemistry assays was evaluated using QC software (Unity Real-Time, Bio-Rad; Westgard Advisor). A digital dashboard was developed to visualize predictive indicators and monitor Key Quality Indicators (KQIs) and Key Risk Indicators (KRIs) in real time.

Results: Following implementation, 72 % of analytes achieved world-class performance (≥ 6 σ), raising process capability from 1.35 σ to 3.1 σ. The frequency of QC reruns decreased from 7.0 % to 0.18 %, with a 29 % reduction in internal failure costs and a 45 % decrease in error-identification time. Labor efficiency improved despite a 56 % rise in testing volume, accompanied by a 20 % reduction in turnaround time (TAT). The MA-based PQI dashboard enabled proactive anomaly detection and strengthened staff confidence in analytical reliability.

Conclusion: The Predictive Quality Intelligence approach represents an evolution from reactive control to predictive laboratory intelligence, aligning with ISO 15189:2022 and CLSI EP23-A risk-based QC standards. By combining Six Sigma analytics with real-time data modeling, laboratories can sustain high analytical performance, optimize resource utilization, and reinforce patient safety. This framework supports Saudi Vision 2030's digital transformation in healthcare by demonstrating that predictive error prevention is achievable, measurable, and cost-effective within modern clinical chemistry operations.

POSTER PRESENTATION ABSTRACTS

Abstract # 40

Comprehensive Assessment of Flow Cytometry Light Chains: Qualitative and Quantitative Evaluation Using Serum Protein Immunofixation and Free Light Chain Analysis

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Background: The detection of Kappa (κ) and Lambda (λ) light chains is crucial for the diagnosis and management of diseases such as multiple myeloma. Abnormal secretion of κ and λ light chains can be assessed quantitatively or qualitatively using various methods. This study aimed to compare the outcomes of κ and λ light chains and their ratio (κ/λ) in different patients with and without monoclonal gammopathies, utilizing flow cytometry (FC), serum free light chain assays (sFLC), and gel immunofixation electrophoresis (IFE).

Methods: This retrospective study included data from 92 patients, both with and without monoclonal gammopathy. Patients were categorized into two groups based on serum protein electrophoresis and IFE: those with positive monoclonal bands (n=71) and those without (n=21). Simultaneous assessments of bone marrow plasma cells were conducted using FC, along with serum free κ and λ light chain assays.

Results: After natural logarithm transformation, the serum κ/λ ratio was compared to the FC results for plasma cells. The quantitative assessment of κ/λ ratios showed a stronger association between sFLC and abnormal plasma cells ($r = 0.84$, $p < 0.001$) compared to normal plasma cells ($r = 0.32$, $p < 0.05$). Additionally, qualitative Chi-square analysis indicated a significant association for detecting light chains for FC in comparison to IFE technique ($p < 0.001$) with sensitivity and specificity of 94.2% and 47.6% respectively.

Conclusion: Free light chain immunophenotyping using FC can serve as an alternative technique for identifying the type and quantity of positive free light chains when compared to IFE and sFLC assays

POSTER PRESENTATION ABSTRACTS

Abstract # 41

Six Sigma–Based Rejection Rate Monitoring in The Clinical Chemistry Laboratory (2022-2024)

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Background: The rejection of laboratory samples leads to delays in patient care, increased costs, and reduced efficiency. Common reasons include hemolysis, insufficient sample volume, and labeling mistakes. Ongoing monitoring through Key Performance Indicators (KPIs) based on the Six Sigma methodology supports benchmarking and enables targeted quality improvement. Our aim to assess the monthly as well as overall sample rejection rates and reasons in the Chemistry section for the years 2022, 2023, and 2024.

Methods: Study Design: Observational, retrospective analysis of rejected Chemistry samples in 2022, 2023 and 2024. Data Source: Laboratory Information System (LIS) extraction into the Excel template provided. Indicators measured include: Total samples received per month, Number of rejected samples, Rejection rate (%), DPMO and Sigma level. Categorization of causes: Specimen lost/not received, Mislabeled specimen, Wrong date or time collection error, Wrong collection container, Age of specimen, Hemolyzed specimen, Lipemic/icteric specimen, Specimen clotted, Contaminated specimen (IV fluid dilution), Insufficient specimen quantity, Unacceptable variance (delta check), Not kept at correct temperature and other reasons.

Results: In laboratory operations, sample rejection is a significant quality concern that affects both diagnostic accuracy and patient care. Understanding the causes of rejected samples is essential for improving laboratory performance. Our analysis revealed three main reasons for rejection: hemolyzed specimens, insufficient specimen quantity, and contaminated specimens. Additionally, the Six Sigma performance level for the years 2022, 2023, and 2024 was consistently measured at 4, indicating a stable but improvable quality level. These findings highlight the need for targeted corrective actions to address rejection causes and enhance process quality, ultimately improving laboratory efficiency and patient care outcomes. Also, DPMO is for the 3 years is around 5000 which indicate a good performance but improvement is needed.

