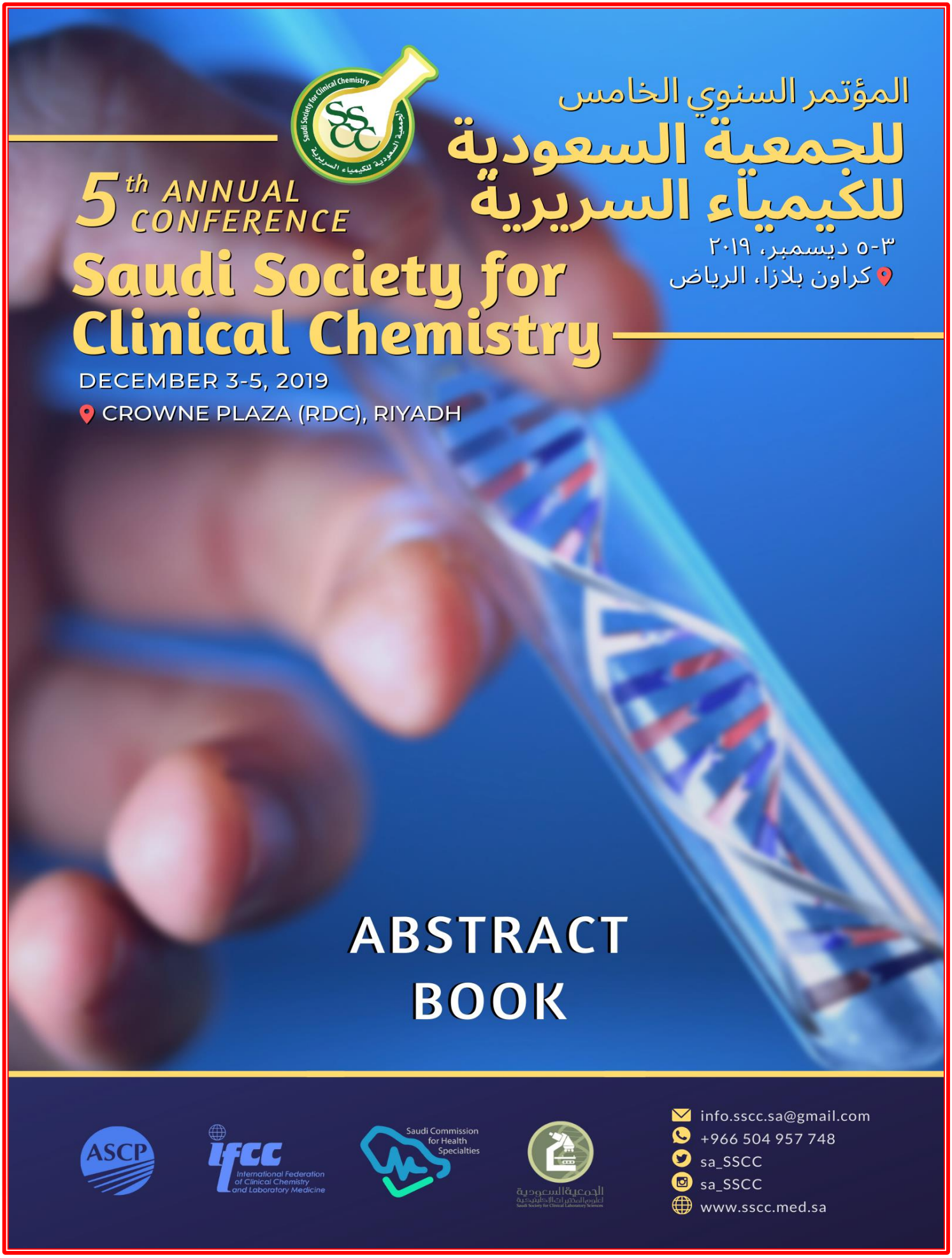

المؤتمر السنوي الخامس
للجمعية السعودية للكيمياء السريرية
٣-٥ ديسمبر، ٢٠١٩
كراون بلازا، الرياض

5th ANNUAL CONFERENCE
Saudi Society for Clinical Chemistry
DECEMBER 3-5, 2019
CROWNE PLAZA (RDC), RIYADH

ABSTRACT BOOK

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Introduction and Welcome

Dear Colleagues,

We are very pleased to host the 5th Annual Meeting Saudi Society for Clinical Chemistry with an education and scientific programs paired with a dynamic exposition in Riyadh 3ed –5th December 2019.

The scientific program features expert from International Federation of Clinical Chemistry and Laboratory Medicine, the Middle East and Saudi Arabia, sharing recent advances and innovations. Scientific conference attendee will meet and network with experts in the field and engage with their peers for a unique learning experience.

The scientific program will feature the latest update of clinical testing including disease biomarkers, quality management, biochemical genetics, automation, point of care testing and education and training.

The Saudi Society for Clinical Chemistry is excited to bring forward this opportunity for laboratory experts and we hope to see you in Riyadh.

We would like to take this opportunity to extend our gratitude to the Saudi Commission for Health Specialties, our sponsors and supporters for their support of Saudi Society for Clinical Chemistry. We would also like to offer special thanks to our exhibitors and speakers for their participation in the exhibition and conference.

On behalf of Saudi Society for Clinical Chemistry, we wish you a successful meeting and look forward seeing you again in 2020.

Best Regards,

Dr. Samia Sobki
President, SSCC

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Speakers (Pre-Conference Workshop):

- **Mr. Abdulrafik Khan,** *NGHA, Riyadh, KSA*
- **Mr. Mohammad Al Shuraidi**, *Roche Diagnostic, Dubai*
- **Dr. Majed Wakid,** *King Abdulziz University, Jeddah, KSA*
- **Mr. Nael Soudi,** *MedLabs Consultancy Group, Amman-Jordan*
- **Dr. Rajiv Erasmus,** *President of AFCC, University of Stellenbosch, South Africa*
- **Dr. Hisham Maher,** *Saudi German Hospital-Dammam, KSA*

Speakers Day (1):

- **Dr. Samia Hassan Sobki** *(SSCC President), PSMMC, Riyadh, KSA*
- **Dr. Rajiv Erasmus,** *IFCC, Representative)*
- **Dr. Anwar Borai,** *NGH, Jeddah, KSA*
- **Dr. Sohail Inaam,** *PSMMC-Riyadh, KSA*
- **Dr. Salam Saadeddin,** *PSMMC, Riyadh, KSA*
- **Dr. Humoud Khallaf,** *KFSH- Dammam, KSA*
- **Dr. Rajiv Erasmus,** *President of AFCC*
- **Dr. Nafila Al Riyami,** *SQU, Oman*
- **Dr. Mohammed Habbab,** *MOH, Riyadh, KSA*
- **Dr. Sumayah Al Jenedil,** *KFSHRC, Riyadh, KSA*
- **Dr. Manal Alkindi**, *Royal Hospital, Oman*
- **Dr. Abdulhadi Bima,** *KAU,Jeddah, KSA*

Speakers Day (2):

- **Dr. Waleed Al Tammimi,** *NGH, Riyadh, KSA*
- **Mr. Abu Baker Yagut,** *NGH, Jeddah, KSA*
- **Ms. Sumedha Sahni,** *BD & Company, Dubai, UAE*
- **Dr. Mads Nybo,** *Odense University Hospital-Denmark*
- **Dr. Huda Hassan,** *Naif University, Riyadh, KSA*
- **Dr. Sarar Hamza Mohamed,** *PSMMC, Riyadh, KSA*
- **Dr. Saeed Al Turki,** *NGH, Riyadh, KSA*
- **Dr. Amal Al Hashim,** *PSMMC, Riyadh, KSA*
- **Dr. Heba Kary,** *KFAFH, Jeddah, KSA*
- **Dr. Randa Ratrut,** *MOH, Dammam, KSA*
- **Mr. Nael Soudi,** *MedLabs,, Amman-Jordan*
- **Mr. Jean Baptiste Raimbourg,** *QC Product Manager EMEA - BioRad*
- **Dr. Salam Saadeddin,** *PSMMC, Riyadh, KSA*
- **Dr. Ali Al Othaim**, *NGHA, Riyadh, KSA*
- **Dr. Samia Hassan Sobki** *(SSCC President), PSMMC, Riyadh, KSA*

Moderators:

- **Dr. Salam Saadeddin,** *PSMMC, Riyadh, KSA*
- **Dr. Ali Al Johi,** *PSMMC, Riyadh, KSA*
- **Dr. Abdulwahid Al Dehaimi,** *KFMC, Riyadh, KSA*
- **Dr. Anwar Borai,** *NGH, Jeddah, KSA*
- **Dr. Nayel Marzooq Aljaser,** *MOH, NBR (Arar), KSA*
- **Dr. Anwar Borai,** *KAMC, Jeddah, KSA*
- **Dr. Abdullah Al Turjman,** *PMAH, Riyadh, KSA*
- **Dr. Waleed Al-Omaim,** *KFSHRC, Riyadh, KSA*
- **Dr. Ali M. Al-Shanqiti,** *KSU, Riyadh, KSA*
- **Dr. Zahir Al Shehry,** *KFMC, Riyadh, KSA*
- **Dr. Zuheir Awan,** *KAU, Jeddah, KSA*
- **Dr. Ali Al Othaim,** *NGHA, Riyadh, KSA*
- **Dr. Rana Hasanato,** *KSUMC, Riyadh, KSA*
- **Prof Dr. Khaled Al Harbi,** *KSU, Riyadh, KSA*
- **Dr. Gihan Gawish,** *Al-Imam University, Riyadh, KSA*
- **Dr. Khalid Al Sumaili,** *KSUMC, Riyadh, KSA*
- **Dr. Nashat Nafouri,** *NGHA, Riyadh, KSA*
- **Dr. Hisham Shams,** *SGH, Dammam, KSA*

PRE-CONFERENCE WORKSHOP

5th Annual Conference of the Saudi Society for Clinical Chemistry (SSCC)

Tuesday, December 3, 2019

8:00 – 15:00	Registration	
Time	Morning Workshop	Speakers
	Session (I): Method Validation workshop Moderators: Dr. Salam Saadeddin / Dr. Ali Al Johi	
9:00 – 9:25	Analytical Method Validation/Verification	Mr. Abdulrafik Khan *(NGH- Riyadh)*
9:25 – 9:50	Accuracy and Reference Interval Validation	Mr. Abdulrafik Khan *(NGH- Riyadh)*
9;50 – 10:15	Precision and Sensitivity studies: Targets & Interpretation	Mr. Mohammed Al Shuraidi *(Roche- Dubai)*
10:15 – 10:40	Linearity Studies: Targets & Interpretation	Mr. Mohammed Al Shuraidi *(Roche- Dubai)*
10:40 – 11:05	Sensitivity Studies & Carryover Studies: Targets & Interpretation	Mr. Mohammed Al Shuraidi *(Roche- Dubai)*
11:05 – 11:15	Questions & Answers	
11:15 – 12:45	Prayer Time - Lunch Break	
Time	Afternoon Workshop	Speakers
	Session (II): Clinical Chemistry Training Programs (National & International) Moderators: Dr. Abdulwahid Al Dehaimi / Dr. Anwar Borai	
12:45 – 13:10	"Current and Future Programs for Medical Laboratories: SCFHS".	Dr. Majed Wakid *(KAU-Jeddah)*
13:10 – 13:35	Advancing Laboratory Medicine Through Certification & Life Long Learning	Mr. Nael Soudi *(ASCP, MedLabs, Amman)*
13:35 – 14:00	Pillars of Laboratory Management	Dr. Rajiv Erasmus *President of AFCC*
14:00 – 14:15	Panel Discussion	All Speakers
Time	Industry Workshop	Speaker
	Moderator: Nayel Marzooq Aljaser	
14:15 – 14:45	Maximizing Utilization Management in the Private Setting	Dr. Hisham Maher *(Saudi German Hospital-Dammam)*
14:45 – 15:00	Questions & Answers	
	End of workshop	

Scientific Program

5th Annual Conference of the Saudi Society for Clinical Chemistry (SSCC)

DAY ONE SCHEDULE: Wednesday, December 4, 2019

7:30 – 14:00	Registration	
Time	Morning Sessions	Speakers
8:00 - 8:15	Opening Ceremony	Dr. Samia Sobki *(SSCC President)*
Session (III): Keynote IFCC Lecture		
8:15 - 9:00	Leadership and Excellence in the Laboratory	Dr. Rajiv Erasmus *(IFCC Representative)*
Session (IV): Biomarkers of Disease I Moderators: Dr. Abdullah Al Turjman / Dr. Waleed Al Omaim		
9:00 – 9:25	Albumin-Adjusted Calcium and Ionized Calcium for Assessing Calcium Status in Hospitalized Patients	Dr. Anwar Borai *(NGH Jeddah)*
9:25 – 9:50	Updates on GDM: Guidelines	Dr. Sohail Inaam *(PSMMC-Riyadh)*
9;50 – 10:15	Clinical Laboratory Practice Recommendations for The Use of High-Sensitivity Cardiac Troponin Assays	Dr. Salam Saadeddin *(PSMMC-Riyadh)*
10:15 – 10:25	Questions & Answers	
10:25 – 10:40	Coffee Break	
Session (V): Biomarkers of Disease II Moderators: Dr. Ali Al Shingiti / Dr. Zahir Al Shehry		
10:40 – 11:05	Using Biomarkers for Breast Cancer: Diagnosis Monitoring Treatment	Dr. Humoud Khallaf *(KFSH- Dammam)*
11:05 – 11:30	HbA1C in the diagnosis of diabetes: One size does not fit all	Dr. Rajiv Erasmus *(President of AFCC)*
11:30 – 11:55	Investigation of Multiple Myeloma and Monoclonal Gammopathies: An Update	Dr. Nafila Al Riyami *(SQU - Oman)*
11:55 – 12:05	Questions and Answers	
12:05 – 14:00	Prayer Time - Lunch Break - SSCC Board meeting - & Poster session (13:00 – 14:00)	
Time	Afternoon Sessions	Speakers
Session (VI): Cardiac/Lipids Moderators: Dr. Zuheir Awan / Dr. Ali Al Othaim		
14:00 – 14:25	Lipids Biochemistry as Target for Anti-lipids	Dr. Mohammed Habbab *(MOH-Riyadh)*
14:25 – 14:50	Medical value of Lipid Markers in Dyslipidemia Screening and CVD Risk Management	Dr. Sumayah Al Jenedil *(KFSHRC-Riyadh)*
14:50 – 15:15	Low LDL: Clinical and Technical Aspect	Dr. Manal Al Kindi *(Royal Hospital - Oman)*
15:15 – 15:40	Dyslipidemia in Different Age Population from Laboratory Prospective	Dr. Abdulhadi Bima *(KAU-Jeddah)*
15:40 – 16:00	Questions and Answers	
End of Day One		

Scientific Program

5th Annual Conference of the Saudi Society for Clinical Chemistry (SSCC)

DAY TOW SCHEDULE: Thursday, December 5, 2019

7:30 – 16:00	Registration	
Time	**Morning Sessions**	**Speakers**
Session (VII): Automation **Moderators: Dr. Rana Hassanato / Prof. Khalid Al Harbi**		
8:00 – 8:25	Sample Collection Devices as a Source of Pre-Analytical Errors: Impact of Collection Tube Components on Clinical Assays	Dr. Waleed Al Tammimi *(NGH-Riyadh)*
8:25 – 8:50	The Benefit of Using an Independent Quality Control Material: Case Studies.	Dr. Abu Baker Yagut *(NGH-Jeddah)*
8:50 – 9:15	The Challenges of the Preanalytical Phase – Working Successfully Towards ISO 15189 Accreditation	Ms. Sumedha Sahni *(BD & Company- Dubai, UAE)*
9:15 – 9:40	Pre-analytical Challenge on an Automated Lab Solution	Dr. Mads Nybo *(Odense Univers. Hospital-Denmark)*
9:40 – 10:05	The Secrets to Success: Implementing Robust LC-MS/MS Methods in the Clinical Laboratory	Dr. Huda Hassan *(Naif University – Riyadh)*
10:05 – 10:15	Questions and Answers	
10:15 – 10:30	Coffee Break	
Session (VIII): Biochemical Genetics & Others **Moderators: Dr. Gihan Gawish / Dr. Khalid Al Sumaili**		
10:30 – 10:55	Universal Newborn Screening at a Tertiary Center in Riyadh: Lessons to Learn	Dr. Sarar Hamza Mohamed *(PSMMC-Riyadh)*
10:55– 11:20	Cell Free DNA in Prenatal and Cancer Diagnosis	Dr. Saeed Al Turki *(NGH- Ryadh)*
11:20– 11:45	Molecular Testing & Parallel Biochemical Analysis: An Efficient Combination for the Diagnosis	Dr. Amal Al Hashim *(PSMMC-Riyadh)*
11:45– 11:55	Questions and Answers	
11:55 – 13:50	Prayer Time - Lunch Break – General Assembly - & Poster session (12:50 – 13:50)	
Time	**Afternoon Sessions**	**Speakers**
Session (IX): Laboratory Management **Moderators: Dr. Nashaat Nafouri / Dr. Hisham Shams**		
13:50 –14:15	Loosing laboratory samples, does it matter?	Dr. Heba Kary *(KFAFH – Jeddah)*
14:15 –14:40	Benchmarking Applications for Patients and Professionals	Dr. Randa Ratrout *(MOH-Dammam)*
14:40–15:05	The Art and Science of Sustaining Laboratory Accreditation	Mr. Nael Soudi *(MedLabs, Amman, Jordan)*
15:05 – 15:30	Quality Management Solutions	Mr. Jean Baptiste Raimbourg *(EMEA - BioRad)*
15:40 – 16:00	Questions and Answers	
Session (X): Awarding Session		
15:40 – 3:55	Poster Session Awards Announcement	Dr. Salam Saadeddin
3:55 – 4:05	Sponsor's Acknowledgement	Dr. Waleed Al Tamimi Dr. Ali Al Othaim
4:05– 4:15	Closing Remarks	Dr. Samia Sobki
End of Day Tow		

Oral Presentation Abstracts

Precision and Sensitivity Studies: Targets & Interpretation

Mr. Mohammed Al Shuraidi

Quality Manager, Roche Diagnostics Middle East FZCO, Dubai, UAE

CLSI EP15 was released as an A3 document in September 2014 (http://shop.clsi.org/EP15.html). This is its fourth iteration, and although it retains much of its original approach, there were some significant changes in the A3 version. The most significant change is the creation of a relatively simple experiment that gives reliable estimates of a measurement procedure's imprecision.

