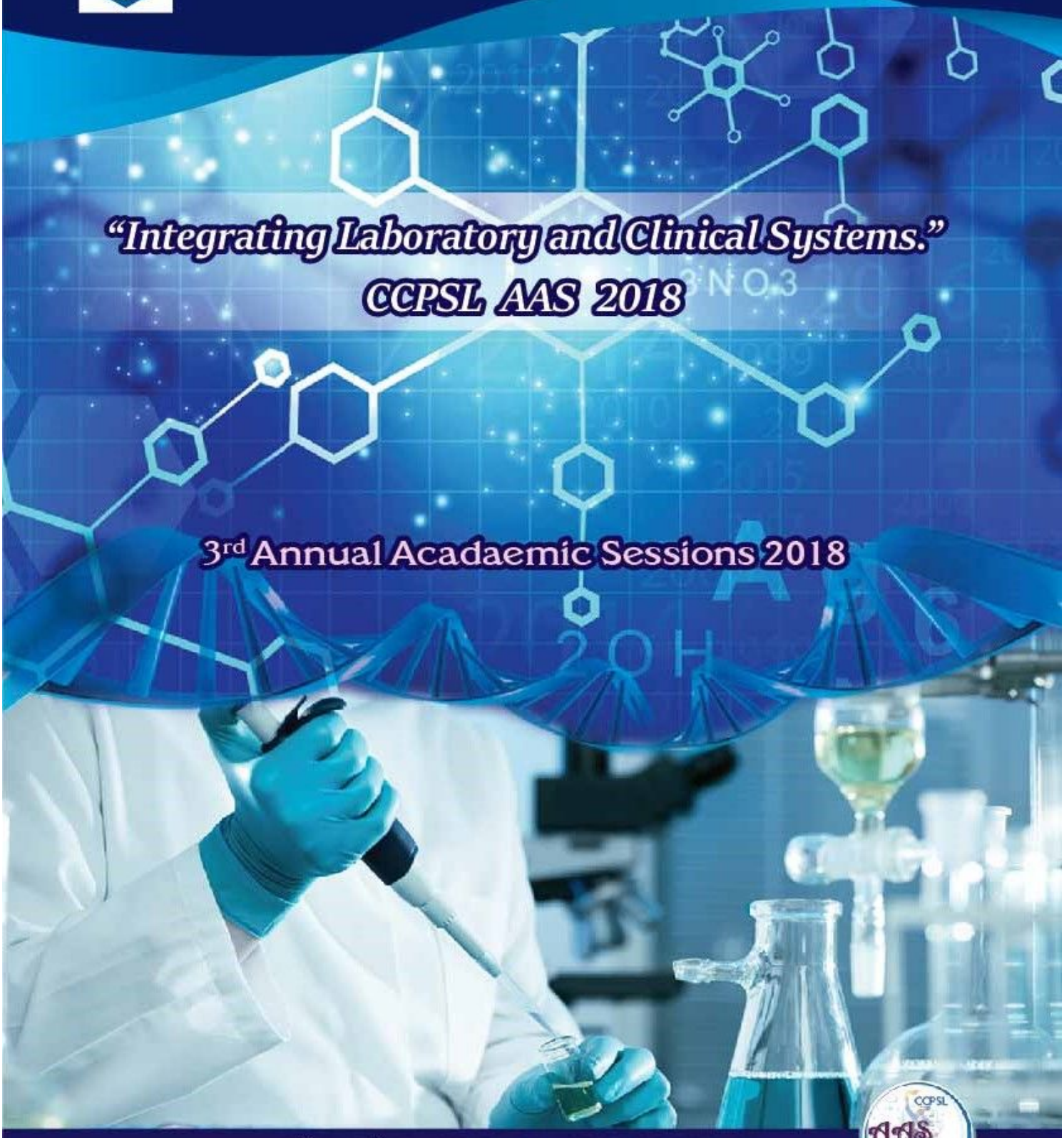
COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA

under the Auspices of

"Integrating Laboratory and Clinical Systems."

CCPSL AAS 2018

3rd Annual Acadaemic Sessions 2018



15th to 17th March 2018 at Hotel Galadari, Colombo

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA

"Integrating Laboratory and Clinical Systems"

3rd Annual Academic Sessions

2018

15th to 17th March 2018
at Hotel Galadari, Colombo.

CONTENTS

MESSAGE FROM THE PRESIDENT

Dr B K T P Dayanath

MBBS, D. Path, MD (Chem. Path), MAACB
Consultant Chemical Pathologist &
Head Department of Pathology
Colombo North Teaching Hospital
Ragama, Sri Lanka

Dear all,

It is my pleasure and honor to welcome you to the Annual Academic Sessions of the College of Chemical Pathologists of Sri Lanka (CCPSL) at Hotel Galadari, Colombo on 15th, 16th and 17th of March 2018 under the theme of "Integrating Laboratory & Clinical Systems". It is the 3rd time such a great event is being organized in this country bringing current concepts in Chemical Pathology, laboratory industry and laboratory professionals together under the auspices of International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) and Asia Pacific Federation for Clinical Biochemistry and Laboratory Medicine (APFCB).

CCPSL is a well-established organization in laboratory medicine consisting of Chemical Pathologists & trainees in Chemical Pathology to foster and lead the field of Clinical Chemistry in Sri Lanka. CCPSL is committed to improve the standards of health care and services in the country.

This year the academic programme has been designed to be a forum for members, medical professionals, laboratory professionals and industry to update their knowledge on the current best practices in Chemical Pathology. There will be two parallel programmes conducted by renowned local and 14 foreign faculty with a wide coverage of current and important topics in Chemical Pathology and a large industrial exhibition delivering the latest technology.

I together with my council, cordially invite you to participate in this land mark event of the journey towards integrating laboratory & clinical systems in Sri Lanka.

3rd President
College of Chemical Pathologists of Sri Lanka

MESSAGE FROM THE DIRECTOR GENERAL OF HEALTH SERVICES

Dr Anil Jasinghe

Director General of Health Services
Ministry of Health, Nutrition & Indigenous Medicine
Sri Lanka

It is with great pleasure that I convey this message on the occasion of the 3rd annual academic sessions and the induction of the President of the College of Chemical Pathologists of Sri Lanka.

Despite being a newly formed College, the scientific programme of the sessions with the theme "Integrating Laboratory and Clinical Systems" bears evidence for the contribution of the profession to the management of patients and the entire healthcare delivery system. Having a parallel programme on Medical Laboratory Science is a noteworthy gesture contributing to the professional development of medical laboratory technologists and scientists both in the state and private sector. The Ministry of Health and Indigenous Medicine recognizes Chemical Pathology as a discipline in Pathology essential for improved diagnostics and better patient care and hence would readily support the development of Chemical Pathology services in state sector hospitals on par with other Pathology disciplines.

I take this opportunity to appreciate all those who have been involved in organizing this event and pledge my fullest support to all the future endeavours undertaken by the College of Chemical Pathologists of Sri Lanka in improving the healthcare delivery system in the country.

Best Wishes,
Dr Anil Jasinghe

MESSAGE FROM THE CHIEF GUEST (DEPUTY DIRECTOR GENERAL LABORATORY SERVICES)

Dr B V H S Benaragama

Deputy Director General of Laboratory Services
Ministry of Health, Nutrition & Indigenous Medicine
Sri Lanka

I consider it a great honour and privilege bestowed on me to be invited as the Chief Guest at the inauguration of 3rd annual academic sessions and the induction of the President of the College of Chemical Pathologists of Sri Lanka.