Conclusion: Sample rejection monitoring using Six Sigma showed stable performance (Sigma 4, DPMO ~5000) across 2022–2024. The main rejection causes were hemolyzed, insufficient, and contaminated specimens. Targeted interventions are required to further reduce rejections and enhance patient care.

POSTER PRESENTATION ABSTRACTS

Abstract # 42

Rationalization Cardiac Biomarker Requests: Hs-Troponin I As the Primary Marker and Restricted Role of CK-MB

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Background: High-sensitivity cardiac troponin I (hs-cTnI) is recognized internationally as the gold standard biomarker for detecting myocardial injury (MI) and diagnosing acute coronary syndrome (ACS), due to the superior sensitivity and specificity. Despite clear international recommendations, creatinine kinase-MB (CK-MB) continued to be ordered alongside hs-cTnI among emergency departments, leading to redundant testing, increased costs, and delayed decision-making. This study evaluates the utilization of CK-MB co-ordered with hs-cTnI in the STAT laboratory, assess concordance between both biomarkers, and determine its clinical value.

Methods: A retrospective analysis of 8,297 emergency cases conducted at the STAT laboratory of King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. After reviewing all STAT orders for hs-cTnI and CK-MB, cases were stratified into four groups based on the biomarker positivity or negativity, and concordance rates were calculated. Gender-specific cut-offs were applied (hs-cTnI: 15.6 ng/L for females, 34.2 ng/L for males; CK-MB: 3.1 ng/mL for females, 5.2 ng/mL for males).

Results: Among the total cases of 5,171 patients with a positive hs-cTnI, 4327 patients had negative CK-MB results (83.7%), while only 844 patients showed positive CK-MB (16.3%). Conversely, 2,917 cases were negative for both hs-cTnI and CK-MB (35.16%), while only 209 cases showed positive CK-MB in the absence of hs-cTnI elevation (2.52%). Overall, concordance rate between the two biomarkers was 45.3%.

Conclusion: The study confirms that hs-cTnI is the primary and most reliable marker for myocardial injury. Routine CK-MB ordered with hs-cTnI is unnecessary and does not improve the diagnostic accuracy. CK-MB should therefore be reserved for specific cardiology indications by cardiologists, or requested as an add-on or single test, while hs-cTnI remains the gold marker in emergency practice.

POSTER PRESENTATION ABSTRACTS

Abstract # 43

Identifying Novel Therapies for Cystinuria.

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Background: Cystinuria is an inherited metabolic disorder in which the kidneys fail to properly reabsorb Cystine, resulting in high urinary Cystine concentration and the eventual development of Cystine stones in the kidneys, ureters, or bladder. Available drug treatment (Thiol drugs) are used to decrease the Cystine concentration in the urine. However, these drugs severely reduce patients' quality of life through agonising side-effects. This necessitates the need for other therapeutic approaches that can treat the disorder without causing major side-effects. Cystine is mostly reabsorbed through a cellular heterodimer transporter channel at the plasma membrane (PM) of the kidney's proximal tubule epithelial cells. This process results in a urinary Cystine concentration of <30mg/day in healthy individuals. The transporter channel consists of two protein subunits, rBAT and b0, +AT which are encoded by SLC3A1 or SLC7A9 genes, respectively. Cystinuria is caused by mutation in one or both protein subunits, leading to the mis-localization of the functional rBAT and b^0, +AT transporters at the plasma membrane due to their retention in the endoplasmic reticulum (ER) of the cell. The mutation translates into disruption of urinary Cystine re-absorption and leads to hyperexcretion of Cystine in the urine which is typically >300mg/day. This research hypothesizes that repurposing established drug compounds (LOPAC1280) to fix the molecular cause of the disease by re-directing b0,+AT protein from the ER back into the PM could provide a novel and improved therapeutic approach.

Methods: In this study, transduced human proximal tubule epithelial cells (PTECs) overexpressing fluorescently tagged rBAT and b0, +AT proteins were used. A unique screening assay model was developed and optimized using a high-content fluorescent microscope system (IN-CELL analyser). This model enabled quantification of b^0, +AT exit from the endoplasmic reticulum (ER) using Pearson's correlation coefficient relative to the control. Subsequently, Total Internal Reflection Fluorescence (TIRF) microscope was employed to assess the localisation of b0, +AT at the PM. This developed system was then utilised for the screening of LOPAC1280 library on the mutated cell line (p. Met467Thr-rBAT expressing cell line).

Results: One drug was identified as a final target hit (LOPAC955), which successfully induced exit of b0, +AT from the ER and translocated it to the PM in the mutated cell line.

Conclusion: The full LOPAC1280 library was screened on mutated cells. One target hit was identified which showed promising results in the exit of the b0,+AT from the ER to the PM. With further confirmation, the drug LOPAC955 may be repurposed and personalized for Cystinuria patients carrying the most common pathogenic variant, p. Met467Thr-rBAT. Additionally, this tailored screening assay could be used as a model for other Cystinuria-causing variants, and other protein ER trafficking diseases.