The new precision experiment will cover both repeatability and within laboratory precision in a five days protocol to verify the manufacturer claim which has been established using EP5. The analysis will be based on ANOVA variance technique that combines both within-run and between-run imprecision. Briefly, If the calculated SD from this experiment is less than the manufacturer / published SD, then the user has verified the claim. However, in case of failing to meet the claim, the user must calculate the “verification limit” which depends on the sample size. If the calculated SD is not statistically significantly larger than the published standard deviation, then the user has verified the published precision. Having access to a software to perform such long calculations will make the experiment less challenging to the laboratory professionals. One of the examples that we hope to discuss in this session is the EP evaluator application.

Oral Presentation Abstracts

Linearity Studies: Targets & Interpretation

Mr. Mohammed Al Shuraidi

Quality Manager, Roche Diagnostics Middle East FZCO, Dubai, UAE

Linearity is defined as the ability (within a given range) to provide results that are directly proportional to the concentration (amount) of the analyte in the test sample. Linearity typically refers to overall system response (i.e. the final analytical answer rather than the raw instrument output). Also, the linearity of a system is measured by testing levels of an analyte which are known by formulation or known relative to each other (not necessarily known absolutely); when the system results are plotted against these values, the degree to which the plotted curve conforms to a straight line is a measure of system linearity. Verification of linearity is one of the difficult challenges that faces the laboratory professionals in the method verification process. Starting from samples availability, covering AMR, analysis module, defining total allowable error and finally, troubleshooting the failure if happened. Some of the laboratories are mixing up between calibration verification and linearity verification and unfortunately, there are exceptions to avoid performing such hectic experiment, but the laboratories are not confident enough to use them (the exceptions) or to refer to them.

Oral Presentation Abstracts

Sensitivity Studies & Carryover Studies: Targets & Interpretation

Mr. Mohammed Al Shuraidi

Quality Manager, Roche Diagnostics Middle East FZCO, Dubai, UAE

Detection capability is an umbrella term for a set of performance attributes that may be used to characterize measurement accuracy in the low-end region of the measuring interval. In clinical laboratories today, Detection limit is expressed in terms of the LoB, LoD, and LoQ. It is important to recognize a key difference in how these three limits are established. These performance attributes (LoB, LoD, and LoQ) reflect increasing informational content in the measurement procedure's ability to resolve measurand levels, from an upper boundary on expected blank sample measurements (LoB), to simple detection of measurand presence (LoD), to the minimal measurand amount that can be measured with defined accuracy (LoQ). The LoB and LoD are statistical constructs based upon variability of the measurement procedure and selection of acceptance probabilities for Type I and II errors. In contrast, establishment of the LoQ depends on the specific acceptance goals used by the developer or user to designate results as acceptable for quantitative analysis with respect to clinical applications of the measurement procedure.
CarryOver.

The Carry Over was defined in the CLSI EP10-A3 guidelines as the discrete amount of analyte carried by the measuring system from one sample reaction into subsequent sample reactions, thereby erroneously affecting the apparent amounts in subsequent samples. In practice, carryover is a problem only for analytes with a wide clinical range of analyte concentration, such that a minute degree of carry-over could have significant clinical implications. The laboratory should select representative examples of such analytes for carryover studies. Some of the challenges that laboratories face are identifying the assays which need carry over verification, concentrations availability and the analysis to follow in order to meet the requirements. Carry Over has exception which can be used to exempt the laboratory from performing such experiment.

Oral Presentation Abstracts

Current and Future Programs for Medical Laboratories: SCFHS

Dr. Majed Wakid

AUH, Jeddah, KSA

There is a growing worldwide awareness in the field of health professions postgraduate education. In accordance with The National Transformation Program 2020 and Vision 2030, there is a growing need for professionals specialized programs in Medical Laboratories in Saudi Arabia.

This talk will present an overview about the current postgraduate programs (Board and Diploma) in the field of Medical Laboratories. These programs are accredited by the Saudi commission for Health Specialties (SCFHS). The talk will cover the content, the accredited centers and eligibility requirements for each program. In addition, the speaker will discuss the future prospect for the expansion in the programs.

Oral Presentation Abstracts

Advancing Laboratory Medicine through Certification and Lifelong Learning

Mr. Nael Soudi, *MS, CT(ASCP)(MIAC), CPHQ, LSSGB*

Chief Quality Officer, MedLabs Consultancy Group, Ammam-Jordan

The American Society for Clinical Pathology unites more than 100,000 anatomic and clinical pathologists, medical laboratory professionals, residents and students to accelerate the advancement of laboratory medicine to better improve patient care through knowledge, collaboration, and global community. ASCP and the ASCP Board of Certification (ASCP BOC) are partnering with organizations worldwide to offer Membership, Publications, Education, Networking and Certification.

In 2006, the American Society for Clinical Pathology Board of Certification (ASCP BOC), the premier American laboratory certification agency, created the international certification option 'ASCP^{i}'. The ASCP^{i} certification was designed in recognition of today's global demand for a reliable healthcare system that will preserve patient safety and will standardize and ensure excellence in laboratory practice globally. In the lecture, the history of international certification will be discussed and the importance of ASCP^{i} credentialing as it relates to quality improvement in the laboratory. Each of the specific certification categories will be outlined as well as the eligibility for these examinations. ASCP^{i} information resources and instruction regarding the ASCP^{i} certification will be discussed.

Post-certification, professionals worldwide are called to demonstrate a commitment to lifelong learning. This presentation will detail how international laboratory professionals can best take advantage of membership and education opportunities available through the ASCP with a focus on the ASCP and SSCC partnership.

Objectives: This presentation will provide an overview of the certification process and an introduction to ASCP membership and education.

Oral Presentation Abstracts

Pillars of a Laboratory Management Program for Senior Laboratory Professionals

Dr. Rajiv Erasmus, Chemical Pathology

Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

Laboratory results are essential to all aspects of health care and they should be accurate, reliable and timely. Inaccurate results can lead to misdiagnosis, adverse reactions, increased cost and unnecessary investigations and treatment. Although medical, scientific and technical expertise are important components, it is the successful integration of these 3 key elements that ensures the success of a laboratory. A laboratory management program should not be confused with a quality management program which is only one of several key elements. A laboratory management program includes (a) leadership development, in which the leader needs to understand the team's needs, aspirations and concerns, communicate effectively and manage conflict (b)strategy development and planning, which is critical to ensure the long term success of any organization (c)financial planning, without a sound financial plan, accounting and monitoring system, modern laboratories cannot exist (d) a sound quality management system model, which is the backbone of the laboratory and looks at the entire system and is critical for accreditation which is a tool to demonstrate the competence of medical laboratories and ensure the delivery of timely, accurate and reliable results. Other aspects of laboratory management include risk management and prevention of accidents which requires constant vigilance and monitoring. Staff training and performance management are equally important.

Oral Presentation Abstracts

Leadership and Excellence in the Laboratory

Dr. Rajiv Erasmus, Chemical Pathology

Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

Pathologists and senior scientists often lead large laboratories. There is, in fact, no one right way to lead in all circumstances, and one of the main characteristics of good leaders is their flexibility and ability to adapt to changing circumstances. In general, leaders will have a vision of what can be achieved and then communicate this to others and evolve strategies for realizing the vision. They motivate people and are able to negotiate for resources and other support to achieve their goals. Strategic thinking skills is perhaps the most important skill a leader needs—and what really distinguishes leaders from managers—is to be able to think strategically. Of course, as well as being able to create a compelling vision, they must also be able to communicate it effectively to their followers, which is partly why communication skills are also vital to leaders. Alongside strategic thinking, therefore, go organizing and action planning, both essential for delivery of your vision and strategy. In the laboratory, good leaders also often have very strong facilitation skills, to manage groups effectively. Leaders also need to be able to make good decisions in support of their strategy delivery and solve problems. One of the first skills that new leaders need to master is how to delegate. This is a difficult skill for many people but, done well, delegation can give team members responsibility and a taste of leadership themselves, and help them to remain motivated. Leadership is often particularly important at times of change. In *Nelson Mandela's 8 Lessons for Leadership* and in the book, *Legacy* which is the story of the All Blacks Rugby Team from New Zealand these attributes will be discussed and how they can be adopted in a laboratory environment.

Oral Presentation Abstracts

Albumin-Adjusted Calcium and Ionized Calcium for Assessing Calcium Status in Hospitalized Patients

Dr. Anwar Borai PhD, MSc, MLS (ASCP)CM

Clinical Chemistry Head Section at King Abdulziz Medical City, Jeddah
Director of Clinical Laboratory Sciences, King Saudi Bin Abdulaziz Univ. for Health Sciences, Jeddah.

Calcium is a ubiquitous mineral in the human body, found as hydroxyapatite in bone, in solution complexes with proteins and small anions, and as a “free” hydrated ion. This free ion is measured in clinical laboratories as whole blood, plasma, or serum “ionized calcium” (iCa). Measurement of iCa has been advocated for clinical monitoring because free calcium is the physiologically relevant species that interacts with homeostatic receptors and ion channels. Total calcium level can be affected significantly by the level of albumin. Therefore, adjusted calcium (AdjCa) level has been shown to be effective way in estimating the true total calcium level in hospitalized patients by just using a simple equation. Given the ongoing controversy about measurement of iCa or AdjCa in hospitalized patients will be discussed in our talk.

Oral Presentation Abstracts

Updates on Gestational Diabetes Mellites (GDM): Guidelines

Dr. Sohail Inaam, FRCP (Ed), FRCP

Senior Consultant Endocrinology & Diabetes, Department of Endocrinology & Diabetes
Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Diabetes and obesity are on the rise worldwide reaching epidemic proportions. There is a proportional increase in the incidence of gestational diabetes (GDM). It is proposed that the term GDM (or hyperglycemia of pregnancy) be reserved for maternal hyperglycemia less severe than that seen in overt diabetes with increased risk of adverse pregnancy outcomes. This change is to differentiate those 5-10% of women who may have undiagnosed diabetes in pregnancy and are at higher risk. Most guidelines recommend that all women on booking should be screened for undiagnosed diabetes early in pregnancy. This is done using either a fasting glucose or HbA1c. Women meeting the criteria for diagnosis of diabetes in the non-pregnant state are labelled Diabetes or Overt Diabetes in pregnancy. Women not meeting these criteria should undergo testing for GDM between 24-28 weeks.

There are two approaches for screening for GDM. 1) A single step approach using a 75 Gm OGTT. This is favored by WHO, IDF, NICE, ADA, IDF & FIGO. There is now a developing consensus that the IADPSG criteria be used in diagnosis of GDM since they are based on the large international observational HAPO study. There remains debate about the cut offs used for diagnosis as lower suggested values result in an increased prevalence of GDM. 2) Two step approach. This is recommended by Canadian, ACOG and also ADA. Initial screening is performed using a 50 Gm oral glucose challenge test. If positive a formal OGTT is performed using 75 Gm (Canadian Diabetes) or 100 Gm (ACOG).

Universal screening is recommended for all women following two systematic reviews showing benefit of treatment for milder forms of hyperglycemia in pregnancy. This along with lower cut off values on OGTT and increase background risk will mean a greater number of women will require care for hyperglycemia in pregnancy. Early screening for GDM in high risk groups is recommended but the best test or diagnostic criteria used have not been rigorously tested. The cutoffs used have been based on fasting glucose, HbA1c or OGTT. Medical nutrition therapy remains the cornerstone and is effective in over 60-80% of women. In Insulin still remains the gold standard pharmacological intervention. Oral agents such as Metformin and Glibenclamide are being increasingly used in GDM following many randomized controlled trials. These agents are category B and cross the placenta. Metformin appears safer than glibenclamide. As very long-term safety in off springs has not been established women must make an informed decision about using oral agents. Care of these patients does not stop with parturition. This is a high-risk group for subsequent development of diabetes. Post-partum screening between 6-12 weeks is recommended to diagnose those with persistent abnormalities of glucose tolerance. Those with normal results should follow a healthy life style and be screened every 3 years for development of diabetes.

Oral Presentation Abstracts

Clinical Laboratory Practice Recommendations for Use of High-Sensitivity Cardiac Troponin Assays

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

Consultant, Division of Clinical Chemistry-Central Military Laboratory and Blood Bank, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

The role of cardiac troponins in the diagnosis of myocardial infarction/injury is well established. Previous-generation troponin assays have been used as diagnostic and prognostic markers in acute coronary syndrome patients and for risk stratification to guide triage decisions and aid in treatment selection. New high-sensitivity cardiac troponin (hs-cTn) assays are increasingly being used in many countries worldwide. These assays enable cTn measurement with a high degree of analytical sensitivity with a low analytical imprecision at the low measuring range of cTn assays (coefficient of variation of < 10% at the 99th percentile upper reference limit). They represent an important advance with added sensitivity for cardiac myocyte necrosis, but there remains a need for judicious interpretation with these tests.

The new troponin assays had several distinct roles in clinical practice including facilitation of earlier diagnosis and rule-out of myocardial infarction, risk stratification in acute cardiac conditions and prognostic information in stable disease states, and therapeutic monitoring and drug toxicity evaluation. In the last few years, multiple studies using hs-cTnT or hs-cTnI with thousands of patients confirmed the validity of different 1-3-hour algorithms. However, because these hs-cTn are not specific for the etiology of cardiac cell death, the clinician has an increasing responsibility to interpret each test in clinical context. Early diagnosis of myocardial infarction (MI) is the most important indication of hs-cTn assays. Hs-cTn assays complement detailed clinical assessment including chest pain characteristics and the electrocardiogram. Hs-cTn assays for the first time allowed the precise quantification of cardiomyocyte injury around the 99th percentile and thereby substantially increased the accuracy of MI detection from blood obtained at presentation to the emergency department (ED). Higher accuracy at ED presentation enabled the development and extensive validation of early hs-cTn–based diagnostic algorithms, which substantially reduced the time required for the safe rule-out or rule-in of MI.

Oral Presentation Abstracts

Using Biomarkers for Breast Cancer: Diagnosis Monitoring Treatment

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Director of Molecular Diagnostics Laboratory at King Fahad Specialist Hospital-Dammam, KSA

Breast cancer is the most common cancer in women. Due to the introduction of a systematic screening, its incidence has increased. Some patients with this cancer have better prognosis than others. Therefore, there has been a quest for a biological marker that identifies these patients and prevent over treating them. On this regard, many markers have been studied in the last decades in order to provide both a useful prognostic tool, and a possible therapeutic target. In this chapter presentation, we review the current knowledge about the principal breast cancer biomarkers and shine the light on others that may have in the future a key role in breast cancer management.

Oral Presentation Abstracts

HbA1c in the Diagnosis of Diabetes: One size does not fit all

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Several reports over the last decade have shown discordance between average blood glucose and HbA1c levels and raises the question if we should be equating HbA1c with mean blood glucose values as has become common. We also need to debate if a binary cut point for HbA1c in the diagnosis of diabetes, such as 6.5%, is an adequate representation of blood glucose and suggests that reliance only on HbA1c could miss persons with diabetes and falsely diagnose those without. Indeed, there is mounting evidence that a cut off of 6.5% can miss several persons with diabetes. A "high glycator–low glycator" hypothesis sets out to explain how apparently equivalent glycemic control could result in differing A1C values. This hypothesis is based on the observation that while most individuals in a population with a given mean blood glucose will have A1C within a fairly narrow expected range, there are subsets who have a consistently higher or consistently lower value. Racial differences have also been reported for different HbA1c levels for the same blood glucose levels. Since HbA1c is used as the primary measure of quality of diabetes care and provider performance, how is the apparent racial effect accounted for? If HbA1c levels are affected by iron deficiency anemia how may it affect the management of patients with diabetes in developing countries where iron deficiency is common. In view of population differences that have been observed, we should therefore be developing population-based target values for HbA1c and re-evaluating cut off points for the screening of subjects for diabetes.