Chemical Pathology, an integral component of laboratory medicine has advanced rapidly over the last decade with the increasing numbers of Chemical Pathologists joining the work force in the laboratories in the state sector. The Ministry of Health seeks the support of the members of the College in upgrading the existing Chemical Pathology services and relies on their expertise resolving technical issues related to upgrading the services. The contribution made by the profession as a whole for the delivery of healthcare in the country is well recognized and appreciated by the Ministry of Health.

The College, having being established just over three years ago, has progressed rapidly, developing links with the international laboratory community; the sessions are being held under the auspices of International Federation of Clinical Chemistry (IFCC) and the Asia Pacific Federation of Clinical Biochemistry (APFCB). I am pleased to note that the scientific program addresses the topic of national interest like chronic kidney disease.

I extend my good wishes to the College of Chemical Pathologists of Sri Lanka for a successful and productive annual academic sessions, a key milestone in professional development of the membership.

Best Wishes,
Dr B V H S Benaragama

MESSAGE FROM THE GUEST OF HONOUR

Associate Professor James Dorey

Chemical Pathologist
Monash Medical Center
Associate Professor
Department of Medicine, Monash University
Australia

As your honoured invited colleague it gives me great pleasure to welcome you all as delegates and guests to this third Academic Session of the College of Chemical Pathologists of Sri Lanka. The outstanding reputation of these sessions has been firmly established from the outset in 2016 as academically excellent, highly relevant, superbly organised and socially satisfying.

I trust you will all participate to the full in the many excellent components of the programme before us; academic presentations, the displays of new technology and equipment and of course the social events where lasting friendships will be made.

Sri Lanka is now enjoying a new era of long awaited peace and development and this gathering will enable both pathologists and laboratory scientists to gather new knowledge, strengthen collaborations and most importantly continue to develop high quality, cost effective and relevant diagnostic services to underpin the health and welfare of the people of this beautiful land.

Have a wonderful meeting and take home at least one new idea to improve your laboratory!

Best Wishes,
Associate Professor James Dorey

MESSAGE FROM THE PRESIDENT OF IFCC

Professor Howard Morris

President
International Federation of Clinical Chemistry and
Laboratory Medicine

Dear friends and colleagues,

It is my great pleasure to welcome you to the 3rd Annual Academic Sessions 2018 of the College of Chemical Pathologists of Sri Lanka being held in Colombo from 15th to 17th March. I congratulate Dr. B. K. T. P. Dayanath and his colleagues for their excellent organization of this important event for laboratory medicine. The IFCC is proud that this conference is being held under its auspices.

The CCPSL is responsible for the professional leadership of laboratory medicine in a region, which is rapidly developing. The provision of quality healthcare is a key element of security for every country and the practice of high quality laboratory medicine is a major contributor to the provision of optimal healthcare. This congress has a high degree of responsibility to inspire and train healthcare professionals to provide the highest level of service to support patients and inspire their community. Laboratory medicine specialists and the diagnostic industry working together converting data into knowledge adds value to healthcare and improves patient outcomes.

It is important that as laboratory professionals we regularly come together to discuss, debate and decide on the best practice for laboratory medicine to improve the quality of healthcare for our patients and our communities. This 3rd Annual Academic Sessions of the CCPSL provides an excellent opportunity by addressing the important topic of "Integrating Laboratory and Clinical Systems" covering the range of scientific and technological aspects of Laboratory Medicine. The guest speakers are international experts on the latest developments in this field. The program provides an excellent forum for an effective exchange of ideas and stimulates highly productive discussions.

I wish all delegates an enjoyable and productive congress in Colombo.

Best Wishes,
Professor Howard Morris

MESSAGE FROM THE PRESIDENT OF APFCB

Professor Sunil Sethi

President
Asia-Pacific Federation for Clinical Biochemistry and Laboratory Medicine

On behalf of the Asia-Pacific Federation for Clinical Biochemistry and Laboratory Medicine (APFCB), my best wishes to the College of Chemical Pathologists of Sri Lanka (CCPSL). CCPSL has always had a wonderful track record of organizing and executing good scientific programmes. On the occasion of the Annual Academic Sessions 2018, the two-day meeting promises to have sessions which cover a wide-range of important topics of Clinical Biochemistry.

You have my very best wishes for a successful meeting. I am sure all the speakers and participants will have a rewarding time of good science and enjoyable networking. On behalf of the Executive Board of the APFCB, allow me to convey my thanks and appreciation to the Organizing Committee of the CCPSL AAS 2018. I would also like to thank the CCPSL for the generous offer of sponsoring fellow APFCB members from participating in the event.

Best Wishes,
Professor Sunil Sethi

MESSAGE FROM THE JOINT SECRETARIES

Dr Deepani Siriwardhana

MBBS, D Path, MD (Chem. Path)
Specialist in Chemical Pathology
Faculty of Medicine
University of Ruhuna, Galle

Dr Rajitha Samarasinghe

MBBS, D Path, MD (Chem. Path)
Consultant Chemical Pathologist
National Cancer Institute (Apeksha Hospital)
Maharagama

In patient-centered medicine, the best possible outcomes are achieved only through collaborative practice of the healthcare delivery team. Recently inter-professional education has been widely advocated in achieving this goal. Having this in mind, our vision for the 3rd annual academic sessions of the College of Chemical Pathologists of Sri Lanka (CCPSL) was to create a platform to exchange ideas and share expertise among clinicians and laboratory professionals for better patient care; hence we selected the theme "Integrating Laboratory and Clinical Systems" for this year.

In laboratories we work side by side with medical laboratory technologists and scientists to deliver accurate and timely reports for patient diagnostics and management. The advance of laboratory medicine is only possible through continuing education and professional development of all categories of laboratory professionals. Many laboratories are now applying for accreditation based on ISO 15189 standard for quality and competence in laboratory testing; thus creating opportunities for continuing education of the laboratory staff is a national need. Therefore the academic and the medical laboratory science programmes were planned to address the knowledge gaps and highlight new developments in the field of Chemical Pathology keeping it relevant for the entire team in the laboratory.

While thanking the foreign and the local faculty for their invaluable contribution to the various symposia plenaries and lectures, we are hopeful that the 3rd annual academic sessions of the CCPSL would turn out to be a very productive and enjoyable learning experience for all the delegates.