POSTER PRESENTATION ABSTRACTS

Abstract # 44

Assessment of Vitamin D Levels in Individuals on a Ketogenic Diet in Khartoum State

Suhair Abdelrahman Ahmed, and Ame Emad Aldein Ahmed

Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, Al Neelain University, Khartoum, Sudan.

Background: The ketogenic diet (KD), while beneficial for certain conditions, has been associated with potential nutrient deficiencies with long-term adherence. Concurrently, vitamin D deficiency is a significant public health issue in Sudan, affecting various population groups. This study aimed to assess and compare vitamin D levels in individuals adhering to a KD versus a matched control group in Khartoum State.

Methods: This comparative cross-sectional study was conducted at El-Ryada Medical Centre between July and October 2022. The study comprised 80 participants: 40 healthy obese Sudanese adults adhering to a ketogenic diet (KD) and 40 healthy, age-matched controls not following the diet. From each participant, a 3 mL venous blood sample was collected. Serum was separated, and vitamin D (25-OH) levels were quantified using a Snibe Maglumi 2000 automated analyzer. Demographic and dietary data were obtained using a structured questionnaire and statistically analyzed with SPSS software, version 24.

Results: The study population comprised 80 adults, divided into a ketogenic diet (KD) group (n=40) and a control group (n=40). The KD group had a higher proportion of males (57.5%), a mean age of 28 years, and a mean BMI of 35.8 kg/m². In contrast, the control group had a higher proportion of females (55%), a comparable mean age of 27 years, and a significantly greater mean BMI of 38.9 kg/m². The mean duration of KD adherence was 13.35 months. The analysis of serum vitamin D levels showed comparable insufficiency in both cohorts, with a mean of 22.81 ng/mL in the KD group and 22.87 ng/mL in the control group. This difference was not statistically significant ($p > 0.05$). Regression analysis further indicated no significant association between vitamin D levels and any of the recorded demographic variables, including age, gender, or BMI.

Conclusion: The study concludes that the Sudanese population in Khartoum State exhibits insufficient vitamin D levels, irrespective of adherence to a ketogenic diet or the specific demographic factors considered. Public health initiatives to address vitamin D deficiency are warranted, focusing on the general population.

POSTER PRESENTATION ABSTRACTS

Abstract # 45

Newborn Screening Experience for Glucose-6-Phosphate Dehydrogenase in A Tertiary Center in Saudi Arabia

Fatima Almutairi, Haneen Asiri

Newborn Screening & Metabolic Laboratory, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Background: Glucose-6-Phosphate Dehydrogenase (G6PD) is an enzyme that generates nicotinamide adenine dinucleotide phosphate (NADPH), which protects red blood cells against oxidative stress. G6PD plays a role in all cells, but is the most essential for red blood cells. Diminished G6PD activity may lead to hemolysis. The affected patients present with jaundice, acute or chronic hemolytic anemia or neonatal hyperbilirubinemia. Management of G6PD deficiency is essentially the avoidance of oxidative factors. The current study aims to determine the incidence of G6PD in a tertiary medical Centre in Saudi Arabia.

Methods: Dried blood spots (DBS) specimens were collected from the newborn babies between 24-72 hours after birth during the period from 25th August 2025 to 6th October 2025. G6PD levels were measured utilizing a genetic screening processor (GSP) based on the oxidation of glucose-6-phosphate substrate to 6-phosphogluconate by G6PD present in the blood spot sample and the concomitant reduction of NADP+ to NADPH. Initial remarkable results were reanalyzed using recall samples for evaluation and confirmation before being referred for medical management. All remarkable recall samples have undergone further diagnostic confirmation.

Results: A total of 4700 newborn babies were screened for G6PD during the study period with a coverage rate of 100 %. More than 6 % cases were confirmed and diagnosed with G6PD.

Conclusion: We reported the incidence of G6PD in our Center. Our study highlights the importance of increasing the coverage rate of Newborn screening in Saudi Arabia in the first days of life for early diagnosis & subsequently early management of this fetal and highly treatable disease.

POSTER PRESENTATION ABSTRACTS

Abstract # 46

Newborn Screening Experience for Glucose-6-Phosphate Dehydrogenase in A Tertiary Center in Saudi Arabia

Fatima Almutairi1, Haneen Asiri1

Newborn Screening & Metabolic Laboratory, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

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POSTER PRESENTATION ABSTRACTS

Abstract # 47

Method Verification of Serum Methylmalonic Acid by Liquid Chromatography Tandem Mass Spectrometry

Fatima Almutairi

Newborn Screening & Metabolic Laboratory, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Background: Methylmalonic acid (MMA) is important intermediate product of amino acid decomposition, which occurs during the conversion of propionyl coenzyme A to succinyl coenzyme A in a vitamin B12-dependent reaction. Deficiency of vitamin B12 leads to elevation MMA levels in plasma, serum and urine. So the elevated MMA is a good indication of vitamin B12 deficiency. MMA in serum/plasma is a frequently requested analyte at clinical laboratories the analytical method was improved and validated.