Oral Presentation Abstracts

Investigation of Multiple Myeloma and Monoclonal Gammopathies: An Update

Dr. Nafila Riyami, *FRCPC*

Senior consultant medical biochemist at Sultan Qaboos university hospital (SQUH) and Assistant HoD for the department of clinical Biochemistry at SQUH

Monoclonal gammopathies include a variety of hematological conditions ranging from mild disorders such as monoclonal gammopathy of undetermined significance (MGUS) to severe, life threatening disorders such as multiple myeloma (MM). Multiple myeloma is an incurable B- cell malignancy that is characterized by plasma cell infiltration of the bone marrow, organ dysfunction and a M-protein in serum, urine or both. MM accounts for around 10 % of all hematological malignancies. The clinical chemistry laboratory employs a number of assays, including serum and urine protein electrophoresis (SPEP, UPEP), immunofixation electrophoresis (IFE) and serum free light chain assay (FLC) in the diagnosis of MGUS and MM. In this talk, the latest diagnostic guidelines are highlighted. The use of the relatively new heavy light assay (HL) in the diagnosis and management of MGUS and MM is discussed. The results of a recent Omani study, that our group has conducted, establishing the reference ranges for the free light and Hevylight assay in 147 Omani males and 155 Omani females are shown. The performance of these assays compared to SPEP/ IFE is also shared. To the best of our knowledge, the Omani study, is the first of its kind in the Middle east North Africa region (MENA).

Oral Presentation Abstracts

Lipids Biochemistry as Target for Anti Lipids

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Lipids are important biomolecules. Cholesterol is an essential component of the human cell membrane and a precursor for steroid hormones and bile acids. Triglycerides also play an important role in transferring energy from food into body cells. However, any biomolecule in excess is not good for human health. In hyperlipidemia, increased lipids carried in the bloodstream always considered a threat to many organs, especially coronary and cerebral arteries and they represent the most important risk factor for atherosclerotic cardiovascular diseases. Cholesterol and triglycerides are lipophilic molecules which are transported by lipoproteins. The buoyant density and Apo lipoprotein composition is the determining factor of the type of lipoprotein. There are three key pathways of lipid metabolism, exogenous, endogenous and reverse cholesterol transport pathways. In the exogenous pathway, lipoprotein lipase (LPL) acts on dietary chylomicrons to form free fatty acids (FFAs) and their remnants are taken by the liver. In the endogenous pathway, LPL cleaves very-low-density lipoproteins (VLDL), synthesized by the liver, to form intermediate density lipoproteins (IDLs), taken up by the liver or low-density lipoproteins (LDLs) and FFAs. In the third pathway, high-density lipoprotein (HDL) collects peripheral cholesterol and transports it to the liver.

Understanding lipid biochemistry allowed for the development of lipid-lowering drugs to fight these problems. Lipid lowering therapies were developed by identifying an enzyme or receptor involved in biosynthesis pathway and developing an inhibitor which interferes with lipids synthesis. One group of drugs (statins) lowers cholesterol by interfering with the cholesterol biosynthetic pathway. On the other hand, fibrates decrease fatty acid and triglyceride levels by stimulating the peroxisomal β-oxidation pathway and niacin modifies lipoproteins. Apart from these drugs, ezetimibe, which selectively inhibits intestinal cholesterol absorption, cholestyramine, colestipol, and colesevelam, which sequester bile acids, torcetrapib, which inhibits cholesterol ester transfer protein, avasimibe, which inhibits cholesterol acyltransferase (acyl-CoA), implitapide, which inhibits microsomal triglyceride transfer protein, evolocumab and alirocumab, which inhibit proprotein convertase subtilisin/kexin type 9 (PCSK9) are providing clinicians with several therapeutic options for lipid lowering. However, the risk of having an event remains unacceptably high in many people despite treatment with these established agents, this has stimulated the search for new therapies along the lipid biochemistry pathways that are designed to reduce residual cardiovascular risk.

Oral Presentation Abstracts

Medical Value of Lipid Markers and Cardiovascular Risk Assessment

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King Faisal Specialist Hospital and Research Centre

Cardiovascular disease (CVD) is considered the most common cause of death in the Arabian Gulf accounting for up to 45% of all mortalities. It is important to understand the significance of risk assessment lies in CVD because It is the world's major disease burden. Lipid profile classified by; including triglycerides and total cholesterol and the particles that carry cholesterol LDL, HDL, VLDL Cholesterol-rich LDL and other apolipoprotein B (apoB, VLDL and, IDL, and Lp(a)), are directly implicated in the development of ASCVD Both LDL-C and non–HDL-C have clinical utility in helping to set and measure achievement of lipid treatment goals. ApoB is considered an optional, 2ry target for treatment of hypercholesterolemia. An elevated triglyceride level is not a target of therapy. Triglyceride becomes the primary goal of therapy when the triglyceride concentration is very high >500 mg/dL. Consider the treatment to prevent pancreatitis. HDL-C is not recommended as a target of therapy per se, but the level is often raised as a consequence of efforts to reduce atherogenic cholesterol through lifestyle and drug therapies. Low HDL-C levels are not consistently associated with premature ASCVD neither high HDL-C levels are consistently associated with atheroprotection.

Non-HDL is calculated as (total cholesterol – HDL). Non-HDL-C has superiority of over LDL-C for predicting ASCVD event risk as some triglyceride-rich lipoprotein remnants (VLDL) enter the arterial wall, and thus contribute to atherosclerosis. The lipoprotein profile should be considered at age 20 years and should be obtained at least every 5 years in person who has high ASCVD risk factors. Fasting for a lipid profile is not routinely recommended unless triglycerides > 4.5 mmol/L. LDL measurement by direct method (Beta quantification) is the gold standard method. Friedewald equation calculation has its limitation especially with hypertriglyceridemia. Statins reduce the atherosclerosis by lowering cholesterol. Adding more agents may be considered for the patients who have not reach their goal.

Oral Presentation Abstracts

LOW LDL: Clinical and Technical Aspect

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Cardiovascular disease (CVD) is one of the most common causes of morbidity and mortality worldwide. There are many Modifiable and non-modifiable CVD Risk Factors. LDL-C Is a Major Modifiable CV Risk Factor. The greater the absolute reduction in LDL-C the greater the reduction in CV events. Every 1 mmol/l decrease in LDL-C decrease the CVD by 20-25%. Many studies have proved that Low LDL is safe and no adverse effect. Several ongoing studies are aiming to enhance our knowledge regarding the safety of low LDL and reduction in cardiovascular risk.

Measuring LDL-C by gold standard ultracentrifugation is time-intensive and expensive. The laboratories use different methods to measure or calculate LDL-C. Most of laboratories use Friedewald formula (FF) to calculate LDL-C for it simplicity and free cost. The FF has several limitations that have become more relevant today than previously. Recent studies have shown that Friedewald underestimates LDL-C at lower levels, which could result in under treatment of high-risk patients especially in the era of potent LDL lowering for high-risk patients, for whom guidelines recommend targeting LDL- C <70 mg/dL(<1.8 mmol/l) or even lower with therapies such as high-intensity statins, ezetimibe, and proprotein convertase subtilisin/kexin type 9 inhibitors.

Oral Presentation Abstracts

Dyslipidemia in Different Age Population from Laboratory Prospective

Dr. Abulhadi Bima

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Dyslipidemia are recognized as an important modifiable risk factor for cardiovascular disease. However, despite the huge growth in the awareness of possible dyslipidemia adverse outcome early detection of familial hypercholesterolemia and secondary dyslipidemia is away from target to carry out successfully the desired cardiovascular disease prevention. Targeting the right biochemical marker and having the right reference values are crucial to achieve these targets.

Although reference values for the major lipoproteins, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides, is well established, the complete contemporary percentile-based reference values are underreported and under practiced in laboratory setting. Other early biochemical marker (other than cholesterol) related to earlier pathological changes in cardiovascular disease might be useful in the assessing CVD risk. Highlighting striking gender- and age-related differences in plasma lipid profiles and the use of other routinely available biochemical marker can assist in early identification of individuals with hypocholesterolemia and hypercholesterolemia, especially familial hypercholesterolemia and will help in early prevention of cardiovascular disease.

Oral Presentation Abstracts

Sample Collection Devices as a Source of Pre-Analytical Error: Impacts of Collection Tube Components on Clinical assay

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Ministry of National Guard Health Affairs, Riyadh, KSA.

Proper blood collection and timely processing are critical pre-analytical steps required for the integrity of laboratory results. Although the influence of blood collection devices on laboratory tests is often overlooked, correct pre-analytical handling is essential. Therefore, it is necessarily to evaluate the suitability of new devices or monitor ongoing performance.

Glass/plastic evacuated blood tubes containing anticoagulants can be used with polymer gels and clot activators as additives. Despite their similarity, evacuated blood tubes supplied by different manufacturers vary in the materials and additives used, which can potentially affect test performance.

Many interferences were reported from various studies, for example Bowen RA et al found that the surfactant, which is used to coat the inner surfaces of tubes, appears to account for previously reported immunoassay interference by Serum Separator Tube (SST). One of the mechanisms for this interference is the desorption of antibodies from the solid phase by the surfactant. This problem revealed how these devices can adversely affect laboratory test results and emphasized the importance of understanding device limitations.

In this presentation, we will discuss how blood collection materials and devices can alter chemistry test results, with an emphasis on blood collection tube (BCT) additives.

Oral Presentation Abstracts

The Benefit of Using an Independent Quality Control Material: Case Studies

Dr. Abu Baker Yagoot

Clinical Biochemistry, Department of Pathology, King Abdulaziz Medical City

The benefit of using independent Quality Control Material, participate in Monthly Quality peer comparison program and establish your own Q.C range to achieve confidence in providing an accurate and precise patient result and also be able to immediately identify risk. The lecture will discuss a real life case studies from our Chemistry Lab to share experience and inspire other Labs to learn innovative way of quality related investigation , documentation and problem solving including a retro data analysis to determine if patient harm was done or not during a Q.C related poor performance in an Automated Chemistry Lab. Also will include the benefit of using C.AP Linearity survey instead of in-house linearity survey.

Oral Presentation Abstracts

The Challenges of the Preanalytical Phase: working Successfully Towards ISO 15189 Accreditation

Sumedha Sahni, MD

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The Challenges of the Preanalytical Phase – Working Successfully Towards ISO 15189 Accreditation

Over 68% of errors in clinical diagnosis occur in the preanalytical phase, which remains one of the most challenging areas to standardize, improve and sustain. This is largely because a significant part of the preanalytical phase lies outside the laboratory and is not under control of Lab Management. Nevertheless, the laboratory bears the responsibility of recognizing clinical specimens that cannot be analyzed at all or, if processed, carry the risk of generating erroneous results; this is one of the most critical functions performed by accessioning staff.

There is no doubt that accreditation systems built around ISO 15189 standards help reduce risk, optimize performance, lower costs, and provide proof of an integrated quality management system throughout all parts of the organization that interact with the medical laboratory. For laboratories that are working towards accreditation, implementation of quality indicators (QIs) for systematically monitoring and evaluating preanalytical processes and procedures that carry the greatest risk to patient care is recommended.

This presentation will review the benefits of adopting and implementing effective quality improvement methods that have the potential to positively impact not only the preanalytical phase, but also the analytical and post analytical phases.

Oral Presentation Abstracts

Serum Indices: Simple and Easy Tool

Mr. Jean Baptiste Raimbourg, BSc

Product Manager Bio-Rad QSD EMEA

Laboratories are increasingly being automated in terms of sample reception units, tracks for sample transportation, analytical equipment and storage units on the track. Such laboratory automation offers a number of opportunities, e.g. a more homogenous sample handling, less manual handling and shorter turn-around-times. There is increasing awareness of the preanalytical phase *before* the samples reach the laboratory (patient identification, sampling procedure). But importantly, the lab automation solutions *also* contain a number of preanalytical pitfalls that laboratory professionals need to address: The more automated the system becomes, the harder it can be to discover and solve the errors.

This presentation will briefly introduce the subject and then focus on the most prominent of these challenges, namely sample transportation, sample handling and hemolysis-icterus-lipemia (HIL) indices, the latter being the most frequent preanalytical error. Furthermore, handling of the hemolyzed specimens is also an area where the HIL analysis quality is very important to assure – ways to do this will also be addressed. Finally, suggestions on how to assure preanalytical quality at an automated lab solution will be described.

Oral Presentation Abstracts

The Secrets to Success: Implementing Robust LC - MC/MS Method in the Clinical Laboratory

Dr. Huda Hassan, PhD

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Liquid chromatography–tandem mass spectrometry (LC–MS/MS) has been increasingly used in routine clinical laboratories during the last two decades. It combines high analytical specificity with high analytical sensitivity superior to that of immunoassays or conventional high performance/pressure liquid chromatography (HPLC) for low molecular weight analyte, it offers multi-analyte potential and flexibility when developing the assays in house. It also provides higher throughput than gas chromatography–mass spectrometry (GC–MS). In addition, abundant information can be obtained from a single LC–MS/MS run which can produce a large amount of quantitative or qualitative data. In clinical analysis Tandem Mass Spectrometry has played an increasingly important role, with the analysis of Biochemical Genetics, Newborn Screening laboratories, acylcarnitine's and amino acids from neonatal blood spots and it is common now to find it in laboratories with applications for endocrinology, toxicology, pharmacology, and therapeutic drug monitoring. The information related to the **LC**–MS/MS in clinical applications was collected from literature review of scholarly sources, present different examples and laboratory experience, share personal experiences, discuss strengths, weakness, and discuss the evolving toward automation in high-throughput core laboratory sections.

The analytical sensitivity and specificity are inferior for many of the analytes tested in routine clinical laboratories. Moreover, LC–MS/MS can be multiplexed for high testing throughput and multiple analyte detection. The disadvantages of LC-MS/MS include the absence of Food and Drug Administration (FDA) and Conformité Européenne (CE) Mark approved tests, the high cost of analytical instrumentation, the technical expertise needed to operate and maintain analyzers. Manual workflows, complexity of operation and maintenance of instrumentation. The lack of standardization and harmonization in mass spectrometry is a major challenge that needs to be overcome for more widespread use of this technology in the clinical laboratories. The development of fully automated LC-MS/MS front-end modules or MS/MS-based analyzers which offer a degree of user-friendliness and robustness similar to current standard clinical chemistry analyzers seems feasible today based on existing technologies. In conclusion, LC-MS/MS is an almost universal technology for the quantification of small molecules in human sample materials. It is foreseeable that it will become a key instrument in routine clinical laboratories. The implementation of LC–MS/MS will increase in the next few years as this technology continues to improve and the advantages become better known

Oral Presentation Abstracts

Newborn Screening for Congenital Hypothyroidism: Lessons Learned from the Military Hospital Experience

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Professor/Consultant Metabolic Pediatrician & Deputy Head, Genetics/ Metabolic Medicine Division, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

BACKGROUND: The aim of the Newborn screening (NBS) is to identify affected newborns and intervene to prevent the associated morbidity and mortality. The primary objectives of this study were to determine the incidence of newborn screening disorders and to study the key performance indicators of NBS.

METHODS: This is a retrospective single center study of all infants who underwent NBS in the period from January 2012 to December 2017 at Prince Sultan Military Medical City, Riyadh, Saudi Arabia. We screen for 17 disorders. Samples were collected after 24 hours of life. The initial positive results had a second "recall"samples. True positive cases were immediately referred for medical management. Data were abstracted from the laboratory computerized and non-computerized records. Demographic and clinical characteristics of confirmed patients were abstracted using case report forms.

RESULTS: During the study period, 56632 infants had NBS with a 100% coverage rate. A total of 38 cases were confirmed. The incidence of congenital hypothyroidism was 1:3775. The positive predictive value for detection of congenital hypothyroidism was 87.5%. Propionic aciduria was the most common metabolic disorder with an incidence of 1:14158. Very Long Chain Acyl CoA Dehydrogenase deficiency (VLCAD) and glutaric aciduria type 1 had an incidence of 1:18877 each. Phenylketonuria (PKU), biotinidase deficiency, maple syrup urine disease and citrulinemia had an incidence of 1:28316 each. Galactosemia and 3 methyl crotonyl carboxylase deficiency had the lowest incidence of 1:56632. No case with congenital adrenal hyperplasia was detected. The sample rejection rate was 1:1587.

CONCLUSION: The coverage of Newborn Screening Program in our facility was 100%. With regard to hypothyroidism, the incidence matches the world-wide incidence. The incidence of other inherited disorders was in line with the regional figures.

Oral Presentation Abstracts

Molecular Testing & Parallel Biochemical Analysis: an Efficient Combination for the Diagnosis

Dr. Amal Al Hashim

Head division medical genetic, Prince Sultan Military Medical City

The field of Clinical Genetics describes the spectra of the symptoms and of the associated genomic variants for inherited disorders. These two domains are at the extremes of the chain of disease-linked abnormalities: the mutation as the ultimate cause on the one end and the phenotypic manifestation as the ultimate consequence at the other. There are, however, a number of additional in-between areas that may be altered in a disease-specific manner. These not only include structural units at the subcellular, cellular, and tissue level, but also the transcriptome, the proteome, and the metabolome.

The metabolome is a collection of small molecules resulting from multiple cellular and biological processes that can act as biomarkers of disease. Conceptually linking these levels to Clinical Genetics will not only entail a better understanding of inherited disorders, but also facilitate the discovery of corresponding biomarkers. The ideal biomarker, especially for a genetic condition, fulfills the following criteria: (i) be reliably quantifiable, (ii) be present in an easily accessible clinical sample, (iii) elucidate the molecular pathogenesis of the disease, (iv) reflect disease burden, and (v) enable monitoring of therapeutic measures. In this respect, the metabolome may be regarded a particularly promising type of disease link.