EXECUTIVE COUNCIL 2018, COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA

Front row from left : Dr Rajitha Samarasinghe (Joint Secretary), Dr Saroja Siriwardene (Honourary Advisor), Dr Chandrika Meegama (Immediate Past President), Dr BKTP Dayanath (President), Dr Gaya Katulanda (President Elect), Dr Manjula Dissananayake (Treasurer), Dr Deepani Siriwardhana (Join Secretary)

Back row from left : Dr Eresha Jasinge (Co-Editor), Dr Dulani Jayawardana, Dr Dilinika Perera, Dr V Kesavan (Co-Editor), Dr Saman Peduruhewa, Dr Nangai Kularatnam, Dr Thamara Herath, Dr Kisali Hirimuthigoda, Dr Neranjana Vithanage, Dr Majitha Ibrahim

Absent : Dr. Roshitha de Silva

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA
COUNCIL- 2018

President	:	Dr BKTP Dayanath
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		Dr Nangei Kularathnam
Honorary advisor	:	Dr Saroja Siriwardene

ACADEMIC PROGRAMME

ACADEMIC PROGRAMME

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA
Annual Academic Sessions 2018 (CCPSL AAS 2018)
Academic Programme

Day 1: Friday 16th March 2018

TIME	TOPIC	LECTURER
9.00 am - 10.00 am	Symposium on Renal Disease	
9.00 am - 9.20 am	"Chronic Kidney Disease" Current Situation in Sri Lanka	Dr. Thilanga Ruwanpathirana
9.20 am - 9.40 am	"Chronic Kidney Disease" Global Experience	Associate Prof. Graham Jones
9.40 am - 10.00 am	Role of the Laboratory in Paediatric Nephrology	Dr. Harshani Dharmawardena
10.00 am - 10.20 am	**TEA**	
10.20 am - 11.00 am	Plenary: Current and Future Developments of Cardiac & Renal Biomarkers	Prof. Salvatore Di Somma
11.00 am - 12.20 pSm	Symposium on Endocrinology	
11.00 am - 11.20 am	Thyroid Disease in Pregnancy	Prof. Chandrika Wijeratne
11.20 am - 11.40 am	Chemical Pathology & Dynamic Endocrine Testing: What, Why, How and Who?	Associate Prof. James Doery
11.40 am - 12 noon	"Endocrine Emergencies" the Role of the Laboratory in Management	Dr. Sajith Siyambalapitiya
12.00 noon - 12.20 pm	Control of Preanalytical Variables in Endocrine Testing	Dr. Saroja Siriwardene
12.20 pm - 1.30 pm	**LUNCH**	
1.30 pm - 2.10 pm	Plenary: Establishing and Harmonization of Reference Ranges	Associate Prof. Graham Jones
2.10 pm - 2.50 pm	Symposium on Toxicology	
2.10 pm - 2.30 pm	Role of the Chemical Pathology Laboratory in Forensic Medicine	Dr. Rohan Ruwanpura
2.30 pm - 2.50 pm	Drugs of Abuse Testing - Past, Present and Future	Dr. Elina Raja Aziddin (APFCB Travelling Lecturer)
2.50 pm - 3.10 pm	**TEA**	
3.10 pm - 3. 50 pm	Plenary: Is Salivary Diagnostics Ready for Personalized Medicine?	Associate Prof. Chamindie Punyadeera
3.50 pm - 4.30 pm	Plenary: Evolution of Mass Spectrometry Techniques	Dr. Joe El-Khoury
Industrial Exhibition Closes at 5.00 pm		

ACADEMIC PROGRAMME

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA
Annual Academic Sessions 2018 (CCPSL AAS 2018)
Academic Programme

Day 2: Saturday 17th March 2018

TIME	TOPIC	LECTURER
8.30 am - 9.15 am	Plenary: Impact of Quality Systems on Laboratory Performance: Development and Utilization of Quality Indices to Manage Clinical Laboratory Performance	Dr. Joe El-Khoury
9.15 am - 10.15 am	Symposium on Laboratory Management	
9.15 am - 9.35 am	How to Minimize Laboratory Errors	Dr. Elina Raja Aziddin (APFCB Travelling Lecturer)
9.35 am - 9.55 am	Calibration of Laboratory Equipment	Dr. W. M. S. Wijesinghe
9.55 am - 10.15 am	Laboratory Accreditation: Our Ambiguous Partner on the Quality Journey	Associate Prof. James Doery
10.15 am - 10.30 am	**TEA**	
10.30 am - 11.30 am	Symposium on Intensive Care Medicine	
10.30 am - 10.50 am	ICU Management : Role of the Chemical Pathology Laboratory	Dr. Manoj Edirisooriya
10.50 am - 11.10 am	Investigation of a Sick Baby	Dr. Nalin Kitulwatte
11.10 am - 11.30 am	Total Parenteral Nutrition	Prof. Anuja Abeydeera
11.30 am - 12.30 pm	Symposium on Reproductive Medicine	
11.30 am - 11.50 am	Role of the Laboratory in Assisted Reproduction	Prof. Sumedha Wijerathne
11.50 am - 12.10 pm	Antenatal Screening and Fetal Medicine	Dr. Tiran Dias
12.10 pm - 12.30 pm	Novel Biomarkers of Preeclampsia Screening	Dr. Saswati Das
12.30 pm - 1.30 pm	**LUNCH**	
1.30 pm - 2.15 pm	Plenary: " Managing Lipid Disorders; Best Practice"	Dr. David Blank
2.15 pm - 3.00 pm	Plenary: Markers of Infection and Inflammation	Dr. July Kumalawati
3.00 pm - 3. 15 pm	**TEA**	
3.15 pm - 4.00 pm	Recent Advances in Molecular Diagnostics	Mr. N. Vijayarangan
4.00 pm - 4.30 pm	Oral Presentations of Selected Abstracts	
4.30 pm - 5.00 pm	Prize Giving & Vote of Thanks	
Industrial Exhibition Closes at 5.00 pm		

MEDICAL LABORATORY SCIENCE PROGRAMME

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA
Annual Academic Sessions 2018 (CCPSL AAS 2018)
Medical Laboratory Science Programme

Day 1: Friday 16th March 2018

TIME	TOPIC	LECTURER
9.00 am - 9.30 am	Optimizing the Preanalytical Phase	Dr. S. I. Majitha
9.30 am - 10.00 am	Laboratory Information System: Advantages & the Future	Dr. Srinivasan Periathiruvadi
10.00 am - 10.30 am	**TEA**	
10.30 am - 12.00 noon	Workshop on Quality Assurance: A Problem Based Approach	
10.30 am - 11.15 am	Internal Quality Control	Dr. Gaya Katulanda & Dr. Kisali Hirimuthugoda
11.15 am - 12.00 noon	Extenal Quality Assurance	
12 noon - 12.30 pm	Assay Development in Complex Biological Matrices	Associate Prof. Chamindie Punyadeera
12.30 pm - 1. 30 pm	**LUNCH**	
1.30 pm - 2.00 pm	Good Laboratory Practice	Dr. Anita Ittoop
2. 00 pm - 2.30 pm	Thyroid Function Tests	Dr. Chandrika Meegama
2.30 pm - 3.00 pm	Evaluation of Liver Function Tests	Dr. Thamara Herath
3. 00 pm - 3.15 pm	**TEA**	
3.15 pm - 3.45 pm	Application of Six Sigma in Clinical Laboratory: From Theory to Practice	Dr. Saswathi Das
3.45 pm - 4.15 pm	Assay Interferences	Dr. Dulani Jayawardana
Industrial Exhibition Closes at 5. 00 pm		

MEDICAL LABORATORY SCIENCE PROGRAMME

COLLEGE OF CHEMICAL PATHOLOGISTS OF SRI LANKA
Annual Academic Sessions 2018 (CCPSL AAS 2018)
Medical Laboratory Science Programme