Methods: The serum samples were collected, the extracted MMA levels were measured utilizing liquid chromatography tandem mass spectrometry (LC-MS/MS), the separated chromatographically via an analytical column. Used of an electro spray ionization (ESI) in negative mode and the use of a deuterated internal standard. The precision study was performed using 50 quality control samples of two different concentration run for a period of 5 days. Mean, Standard Deviation (SD), and coefficient of variation (%CV) were calculated and compared to the manufacture recommendation. Method comparison study for MMA was done comparing 35 samples of patients. Linearity study was using four different concentrations of calibration samples that are spanning the analytical measurement rang (AMR).

Results: Between days precision study for low and high concentrations, %CV were 6.7.and 4.0 respectively. Method comparison acceptable criteria: slop (m) 0.9-1.0 and correlation coefficient (r) ≥ 0.975, data was entered to EP evaluator, the yield slop (m) was 0.974 and correlation coefficient = 1.0, the method was found linear over the AMR of 36-1584 nmol/L. the low limit of quantitation observed 36 nmol/L which is agreed with the manufacture claim (36.1).

Conclusion: Overall performance of MMA validation were acceptable on LC-MS/MS provided reliable results for patients samples testing.

POSTER PRESENTATION ABSTRACTS

Abstract # 48

Prevalence And Determinants Of Anemia Among Medical Students Living in Hadhramout University Hostels, Mukalla, Yemen

Azal Bagunaid1, Aseela Altaffi1, Wafa Bin-Swileh1, Dania Almrhm1, Bian Bawazir1, Fatema Najeeb1, Sara Binjahlan1, Anwar Bin-Ghouth2, Lotfi Bin Dahman1

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[2]Community Medicine Department, College of Medicine and Health Sciences, Hadhramout University, Mukalla, Yemen

Background: Anemia remains a major global public health concern, particularly among young adults, including university students. Medical students are especially susceptible due to academic stress, poor dietary habits, and irregular lifestyles. In Yemen, data on the prevalence and determinants of anemia among medical students are scarce, especially among those residing in university hostels. Therefore, this study aimed to determine the prevalence and determinants of anemia among medical students living in Hadhramout University hostels in Mukalla, Yemen.

Methods: An analytical cross-sectional study was conducted among 277 medical students residing in Hadhramout University hostels, selected through simple random sampling. Data were collected using a structured questionnaire to obtain socio-demographic, lifestyle, and health-related information. Anemia was diagnosed and classified according to WHO criteria. Data were analyzed using SPSS version 25. Associations between anemia and socio-demographic characteristics were assessed using the Chi-square test, and linear regression analysis was performed to evaluate the effects of body mass index (BMI) and stress levels on anemia status.

Results: The mean age of participants was 22.43 years, with 66.4% males. More than half of the students (55.6%) were enrolled in the Medicine program. The overall prevalence of anemia was 21%. Among female students, more than half (51%) were anemic, compared to only 6% of male students, representing a statistically significant difference ($\chi^2 = 76.747$, $p < 0.001$). Significant associations were also observed between anemia and academic specialty ($\chi^2 = 12.187$, $p = 0.007$) and residency ($\chi^2 = 5.525$, $p = 0.022$). Linear regression analysis revealed that BMI had a significant positive association with anemia ($B = 0.43$, $t = 2.236$, $p = 0.026$), while stress showed a significant negative association ($B = -0.062$, $t = -2.650$, $p = 0.009$).

Conclusion: Anemia is a significant health concern among medical students at Hadhramout University, with female students disproportionately affected. The findings highlight the need for nutritional education and stress management programs to reduce anemia prevalence. Implementing university-based health initiatives could help improve students' nutritional status, mental well-being, academic performance, and overall quality of life.

POSTER PRESENTATION ABSTRACTS

Abstract # 49

Effect of Monoclonal Immunotherapy Daratumumab and Isatuximab on the Results in Serum Protein Electrophoresis and Immunotyping Tests of Myeloma Patient Samples

Sarah Aljunidel[1], Noof Mathkor[1], Waleed Tamimi[1], Khalid Sumaily[2], Ahmad Mujamammi [2], Essa Sabi[2], Souad Alenazi [1], Fahad Almasnad[1]

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[2]King Saud University, King Khaled University Hospital, Riyadh, KSA

Background: Multiple Myeloma is a plasma cell cancer that causes high mortality and morbidity. Immunotherapy such as Daratumumab and Isatuximab showed efficiency to treat refractory multiple myeloma. During follow up the myeloma patient specially during and after receiving an immunotherapy it showed an interference on interpretation the result of Immunosubtraction that made a challenge to determine if the band source from the therapy or not, so we used a special kit assay Hydrashift Daratumumab and Hydrashift Isatuximab kits assay to clear the source and determine the clear remission of the disease.