It is highly complex, but made up of discrete, measurable entities. These metabolites are present throughout the human body, including in blood, are stabilized by sampling on dried blood spots, and can easily be determined using mass spectrometry.

Recent findings in the field of metabolic biomarkers are highly promising. In this communication we will describe some genetic disease and how the recent discovery of new biomarkers help the clinical geneticist to finalize the diagnosis and monitor the treatment.

Oral Presentation Abstracts

Losing Laboratory Sample: Does it matter?

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King Fahad Armed Forces Hospital, Jeddah, KSA

The impact of Laboratory errors on patients ranges from inconvenience to severe harm. When easily retrievable specimens such as blood or a gastrointestinal mucosal biopsy are lost, repeat testing may be unpleasant for patients but is not likely to cause long-term harm. If tests need to be redrawn or repeated, the resulting delay in diagnosis may cause a delay in treatment, minor patient harm, additional anxiety, and frustration for both patients and care providers.

In the case of an irretrievable specimen, such as a tissue discarded, or CSF sample, loss of the specimen results may lead to an inability to make a diagnosis and thus permanent harm. The lecture will discuss the different definition of lost sample, causes, examples, and how to prevent it.

Oral Presentation Abstracts

Classification and Benchmarking App's for Patients and Professionals

Dr. Randa Taiseer AlRatrout, MBBS, KSUF

Consultant in Medical Biochemistry, Head division of Newborn screening Lab,
Dammam Regional Lab& Blood Bank

In a health care setting, patients and their families are our customers. It is vital that we engage, empower, and hear patients and carers at all times in order to place the quality of patient care, and patient safety, above all other aims. The health service runs on limited resources – public money has to be intelligently used. There is little time and no justification for unnecessary repetition of effort in identifying and implementing what is best practice. It is vital to all – staff and patients – that professionals truly collaborate.

Clinical practice benchmarking is a quality improvement tool. It facilitates structures and formalizes how best practice is compared, shared and developed. Hospital resources should effectively meet patients' needs. Involvement in clinical practice benchmarking and the opportunity to share good practice rewards those who are willing to share. It inspires all health practitioners to make changes in practice and reassures everyone that they are doing the best they can to develop and improve the quality of care. Benchmarking was first introduced to the NHS at the launch of the Benchmarking Club, sponsored by the NHS Management Executive, in January 1991. The club focused on benchmarking organizational issues rather than clinical ones, covering issues such as reducing cancelled operations or the number of non-attenders in outpatient clinics.

In conclusion, benchmarking identifies strengths and weaknesses within organizations, identifies the level of performance possible by looking at the performance of others, and how much improvement can be achieved, promotes changes and delivers improvements in quality, productivity and efficiency and helps to better satisfy the customers' need for quality, cost, product and service by establishing new standards and goals.

Oral Presentation Abstracts

The Art and Science of Sustaining Laboratory Accreditation

Mr. Nael Soudi, MS, CT(ASCP)(MIAC), CPHQ, LSSGB

Chief Quality Officer, MedLabs Consultancy Group, Ammam-Jordan

In today's quest for delivering the best possible care to patients and as healthcare organizations grow and their scope of service expands, implementing and sustaining the Quality and Safety culture is becoming a major challenge.

Adopting Quality and Safety systems in healthcare was lagging behind as compared to the manufacturing industry. The leap was Giant, as healthcare workers (irrespective of their specialty) could not see "The Patient Journey" as a "Process" which requires integration, patient centered care, a holistic approach, and continuous improvement, the laboratory is no different being one of the main pillars of healthcare it evolved in parallel as well.

Despite resistance, the Quality and Safety culture was created and further enforced by accreditation requirements. As a result, a new and continuous challenge has emerged in laboratories in the form of their inability to sustain the accreditation requirements, ensuring that the entire process of quality and safety compliance is actually a way of life and thus avoiding the burst of intense preparation just before the accreditation and/or audit visits, then seeing a decline until the next one; and so on.

The presentation will discuss why it is becoming increasingly challenging to sustain the Quality and Safety culture, why Laboratories go through the vicious cycles of intense preparation for audits instead of having a steady state of compliance and how we can influence our staff to comply with Quality and Safety requirements, everyone, day in & day out.

Oral Presentation Abstracts

Quality Management Solutions

Dr. Mads Nybo, MD, PhD

Associate Professor, Lab director, Odense University Hospital, Denmark

Laboratories are increasingly being automated in terms of sample reception units, tracks for sample transportation, analytical equipment and storage units on the track. Such laboratory automation offers a number of opportunities, e.g. a more homogenous sample handling, less manual handling and shorter turn-around-times. There is increasing awareness of the pre-analytical phase *before* the samples reach the laboratory (patient identification, sampling procedure). But importantly, the lab automation solutions *also* contains a number of pre-analytical pitfalls that laboratory professionals needs to address: The more automated the system becomes, the harder it can be to discover and solve the errors.

This presentation will briefly introduce the subject and then focus on the most prominent of these challenges, namely sample transportation, sample handling and hemolysis-icterus-lipemia (HIL) indices, the latter being the most frequent pre-analytical error. Furthermore, handling of the hemolysed specimens is also an area where the HIL analysis quality is very important to assure – ways to do this will also be addressed. Finally, a number of suggestions on how to assure pre-analytical quality at an automated lab solution will be described.

Poster Presentation Abstracts

1- The Determination of DNA Concentration Using ICP-OES

Noura A. Alshehri and Ian Podmor.

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Background: Accuracy in quantifying biological molecules, such as DNA, lipids, proteins, carbohydrates and vitamins, is very important for molecular analyses. Accurate quantification of DNA is prerequisite. Analysis of DNA for hereditary diseases and genotyping of various traits, and other quantitative assays require absolute or near absolute quantification of DNA for a given biological sample. However, most current methods of quantifying DNA have significant inadequacies that range from lack of "Certified Reference Materials" for comparison, interferences from reagents, inability to distinguish between RNA and DNA, inability to measure very low concentrations, and dependency on signals emitted by biologically. This study utilized the amount or quantity of phosphorus in a purified DNA, in conjunction with right CRM calibrant, to provide a traceable means through which DNA quantity was certified.

Methods: The ICP-OES reading for TMP solutions "Thymidine monophosphate C10H14N2O8P1-" of different concentration (500p.p.m, 50p.p.m, 5p.p.m) that were prepared showed that spectral intensity of Phosphorus is higher than sulfur, even when the TMP concentration is low. This observation can be attributed to the fact that P is a natural component of both the TMP and the DNA. In this experiment (TMP Method), was used instead of the DNA. It is because TMP as a monomer or building block of DNA has a less molecular weight than the DNA and, it is more sensitive to phosphorus and sulfur. Furthermore, thymidine monophosphate was used at this stage to manage sample concentration before determining the minimum DNA concentration that can successfully dissociate the covalent bonds in a DNA adox.

Results: This experiment utilized the amount of phosphorus contained in the DNA by incorporating it with the right CRM calibrant to provide a traceable way through which its quantity could be ascertained. ICP-OES was used because its analytical curve regions are both wider and linear, and there is minimal chemical and ionization interference that allows high-matrix analysis. For instance, it was able to analyze phosphorus and sulfur at different wavelengths. Additionally, ICP-OES is highly sensitive.

Conclusion: From the experimental results, it is clear that it is not only possible to accurately quantify the amount of DNA in a sample, but it can even be done so when the concentration is extremely low. DNA carries hereditary information of an individual and, therefore, the methods employed in its quantification ought to be not only accurate, but also employ appropriate CRM for comparison.

Poster Presentation Abstracts

2- IgG4 deficiency related to gene deletion in down syndrome

M Jeraiby

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Background: IgG4 deficiency is more frequent among persons with Down syndrome (DS), without identifying explanation. The role of IgG4 deficiency is not fully established for many affected persons in the general population are asymptomatic. Nevertheless, in the context of DS it may be an important factor in repeated infections and even stroke. The aim of the present study was to investigate the molecular mechanism of IgG4 deficiency at the level of the heavy chain gene (IGHG4) gene.

Methods: Quantitative real-time polymerase chain reaction (Q-PCR) was carried out to measure IGHG4 copies number with SYBR Green detection and comparison to a reference gene (36B4). A IGHG4/36B4 ratio was considered normal (2 copies of IGHG4) when between 0.8 and 1.2. We studied 44 DS persons: 21 males and 23 females from 7 years to 57 years, composed of 23 DS persons (11 males and 12 females) carrying severe IgG4 deficiency (<0.02 g /L), 5 having an IgG4 level not detectable and 21 DS subjects (10 males and 11 females) with no IgG4 deficiency (level >0.1 g /L). The patient group was compared with 38 healthy donners (controls) without DS.

Results: IGHG4 heterozygous deletion was found in 16 (69.6%) DS patients with IgG4 deficiency versus in 2 (9.5%) DS subjects without IgG4 deficiency (p =0.0001 with Yates correction). in the control group, no deletion was seen.

Conclusion: IGHG4 haploinsufficiency is highly correlated to IgG4 deficiency is our population with DS, but other factors exist that need to be identified.

Poster Presentation Abstracts

3- Assessment of Medical Intern's Knowledge, Awareness and Practice of Familial Hypercholesterolemia at Academic Institutes in Jeddah, Saudi Arabia

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Faculty of Medicine, King Abdulaziz University, Jeddah, KSA.

Background: Familial Hypercholesterolemia (FH) is a serious under-diagnosed disease characterized by raised low-density lipoprotein cholesterol (LDL-C) and premature coronary artery diseases (CAD). The scarcity of FH reported patients in Saudi Arabia indicates lack of FH awareness among physicians. The goal of this research was to assess knowledge, awareness, and practice (KAP) about FH disorder among Saudi medical interns and to identify areas that needs educational attention.

Methods: This cross-sectional study involved 170 Saudi medical interns (83 males and 87 females) from academic institutes in Jeddah, Saudi Arabia. The interns were asked to fill an online FH-KAP questionnaire. Total score for each separate domain measured by adding correct answers.

Results: Although, knowledge of FH definition (76.5%) and classical lipid profile (52.4%) were reasonable; knowledge on inheritance (43.5%), prevalence (12.4%) and CAD risks (7.1%) were poor. Knowledge score was significantly elevated in female than male (7.5±3 vs. 5.3±2.6, $P<0.001$). Regarding awareness, 54.1% were familiar with FH disorder, 50.6% with the presence of lipid clinic but only 16.5% were acquainted with guidelines. Furthermore, in the practice domain 82.9% selected statin as first line treatment and 62.9% chose routinely checking the rest of the family, while 15.3% chose ages 13–18 years to screen for hypercholesterolemia in patients with a positive family history of premature CAD.

Conclusion: Substantial defects in FH-KAP among Saudi medical interns were found, emphasizing the importance of professional training. Extensive and constant medical education programs as early as an internship are required to close the gap in CAD prevention.

Poster Presentation Abstracts

4- Measurement of Maternal Serum Levels of Proinflammatory Cytokines in Idiopathic Recurrent Pregnancy Loss

Poonam Tyagi, Noura Al Dayan

Department of Medical Laboratory Sciences, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, Alkharj, Riyadh, KSA

Background: Cytokines, as exceptionally potent, versatile, potent mediators of an immense array of reactions ranging from rejection of allografts, autoimmune diseases, and hypersensitivity, have received much attention from reproductive immunologists. These cytokine patterns also devoted to cross regulation between immune responses and other systems, as observed during the interplay between infection and pregnancy (2,3). Successful pregnancy is associated with T helper cells-2(Th-2) immunity and is helpful in maintaining pregnancy, while T helper cells-1 (Th1) activity is responsible for deleterious effects. Recent attention has focused on elucidating the immunobiological roles of different kinds of cytokines in normal human pregnancy following the accumulated reports of complex cytokine activity within uteroplacental tissues. Recurrent idiopathic spontaneous miscarriage with good outcome may be considered as useful clinical picture to investigate the immunologic mechanism, specially cytokines level that might be required to regulate the first trimester pregnancy evolution towards either positive continuation or negative termination. This research work aimed to investigate TH-1 type of cytokine i.e. IL-2 and TH-2 cytokine i.e. IL-6 in women having recurrent miscarriage with no any known reason and correlated the results with same age group normal pregnant females selected as control.

Methods: This research study enrolled 75 females, 50 women having a history of idiopathic recurrent spontaneous miscarriage and 25 normal pregnant females aged 21-41 years during the period between September 2015 to January 2018 from King Saud Medical City and other private hospitals. Blood was collected from all selected study group patients after investigating protocol including ultrasonography and blood test to find out any possible anatomical, endocrinological, infectious, genetic and immunological cause of miscarriage, and serum was analyzed for IL-2 and IL-6 cytokines by using highly sensitive sandwich ELISA kits from Coulte Immunotech. (France).

Results: Th1 activity (IL-2) was significantly higher in RSM patients irrespective of whether continuing their pregnancy or aborting in comparison to control ($p < 0.001$). On the other hand, Th2 activity (IL6) was decreased ($p < 0.001$) in study group patients as compared to control group.

Conclusion: The patients with Recurrent spontaneous miscarriage have a definite increase in Th1 activity and decrease in Th2 activity whether aborting or continuing their pregnancy in comparison to normal pregnant women. Our findings support the hypothesis that inflammatory processes may contribute to pregnancy loss, possibly through their role in implantation. The results are of statistically significant prognostic relevance.

Poster Presentation Abstracts

5- Validation of Electro Chemiluminescence Immunoassay Method for The Quantitative Analysis of Total Vitamin D in Serum & Plasma

Khalil Softa, Mohammad Sulaiman and Salam Saadeddin

Division of Clinical Biochemistry, Department of Central Military Laboratory & Blood Bank, Prince Sultan Military Medical City, Riyadh, KSA

Background: Vitamin D is a fat-soluble steroid hormone that is mainly produced in the skin by exposure to sunlight. Vitamin D is biologically inert and must undergo two successive hydroxylations in the liver and kidney to become the biologically active 1, 25-dihydroxyvitamin D. The two most important forms of vitamin D are vitamin D3 (cholecalciferol) and vitamin D2 (ergocalciferol). In contrast to vitamin D3, the human body cannot produce vitamin D2 which is taken up with fortified food or given by supplements. In human plasma vitamin D3 and D2 are bound to the vitamin D binding protein and transported to the liver where both are hydroxylated to form vitamin D (25-OH), i.e. 25-hydroxyvitamin D. It is commonly agreed that vitamin D (25-OH) is the metabolite to determine the overall vitamin D status (Total Vitamin D) as it is the major storage form of vitamin D in the human body. Vitamin D is essential for bone health.

Methods: Vit-D T2 method validation was performed using Roche Reagent on Cobas e602 and e801 modules using serum and heparinized plasma samples. Method validation was done according to the laboratory policy followed CLSI guidelines. Precision study was performed using 50 quality control samples of 2 different concentration in inter run for a period of 5 days. Mean, SD and CV% were calculated and compared to the manufacturer recommendation. Method comparison study was done comparing 25 samples of patients. Linearity study was done using 8 different concentrations patient samples that spanning the analytical measurement range (AMR) from 11.6- 250 nmol/L. Sensitivity test performed using universal diluent samples and got close to 7.5 nmol/l which is LLOD.

Results: Between days precision study for low and high concentrations, CV% were 2.7 and 3.2 respectively. Method comparison acceptable criteria: slope 0.9 – 1.1 and correlation coefficient (r) > 0.975, data was entered to EP evaluator, the yield slope was 0.941 and correlation coefficient (r) = 0.976.The method was found linear over the AMR of 7.5- 250 nmol/L. The Low limit of quantitation observed 7.53/8.3 nmol/L which is agreed with the manufacturer claim (7.5).

Conclusion: Overall performance of Vit-D T2 was acceptable on Roche Cobas 8000 (e801 module). It provides reliable results for patients' samples testing.

Poster Presentation Abstracts

6- Evaluation of Six POCT Hba1c Analyzers at Prince Sultan Military Medical City

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Blood Bank, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Background: Measurement of HbA1c is the most important parameter to assess glycemic control in diabetic patients. Due to its fast turnaround of results in the outpatient setting, point of care testing (POCT) of Hemoglobin A1c (HbA1c) was introduced in 2018 at Prince Sultan Medical City in the Pediatrics and Adults Outpatient Diabetic Clinics. POCT Roche Cobas b101 measures HbA1c based on photometric transmission method in the whole blood. It is imperative for the purpose of patient care to assure that all analyzers give comparable results to the laboratory immuno-turbidimetry reference method. The objective of this study was to evaluate the analytical performance of 6 POCT Roche Cobas b101 with respect to impression, linearity and inaccuracy against the laboratory reference method Cobas c513.

Methods: Six Cobas b101 HbA1c analyzers located in three different Outpatient Diabetic Clinics were evaluated. Total precision was assessed using quality control solutions, the manufacturer's claim were tested by running three replicates over five days using quality control solutions at two different concentration levels and coefficients of variation (CVs) were calculated. Linearity was done using 6 different concentrations spanning the analytical range. The accuracy was assessed using 20 venous EDTA whole blood samples that were collected from adult and pediatric patients in the Diabetic Outpatient Clinics. Venous samples were run on each analyzer and the results were compared with Roche Cobas c513 laboratory reference method. Regression analysis was used for the correlation and systematic error was calculated and compared to the allowable error.