Day 2: Saturday 17th March 2018

TIME	TOPIC	LECTURER
9.00 am - 9.30 am	Investigations in Diagnosis and Management of Diabetes Mellitus	Dr. Saman Peduruhewa
9.30 am - 10.00 am	Cardiac Markers	Prof. Salvatore Di Somma
10.00 am - 10.30 am	Renal Function Tests	Dr. Deepani Siriwardhana
10.30 am - 10.50 am	**TEA**	
10.50 am - 11.20 am	Reagent Management in a Chemical Pathology Laboratory	Dr. Saroja Siriwardene
11.20 am - 11.50 am	Research for Quality Improvement: Writing a Proposal	Prof. Janaki Hewavisanthi
11.50 am - 12.20 pm	Body Fluid Analysis	Dr. Nangai Kularathnam
12.20 pm - 1.20 pm	**LUNCH**	
1.20 pm - 1.50 pm	Ethics in Laboratory Medicine: Are You Serious?	Associate Prof. James Doery
1.50 pm - 2.20 pm	Standardization and Traceability	Associate Prof. Graham Jones
2.20 pm - 2.50 pm	Chemical Pathology Quiz	Dr. Dilinika Perera Dr. Neranjana Vithanage
2.50 pm - 3.20 pm	Risk Management in the Laboratory	Dr. Elina Raja Aziddin (APFCB Travelling Lecturer)
3.20 pm - 3.50 pm	Customer Satisfaction: The Way Forward	Dr. P. H. R. Suraweera
3.50 pm	Prize Giving & Vote of Thanks	
4.00 pm	**TEA**	
Industrial Exhibition Closes at 5. 00 pm		

INAUGURATION PROGRAMME

6.15 pm	Invitees take their seats
6.30 pm	Ceremonial Procession
6.35 pm	National Anthem
6.40 pm	Lighting of the Traditional Oil Lamp
6.45 pm	Welcome address by Dr Rajitha Samarasinghe Joint Secretary CCPSL
6.50 pm	Induction of the President by Dr Saroja Siriwardene, Honorary Advisor
6.55 pm	Presidential address by Dr B K T P Dayanath
7.15 pm	Address by the Guest of Honour Associate Professor James Doery Monash University and Monash Medical Centre Victoria, Australia
7.25 pm	Address by the Chief Guest Dr B V H S. Benaragama Deputy Director General of Laboratory Services
7.35 pm	Award of CCPSL Felicitations
7.40 pm	Award of CCPSL Fellowships
7.50 pm	Vote of thanks by Dr Deepani Siriwardhana Joint Secretary CCPSL
7.55 pm	Cultural show
8.25 pm	Ceremonial Procession leaves
8.30 pm	Cocktails

FELLOWSHIP AWARDS

Professor M C P Canagaratna

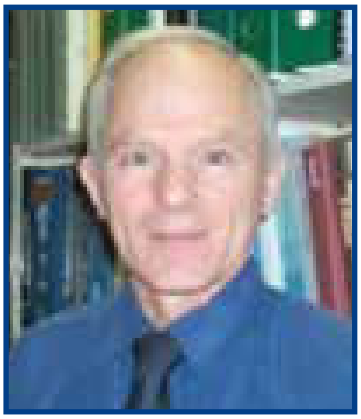
Mary Cecilia Pumany Canagaratna was Head Prefect of St. Bridget's Convent, Colombo, before she entered the Faculty of Medicine Colombo in 1959. She passed the 2nd MB, 3rd MB and Final MB with Second Class honours. In the process, she obtained distinctions in Pharmacology, Community Medicine and Parasitology and was awarded the Medal in Pharmacology.

She joined the Department of Biochemistry of the Faculty of Medicine, Colombo in March 1968. Two years later, she left the island on postgraduate leave to train at the Department of Biochemical Pathology, University College Hospital Medical School in UK. Having obtained her PhD in 1973, she was appointed Senior Lecturer in Biochemistry at the Faculty of Medicine, Colombo, in October that year. Subsequently she was promoted to Associate Professor in Biochemistry and was the Head of Department for several years. Prof. Canagaratna had multiple research interests, and together with her MPhil student, she was awarded a prize at the SLMA sessions for a paper titled 'The effect of fatty fish intake on serum lipids'.

Prof. Canagaratna was a valued member of the Board of Study in Pathology of the Postgraduate Institute of Medicine and was the convener of the MCQ core group in Chemical Pathology. Some of her brain-teasers are archived in the MCQ bank, marked 'MCPC'! She contributed as the Chief examiner of the Chemical Pathology component of the Diploma in Pathology.

Prof. Canagaratna was instrumental in setting up the 2-year MD Chemical Pathology training programme for the Postgraduate Institute of Medicine. She was a Supervisor of the first candidate who opted for Chemical Pathology in 1988. She helped the Board of Study in Pathology to design the required curriculum, and recommended text books and journals for tutoring and reference. She held one-to-one tutorial discussions with the trainee and allowed unlimited access in her laboratory, while inculcating the culture of cleaning one's own glassware as part of the basic training of a good laboratory scientist of that era. She encouraged the trainee to use more sophisticated equipment by allowing research requiring special skills, under supervision. She was the Chief examiner at the MD Chemical Pathology in 1991, with Prof. R. Swaminathan from UK as the external examiner, and her trainee was successful.

On a personal note, as your undergraduate student of '73 and postgraduate MD trainee in Chemical Pathology I am privileged to read this citation, and having witnessed your enthusiasm for maintaining quality standards at postgraduate exams regardless of the many obstacles you had to face as a pioneer, I wish to place on record, my heartfelt gratitude to you Madam, for your unstinting efforts, your courage and understanding. You did not give up until you placed Chemical Pathology on its mark and allowed the speciality to blossom into this College of Chemical Pathologists.



Associate Professor James C G Doery
Monash Medical Centre
VIC, Australia

Dr James C.G. Doery was born on 21st of June 1944 in Melbourne. He had his initial education at Mont Albert Primary School in Mont Albert, Victoria. Thereafter, he entered the Carey Baptist Grammar School in Melbourne for his secondary education. After having a very successful and productive school life, he entered the University of Melbourne to obtain BSc in Chemistry and Biochemistry. Subsequently he obtained his Masters from the same university for the Thesis "Energy Metabolism and Function in Human Blood Platelets".

As a person with an unquenchable thirst for learning, he moved to Canada to broaden his academic horizons where he entered the McMaster University in Hamilton, Ontario. He was a Canadian Heart Foundation Research Fellow working in the Department of Pathology on Platelet Metabolism and Function.

Dr. James Doery completed his MD at McMaster University Medical School in 1975.

A very important milestone of his life occurred at McMaster. There he met his wife Rose who was from Malaysia.

In 1979, Dr. Doery returned to Australia and completed FRCPA in Chemical Pathology at St. Vincent's Hospital, Melbourne in 1984.

Thereafter, he became the Principal Specialist in Chemical Pathology at Monash Medical Centre, VIC, the central hospital of the largest hospital network in Victoria. He started his career at Monash Medical centre in 1985 and continues in his great service as a senior Consultant Chemical Pathologist to date.

At Monash, Dr. Dorey has greatly contributed to the training of numerous scientists and Chemical Pathology registrars both from Australia and the Asian region including seven registrars from Sri Lanka. This interaction with the younger and international group of trainees coming from different backgrounds has been a highly satisfying part of his career. I had the privilege of working with

Dr. Doery as a trainee and he was a great mentor and a close friend at the same time. I was able to witness his passion and commitment to work and the immense satisfaction derived from committed work.

Dr. Doery also has been the Deputy Chair and Medical Administrator of Research Ethics at Monash Health for the past 25 years and held University appointments including supervisor of PhD students at Monash University. Dr Doery currently works as an adjunct clinical associate professor at the Department of Medicine, Monash University. He has contributed to more than 140 researches and there are many publications under his name.