Method: we used waste serum samples from myeloma patients (n = 22) receiving immunotherapy daratumumab and Isatuximab were analyzed through serum Immunofixation electrophoresis and used special kits Hydrashift daratumumab and Hydrashift Isatuximab kits assay. Results were compared and were evaluated along with serum immunofixation and new kits results.

Results: For patients on Isatuximab immunotherapy we found three cases only on isa, the results were the presence of both M protein in gamma region and the isa complex shifting band in alpha region in form of faint band. For patients on Dara there were sixteen cases. Three cases we found on their result faint band Dara complex in alpha region and absence of M protein which indicates full remission. Thirteen cases their results were presence of both M protein in gamma region and Faint band Dara complex in alpha region. Three cases their last Dara cycle was more than a month (>21 days) and their results were only presence of M protein with Negative of Dara interference; this indicate that might be needed of frequent cycles to achieve a remission.

Conclusion: Hydrashift Daratumumab and Hydrashift Isatuximab are valuable tools to eliminate the interference of immunotherapy.

POSTER PRESENTATION ABSTRACTS

Abstract # 50

Studying Changes in Phagocytic Cell Biomarkers and miRNAs for Diagnosis and Monitoring of Sepsis Patients

Abrar Saati, Eman Almalki, Nuha Alkhattabi, Nesrin Tarbiah

Biochemistry Department in the Faculty of Sciences at King Abdulaziz University, Jeddah, Saudi Arabia

Background: Sepsis is a potentially fatal illness that results from a dysregulated inflammatory response to an infection. It can induce organ failure and even septic shock. After Systemic Inflammatory Response Syndrome (SIRS), it advances to Severe Sepsis and, ultimately, Septic Shock, which is linked to a high death rate. In order to lower mortality and provide timely treatment, early diagnosis is essential. The necessity for faster alternatives, such as diagnostic methods like blood culture. The diagnosis and prognosis of sepsis are significantly influenced by biomarkers. Among these, Presepsin (CD14 subtype) and CD64 have demonstrated great promise as early markers of the severity of sepsis and bacterial infection, providing useful instruments for prompt diagnosis and patient care. Thus, the purpose of this study is to determine whether CD14 and CD64 are specific and selective biomarkers for sepsis and how well they work for early diagnosis and patient monitoring.

Methods: This study enrolled 37 adult patients aged > 18 years old, who were diagnosed with sepsis and recruited from hospitals in the western region of Saudi Arabia, Jeddah city. Data was collected from medical records, including patient age, gender, and laboratory results. According to the severity of disease, the patients were categorized into three groups: SIRS, severe. Septic shock. All serum samples were examined by using the enzyme-linked immunosorbent assay (ELISA) procedure to measure interested biomarkers. Statistical analyses were performed by one-way ANOVA in (SPSS) to compare findings between the three groups.

Results: Compared to women, men made up the bulk of study participants (67% of the sample). Gender, however, had no discernible impact on the variations in outcomes among the groups. 54% of sepsis cases were in elderly individuals 60 years of age or older. According to the results of one-way ANOVA, there was a statistically significant difference between the patient groups, and the severity of the disease was correlated with higher biomarker levels. As far as we are aware, no fatalities occurred throughout the trial.

Conclusion: According to the findings, presepsin CD14, and CD64 are potent indicators for determining the severity of illness and identifying sepsis. They also offer a quick and efficient substitute for the existing techniques.

POSTER PRESENTATION ABSTRACTS

Abstract # 51

Optimizing CRP And Pct Requests in Emergency Care: Experience from A High-Volume Hospital

Wejdan Alghamdi, Moroje Aljihani, Donia Firaq, Seham Alqahtani, Amera Albugmi, Ali Al-Hamad, Waleed Tamimi

Department of Pathology & Laboratory Medicine, King Abdulaziz Medical City Riyadh, Saudi Arabia

Background: C-reactive protein (CRP) and procalcitonin (PCT) are widely used inflammatory markers in emergency and critical care. Both tests are often ordered together, although their clinical utility across different infectious categories remains debated. This study evaluated the performance and positivity patterns of CRP and PCT in patients presenting to the Emergency Room at King Abdulaziz Medical City with both tests measured at admission and a recorded diagnosis.

Methods: We performed a retrospective observational analysis of laboratory information system (LIS) data covering January–February 2025. All measurements were performed on the Abbott Alinity ci-series analyzer. Manufacturer reference intervals were applied (CRP ≤ 5 mg/L; PCT ≤ 0.07 ng/mL). A total of 200 patient samples were included, categorized into five groups: sepsis, bacterial, viral, other infections, and no infection. CRP and PCT results were summarized by mean values, standard deviations, and positivity across categories. Subgroup analysis was performed by gender.

Results: Overall, CRP (mean 61.4 mg/L) was more consistently elevated across categories compared to PCT (mean 1.3 ng/mL).