Results: Total imprecision showed %CVs of 1.75 -2.7%, they were consistent with those claimed by the manufacturer at all concentration levels. The test was linear over measured range of 4.26 -11.4%. All analyzers showed satisfactory correlation between the results with correlation coefficient (r) value from 0.992 to 0.995, the slope values were from 0.92 – 0.95, and the y intercept were close to zero and the results were within the recommended value ± 6% of the laboratory analyzer values.

Conclusion: Overall performance of the six Roche Cobas b101 were acceptable, they provided reliable results with respect to precision and linearity, and they demonstrated good correlation with the immuno-turbidimetry standard laboratory method.

Poster Presentation Abstracts

7- Association between Cytokine Gene Polymorphism and Recurrent Pregnancy Loss

Alaa S. Alhegaili and Poonam Tyagi

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Background: Recurrent pregnancy loss (RPL), defined as three or more consecutive pregnancy losses before the 24th-week of gestation. It reported that RPL as one of the common disorders which affects 1 to 3 % of pregnant women. Several factors could cause RPL, including age, lifestyle, uterine anomaly, infection, hormonal problem, immune, and genetic factors. However, about 50 % of pregnancy loss is not associated with these causes. Also, the production of cytokines and their level during pregnancy is suggested critical to a successful pregnancy. Many studies have been reported the association between the cytokine gene polymorphism and RPL, as these genetic polymorphisms could affect cytokine production and function. In this study, we aim to determine whether the single nucleotide polymorphisms (SNPs) in tumor necrosis factor-α (TNF-α), interleukin genes (IL-1B, IL-10) and endothelial nitric oxide synthase genes (eNOS) are associated with unexplained RPL among Saudi women.

Methods: Blood samples collected from 50 women with recurrent pregnancy losses and 25 healthy pregnant women without a history of RPL or any medical conditions. The age range of all the participant's women in this study for both the case and control groups was in the range of 21 to 41 years. First, the biochemical analysis was carried out to evaluate the cytokine level and total oxidant status (TOS) in the blood samples. The quantitative measurement of inflammatory cytokine (TNF-α) was performed by ELISA (coulter immunotech, France). The serum level of TOS was measured by HITACHI 912 automatic analyzer. Also, total genomic DNA will be extracted to perform genotypes analysis by polymerase chain reaction (PCR). The polymorphisms genotyping analysis will perform for the following genes TNF-α (238G/A and 863A/C), IL1B (511 T > C), IL10 (1082A > G), and NOS3 Glu298Asp (12862 A>G).

Results: Comparing to the control group, the biochemical analysis of serum TOS level was significantly higher as the mean ± SD value was (4.29 ± 0.67vs. 2.46 ± 0.52mmol Trolox Equiv./L; $p < 0.001$). Also, the level TNF-α for the case group was significantly higher than that for the control group, as the mean ± SD value was 335.13 ± 4.97 pg/mL.

Conclusion: The successful outcomes of the pregnancy depend on many factors, such as cytokine, growth, and genetics factors. Here, we investigate the association between SNPs in the promoter region of cytokine and eNOS genes and RPL among Saudi women.

Poster Presentation Abstracts

8- The Association between Obesity and BDNF Among Saudi Population

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Background: Obesity is one of the most growing health problems worldwide. People who are obese, in compared to people with a normal or healthy weight, are at high risk for serious diseases. There are many studies emphasize that the Brain-derived neurotrophic factor (BDNF) has an important role in the regulation of food intake and body weight. Briefly, a functional loss of one copy of the BDNF gene, due to rearrangement of chromosomes or microdeletions, can lead to obesity in humans. Therefore, this study was planned to investigate how strong is this BDNF functional loss can affect the body weight in the Saudi population. The objective of this research is to study the association between BDNF and obesity among the Saudi population.

Methods: The sample for this study included 40 blood samples from obese Saudi and non-obese control group of different age and gender with and a specified BMI. The BDNF protein concentration was measured by an Enzyme-linked immune sorbent assay (ELISA).

Results: Statistical analysis showed insignificant correlation between the BMI and the BDNF protein in the serum. However, a clinically significant difference between the BDNF and BMI has been observed. In obese subjects, a low amount of the BDNF protein has been detected.

Conclusion: In summary, although our results showed that there is no statistically significant correlation between the BMI groups and their BDNF protein in their serums, it was clear that there is a clinical significant association between BMI and BDNF protein. These results support the role of BDNF in controlling the appetite, which might therefore, lead to obesity. Knowledge of this role of BDNF could help in generating a new method to decrease the percentage of obesity among the population.

Poster Presentation Abstracts

9- Association of dietary and serum vitamin K with undercarboxylated osteocalcin and bone markers in adults Saudi Female

Samaher Alsadhan[1], Nasser Al-Daghri[2], Sobhy Yakout[2], Syed Hussain[2], Abdullah Alnaami[2] and Jean-Yves Reginster[3]

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Background: Osteoporosis is a systemic bone disease known by bone mass reduction and accounts for approximately 34-48% in Saudi Arabia. Many risk factors can increase fracture risk. Among them, low vitamin K level has been suggested to increase the risk of fracture; however, its role on bone mineral density (BMD) still inconsistent. Our objective was to determine vitamin K status and its correlation with bone mineral density, bone markers and cytokines in Saudi female in Riyadh, Saudi Arabia.

Methods: A food frequency questionnaire was completed by both groups. Serum vitamin K, bone marker (OC and CTX) and cytokine levels (IL-6, TN-α, OPG, and RANKL) were measured in both groups. A case-control study with 138 participants was conducted. Subjects were divided according to their BMD into two groups (53 patients in normal BMD group and 85 patients in reduced BMD group).

Results: Low vitamin K intakes were observed in both groups (16-19µg/day) with no significant correlation seen between vitamin K intake and serum vitamin K. A positive correlation was seen between dietary vitamin K and inflammatory cytokines IL-6 and OPG in osteoporosis groups (r=0.33, P=0.001). There was no correlation seen in this Cross-sectional study between vitamin K consumption and OC, a bone formation marker and BMD of the lumbar spine or femoral neck.

Conclusion: In a group of premenopausal and postmenopausal women, a significant positive association was seen between serum vitamin K and BMD, while vitamin K consumption was not associated with BMD.

Poster Presentation Abstracts

10- 25-hydroxyvitamin D, free and bioavailable fractions of vitamin D and its association with sex hormone among postmenopausal Saudi women with osteopenia and osteoporosis

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Background: Exploring the normal association between 25(OH)D metabolites (free and bioavailable) and sex hormones in osteoporotic postmenopausal women might support us to better know 25(OH)D role in androgen pathophysiology. Consequently, we pointed to assess the relationship between 25(OH)D metabolites and sex hormones in a group of osteoporosis, premenopausal Saudi women.

Methods: In this study, 189 Saudi postmenopausal women aged ≥50 years old (N=80 healthy control without osteoporosis, N=109 with low BMD) were recruited. Height, Weight, and blood pressure were obtained from all patients. Fasting blood samples were collected. Lipid profile, phosphorous and calcium were analyzed. Serum 25(OH) D and sex hormones were measured.

Results: Results showed that low BMD Patients has significantly higher total 25(OH)D, PTH, Follicle-stimulating hormone (FSH) and Sex hormone-binding globulin (SHBG) than health patients ($p<0.05$). Total 25(OH)D doesn't give any significant correlations with the level of sex hormones however both free and bioavailable 25(OH)D did many significant.

Conclusion: Our study confirms the appropriateness of 25(OH)D supplementation in postmenopausal women may have an influence on bone metabolism, as well as on other body functions related to sex hormones actions.

Poster Presentation Abstracts

11- Association of Iron and Copper with Concentrations of 25-Hydroxyvitamin D and 1,25-Dihydroxyvitamin D in An Arabic Population

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Background: It is obvious that vitamin D metabolites can benefit in the absorption of inorganic minerals. The aim of this study is to assess and define the association between serum concentrations of iron and copper with levels of 25-hydroxyvitamin D and 1,25-dihydroxyvitamin in a middle eastern population that is either sufficient or deficient in vitamin D.

Methods: This is a case-control study including anthropometrics, glucose and lipid profile. Serum copper, iron and total iron binding capacity were measured. Also, serum 25-hydroxy vitamin D and 1,25-dihydroxy vitamin D were measured. Setting took place at the Vitamin D School Project Database, King Saud University (2014-2016). Participants included 199 Saudi adult patients aged 47.7 ± 15.6 years, patients were divided into two groups; 87 subjects in group one had vitamin D deficiency, and 112 subjects in group two have vitamin D sufficiency.

Results: There is a significant difference in TIBC (P=0.015) and transferrin saturation (P=0.004) and no significant difference in copper and iron concentration between the two groups. In the vitamin D deficient group, 25-hydroxyvitamin D was significantly and inversely associated with serum copper levels (P=0.038).

Conclusion: Sufficient levels of vitamin D are associated with increased iron absorption. Therefore, iron screening is recommended in vitamin D deficient patients. On the other hand, vitamin D association with copper is controversial and need further investigation.

Poster Presentation Abstracts

12- Association of Serum Lipid Profile Level with Diabetes.

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Background: Diabetes mellitus is a common metabolic disorder that associated with insulin dysfunction and disturbances of carbohydrate, lipid and protein metabolism. Individuals with diabetes have dyslipidemia leading to cardiovascular risk due to uncontrolled hyperglycemia. We aimed to study the Association of Serum Lipid Profile level with the diabetic patients in our area.

Methods: The cross-sectional study was carried out at King Fahad Military Medical Complex (KFMMC), Dhahran. The data within six months were collected in the Clinical chemistry laboratory from diabetic patients (N=1190) and healthy subjects (N=1197) attending KFMMC in Dhahran. The parameters used for this study were serum total cholesterol (TC), high density lipoprotein (HDL), low density lipoproteins (LDL), triglyceride (TGL) and fasting glucose levels. These data were random from different ages and both genders. The age groups range from 18 to 96 years, including males and females. Data analysis was performed using SPSS 16.0 software. Descriptive analysis was done whilst Pearson Correlation was used to test association between blood glucose and lipid parameters of diabetic patients. Odds ratio (OR) with 95% confidence interval (CI) was calculated using Logistic regression analysis was applied for exploring lipid profile level as risk factors in diabetes.

Results: The data showed that 1190(49.8%) of these individuals attending KFMMC had diabetes while 1197(50.2%) healthy individuals. In the diabetic patients the lipid profiles level of TGL, TC and LDL were higher than control group while there was low serum HDL. Glucose fasting was significantly positive in correlation with triglyceride ($P < 0.001$) while It was significantly negative in correlation with HDL ($P < 0.05$). Logistic regression result showed that the parameters that contribute significantly with diabetes are TGL (OR=3.280, CI=2.46-4.36) with ($P < 0.001$), LDL (OR=0.448, CI=0.236-0.850) with ($P < 0.01$) and HDL (OR=0.276, CI=0.140-0.543) with ($P < 0.001$).

Conclusion: This study showed elevated levels of TG, LDL and TC while were reduced levels of HDL among diabetic patients. This indicates the influence of hyperglycemia on lipid profile of patients. Since these elevated levels can lead to cardiovascular disease and its complications, it is important for the monitoring of these lipid levels throughout the course of the disease.

Poster Presentation Abstracts

13- Red Blood Cells Folate Vs Serum Folate: A Review of The Tests Utility.

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King Fahad Medical City (KFMC), Riyadh, KSA

Background: Folic acid test measures the amount of folic acid in the blood. Deficiency in folate can lead to premature infants, hemolytic anemias, malabsorption syndrome and alcoholics. Furthermore, research showed a link between folate deficiency and pregnancy complications especially neural tube defect (NTD). Here at the Biochemistry section in King Fahad Medical City, folate values can be measured using either a serum folate or a red cell folate assay. However, red cell folate is more time-consuming and a costly test. This report aims to assess whether the red cell assay demonstrated greater performance characteristics to justify these disadvantages. In order to help communicate our recommendation that serum folate is a suitable substitute for red blood cell folate levels and that the latter should be discontinued.

Methods: A retrospective study was conduct at the Biochemistry Section, results were collected for both serum folate and RBC folate from 1st January 2019 up till October 2019. Additionally, normal samples were freshly collected, and later tested on different time interval using the RBC folate assay to investigate tests accuracy, and precision. Moreover, to be able to assess the testing process and phases. Finally, a review was conducted on both serum and RBC folate assays records of validation data, QC data, and proficiency testing (PT).

Results: By observing the actual process of the RBC assay the assay consumes around 2.5 hours from the operating staff. Also, the data analysis revealed that physicians order serum folate around (7x) times more often than RBC folate. Additionally, (17%) of RBC folate samples were abnormal, and only (6.4%) in the case of serum folate samples. Also, in patients with high folate in serum folate, only (6%) were followed by RBC assay, and in the cases of high folate in RBC folate, (35.5%) of the cases were tested again for serum folate. Similarly, in the cases of low folate in serum folate, (2%) of the cases were tested once more for RBC folate.

Conclusion: The disadvantages seen in the RBC folate assay make it hard for the Biochemistry section to adhere to quality standards and protocols. Consequently, as seen from several articles and other laboratories experience with the matter that serum folate is a suitable substitute for RBC folate and some argue even further that folate testing itself is outdated. However, we are aware that discontinuing a test require further investigations and involvements with physicians, admins, and other stakeholders, yet this initial investigation provide a solid base for us to raise the question of the utility and cost-effectiveness of the RBC folate assay

Poster Presentation Abstracts

14- Improving Potassium turnaround (TAT) time in emergency lab.

Ayman Naitah

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Background: Potassium (K^+) is the major intracellular cation, 98% of potassium concentration is inside the cell. Function of potassium in the body is neuromuscular transmitter and contraction of heart Potassium ion concentration has a major effect on the contraction of cardiac muscle. An elevated plasma potassium slows the heart rate and a depleted potassium increase heart rate which can cause heart attack. The aim of this plan to improve the turnaround time in emergency lab to release potassium result within 60 minutes or less to provide best patient care and to eliminate harm that patient can be exposed to disability or death.

Methods: Key performance indicator (KPI) in emergency lab was indicated the turnaround time of potassium releasing results were less than 95% of total potassium results within 60 minutes, emergency lab has started an improvement system to reduce the turnaround time of releasing potassium results. A team of work has collaborated from emergency lab staff (process samples immediately), portering (bring sample to lab immediately) and quality officer (monitor cause of delay). Planning has made to follow sample processing from ordering to analyzing has included staff, equipment and information system facilities. Improvements have initiated in staff training, stat equipment and auto verification has implemented by team work.

Results: Pneumatic tube system has been installed to hospital sample processing, sample processing accumulated time has been reduced by staff training and stat equipment and Potassium result has been separated from other analytes verification.

Conclusion: Improvement of turnaround time in emergency lab was achieved after monitoring day by day for month of July, August and September by staff collaboration to implement the plan was made. Turnaround time of potassium was improved from 90% to more than 95% of total results released.

Poster Presentation Abstracts

15- Hypocalcemia and Hypomagnesemia Among Patients with Depression Attending KFMMC-Dhahran-KSA.

Sara Alzahrani, Asayel AlHomoud and Murtada Taha

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Background: Depression is one of the most common psychological disorders worldwide. Genetics, socio-economical and pathophysiological factors have been indicated to be the major cause of depression. Calcium is an essential mineral for cellular mechanism. Hypocalcemia occur when PTH and vitamin D is not sufficient, so Ca2+ will not be regulated. Magnesium is one of the most essential minerals in the human body, connected with brain biochemistry and the fluidity of neuronal membrane. Hypomagnesaemia is most frequently observed in hospitalized individuals in intensive care units or those receiving diuretic therapy or digitalis therapy. Varieties of neuromuscular and psychiatric symptoms, including different types of depression, were observed in magnesium and calcium deficient patients. The objective of this research is to study the association between hypomagnesemia and hypocalcemia and depression.

Methods: In this study, 100 depressed patients and 100 normal subjects of both genders and different ages were involved. Calcium (Ca) and magnesium (Mg) serum concentrations of the patients and control were determined by Dimension RXL Max instrument.

Results: Our study shows significant differences for both calcium and magnesium (since $P < 0.05$) between depressed cases and control group. In addition, our results showed that females have a higher risk of having depression than males.

Conclusion: In conclusion, our results shows a strong association between hypomagnesemia and hypocalcemia and depression. Further studies using large number of patients are required to confirm this result.

Poster Presentation Abstracts

16- Reference Ranges of Serum "Free Light Chains and Heavy Light Chains" in Omani Adults.