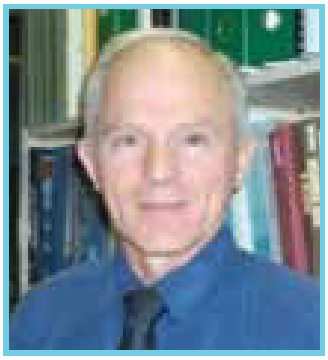
He has a son and three daughters and enjoys family life with his lovely wife who is also a top athlete, representing Australia in international Dragon boat racing. He is also hoping for further additions to his first grandchild.

He enjoys gardening and fishing and maintains a small apiary of beehives and has given honorary service in number of voluntary community organisations.

Let me share one of my personal experiences during my training with Dr Doery at Monash.

One gloomy morning in the winter in year 2010, I received a telephone call from one of my Sri Lankan friends who was working in the Monash medical centre as a gastrointestinal surgeon. He told me "your boss was seated in my theatre from early morning till I was finishing an emergency laparoscopic surgery for a student from Monash University. What has happened?" This international student from Hongkong had developed a severe abdominal pain in the midnight and did not have anybody to tell his agony. Suddenly he found the telephone number of Dr Doery who was popular among all overseas students around the Monash University and gave him a call early in the morning. From that minute onwards Dr. Doery took the whole responsibility of him until he was fully recovered. I do not know whether a man can be more humane than this.

INTERNATIONAL GUEST FACULTY



Associate Professor James C G Doery

BSc, MSc, MD, MAACB, FRCPA
Chemical Pathologist
Monash Medical Center
Associate Professor
Department of Medicine, Monash University
Australia

Assoc Prof James qualified in Biochemistry at the University of Melbourne and completed his MSc on Platelet metabolism and function in the Department of Medicine, St Vincent's hospital in Melbourne. In 1970 he took up a research position at McMaster University in Canada & continued research in platelets in the Department of Pathology under a Canadian Heart Foundation fellowship and subsequently completed his MD. In 1978 he was appointed as the first Chemical Pathologist at the Queen Victoria hospital in Melbourne. Here James has overseen the growth and automation of the service and developed their wide range of dynamic endocrine testing services.

James has been the deputy chair and medical administrator of the Monash Health Human Research and Ethics Committee since 1993. He has always maintained interest in teaching and research through university affiliations. Currently he works as adjunct clinical Associate Professor within the Department of Medicine at Monash University. In addition to over 30 years of continuous training of local chemical pathologists, James has hosted large numbers of overseas trainees from Japan, China, Hong Kong and Sri Lanka in the field of science and pathology. James' research interests are broad involving many collaborations in both medicine and engineering with over 200 peer reviewed publications and abstracts.

Dr Graham Jones

MBBS, BSc (med), D. Phil, FRCPA, FAACB
Senior Staff Specialist in Chemical Pathology
Department of Pathology (SydPath)
St Vincent's Hospital
Sydney
Australia

Doctor Graham Jones is a senior staff specialist in Chemical Pathology at St Vincent's hospital in Sydney. He has obtained his medical degree and a BSc from the University of Sydney and a DPhil in Biochemistry from Oxford University. He also holds fellowships from the Royal College of Pathologists of Australasia (FRCPA) and the Australasian Association of Clinical Biochemists (FAACB) and is a conjoint Associate Professor at the University of New South Wales. He has been active in professional activities as a chair or member of national committees on External Quality Assurance in Chemical Pathology, testing for chronic kidney disease, diagnosis of diabetes, units for therapeutic drug monitoring and common reference intervals.

Internationally he has been the chair of the International Federation of Clinical Chemistry / World Association Pathology and Laboratory Medicine task force on chronic kidney disease from 2009 to 2015 and is a member of the executive of the Joint Committee for Traceability in Laboratory Medicine (JCTLM). Recent awards include the AACB Roman travelling lectureship in 2014, the Asia Pacific Federation of Clinical Biochemistry travelling lectureship for 2015. In 2015 he was awarded the Barry Inglis medal for services to metrology in Australia.

Professor Salvatore Di Somma

MD, PhD
Director, Emergency Medicine
Sant'Andrea Hospital Rome
Faculty of Medicine and Psychology
Sapienza University of Rome
Italy

Prof Salvatore Di Somma graduated in Medicine from the University of Naples in 1978 & obtained post graduate qualifications in Internal Medicine & Cardiology from the same university. Currently he is the Director in Emergency Medicine in Sant'Andrea Hospital Rome & Associate Professor of Medicine, Chairman of Postgraduate School of Emergency Medicine, Chairman and Coordinator in Emergency Medicine & Member of the council in Faculty of Medicine and Psychology of Sapienza University of Rome. He also served as a Research Fellow and Assistant Professor in various Universities. He is a member of many scientific societies such as American Heart Association (AHA), American Society for Cardiovascular Pathology, Heart Failure Society of America, Italian Society of Cardiology and Internal Medicine.

He has published more than 300 papers & written books in the field of cardiology, intensive care and emergency medicine and a member of many international journals and editorial boards. In addition he is a reviewer for > 50 international medical journals in the fields of CV diseases, internal medicine & emergency medicine. Since 2007 he is the President and Organizer of the GREAT international meetings with more than 1.000 worldwide attendees each year & official coordinator at the Sapienza University of Rome for international co-operation. He has presented more than 300 presentations, & invited lectures and chaired at major international congresses in the fields of hypertension, cardiology, intensive care, internal medicine and emergency medicine.

Dr David Blank

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Dr Blank is a graduate of McGill Medical School. He completed a residency in Medical Biochemistry at University of British Columbia followed by a fellowship in Laboratory Medicine at the National Institutes of Health in Bethesda, Maryland (U.S.A). He then joined the Faculty of Medicine at McGill University as a Medical Biochemist at the Royal Victoria Hospital. He is a fellow of the Canadian Royal College of Physicians and Surgeons (FRCPC) and a Diplomat of the American Board of Clinical Lipidology. Initially, an examiner for the Quebec College of Physicians, he became an examiner and ultimately, the chief examiner for Medical Biochemistry for the FRCPC.

Currently, he is the Director of the McGill University Health Centre (MUHC) Department of Medicine's Division of Medical Biochemistry and introduced North America's first robotic line to include chemistry, immunochemistry, hematology and coagulation. He is also cross appointed to the Division of Endocrinology where he has been an attending physician at the MUHC lipid clinic for over thirty years. His interests include dyslipidemias, point-of-care testing, and laboratory automation.

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Dr Elina is a Senior Biochemist and Head of the Drug and Research laboratory in Hospital Kuala Lumpur (HKL). She received her degree in Biochemistry and PhD from University of Malaya. She has more than 30 years experience in clinical biochemistry and has special interest in drugs of abuse testing and quality management. Dr Elina's research studies include method development for toxicology and drugs of abuse testing, drug pharmacology and toxicity studies, effect of genetic profile on drug uptake and therapeutic levels & studies on reference values and quality improvement studies.

Dr Elina has held numerous representative roles at national and international level such as member on Programme Standards For Medical and Health Sciences, member of the National Committee on Method Standardization, member of the Research Committee for Allied Health Professionals & member of the Steering Committee on Allied Health Professionals Act. She is also the technical manager for Pathology Department-HKL, the President of the Malaysian Association of Clinical Biochemists (MACB), national representative to the Asia Pacific Federation of Clinical Biochemistry and laboratory medicine (APFCB), national representative to the International Federation of Clinical Chemistry and laboratory medicine (IFCC).