- Sepsis (n=5): markedly elevated CRP (166.2 mg/L) and PCT (9.1 ng/mL).
- Bacterial (n=66): moderately elevated CRP (76.0 mg/L) with low-to-moderate PCT (1.4 ng/mL).
- Viral (n=72): elevated CRP (43.1 mg/L) but relatively low PCT (1.4 ng/mL).
- Other infections (n=23): CRP (92.3 mg/L) with low PCT (0.75 ng/mL).
- No infection (n=34): both CRP and PCT largely within reference interval (CRP 35.8 mg/L, PCT 0.30 ng/mL).

By gender, males (n=80) showed higher mean CRP (67.6 mg/L) and PCT (1.95 ng/mL) compared to females (57.3 mg/L and 0.91 ng/mL, respectively).

Conclusion: CRP showed non-specific elevation across multiple categories, while PCT increases were more specific and mainly elevated in sepsis. These findings suggest that routine combined testing may not be necessary in all cases, and selective use could reduce redundancy and cost without compromising diagnostic value.

POSTER PRESENTATION ABSTRACTS

Abstract # 52

Lipid Profile Alterations in Individuals with Insulin Resistance Identified by HOMA-IR Compared to Healthy Controls

Meshal M. Al Sharafa[1], Ms. Ruwydah N. Degriri[1], Ayed Dera[2], Hanan Henidi[3], Saeed S. AL Shlwi[4], Dalal F. ALShamri[5], Alaa A. Al Masud[1]

[1] Tissue banking section, Research department, Natural and Health Science Research Center, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia
[2] Department of Clinical Laboratory Sciences, College of Applied Medical Sciences, King Khalid University, Abha, Saudi Arabia
3 Research Department, Natural and Health Sciences Research Center, Princess Nourah bint Abdulrahman University, Riyadh,
4 Department of Surgery, King Abdullah Bin Abdulaziz University Hospital, Riyadh, Riyadh, Saudi Arabia
5 Department of Nutrition, King Abdullah Bin Abdulaziz University Hospital, Riyadh, Riyadh, Saudi Arabia

Background: Insulin resistance (IR) is a major metabolic disturbance contributing to type 2 diabetes mellitus and cardiovascular disease. Dyslipidemia frequently accompanies IR, yet the exact lipid alterations remain inconsistent across populations. Defining these patterns can provide insights into early cardiometabolic risk prediction.
Methods: A cross-sectional study was performed on 392 individuals. Insulin resistance was defined using a homeostatic model assessment of insulin resistance (HOMA-IR) cutoff of 1.6, categorizing 238 participants as insulin resistant and 154 as normal controls. Fasting lipid profiles were measured, including triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and total cholesterol (TC). Statistical analysis was conducted, with $p < 0.05$ considered significant.
Results: The insulin resistance group exhibited significantly higher triglyceride levels (1.41 ± 0.84 mmol/L vs. 0.83 ± 0.37 mmol/L, $p < 0.01$) and significantly lower HDL-C levels (1.30 ± 0.32 mmol/L vs. 1.56 ± 0.33 mmol/L, $p < 0.01$) compared to normal controls. In contrast, LDL-C (3.29 ± 0.85 mmol/L vs. 3.08 ± 0.79 mmol/L, $p > 0.05$) and TC (4.77 ± 0.90 mmol/L vs. 4.70 ± 0.91 mmol/L, $p > 0.05$) did not differ significantly between groups. This indicates a selective dyslipidemia pattern among insulin-resistant individuals.
Conclusion: Insulin resistance, as defined by a HOMA-IR cutoff of 1.6, is associated with elevated triglycerides and reduced HDL-C, while LDL-C and TC remain unchanged. This specific dyslipidemia profile may underlie the increased cardiometabolic risk observed in insulin-resistant populations, highlighting the importance of early lipid monitoring and targeted preventive interventions.

POSTER PRESENTATION ABSTRACTS

Abstract # 53

Polyethylene Glycol (PEG) Testing for Macroprolactin: A Laboratory Experience

Sarah Aljunidel, Amal Al Sughair, Dalal Al Baqami, Haya Al Dawsari, Huda Al Mutairi, Nora Al Bagaei, Rana Madani, Aisha Al Harthi, Majed Al Shebani, Ali Al-Hamad, Waleed Tamimi

Department of Pathology & Laboratory Medicine, King Abdulaziz Medical City Riyadh, Saudi Arabia

Background: Macroprolactinemia is an important cause of hyperprolactinemia, often leading to unnecessary investigations and treatment if not recognized. Polyethylene glycol (PEG) precipitation is a widely used screening method to differentiate true hyperprolactinemia from macroprolactin interference. This study aimed to evaluate the correlation between laboratory recovery percentages, MRI findings, and clinical diagnoses.