Maya Al-Shidhani[1], Mohsin Al-Lawati[1], Jalila Al-Shekaili[2], Waad-Allah Mula-Abed[3], Fahad Al-Zadjali[1] and Nafila Al-Riyami[1]

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Background: Monoclonal gammopathies (MGs) are plasma cell dyscrasias that are characterized by excess production of monoclonal proteins (M-proteins) consisting of either an intact immunoglobulin and/or light chains (kappa 'κ'or lambda 'λ'). Serum protein electrophoresis (SPEP) and immunofixation electrophoresis (IFE) are routinely done to detect and monitor patients with MGs. However, sometimes SPEP has limited sensitivity for detecting M-proteins e.g. in oligosecretory multiple myeloma. Therefore, some more sensitive biochemical markers have been used in the diagnosis, prognosis and monitoring of patients with various types of MGs. These include; freelite assay that can detect free light chains secreted by MGs when a M-protein cannot be detected by SPEP or IFE, and hevylite assay that facilitates the separate quantification of the κ or λ bounded amounts of a given immunoglobulin. Several studies have shown racial differences in reference ranges of immunoglobulin G. The aim of this study is to establish a local reference range (RR) for serum free light chains (sFLC) and heavy light chains (sHLC) using Freelite and Hevylite assays respectively among healthy Omani adults

Methods: This was a prospective observational cross-section study conducted on healthy Omani adults aged 18 to 65 years. A total of 302 participants were selected and divided into two groups (155 females,147 males). The exclusion criteria were MGs, fever, infection, inflammatory and renal disorders. Each participant was requested to answer a questionnaire containing personal data and current and past medical history. Measurements of sFLC and sHLC were done using freelite and hevylite immunoturbidimetric assays on cobas and SPA Plus analyzers, respectively.

Results: The RR for sFLC using 95% confidence interval in mg/L was (κ: 11.1-31.8, λ: 8.1-18.1) in males and (κ: 11.0-46.1, λ: 9.0-22.9) in females, and for sFLC κ/λ ratio was 1.03- 2.37 for both genders. The new established RR for κ and λ sFLC in females was higher than in males (P value=0.0005& 6x10-6 respectively). Additionally, the RR for κ sFLC and hence the sFLC κ/λ ratio were higher compared with that of the manufacturer ranges (100% in average for both genders & 44% respectively). Similarly, the RR for sHLC slightly differed (some higher and some lower) from the published manufacturer RR in both genders. However, small gender differences only existed in IgA κ/λ ratio, IgM κ, IgM λ and IgM κ/λ ratio.

Conclusion: It is important for each laboratory to establish its own local RR for sFLC and sHLC as they may differ from ranges stated by the manufacturer.

Poster Presentation Abstracts

17- CHALLENGING CASE OF HEMOGLOBIN A1C MEASURMENT.

Huda Alkhalaf[1], Shamsa Almari[2], Mariam Alfares[2], Sarah Aljunidel[3], Samia Sobki[1], Waleed Alomaim[2] and Sumayah Aljenedil[2]

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Background: Hemoglobin A1c (HbA1c) is considered a marker to diagnose diabetes mellitus, follow glycemic control and risk of complications. There are highly standardized HbA1c measurement methods like the one established by Diabetics Control and Complications Trial laboratory and certified by National Glycohemoglobin Standardization Program using BioRex 70 HPLC. Despite that, each method can be influenced by many factors leading to aberrant results. Hemoglobin variants can result in either under, over or none estimation of the HbA1c fraction and subsequently to improper clinical management. This can be due to different reasons such as influencing the hemoglobin and glucose binding, improper chromatogram peak measurement, or hemolysis causing decrease in red blood cells life span. High-performance liquid chromatography (HPLC) method separate hemoglobin species using charge differences, but it is susceptible to interference from hemoglobin variants.

Methods: Thirty-two-year-old lady, with history of rare asymptomatic hemoglobinopathy (K-Woolwich) and Still's disease. She has no history of diabetes or anemia. During her regular rheumatology visit, her HbA1c was strikingly high at 42%, the repeated one was 41%. (reportable range, 3.5%–19%). Glucose level was 5 mmol/L which is incompatible with her HbA1c. HbA1c was measured by the cation-exchange HPLC method (BioRad Variant II TURBO).

Results: Patient's chromatogram showed large peak, no variant peaks were identified. The markedly elevated HbA1c was caused by Hb variant that coelutes with HbA1c by HPLC. HbA1c was tested by different methods including chemiluminescent immunoassay, architect and was found to be 4.82%. Turbidimetric inhibition immunoassay, COBAS 2 Roche/Hitachi method result was 5.11%. Capillary HbAc1 electrophoresis was 5.3%. Total hemoglobin electrophoresis was done and showed variant peak combatable with K-Woolwich hemoglobinopathy. The measured Fructosamine was 233 mmol/L (200 -258).

Conclusion: Failure to separate the variant Hb components from HbA1c and/or HbA0 may result in inaccurate HbA1c values. Although HPLC method can recognize some common Hb variants by appearance of an additional peak in the chromatogram, it may miss some rare Hb variants like the one in our patient. Selecting the appropriate method to measure HbA1c is important in such cases. Fructosamine depends on serum protein glycation and is unaffected by abnormal Hb variants, therefore it can be used as an alternative marker. It is mandatory to increase the awareness of Hb variants for proper interpretation of HbA1c results especially in areas with high prevalence of rare Hb disorders.

Poster Presentation Abstracts

18- Associations of Serum Tristetraprolin Levels with Components of Metabolic Syndrome in Saudi Adults.

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Background: Obesity-mediated metabolic syndrome (MetS) poses an increasingly heavy burden on Saudi society, with a widespread economic impact. As such, new insights into the care and treatment of MetS are urgently required. Tristetraprolin (TTP) is RNA binding protein that known to destabilize its target mRNA, the gene that encode TTP is recognized as a new candidate gene for obesity related MetS. However, there are limited studies that support the role of TTP in MetS at the level of proteins. In this study we aim to examine the associations of TTP at the protein level with clinical and biochemical characteristics related to MetS.

Methods: A total of 200 Saudi adults (male and female subjects, 30-65years of age) were recruited and divided into two groups based on the presence of MetS. (with MetS [n=100] and a control without MetS [n=100]). Biochemical characteristics were recorded, including fasting glucose, lipid profile and anthropometric measurements. Circulating levels of TTP as well as C-reactive protein (CRP) in both groups were measured using commercially available ELISA kits. Concentrations of tumour necrosis factor alpha (TNF-α), interleukin-6 (IL-6), interleukin-1beta (IL_β), and leptin were measured using luminx.

Results: Serum TTP levels in MetS group were significantly higher than controls [Median (Q1, Q3) of 287.1 (230.3, 372.7) pg/ml in MetS versus 147.1 (68.2, 280.5) pg/ml in controls, p< 0.001)]. TTP was found to be positively correlated with waists circumference (R=0.25,P=0.001), diastolic blood pressure (R=0.15,p=0.05),glucose (R=0.28,P=0.001), and triglyceride (R=0.20,P=0.001), as well as TNF-α (R=0.20,P=0.05), IL_β (R=0.30,P=0.001), and CRP (R=0.17, P=0.05), and negatively correlated with HDL-cholesterol (R=-0.22,P=0.001).

Conclusion: Our results suggest that there are higher circulating levels of TTP in individuals with MetS compared to those without. Further investigation may provide valuable insights about the specific mechanism of TTP in MetS.

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Poster Presentation Abstracts

19- The Pattern of Vitamin D among Diabetic Patients Attending King Fahd Military Medical Complex (KFMMC) in Dhahran, Saudi Arabia.

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Background: Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. Type II diabetes mellitus recently become a serious health problem everywhere around the world and is an endemic condition in Saudi Arabia. Several studies suggested an association between vitamin D deficiency and insulin impaired function. The purpose of this study was to find an association between hyperglycemia and vitamin D deficiency. In addition, this study was done to determine which age group and gender have the highest vitamin D deficiency and might be considered more susceptible to develop (DM).

Methods: This is a retrospective and cross-sectional study done at King Fahad Military Hospital (KFMMC) in Dhahran-KSA. In this study, 30 normal subjects and 120 of type 2 diabetes mellitus patients of both genders and different ages have been involved. Data were collected from Clinical Chemistry Department of the KFMMC, which include FBG, random blood glucose, HbA1c and vitamin D levels. The data were entered and organized using Excel computer Microsoft Word program and were analyzed by Statistical Package for the Social Sciences (SPSS) at PSMCHS.

Results: The result of this study showed insignificance differences between vitamin D levels and all glucose parameters in T2DM with a p-value of (0.85), (0.16), and (0.06) respectively.

Conclusion: In conclusion, vitamin D has no significant association with the high blood glucose level. However, our study indicates that vitamin D deficiency is a common issue in Saudi Arabia and that our population demands vitamin D supplementation.

Poster Presentation Abstracts

20- Angiogenin Levels and Vitamin D Status: Associations with Glycemic and Metabolic Indices.

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Background: Angiogenin (ANG) is a multifunctional protein known to induce blood vessel formation and is a biomarker for cardiac deterioration, including several types of cancer. Limited information is available as to whether vitamin D supplementation affects circulating angiogenin. This interventional study aims to determine whether vitamin D status correction modulates ANG levels and whether ANG is associated with other known cardiometabolic indices in vitamin D deficient Arab adults.

Method: A total of 100 (54 males/46 females) vitamin D deficient [baseline 25(OH)D 38.8±9.6nmol/l)], non-diabetic Saudi adults (aged 30-50 years) whose vitamin D status were fully corrected (>50nmol/l) after 6 months of vitamin D supplementation were randomly selected from the Vitamin D School Database of the Chair for Biomarkers of Chronic Diseases. Anthropometrics, fasting glucose, lipid profile, apolipoproteins (A1, A2, B, C1, C2, C3, E and H), 25(OH) D and ANG levels were measured at baseline and after six months. Lipid profile and glucose were measured routinely using a chemical analyzer. Serum 25(OH)D was measured using electrochemiluminescence assay. Immunoassay, solid-phase assay was used to measure angiogenin levels. The apolipoproteins (A1, A2, B, C1, C2, C3, E and H) were quantified using multiplex assays.

Result: Post-intervention and in all participants, a non-significant increase was observed in ANG levels [16.5(8.9-27.8ng/ml versus 19.1(-7.0-20.8ng/ml); p=0.39]. Furthermore, levels of apoCIII and apoE significantly increased (p-values 0.001 and 0.009, respectively) with a parallel significant decrease in apoB (p=0.003), post-intervention. Baseline ANG was significantly associated with most apolipoproteins and inversely associated with anthropometrics as well as HDL-cholesterol. Changes in ANG were positively associated with apoE in all participants ($R=0.32$; $p<0.01$) and males in particular ($R=0.40$; $p<0.05$).

Conclusion: Vitamin D supplementation may modestly affect ANG levels, but a larger sample size is needed to confirm this. The association between ANG and apoE in adult Saudi males is worthy of further investigation since both biomarkers have been linked to neurodegenerative disorders.

Poster Presentation Abstracts

21- First Case of a Baby with Classic Homocystinuria Diagnosed by Newborn Screening in Saudi Arabia.

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[1] Newborn Screening & Metabolic Lab and [2] Department of pediatrics, Prince Sultan Military Medical City, Riyadh, KSA

Background: Background: Homocystinuria is a biochemical disorder of methionine metabolism due to cystathionine beta synthase enzyme deficiency and it's characterized by elevated level of plasma methionine and homocysteine. Clinically, the affected patient presents with intellectual disability, visual impairment and vascular thrombotic event. It can be diagnosed early in the newborn period thus preventing its inevitable complications if remained untreated. Newborn screening program (NBS) has been implemented since the 1990s in Saudi Arabia, it is a wide national neonatal screening analysis for 15 inborn errors of metabolism, since then many babies were diagnosed, however only for selected disorders. Homocystinuria is not included in the selected list but with aid of another biochemical marker namely methionine it raises its suspicion.

Methods: NBS test is performed in the 2nd day of life by obtaining dried blood spots specimen (DBS) from the heel of the newborn. 3.2 mm disk was punched from DBS and placed into 96-well polypropylene microtiter plates for processing. Amino acids were extracted using a non-derivatized method. The extracted amino acids were analyzed utilizing liquid chromatography tandem mass spectrometer. Positive mode electrospray ionization ion source was used. Multiple reaction monitoring acquisition mode was employed to identify and quantify different metabolites with the use of N2 as a collision gas. The levels of methionine and other amino acids were evaluated for the 1st DBS testing. The procedure has been repeated using a new recall sample for confirmation. Moreover, plasma homocysteine level has been measured.

Results: The 1st NBS result showed high methionine level at 119 µmol/L (reference range: 8-75 µmol/L). Moreover, the methionine/phenylalanine ratio was 1 (reference range: < 1). Nonetheless, the 2nd NBS result came with higher methionine level at 146 µmol/L and higher ratio at 1.9. Moreover, plasma homocysteine level was evaluated indicating abnormality in the methionine homocysteine cycle. Furthermore, the genetic analysis of CBS gene revealed a homozygous pathogenic variant which is common in the country.

Conclusion: Our study reports the 1st case of a newborn baby diagnosed with homocystinuria by NBS in Saudi Arabia.

Poster Presentation Abstracts

22- Indices of visceral obesity and cardiovascular risk in young women with polycystic ovarian syndrome.

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Background: Polycystic ovarian syndrome (PCOS) is a pro-inflammatory condition associated with markers of chronic inflammation implicated in metabolic disturbances, central obesity and menstrual irregularities, which characterize this disorder. Obesity and an increased body mass index (BMI) are recognized common but non-essential feature of PCOS. However, the abdominal distribution of body fat is especially characteristic among approximately 60% of these women and the existent visceral fat does not only contribute to the development of IR, but also causes a state of chronic low-grade inflammation that is a pivotal factor for predicting the long-term risk of CVD. The association between indices of visceral obesity and cardiovascular risk in young women with polycystic ovarian syndrome. Thus, we aimed to investigate whether the increase of some anthropometric indices of visceral obesity in young women with PCOS consider is a surrogate marker for CVD risk.

Methods: This is a case-control study that included 200 female subjects (aged between18 to 40). Subjects were matched by age and recruited from the Obstetrics and Gynecology Clinics at King Abdulaziz University Hospital and King Abdulaziz Hospital at Jeddah, Saudi Arabia. PCOS condition was diagnosed using the Rotterdam criteria. Besides, body mass index (BMI), several parameters have been applied to evaluate central obesity prevalence among study population, including waist circumference (WC ≥ 80 cm), waist hip ratio (WHR > 0.8) and waist height ratio (WHtR> 0.59). Biochemical parameters including hs-CRP, TNF-α and IL-6 levels were determined for all participants.

Results: The majority of PCOS cases were obese and overweight in comparison with non-PCOS controls ($p<0.0001$). PCOS cases showed significantly higher prevalence of abdominal obesity with respect to WC and WHtR than their control counterparts ($p<0.05$, $p<0.001$ respectively). Serum hs-CRP, TNF-α and IL-6 levels were significantly higher in PCOS cases compared with controls group ($p<0.0001$, $p<0.001$, $p<0.05$, respectively).

Conclusion: The study indicates that women with PCOS had a high prevalence of abdominal body fat distribution, even in lean women with PCOS, and had altered circulatory levels of inflammatory cardiovascular risk markers (e.g.,) hs-CRP, TNF-α and IL-6, which are mainly attributable to the accumulation of visceral fat and an effect of insulin resistance. Therefore, both visceral obesity indicators (WC and WHtR) seem to be important and helpful predictors to identify patients at increased CVR more than either BMI or WHR.

Poster Presentation Abstracts

23- Serum Nlrp3 Levels and Associated Cytokines in Saudi Adults with Metabolic Syndrome.

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Background: Metabolic Syndrome (MetS) is an increasing public health burden on Saudi society, with widespread economic impact. MetS components contribute to the development of metaflammation, which has been associated with activation of early innate immune response through multiprotein complex inflammasomes, the most investigated of which is the nucleotide-binding oligomerization domain-like receptor pyridine NLRP3. This inflammasome triggers the activation and processing of prointerleukin-1β. In this study, we investigated the associations of serum levels of NLRP3 and IL-1β with clinical and biochemical profiles of Saudi Adults with or without MetS.

Methods: A total of 200 Saudi adult males and females (100 with MetS and 100 controls) were randomly selected from the Chair for Biomarkers of Chronic Disease (CBCD) database. Screening for MetS was done using the definition of the National Cholesterol Education Program Adult Treatment Panel (NCEP ATP III) criteria. Lipid profile and fasting blood glucose concentrations were evaluated using routine chemical analyzer, while serum cytokines and growth factors, including IL-1β, IL-6, TNF-α were measured using the Luminex xMAP Technology platform (Luminex Corporation, Texas, USA). Serum NLRP3 levels was assessed using an enzyme-linked immunosorbent assay (ELISA) according to the manufacturer's instructions.

Results: Serum concentrations of NLRP3 showed no significant difference between groups. The MetS group had significantly higher serum concentrations of IL-1$\beta$and TNF-α than the controls ($p<0.001$). Stratified according to sex, significant differences were found in NLRP3 levels: Mets group in males had significantly lower NLRP3 levels than male controls ($p=0.002$), while MetS group in females had significantly higher NLRP3 levels than female controls ($p=0.005$).

Conclusion: Circulating NLRP3 is influenced by MetS and is expressed differently in males and females, possibly confirming the sexual dimorphism theory in immune response. Further investigation using a larger sample size is needed to identify which MetS component affects NLRP3 significantly.

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Poster Presentation Abstracts

24- The Effect of Gum Arabic on Cholesterol Synthesis ond Serum Lipids in Atherogenic Rats.

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Background: Cardiovascular disease (CVD) continues to be one of the most important health problems. CVD results in significant morbidity and mortality worldwide. There is an increasing interest in the therapeutic use of naturally occurring compounds for a wide range of disorders, including cardiovascular dysfunction, cancer, diabetes, ,and neurodegenerative diseases. Our study was aimed to evaluate the effect of Gum Arabic (GA) on atherogenic induced rats.