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Dr July Kumalawati graduated as a medical doctor in 1985 and received her Diploma in Medical Microbiology from the Institute for Medical Research -SEAMEO-Tromped, Kuala Lumpur in 1988. She became a Clinical Pathologist from Faculty of Medicine Universitas Indonesia in 1993 and earned her infectious diseases consultant degree from the Indonesian Association of Clinical Pathologists in 1996 and Indonesian Clinical Pathologist's Collegium in 2004.

She was a lecturer at Clinical Pathology Department, Faculty of Medicine, Universitas Indonesia & Dr. Cipto Mangunkusumo Hospital since 1985. Currently she is acting as public services coordinator at those two units since 2013. She is the Head of Pathology Department, premier Bintaro Hospital (Ramsay-Sime Darby Healthcare) since 1998 and serves as a technical consultant at Bintaro branch of Prodia clinical laboratory since 2008. She holds the prestigious posts of President of Indonesian Association for Clinical Chemistry (2013-2019) & chair of Professional Issues Committee of Indonesian Society of Clinical Pathology and laboratory medicine (2013-2019).

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Associate Professor Chamindie Punyadeera has had a hybrid research career working in industry as well as in academia. She is a globally acknowledged pioneer in salivary diagnostics. She leads a world-class saliva research laboratory in Australia. She is the convener of the inaugural saliva conference in Australasia in 2016 & she has also produced 13 PCT applications and has licensed salivary test for oral cancer to MDxHealth (USA).

She has worked at Philips Electronics in the Netherlands and has been instrumental in developing Philips Mini-care I-20 for cardiac disease detection. She is a consultant to Oasis Diagnostics®-USA and FLUIDS iQ™ Montreal- Canada. Associate Professor C. Punyadeera has >65 publications, 4 invited book chapters & cited 2248 times. She has delivered key note and invited lectures both nationally and internationally and currently serves on the editorial board of the journal of oral oncology.

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Dr Srinivasan Periathiruvadi, graduated from Kilpauk Medical College Chennai & joined the Madras Medical College for his MD in Internal Medicine. His long and illustrious medical career saw him serve as full-time physician at CSI Rainy Hospital-Chennai, & senior registrar in internal medicine, diabetes and endocrinology at University Medical School, Aberdeen, Scotland. Dr. Srinivasan is a serial entrepreneur in health care industry. In 1985 Dr. Srinivasan founded Lister Laboratory in Chennai, now known as Lister Metropolis (a Medical Diagnostic Laboratory). In 1995, he co-founded Jeevan blood bank and research centre which has set several milestones in transfusion medicine in India. In 2008, he co-founded Jeevan public cord blood bank, which today is the largest in South Asia. Also he co-founded a high resolution HLA laboratory which was upgraded based on whole gene sequencing technology in 2017.

He was a member of several professional organizations such as resource person for WHO (SEARO), NACO (Blood safety), Pesident Indian Society of Blood Transfusion and Immunohaematology (Tamil Nadu) and secretary of Association of British scholars (ABS). He was also a recipient of Commonwealth Foundation Fellowship in 1984. Currently he serves in government committees in the field of stem cell research and therapy. Dr. Srinivasan is a prominent speaker in his area of specialty and has published several articles. Currently, he is actively promoting the need for public cord blood and bone marrow donor registry in India.

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Dr Saswati completed MBBS from Lady Hardinge Medical College in 2007 and completed MD in Biochemistry from Maulana Azad Medical College (NewDelhi) in 2013. She is six sigma green belt trained & ISO 15189 trained auditor from Indian institute of Quality Management-Jaipur. She has worked as consultant in Biochemistry and lab manager-quality assurance in Quest Diagnostics for a period of one year.

She has been trained as an international inspector by College of American Pathologists and she is an associate fellow of National Academy of Clinical Biochemistry. She was a recipient of young investigator award by European Society of Endocrinology in 2014 & recipient of six international awards and five national awards in Biochemistry from AACC, IFCC, APFCB, ACBI and AMBI. She has delivered 22 invited talks in CMEs and conferences.

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Dr Anita Ittoop holds a PhD in Biochemistry from Nagpur University, India. She started her career as a Clinical Biochemist in a laboratory. She has been working parallely as a contributory lecturer in the Postgraduate teaching in the Department of Biochemistry, Nagpur University, India. She then moved from an academic field to the corporate world and joined Ortho Clinical diagnostics as an Application specialist.

Dr Anita currently holds the position of Manger – Technical Support at Ortho Clinical Diagnostics. Ortho Clinical Diagnostics is a leading global provider of in vitro diagnostics with an established track record for providing high-quality products and services to the global clinical laboratory and immunohematology communities.

Across the various positions that she has held at Ortho since 2001 she handles all technical queries for SAARC countries and India, organises and conducts customer trainings both on-site as well as at Ortho's training facility, conducts CMEs and also assists with laboratory accreditation.

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Mr N.Vijayarangan, is currently working with Bio-Rad as a Capital Sales Specialist. He has more than 8 years of working experiences in various life science companies, in India. He completed his masters in Biotechnology, followed by Post Master's Degree in Molecular Diagnostics, from Bharathidasan University, India. Vijay has broad research and industrial experience on Infection, Biology and Molecular Diagnostics fields with three co-author research publications on tuberculosis, drug resistance and persistence arena. During his professional journey, Vijay has been a sincere learner of many cutting edge genomics & proteomics technologies; including PCR to Droplet Digital PCR, Microarray, Flow Cytometry, Protein Quantification and Purification techniques.

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SPEAKER ABSTRACTS

Chronic Kidney Disease of Uncertain Aetiology – Current Situation in Sri Lanka

Thilanga Ruwanpathirana

Chronic Kidney Disease of uncertain aetiology (CKDu) was first discovered in Sri Lanka in early '90's from the North Central Province. Later patients were found in adjacent areas and now 11 districts have been identified as high risk. The disease is mostly seen in paddy cultivation areas in the dry zone of the country.

So far, many hypotheses have been put forward by scientists and medical professionals as the possible cause/s of the disease, but none were able to prove them with a proper scientific methodology. Cadmium, Arsenic, Lead, and Fluoride are the leading heavy metals under main focus and excessive and inappropriate use of fertilizers and agro-chemicals are being blamed for adding up of these heavy metals to the soil and waterways. In addition, genetic predisposition, usage of substandard aluminium cooking utensils, low body mass index and cyanobacterial toxin are also on the list.

Though these are not identified as definitive cause/s, statistically significant associations were demonstrated with male gender, having parent or sibling with the disease, being a farmer, advanced age, alcohol consumption, betel chewing, snake bite and drinking well water, with repeated studies. There are four main sources of CKDu data in the country. They are Indoor Morbidity and Mortality Return (IMMR) of the Medical Statistics Unit of the Ministry of Health, data generated through the routine screening programmes conducted by the CKDu Unit in the Ministry of Health, Renal Registries and from research/surveys. One major issue identified in these sources was not using a common case definition for identification of CKDu patients. As a result, neither burden nor the trends of the disease could be ascertained. To overcome this problem, a set of case definitions (suspected, possible and confirmed) were introduced by a collaborative effort of the Epidemiology Unit, Sri Lanka Society of Nephrologists, World Health Organization (WHO) and National Science Foundation (NSF) in the year 2016.