Methods: A total of 131 patient samples referred for macroprolactin analysis were received in the central laboratory of King Abdulaziz Medical City between July 2024 and August 2025. Of these, 33 were excluded due to normal prolactin levels, leaving 98 patients (86 females, 12 males) included in the study. Macroprolactin screening was performed by PEG precipitation, and recovery results were classified as: Positive (<40%), Intermediate (40–60%), and Negative (>60%). Clinical diagnoses and MRI findings were retrieved and correlated with laboratory categories.

Results: Among the 98 included patients, MRI was available for 83 (85%). For the positive recovery group (<40%), 93% were diagnosed with macroprolactinemia. Notably, 76% of these patients had normal MRI findings despite elevated prolactin levels, supporting macroprolactin as the underlying cause. In contrast, patients with negative recovery results (>60%) were more often confirmed as true hyperprolactinemia, with 74% showing concordant clinical and radiological features. The intermediate recovery group (40–60%) yielded equivocal outcomes, with 50% classified as macroprolactinemia and 50% as true hyperprolactinemia. Overall, PEG recovery showed strong agreement with clinical diagnosis, whereas MRI findings alone were less reliable in distinguishing macroprolactin from true disease.

Conclusion: PEG recovery testing provides a reliable laboratory approach to differentiate macroprolactinemia from true hyperprolactinemia, thereby preventing unnecessary imaging and treatment. Most patients with positive recovery (<40%) had normal MRI findings and were correctly classified as macroprolactinemia. Intermediate recovery results require careful clinical correlation. These findings highlight the value of integrating biochemical screening with clinical and radiological data for accurate diagnosis and management of hyperprolactinemia.

POSTER PRESENTATION ABSTRACTS

Abstract # 54

Evaluation of insulin resistance and associated metabolic abnormalities in apparently healthy young adults in Saudi Arabia

Ruwydah N. Degriri[1], Ayed Dera[2], Hanan Henidi[2], Saeed S. AL Shlwi[2], Nouf Almutairi[2], Dalal F. ALShamri [2], Meshal Al-sharafa [3], Alaa A. Al-Masud[2].

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Background: The present study aims to identify apparently healthy young individuals who have developed insulin resistance and associated metabolic abnormalities and are at a risk of developing chronic disease.
Method: Total number of participants enrolled in the study were 205. Apparently healthy participants were (n=299) who were classified into group I (18-30 years), group II (30 to 40 years), group III (> 40 years), Group IV (n=96) for comparison included patients diagnosed with Metabolic Syndrome. Blood glucose, Insulin, lipid profile: triglycerides (TG), cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL) and thyroid profile were analyzed. Insulin resistance was measured by Homeostatic Model Assessment - Insulin Resistance (HOMA-IR).
Results: Insulin resistance tends to increase with age and was significantly greater in subjects aged ≥30 years, predominantly in males ($p=0.0001$). Percentage of Obesity, prediabetes showed significant increase with age across gender/age. Diabetes increased significantly from age group (30-40 years) and above >40 years in both the genders ($p<0.05$). No significant correlation was observed in hypothyroidism with increase in age.
Conclusions: The results of the study revealed that the prevalence of Insulin resistance tends to increase with age in both the genders and was significantly greater in subjects aged ≥30 years. Moreover, A positive correlation of Insulin resistance with BMI, fasting blood glucose, fasting Insulin, TG and negative correlation with HDL was also demonstrated.

POSTER PRESENTATION ABSTRACTS

Abstract # 55

CPT1C As a Prognostic Marker of Metabolic Reprogramming and Tumor Progression in Breast Cancer: An Integrative Bioinformatics Analysis

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[2] Alneelain University, Khartoum, Sudan.

Background: Metabolic reprogramming allows cancer cells to survive under hypoxic and nutrient-deprived conditions. Carnitine palmitoyltransferase-1C (CPT1C), a brain-specific isoform of the carnitine palmitoyltransferase family, CPT1C acts as a metabolic sensor in the neurons and regulates neuron metabolism and function. Studies have also detected its expression in multiple cancer types, for example, gastric cancer, papillary thyroid carcinomas, hepatocellular carcinomas, and basal-like breast cancer. Moreover, its high expression is correlated with poorer overall survival compared to patients with low CPT1C expression. Multiple studies demonstrated the crucial role of CPT1C in aiding cancer cells' survival and adaptation to metabolic stress. Thus this study aimed to evaluate CPT1C expression, its association with clinical and molecular features, and its link to metabolic and immune pathways using multiple bioinformatics databases.

Methods: CPT1C expression profiles were analyzed using GEPIA, UALCAN, and TIMER across tumor versus normal tissues and within different clinical stages, molecular subtypes, menopausal states, and TP53 mutation statuses. Immune infiltration correlations were determined using partial Spearman coefficients adjusted for tumor purity. Co-expressed genes were obtained via LinkedOmics, and Metascape was used to perform Gene Ontology (GO) and KEGG enrichment analyses to identify major biological processes associated with CPT1C.