Methods: Male Wistar rats (180-200g) were divided into six groups each consisted 8 rats: Normal control rats (NC), NC treated with 3.75 % GA, NC treated with 10 % GA, atherogenic rats (AT), AT treated with 3.75 % GA , and AT rats treated with 10 % GA. NC and AT rats were kept on their specific diets for 2 weeks before oral treatment with GA. Treatment with GA continued for six weeks. Body weights, food and water intake were recorded daily. Serum concentrations of total cholesterol (TC), low-density lipoprotein (LDL-C), high density lipoprotein (HDL-C), very low-density lipoprotein (VLDL), triglycerides (TG), phospholipids (PL), and glucose were determined. HMG-CoA Reductase was assayed in liver microsomes. Liver histology was observed under electron microscope.

Results: Serum concentrations of TC, LDL, VLDL and TG were decreased significantly for all treated groups except NC treated with 3.75 % GA that showed no significant difference in TC and LDL. Serum HDL levels were increased significantly for all studied groups. Serum glucose concentrations decreased significantly with increasing dosage of GA for all treated groups ($P \leq 0.05$). PL showed no significant difference between all groups. The activity of HMGR was significantly diminished in AT group treated with 3.75% and 10% GA as it dropped from 5.94±0.272 unit /mg to 1.67±0.151 unit/mg and 2.54±0.086 unit/mg respectively ($P \leq 0.05$). Liver histology observations revealed that GA has no harmful effect on normal control groups. GA showed tissue protective effect through supporting healing of livers and preventing the inflammation and necrosis in AT rats.

Conclusion: Treatment of atherogenic rats with GA has showed protective effects in lowering serum cholesterol and low-density lipoprotein levels. Treatment of atherogenic rats with GA also significantly diminished HMGR activity and therefore improved cholesterol homeostasis.

Poster Presentation Abstracts

25- Validation of Succinylacetone Assay in Dried Blood Spots Using Liquid Chromatography Tandem Mass Spectrometer.

Saad Alkhaloufh, Sarah Alomairi, Albandari Alsaban, Nasibah Fallatah, Ohoud Sallam, Khalid Alhifdy, Rawan Alolayany, Rami Almudarra, Joharah Alfifi and Fahad J Alharbi

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Background: Tyrosinemia type 1 (TYR-I) is an autosomal recessive disorder that may lead to early death if left untreated. Succinylacetone (SUAC) is a primary diagnostic biomarker for TYR-I. Nevertheless, tyrosine can be used in newborn screening (NBS) by tandem mass spectrometry (MS/MS), elevated level of tyrosine is not specific to TYR-I. Having another biomarker to complement tyrosine will increase the diagnostic accuracy in the era of mass screening and precision medicine. The current study aims to highlight the method validation of SUAC assay utilizing MS/MS in dried blood spots (DBS).

Methods: Validation materials were supplied by Center of Disease Control and Prevention's Newborn Screening Quality Assurance Program. Calibration curve for SUAC linearity constructed using six different increasing concentrations 0.4 to 91.8 µmol/L which covers the clinical range. Inter-assay and intra-assay variations were studied in five different days to evaluate the assay precision. In order to study the assay accuracy, the overall analytical recovery of SUAC from DBS was calculated and the method comparison were evaluated. Moreover, the assay carryover was assessed.

Results: SUAC curve was linear up to 91.8 µmol/L with slope of 0.93 and correlation coefficient of 0.996. The lower limit of detection of SUAC in DBS was 0.4 µmol/L and recovery percentage of 99%. The overall percentage of the coefficient variation was 4%. Furthermore, the assay carryover was acceptable at 0.2%.

Conclusion: Our findings showed that SAUC assay in DBS utilizing MS/MS is a reliable method to use SUAC as a primary biomarker for TYR-I in NBS.

Poster Presentation Abstracts

26- Emergency Laboratory Troponin T Turnaround Time (TAT) Within 60 Minutes.

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Background: Cardiac Troponin T increases rapidly after acute myocardial infarction (AMI) and may persist up to two weeks thereafter. High-sensitivity cardiac troponin T assays allows measurement of even low concentrations of cardiac troponin with high precision within the first hours of presentation in the diagnosis of acute myocardial infarction (MI). High-sensitivity cardiac troponin T 1-hour algorithm was shown to allow accurate rule-out and rule-in of acute MI within 1 hour in up to 75% of patients. This algorithm is based on two concepts: First, high-sensitivity cardiac Troponin T is interpreted as a quantitative variable where the proportion of patients who have acute MI increases with increasing concentrations of cardiac troponin T. Second, early absolute changes in the concentrations within one-hour provide incremental diagnostic information when added to baseline levels with the combination acting as a reliable surrogate for late concentrations at 3 or 6 hours.

Methods: All reported troponin results from ED laboratory where FOCUS (Find, Organize, Clarify, Understand, and Select) PDCA (Plan, Do, Check, Act) was used as a tool to study troponin TAT. A team was formulated from ED Laboratory, Nursing, Physicians, Portering, and Quality Specialists. Results of troponin TAT within 60 minutes was 90%. Process mapping was done which include infrastructure, manpower system, equipment and materials. Improvement opportunities were identified and the proper resolutions such as training and education, separation of tests, autoverification, and increasing the number of stat centrifuges were implemented.

Results: Causes for prolonged TAT identified which include inefficient sample delivery, lack of awareness of the importance of such results, improper test grouping, and not fully utilizing available technology.

Conclusion: Emergency Laboratory Division is monitoring the turnaround (TAT) of Troponin T since January 2015 with the target TAT of 90% within 60 minutes. By using the new procedure, a significant increase in the target has been achieved. Thus, by changing the pre-analytical practices and adopting new solutions we can greatly improve the troponin T TAT which resulted in a significant difference of the overall processes. Currently, we have increased our TAT target up to 95% and we will keep on monitoring.

Poster Presentation Abstracts

27- The association of irisin, retinol binding protein-4 (RBP4) and leptin as markers of inflammation with cardiovascular complications in type 2 diabetes mellitus.

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Background: Worldwide cardiovascular disease (CVD) is a major epidemic inflammatory disorder boosted by type 2 diabetes mellitus (T2DM). The risk of CVD increases 2-4 folds in T2DM. Markers of inflammation have been implicated in predicting vascular complications of T2DM. A recent anti-inflammatory myokine irisin has been linked to diabetes, insulin resistance and diabetic complications. Retinol binding protein-4 (RBP4) and leptin are proinflammatory adipokines that have been associated with the risk of T2DM and its complications. Therefore, we aimed to study the association of irisin, retinol binding protein 4 (RBP4) and leptin as markers of inflammation with cardiovascular complications in T2DM patients.

Methods: A case control study design was employed. A total of 90 participants, categorized into: 30 healthy control subjects, 30 T2DM patients without CVD, and 30 T2DM patients with CVD were included. The levels of irisin, RBP4 and leptin were measured and compared between the three groups.

Results: Serum irisin levels were significantly higher in the two diabetic groups compared to the control group. Interestingly serum irisin levels were higher in T2DM patients with CVD group compared to T2DM without CVD group. RBP4 serum levels were significantly higher in the two diabetic groups compared to the control group. However, it did not show significant difference between T2DM patients with and without CVD groups. Lastly, serum leptin levels were not significantly different between T2DM patients without CVD group and control subjects. Whereas its levels showed significantly higher values in T2DM patients with CVD group compared to control group. However, there were no significant differences in serum leptin levels between the groups of T2DM patients with and without CVD.

Conclusion: The myokine irisin shows promise as a marker to detect cardiovascular complications of T2DM. Our results may suggest the beneficial and anti-inflammatory properties of irisin in T2DM and its cardiovascular complications. Therefore, more larger studies are needed to find the possible diagnostic, prognostic and therapeutic role of irisin in T2DM.

Poster Presentation Abstracts

28- Neutrophil Gelatinase Associated Lipocalin As a Marker of Renal Dysfunction in Type 2 Diabetes Mellitus.

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Background: Diabetic nephropathy (DN) is a major microvascular complication of diabetes and microalbuminuria is considered as the first clinical indication of DN. However, some diabetic patients have renal pathological changes and kidney dysfunction even if the levels of albumin in urine are in the normal range, indicating that albuminuria is not the ideal marker for the early detection of DN. Thus, discovering effective biomarkers to diagnose DN before appearance of clinical evidence are needed. The Aim of this study was to evaluate the renal tubular enzyme, urinary neutrophil gelatinase associated lipocalin (uNGAL) as early biomarker of renal dysfunction in type 2 diabetes mellitus (T2DM).

Methods: The current case-control study was performed on 86 patients with T2DM and these patients were classified according to their albumin/creatinine ratio (ACR) into three groups; normoalbuminuric group with ACR<30 mg/g creatinine (n=26), microalbuminuric group with ACR =30-299 mg/g creatinine (n=30) and macroalbuminuric group with ACR ≥300 (n=30). Age and gender-matched healthy subjects were recruited as control group (n=30). uNGAL was measured by ELISA technique in the studied groups.

Results: Compared with healthy control, diabetic patients with normoalbuminuria excreted significantly higher levels of uNGAL (P<0.001). In addition, significantly elevated uNGAL levels were observed in microalbuminuric and macroalbuminuric groups when compared to the control and normoalbuminuric groups (P<0.001). uNGAL was found to correlate positively with FBG, HbA1c, duration of diabetes, urea, creatinine, ACR, but correlate inversely with GFR in diabetic groups.

Conclusion: Our results indi¬cated that uNGAL is the most sensitive biomarker for early renal dysfunction in diabetic patients. Larger prospective studies are needed to validate our findings.

Poster Presentation Abstracts

29- Adrenocorticotropic Hormone Modulates Bone Mineral Density among Postmenopausal Saudi Women with Type 2 Diabetes Mellitus Irrespective of Osteoporosis Status.

Mohammad Masoud, Shaun Sabico, Sobhy Yakout, Malak Khattak, Majed Alokail and Nasser Al-Daghri

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Background: The pituitary gland secretes several hormones known to regulate the activity of other endocrine glands, hence the name "master gland". Neuroendocrinology of bone is a new and emerging field based on the theory that pituitary hormones can directly affect bone remodeling and metabolism. Therefore, the present study aims to determine for the first time in a homogenous Arabian cohort, the associations of the major hormones of the anterior pituitary gland and other hormones with indices of bone mineral density among known T2DM (type 2 diabetes mellitus) and postmenopausal Saudi women, with or without osteoporosis.

Methods: In this cross-sectional study, a total of 363 postmenopausal Saudi women [N=161 without osteoporosis, age (years) 54.7±7.6, BMI (body mass index) (kg/m2) 34.6±5.7; N=202 with osteoporosis, age 59.0±8.7, BMI 32.3±6.4] were randomly selected from the Osteoporosis Registry database of the Chair for Biomarkers of Osteoporosis (CBCD) in King Saud University, Riyadh, Saudi Arabia. Serum calcium was measured routinely. Parathyroid hormone (PTH), follicle stimulating hormone (FSH), thyroid stimulating hormone (TSH), adrenocorticotropic hormone (ACTH), testosterone, estrogen, prostaglandin and insulin-growth factor 1 (IGF1) were measured using commercially available assay kits following manufacturers' instructions. Serum 25(OH)D was measured using electrochemiluminiscence assay. Bone mineral density (BMD) and corresponding T-scores were assessed using dual x-ray absorptiometry (DXA).

Results: Age- and BMI-adjusted comparisons revealed that levels of testosterone and estrogen were significantly lower in the osteoporosis group than those without (p-values 0.05 and 0.02, respectively). Circulating ACTH levels were significantly higher in the osteoporosis group than their counterparts (p=0.002). In all subjects, FSH was inversely and significantly associated with T-Score (spine) (R=-0.27; $p<0.05$) and BMD (femur) (R=-0.35; $p<0.05$). Post-stratification, ACTH was significantly associated with BMD (spine) (R=0.62; $p<0.05$). No significant associations between hormones and BMD were seen in the non-osteoporosis group. In all subjects and using stepwise linear regression, ACTH and IGF1 predicted 32% of the variance in T-Score of the spine (p=0.002). Furthermore, ACTH and TSH predicted 29% of the variance in T-Score of the femur (p=0.002). Lastly, ACTH and IGF1 predicted 37.4% of the variances observed in BMD (femur) (p=0.001).

Conclusion: Among the anterior pituitary hormones, the stress hormone regulator, ACTH, seems to influence BMD the most, at least among Saudi women with T2DM, irrespective of osteoporosis status. An imbalance of this hormone may predispose T2DM individuals to decreased BMD and subsequent osteoporosis. Whether these findings apply to the non-T2DM population needs further investigation.

Poster Presentation Abstracts

30- Cystic Fibrosis Incidence in A Tertiary Center in Saudi Arabia.

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Background: Cystic Fibrosis (CF) is a progressive genetic disorder due to mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene which encodes for a chloride/bicarbonate channel located in the apical membrane of epithelial cells. Defective CFTR gene affects multiple organs, leading to pancreas organ failure with maldigestion and malnutrition, liver and gastrointestinal disease, male infertility and progressive destructive lung disease causing early mortality. Early diagnosis of CF by newborn screening (NBS) helps to prevent early severe complications in children. Nevertheless, NBS does not prevent the disease, it offers early intervention and may delay the onset of disease complications to later stages in life; prolonging adequate life quality and longevity. Immunoreactive trypsinogen (IRT) levels in blood increase in newborns with CF. Elevated IRT is related to pancreatic damage. Automated immunoassays enable large numbers of samples to be processed as part of an NBS program. To our knowledge, there is no NBS for CF in Saudi Arabia, we aim to study the incidence of CF in a tertiary center in Saudi Arabia and to compare the blood IRT levels in days 1 and 5 after birth.

Methods: A retrospective study conducted between 1 May 2017 and 30 April 2019, a total of 10268 newborns were screened in a tertiary center in Saudi Arabia. The dried blood spots (DBS) specimens were collected on Guthrie cards from the newborns on days 1 and 5 after birth. Briefly, 3.2 mm disk of newborn DBS, a set of calibration samples and quality controls were punched into 96-well plate using an automated puncher. Thereafter, the 96-well plate is placed in the magazine of genetic screening processor (GSP) for analysis using time-resolved fluoroimmunoassay detection method. Recall screening testing was performed for initial positive results and the positive results should be confirmed by sweat chloride test and molecular analysis.

Results: A total of three CF cases were diagnosed giving an incidence of 1:3423. The mean concentration of IRT in day 1 was significantly higher than in day 5 (22.5±10 and 17.26±11.01 µg/L, respectively, $p < 0.001$). IRT levels in days 1 and 5 were ranged between (5.0-172.0 and 5.0-103.9 µg/L respectively).

Conclusion: Our study findings highlight the incidence of CF in a tertiary center in Saudi Arabia and underscore the utility of IRT as a screening tool for CF and the impact of sampling time on the levels of IRT.

Poster Presentation Abstracts

31- Validation of Chemilumimescence Immunoassay (CLIA) Method for The Quantitative Determination of Aldosterone and Renin in EDTA Plasma Specimens.

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Background: Aldosterone and renin play a crucial role in our bodies. The adrenal gland in the kidney produces aldosterone hormone which regulating blood pressure and blood volume. The production of aldosterone hormone controlled by renin which is an enzyme produced by special cells in the kidney and released when the blood pressure drops and the sodium levels in the body are low or the potassium is high. Renin is promoted the synthesis of angiotensin ll causes blood vessels narrower and it stimulates aldosterone production, this elevates blood pressure and keeps electrolytes at a normal level. If the levels of aldosterone or renin are too high or low, it can be a sign of health problems. Different conditions can prompt aldosterone overproduction (hyperaldosteronism) or underproduction (hypoaldosteronism) and measuring the ratio between aldosterone and renin in the blood will help to identify the causes.

Methods: Aldosterone and renin validation were performed using Liaison Reagent for aldosterone and renin on Liaison XL analyzer using EDTA plasma samples. Method validation was done according to the laboratory policy followed CLSI guidelines (EP05-A3/EP06-A/EP09-A3/EP17-A2). The precision study was performed using 20 quality control samples of 2 different concentration in run for a period of 20 days. Mean, SD and CV% were calculated and compared to the manufacturer recommendation. Method comparison study for aldosterone was done comparing 23 samples with samples from National Guard Hospital and a comparison study for renin was done by comparing 29 samples with the same samples from National Guard Hospital. Linearity study was done by using 5 different concentrations patient samples that spanning the analytical measurement range (AMR) from 0.97 to 100 ng/dl for aldosterone and renin using also 5 different concentrations from 0.50 to 500 µIU/ml.

Results: Between days precision study for low and high concentrations, CV% were 6.5 and 3.5(aldosterone) and 11.3 &10.4 for (renin) respectively. Method comparison acceptable criteria slope 0.9 – 1.1 and correlation coefficient (r) > 0.97, data was plotted on scatter plot, the yield slope was 1.153 and correlation coefficient (r) = 0.968 for aldosterone and for renin the yield slop was 0.912 and correlation coefficient (r) = 0.997 .The method was found linear over the AMR of 0.97 – 100.0 ng/dl for aldosterone and 1.270 -500 µIU/ml for renin

Conclusion: The overall performance of aldosterone and renin on the Liaison XL analyzer was acceptable. It gives reliable results for patient samples testing.

Poster Presentation Abstracts

32- The synergistic Effect of Melatonin and Vitamin D3 on the Gene Expression of Bcl-2 and Bax in MCF-7 breast cancer cell line.