Further, The Epidemiology unit was assigned the task to plan and implement a long-term longitudinal study to identify the cause/s with the technical and funding support from the WHO and the NSF respectively. In the year 2017, a cross-sectional survey was carried out in the Anuradhapura district to identify the burden of the disease using new case definitions and to identify the suitable study setting/s to commence the long-term follow-up study. With a total sample of 4800 individuals in 5 study settings in Medawachchiya, Rambewa and Mihintale AGA divisions, the prevalence of "suspected" CKDu was found to be 10.7 (Male – 17.5, Female – 7.6) with a male preponderance.

Since there is no definitive cause/s of the illness has been discovered yet the provision of specific preventive methods is also challenging. However, a number of health and non-health interventions are being carried out by the relevant ministries in the country to control the situation and to support the victims of the disease and their families.

Chronic Kidney Disease and the Role of the Routine Laboratory Creatinine Standardisation and More

Graham Jones

The clinical laboratory plays a major role in identifying, staging and monitoring Chronic kidney disease (CKD) using the basic tests of serum creatinine, eGFR and urine albumin or urine protein. There are now clear international guidelines for CKD diagnosis and management from the international organisation KDIGO (Kidney Disease Improving Global Outcomes) covering these issues. In response to these guidelines countries or regions are encouraged to consider how they may best be implemented in their own setting. The International Federation of Clinical Chemistry and the Asia Pacific Federation of Clinical Biochemistry are supporting these activities. It is recommended that laboratories in a region or country act together to provide consistent information to clinicians regarding CKD testing. Standardised laboratory practice is also important as patients may travel for medical services and similar results are required for continuity of care. There are now many examples of countries developing guidelines for national use on testing and management of CKD developed jointly between renal clinicians and laboratory scientists. The process in Australia has taken nearly ten years with several revisions of the guidelines as newer information has become available.

Requirements for optimal CKD testing includes accurate creatinine and urine albumin assays, routine reporting of an estimate of Glomerular Filtration Rate (eGFR) and education concerning the use and limitations of these tests. With regard to serum creatinine, the use of assays traceable to the international reference method, isotope dilution mass spectrometry (IDMS) is required to support the clinical decisions based on research studied. Perhaps the most important issue is discussion and agreement between laboratories and clinicians to ensure that laboratories are meeting the clinical needs of the doctors and patients.

Role of the Laboratory in Paediatric Nephrology

Harshini Dharmawardene

The kidney has the ability to perform many complex and diverse functions such as filtration, absorption and secretion of solutes and production of concentrated urine, to fulfill the purpose of maintaining homeostasis. It can be injured by a variety of different mechanisms involving different segments of the renal tubule leading to an array of clinical and biochemical presentations. Therefore, it is important to understand the normal renal physiology and biochemistry to recognize functional morphologic alterations that may occur due to disease and the need to carry out a battery of tests for the evaluation of many paediatric renal diseases.

Out of the many tests performed, glomerular filtration rate remains the basic parameter of nephrotoxicity. The renal tubular function is accurately measured by standard clearance tests for solutes including electrolytes, glucose and amino acids. The measurement of plasma concentration of some of these solutes may further aid the localization. The identification of the type of proteinuria may localize the nephrotoxicity to certain tubular segment. The renal concentrating capacity serves as a sensitive marker of tubular integrity.

Although the functional reserve of the kidney may mask subtle functional changes, the role of the laboratory in investigating the type of injury and assessing the degree of injury and its progression is pivotal in the management of paediatric renal disease.

Current and Future Developments of Cardiac and Renal Biomarkers

Salvatore Di Somma

Assessment of kidney function is one of the most requested tests in the hospital. An estimation of the kidney function is calculated at least once for nearly every patient admitted. Acute kidney injury (AKI) is common in hospitalized patients. In critically ill patients, reported incidences of AKI vary from 20 to 75% and its incidence appears to be rising. It is well known that AKI contributes to mortality and for surviving patients, a period of AKI may progress to chronic kidney disease (CKD). Moreover, as renal filtration is responsible for the clearance of many drugs, worsening of kidney function may cause drug plasma concentrations to deviate from the therapeutic range. However, real-time and precise assessment of kidney function is not provided by currently available tests.

The glomerular filtration rate (GFR), can be estimated using a formula with different parameters, or determined via a functional biomarker, that is filtrated in the glomerulus. The most commonly used tests to estimate the GFR are based on serum creatinine (SCr) concentration, although many limitations are acknowledged. Apart from ethnicity, body mass and gender causing differences in production in creatinine, calculations are influenced by active renal secretion of creatinine (up to 10-20% of the total clearance) This leads to an overestimation of GFR, especially in patients with deteriorating kidney function. The widely used Modification of Diet in Renal Disease (MDRD) formula based on SCr values is only validated for chronic kidney diseases with a stable health condition. After evaluation in different settings, the MDRD is modified to formulate the Chronic Kidney Disease – Epidemiology Collaboration (CKD-EPI) equation. CDK-EPI is found to be more accurate in staging chronic kidney disease and in risk prediction. Further, the use of cystatin C to estimate kidney function may be distorted due to metabolism of cystatin C in the tubule, differences in race, weight and age. Additionally, in sepsis, the production of serum creatinine and cystatin C is decreased, and their non-renal clearance is increased. Timed urinary clearances (8-24 hours) can be performed, but remains labor-intensive and prone to error. Finally, the calculation of inulin or iohexol clearance is complex and involves not only the administration of intravenous compounds, but also requires urine or blood sampling at several time points. These sensitive methods are considered the gold standard, but unfortunately also prone to measurement error. For these reasons, despite their diagnostic advantage to all other mentioned methods, these clearance methods are not used for determinations in daily clinical practice.

In recent years, several new biomarkers have been proposed to fulfill this unmet medical need in the accurate determination of kidney function. Most markers reflect tubular cell damage, for example Neutrophil gelatinase-associated lipocalin (NGAL) and Kidney Injury Molecule-1 (KIM-1). NGAL can be measured in both plasma and urine. It appears to be an early predictor of AKI, but unfortunately NGAL also increases during inflammation in the absence of AKI.

While SCr is a filtration function marker, the new test measures:Proenkefalin and the TIMP2 and IGFBP7 proteins are upregulated in response to cellular/tissue injury. Compared to SCr, the new tests are more sensitive, accurate and, most important, faster in indicating AKI.

Biomarkers are traditionally identified through theoretical discovery but are often proven not to have viable applications in a clinical setting. The discovery of the TIMP2 and IGFBP7 biomarkers was different in that it was the result of a dedicated study created to identify and validate new biomarkers of AKI.

Using together different cardiac and Renal functional plus damage biomarkers (such as Natriuretic peptides, hsTroponins or BioAdrenomedullin plus TIMP2 and IGFBP7) can allow to better management of patients with cardiac and renal diseases.

Thyroid Disease in Pregnancy

Chandrika N Wijeyaratne

In-depth study of the physiological changes of a normal pregnancy, from its early days, has energized the accurate interpretation of thyroid biochemistry and assessment of thyroid function. Subclinical thyroid disease has been increasingly recognized with greater accuracy in the past few decades due to improved laboratory supports. This facility has opened up a new vista in the understanding of the impact of subclinical maternal thyroid dysfunction on pregnancy outcomes. Sri Lanka has witnessed a change in the epidemiology of thyroid dysfunction following iodization of salt in the 1990s. Local research indicates that predominantly, young women of reproductive age are afflicted with primary hypothyroidism of an autoimmune aetiology. This transition in thyroid epidemiology has indeed replaced the pre-iodization era observation of iodine deficient maternal goiters during pregnancy. In concurrence, thyroid malignancy is also being reported more commonly and in particularly among young women.