Results: CPT1C expression was significantly upregulated in BRCA tissues compared with normal controls ($p < 0.001$). High expression was observed in luminal and triple-negative breast cancer (TNBC) subtypes, postmenopausal patients, and TP53-mutant tumors. Across stages I–III, CPT1C remained consistently elevated ($p < 0.01$). Immune infiltration analysis revealed weak positive correlations with $CD4^+$ T cells ($r = 0.25$, $p < 0.001$), macrophages ($r = 0.12$, $p = 0.0002$), and dendritic cells ($r = 0.16$, $p < 0.001$), suggesting minimal immune association. Functional enrichment analysis indicated strong involvement in hypoxia response, oxygen regulation, extracellular matrix organization, and mitochondrial lipid metabolism, highlighting CPT1C's metabolic and stress adaptation functions.

Conclusion: This bioinformatics study highlights CPT1C as a key metabolic regulator in breast cancer. Its overexpression in TP53-mutant and hypoxic tumors underscores its contribution to metabolic plasticity, extracellular remodeling, and tumor aggressiveness. CPT1C can serve as a novel biomarker of metabolic adaptation and a potential target for metabolism-based therapeutic strategies in breast cancer.

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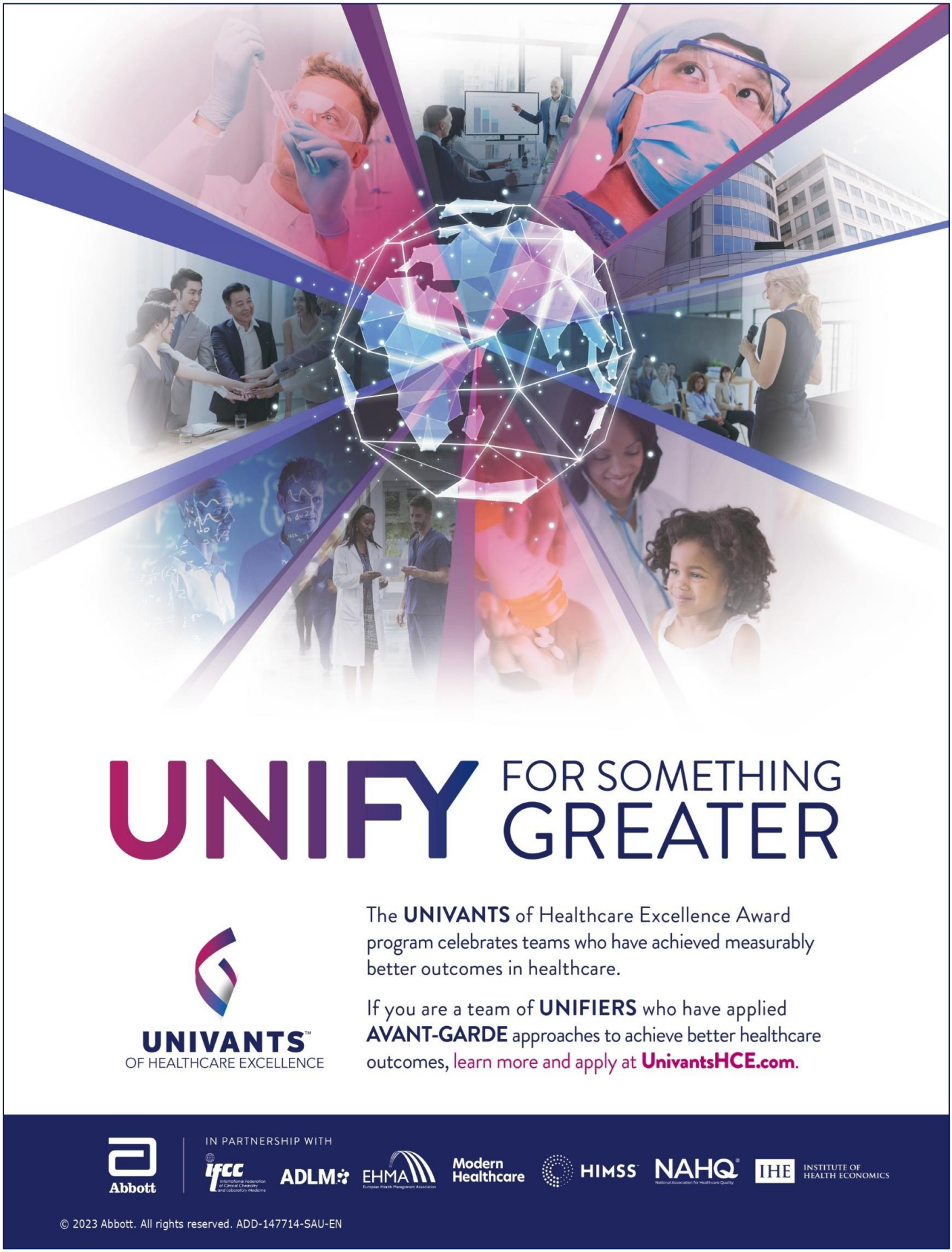
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