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Background: There is now compelling evidence by epidemiology and experimental studies that disruption of circadian rhythm and decreased melatonin synthesis is a risk factor for breast cancer. Also interestingly there is a strong co-relationship between the night shift work and the incidence of breast cancers. Animal model of cancer suggests that the disruption of Light and night (LAN) disrupts the secretion of melatonin enhances the growth of chemical-induced mammary adenocarcinoma in comparison with the control animals. The use of melatonin along with tamoxifen greatly increase the efficacy of the drug as well as a better strategy to treat breast cancers, which are now used in some clinical studies. Similarly, the use of melatonin and vitamin D3 has shown to inhibit breast cancer growth and promote apoptosis. With the ever-increasing rate of breast cancer incidences, there is a strong need to look at the alternative drugs and treatment strategy for the treatment of breast cancer. There is also a need for a better understanding of how these drugs may affect the tumor cells apoptosis and control of metastasis. The aim of the study is to look at the Bax and BCL-2 proteins and gene expression with the treatment of melatonin and vitamin D3 and both.

Methods: In vitro culture of human MCF-7 was exposed to melatonin and vitamin D3. The optimum concentration was found out by MTT Assay. Then, the optimum dosage was used to find out the mRNA expression of Bax and BCL-2 by RT-PCR and protein expression by Western Blot to confirm the apoptotic activity of melatonin and vitamin D3.

Results: There was up-regulation of Bax and protein expression with the combined treatment. At the same time, there was the downregulation of BCL-2 and protein expression with vitamin D3 treatment, melatonin, and the combined effect, but the most significant effect was found with the combined of treatment (Mel 5nM + D3 0.5 nM).

Conclusion: Our study supports the use of vitamin D3 and melatonin as an adjuvant therapy along with the commonly used chemotherapy for the treatment of breast cancers.

Poster Presentation Abstracts

33- Tetrahydrobiopterin (Bh4) Responsiveness Test Revealed 6 - Pyruvoyl - Tetrahydrobiopterin Synthase (Ptps) Deficiency in A Saudi Infant.

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Background: Phenylketonuria (PKU) is an autosomal inherited disorder resulting from an error of phenylalanine (Phe) metabolism which is due to the deficiency of phenylalanine hydroxylase enzyme (PAH) or a defect in the cofactor tetrahydrobiopterin (PH4). If this disorder is detected in early stage after birth immediately, the main symptoms such as mental retardation, seizures and microcephaly can be prevented. Hence, newborn screening (NBS) for PKU and other metabolic disorders is fundamental for early diagnosis and subsequent diet monitoring and treatment of positive cases. The current study aims to highlight the importance of performing BH4 test for atypical PKU patients.

Methods: The patient has been screened in the 2nd day of life using dried blood spots specimen (DBS) where the amino acids extracted by non-derivatized extraction method and utilizing liquid chromatography tandem mass spectrometer (LC-MS/MS). Thereafter, at age of 2 months, as the Phe level was low the patient was put on regular formula for a week. Thereafter, the patient has been undergone to BH4 responsiveness test for 3 days. The levels of Phe, tyrosine (Tyr) and Phe/Tyr ratio were evaluated in each day using the same aforementioned extraction procedure and instrumentation.

Results: The initial and recall NBS results confirmed the diagnosis of PKU. The NBS Phe level was 400 µM. The patient was commenced on Phe restricted formula. After 2 months of age, the levels of Phe, Tyr and Phe/Tyr ratio were (57, 63 and 0.4 µM, respectively). During the 3 days BH4 responsiveness test, baseline Phe, Tyr and Phe/Tyr ratio levels were (534, 40 and 13.4 µM, respectively). On the other hand, at the end of the 3 days, Phe level dropped sharply to be 77 µM. This confirm the impression of BH4 deficiency. 6-pyruvoyl-tetrahydropterin synthase (PTPS) gene sequencing revealed a homozygous mutation (C.283 A>G, p.M80V) in exon 4 confirming PTPS. This patient responded nicely to BH4 therapy together with 5 hydroxytryptophan and Sinemet.

Conclusion: Our study findings underline the importance of performing BH4 test in PKU patients with moderate elevated Phe levels.

Poster Presentation Abstracts

34- Classic Phenylketonuria (Pku) Responsive to Tetrahydrobiopterin (Bh4).

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Background: Phenylketonuria (PKU) is an autosomal recessive inherited disorder resulting from an error of phenylalanine (Phe) metabolism. This disease is mainly caused by the absence or deficiency of the defective hepatic enzyme phenylalanine hydroxylase (PAH) due to mutations in PAH gene. This enzyme is responsible for catalizing the essential amino acid Phe into another amino acid, tyrosine (Tyr). Moreover, any defect in the cofactor, tetrahydrobiopterin (PH4), may cause a rise in the Phe level. The current study aims to highlight the clinical utility of performing BH4 test for classical PKU patients.

Methods: The patient was diagnosed with classical PKU during the newborn screening (NBS) in the 3rd day of life using dried blood spots specimen (DBS). The amino acids, carnitine and acylcarnitine were extracted by non-derivatized extraction method and their levels were measured utilizing liquid chromatography tandem mass spectrometer (LC-MS/MS). At age of 3 years, the patient has been undergone to for 3 days. The levels of Phe, tyrosine (Tyr) and Phe/Tyr ratio in DBS were measured and evaluated in each day of BH4 responsiveness test.

Results: The initial Phe level was 1500 µM. The patient was commenced on low Phe formula where responded nicely to treatment in the first two years of life. However, Phe level was high in the third year of life (1000-1700 µM). Diet was optimized but there was an issue with compliance. The development was age appropriate. Clinical examinations showed that the weight and height were within 25th centile. Skin and hair examinations were normal. CNS examination revealed normal tone and reflexes. Comprehensive - sequence and deletion/duplication study revealed a homozygous mutation in PAH gene (C.671T>C, p.I1244T). The patient was subjected to a 3 days BH4 responsiveness test. The initial level of Phe was 1500 µM. A sharp drop in Phe level was observed at the end of the third day to 700 µM ($p<0.001$). This shows a decrease of more than 50% of the initial level. So, patient was labeled as BH4 responsive classical PKU and hence commenced on BH4. The level of Phe was acceptable in the first 6 months after starting BH4.

Conclusion: Our study findings highlights that applying BH4 responsiveness test on classical PKU patients enhances decreasing Phe levels.

Poster Presentation Abstracts

35- Factors Affecting Preanalytical Stability of Intact Parathyroid Hormone in Serum and Plasma Samples.

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Background: The hallmark of an outstanding clinical laboratory is the consistency of producing reliable results. Intact parathyroid hormone (IPTH) is one of the hormones that can be affected by different factors. In this study, we have investigated IPTH values using different types of tube (Plain, SST and EDTA), the effects of delay in separation and the stability of IPTH at different time intervals using most common storage conditions used in the clinical laboratories.

Methods: Blood samples from 30 healthy subjects were collected in three types of tubes plain (serum), SST (serum), and EDTA (plasma). All samples from each type of tubes were run immediately after separation. Then, serum and plasma were aliquoted and stored in room temperature (25°C), fridge (4°C) and freezer (-20°C). All samples were processed at different time days (2, 4 and 8). All plasma and serum samples were delayed in separation for two hours before they have been processed. All samples were analyzed using chemiluminescent immunoassay (Architect). Total allowable error of 30% was decided for clinically significance using the Clinical Laboratory Improvement Amendment as a reference.

Results: Comparing of three groups means (SST serum, plain serum and EDTA plasma) after an immediate run was not significantly different ($p= 0.95$). By comparing the two means of delayed in separation for plain serum and EDTA plasma was statistically significant $p<0.001$ when compared to zero time. However, the means percent changes (3.77%, 7.37%) for serum and EDTA plasma respectively. By comparing between IPTH means in subsequent days using different storage conditions had a statistically significant difference when compared with zero-time $p<0.001$. However, when compared with a total allowable error of 30% it showed that room temperature stored serum samples had a clinically significance of > 30% changes in all days, while EDTA plasma had only in day 8. Fridge conditions had no clinically significant for serum and EDTA plasma. Freezer stored samples were the best in stability of IPTH for both EDTA plasma and serum.

Conclusion: Using the same analyzer, IPTH can be performed using EDTA plasma and serum or SST freshly. Samples can be reached to the lab within 2 hours of collection. Samples stored at room temperature cannot be analyzed if the samples type are serum, while it can be acceptable up to 4 days using EDTA plasma. IPTH samples stored at fridge and freezer can be analyzed within 8 days using either EDTA plasma or serum.

Poster Presentation Abstracts

36- Evaluation of Total Turn-Around Time for Measurement of Blood Potassium Level in the Emergency Department.

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Background: Total turn-around-time (tTAT) from order to release of the results is very crucial to patient care especially for life-threatening results such as potassium (K). Improving of tTAT will help and support the diagnosis and management at emergency department (ED) and reduce the length of stay (LOS). In this study we compared the tTAT to the laboratory TAT (LabTAT) in order to improve the patient care service at ED.

Methods: Results for 15326 samples for measurement of serum K level were collected retrospectively during the period of 6 months. The goals for tTAT and LabTAT were less than or equal (≤) of 1 hour and 30 minutes respectively.

Results: Around 11809 (77%) samples were reported within K normal range (3.5 to 5.1 mmol/L), however only 4248 (36%) were with tTAT of ≤1 hour. Compared to LabTAT of 11674 (99%) and 10370 (88%) at ≤1 hour and ≤30 minutes respectively. A 645 (4.2%) samples showed lower K (≤3.4 mmol/L) but not critical (≤2.8 mmol/L) with 224 (35%) were with tTAT of ≤1 hour. Compared to LabTAT of 628 (97%) and 539 (84%) ≤1 hour and ≤30 minutes respectively. For higher K (≥5.2 mmol/L) but not critical (≥6.2 mmol/L), 481 (3.1%) samples were reported, with 142 (30%) of tTAT of ≤1 hour. Compared to LabTAT of 472 (99%) and 397(88%) at ≤1 hour and ≤30 minutes respectively. A total of 55 (0.4%) samples showed critically low K (≤2.8 mmol/L) with 9 (16%) were with tTAT of ≤1 hour. Compared to LabTAT of 49 (89%) and 13(24%) at ≤1 hour and ≤30 minutes respectively. In addition, 85 (0.6%) samples showed critically high K (≥6.2 mmol/L) with 12 (14%) were with tTAT of ≤1 hour. Compared to LabTAT of 77 (91%) and 24 (28%) at ≤1 hour and ≤30 minutes respectively. The hemolyzed samples were 2061 (13%) in which 570 (28%) samples were with tTAT of ≤1 hour. Compared to LabTAT of 2029 (98%) and 1398 (68%) at ≤1 hour and ≤30 minutes respectively.

Conclusion: The tTAT in the ED is not perfect and need to be improved by implementation of standardized blood collection procedures to reduce hemolyzed samples. In addition, the clotting time for serum samples can be reduced by either use of rapid clotting factor or heparinized collecting tubes.

Poster Presentation Abstracts

37- Evaluation of BD Vacutainer Barricor blood collection tubes for selected routine chemistry testing on a Roche Cobas® 8000 analyzer.

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Background: Barricor vacutainers are novel non-gel mechanical separator blood collection tubes. These tubes enable faster pre-analytical processing which could reduce turnaround time, eliminate gel-related problems and reduces cellular contamination effects. Our aim was to evaluate the bias, integrity and analytical performance of these tubes compared to Plasma Separator Tubes (PST) and to non-gel lithium heparin tubes (LHT) for 15 routine chemistry analytes on Roche Cobas® 8000 analyzer.

Methods: Blood samples were collected in the three vacutainers from each of the 25 participating blood donors. Barricor vacutainers were centrifuged for 3 min at 4000g and PST and LHT for 10 min at 1300 g within two hours of collection. Plasma samples (n=75) were then analyzed for albumin, alanine aminotransferase, alkaline phosphatase, total bilirubin, calcium, sodium, chloride, potassium, Lactate Dehydrogenase (LDH), phosphorus, NT-Pro-BNP, free-thyroxin, thyroid stimulating hormone, creatinine, and urea. Bias and correlation parameters were determined between tubes. Physical performance evaluation, including tube barrier integrity, fitness to pre-analytical machines, vacuum evaluation, and Plasma appearance, was carried out for the Barricor tubes.

Results: All 15 analytes, except LDH, demonstrated comparable results across the reference range (average absolute %bias; linear regression slopes; correlation coefficients) between Barricor and PST (0.06%-5.59%; 0.842-1.051; ≥0.973) and between Barricor and LHT (0.09%-5.75%; 0.936-1.112; ≥0.904). Values for LDH were 11.65%; 0.842; 0.7618 between Barricor and PST and (10.93%; 0.682; 0.3753) between Barricor and LHT tubes. Lower LDH results were observed with Barricor, which are possibly due to the decreased cellular contamination expected with these tubes. Barricor tubes passed all parameters of the physical performance evaluation.

Conclusion: Barricor tubes demonstrated technically acceptable and analytically equivalent performance for the selected routine chemistry analytes evaluated in this study when compared with PST and LHT tubes, which makes them acceptable alternatives while offering the added benefit of decreased pre-analytical processing time and less cellular contamination.

Poster Presentation Abstracts

38- Evaluation of Quality Key Indicators in Relation to Increased Laboratory Workload.

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Background: Increase of the workload in laboratory tests is a challenge and may affect the quality in the clinical laboratory. Many indicators were used to monitor the quality in the laboratory such as specimen acceptability, error correction and turn-around-time (TAT). However, the effects of shortage of manpower and the continues increase in the workload on the quality has insufficiently and poorly addressed. The aim of this study was to assess the quality indicators in relation to the increase of the workload in order to monitor and improve patient care services.

Methods: Data were collected prospectively on daily basis for specimen acceptability or rejection rate. The data for error correction and TAT were collected retrospectively from the laboratory information system (LIS) for all stat orders for year 2018 and compared to the data from the last five years. The laboratory rejection rate was calculated based on formula Target/cut off= 0.15%/100 samples from college of American pathologists (CAP) referring to proficiency testing Q-track. The error correction rate was calculated by target/cut off = 4.0 % per 10,000 tests in reference to CAP Q-track. The TAT for STAT order was calculated from the time of the receipt of samples in the chemistry laboratory until the release of result.

Results: The total tests performed in the chemistry lab were 9,789,171 and 10,373,426 tests during years 2017 and 2018 respectively. The overall of sample rejection rate was found to be 0.39% and 0.43% for years 2017 and 2018 respectively. Hemolysis remained to be the main reason for rejection of sample with a rate of 61.9 %; sample contamination (IV fluid, Saline, EDTA, etc.) had a rejection rate of 15.11%, and insufficient sample quantity was 14.46%. The error correction rate was found to be 0.35% and 0.40 % for years 2017 and 2018 respectively. Around 70 % of the corrected results were due to mislabeled samples. The percentage of for stat orders with TAT exceeding 1 hour was found to be 1.6% and 1.4% for years 2017 and 2018 respectively. The investigated reasons for the delayed of the results were mostly due to the instrument breakdown and LIS downtime.

Conclusion: The increase of workload without sufficient increase in the manpower or resources may compromise the improvement of quality in the clinical laboratory. The continues training of phlebotomists and nurses for blood collection is very essential to maintain the integrity of samples.

Poster Presentation Abstracts

39- Turn Around Time Improvement in Emergency Department.

Hind Abdulhakim and Heba Kary

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Background: Emergency department (ED) is a medical facility specializing in treating patients with emergency and acute care conditions who present without prior appointment. Due to the unplanned nature of patient attendance, the department must provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life threatening and require immediate attention. The time taken to finish triaging, consultation and referral of each patient can affect the clinical management and patient outcome. Therefore, the prolonged turnaround time (TAT) for reporting laboratory results may have negatively impacting on; time to receive treatment, patient outcome, customers' satisfaction, bed utilization time, and cost. The National Academy of Clinical Biochemistry's (NACB) turnaround time (TAT) benchmark for STAT samples is 1 hour. In house Laboratory TAT for STAT samples was 3 hours due to heavy load and no identification of STAT sample. The study was performed to evaluate the improvement in TAT for reporting laboratory results to patients in Emergency Department

Methods: The study was performed in a period between January 2013 and December 2016 to investigate the improvement of TAT due to implantation of STAT-Lab at King Fahad Armed Forces Hospital, Jeddah. The project has stared by communicating with Emergency Department Physicians to elaborate defects and weakness points, agreed on the most important tests to be utilized by Emergency Department, Instrumentation planning for ER lab. The following four tests were evaluated: Troponin I (Troponin I), Potassium (K), International Normalized Ratio (INR), Hemoglobin (HGB). Data collected from Business Objects program, then analyzed using Excel sheet after excluding outliers.

Results: The observed analysis showed that, by end of 2016, TAT has reduced by: 43% for Troponin to be 45 minutes, 32% for Potassium to be 57 minutes, 26% for INR to be 55 minutes, and 20% for Hemoglobin to be 43 minutes. Therefore, the international benchmark for STAT samples have been achieved.

Conclusion: Adopting STAT Lab to serve emergency medicine department and patients with acute illnesses has demonstrated significant improvement in TAT for accessibility of laboratory results to treating physicians that had positive impact on the following examples: fast time to receive treatment, patient outcome, customer satisfaction, bed utilization, and cost.

Volunteers:

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