Hence, the case mix of maternal thyroid disease observed during pregnancy in Sri Lanka (approximately 1-3% of 400,000 per year) is likely to be similar to that reported from iodine replete Western countries. Laboratory supports in the state health sector in biochemistry, immunology, imaging and cytology has helped improve maternal care with respect to handling thyroid disorders during pregnancy. Nevertheless, a proper understanding of the pregnancy related changes in thyroid and iodine physiology by multi-specialty clinicians caring for women of reproductive-age, is important. Additionally, laboratory services must give greater attention to detail the trimester, ethnicity and assay specific normal ranges when reporting on thyroid function tests performed on pregnant women. Such parallel responses will yield optimal benefit to pregnant women and their offspring.

This presentation will outline the normal physiology of thyroid biochemistry in a pregnant woman, the foetal development of the thyroid axis, along with the expected case mix of thyroid disease and dysfunction that is commonly encountered in Sri Lanka. Specific issues in terms of correct interpretation of laboratory data as well as the correct clinician response required in collaboration with laboratory personnel will be discussed by a case based approach. Areas of emphasis will include early pregnancy supplementation to match increased demands of iodine metabolism and the potential for ill effects with iodine deficiency and excess; estrogen induced increase of thyroid binding globulin changes and their impact; the thyroid responses to increased circulating beta human chorionic gonadotrophin levels in normal and complicated pregnancies, and the issue of maternal hypothyroxinaemia with concurrent placental degradation of thyroid hormones by de-iodinases. Adverse outcomes of pregnancy due to abnormal maternal thyroid function and an update on current evidence based approaches towards minimizing these effects will be discussed. A pragmatic approach to screening, monitoring and reporting in Sri Lankan practice will be addressed. The need for supplementary laboratory support in thyroid immunology for developing care plans based on consensus practice guidelines will be discussed. Perinatal issues and long term postpartum thyroid disease patterns will also be addressed.

Chemical Pathology and Dynamic Endocrine Testing: What, Why, How and Who

Doery JCG

Outline
The endocrine system comprises a complex interplay between the thalamus, hypothalamus, pituitary etc., and target endocrine tissues. Due to the highly dynamic nature of much of the endocrine system, proving pathological over- or under- activity of target organs often requires demonstration of autonomous activity by a suppression test or proof of under activity by use of a stimulation test. Thus, a Syncthen test is examining potential hypofunction of the pituitary adrenal axis while a dexamethasone suppression test seeks to demonstrate autonomous function.

Historically, like most pathology tests, dynamic endocrine tests were pioneered by research physiologists in animal models and subsequently adopted by practising clinicians who often set up boutique endocrine testing units outside of Pathology.

Especially where these tests can be adapted to an outpatient procedure strong arguments can be made for the Pathology Department and the Chemical Pathologist in particular, to take overall responsibility for the procedure including confirming test indications, patient preparation, consenting, administration of drugs, correct sampling procedures, interpretive reporting, clinical audit whereby results are regularly reviewed and discussed at clinical endocrine review meetings. In addition as custodian of the entire dynamic testing database the pathologist is well placed to audit data across the entire age spectrum and contribute authoritatively to the harmonisation of the most efficient investigative protocols in national and international forums.

These concepts will be illustrated using examples such as Synacthen test, growth hormone stimulation by exercise or suppression by glucose ingestion, hCG stimulation to demonstrate viable testicular tissue when testes are impalpable and gonadotrophin releasing hormone to assess premature or delayed puberty.

Finally, it is contended that active adoption of a comprehensive dynamic endocrine testing service can build highly constructive relationship between the Pathology Department and the wider clinical community.

Endocrine Emergencies and the Role of Laboratory in the Management

Sajith Siyambalapitiya

Endocrine emergencies are relatively uncommon and constitute only a small percentage of the emergency workload in critical care areas of the hospital, including the emergency department. Most of these are diabetes related and a small number with other endocrine emergencies. Due to the uncommon nature and the limited clinical exposure to these clinical problems, doctors may not have the desired confidence in managing these conditions and often pose diagnostic challenges to the physicians.

There are several basic principles that we need to follow in the management of these disorders, and the most important is arguably the prompt recognition of potentially life-threatening symptoms. However, the therapy in endocrine emergencies precludes the completion of a meticulous laboratory evaluation. The few critical diagnostic studies obtained concurrently with initiation of

therapy may facilitate subsequent therapeutic decisions. Diabetic ketoacidosis, hypoglycemic coma, hypercalcemia, hypocalcemia, thyroid storm, myxoedema coma, acute adrenal insufficiency, phaeochromocytoma, hypertensive crisis and pituitary apoplexy are among the critical disorders that we encounter as emergencies in the adult population.

Although many endocrine emergencies occur in patients with underlying endocrine dysfunction, it is important not to miss the diagnosis in patients with no previous endocrinopathy. Careful evaluation of the medical history and a detailed patient interview is critical to accurate diagnosis. Confirmation of the diagnosis is based on investigations and the role of the laboratory is crucial in most of these emergency situations. It is equally important to initiate prompt treatment once the diagnosis is made. Measures such as aggressive supportive care, replacement of steroids, and replacement of the appropriate endocrine hormones have been shown to decrease the morbidity and mortality associated with these diseases. In short, although endocrine emergencies are uncommon, the clinical diagnosis should never be missed, as delay can lead to devastating complications and often death.

Control of Pre-analytical Variables in Endocrine Testing

Saroja Siriwardene

Most endocrine tests are based on precise antigen-antibody reactions in order to reach the natural low levels they are found in. Hence they tend to be more costly and exacting assays. In order to get the best out of a measurement, it is important to ensure that common pre-analytical variables do not affect the result. They include awareness of the following:

- diurnal variation (cortisol, testosterone in females, TSH)
- pulsatile nature of hormone secretion (gonadotrophins)
- posture (aldosterone, renin)
- exercise (GH)
- stress (prolactin, cortisol)
- fed status (insulin, gastrin)
- time of menstrual cycle (FSH, LH, progesterone, oestradiol)
- conditions of sample collection, storage and transport (ACTH, PTH)
- medications: steroids (cortisol, ACTH) anti-hypertensives (catecholamines, renin, aldosterone), thyroxine (fT4), phenothiazines (prolactin)
- preparation of patient for test
  random sampling vs dynamic testing (GH, cortisol)
- accuracy of ancilliary measurements (NT value in double marker testing)

Establishing and Harmonising Reference Intervals

Graham Jones

All numerical pathology results are interpreted by comparison with other data and population reference intervals have been described as the most common such comparison tool. Just as a bad clinical decision can be made by an error in a result, an error in a reference interval can also lead to wrong clinical outcomes, and so accurate reference intervals are of vital importance.

According to textbooks, laboratories set reference intervals by performing formal reference interval studies. More commonly they come from the literature or manufacturers information with local validation. Unfortunately in many locations these activities are not done well and there is a wide variation in reference intervals between laboratories, which is not based on differences in the methods or the population.

In order to develop high quality reference intervals there are a number of actions that can be taken. These include the following: understand the physiology and pathology and the relevant pre-analytical and analytical factors of each analyte; understand the statistical processes used in reference interval studies; seek all available data sources including literature, manufacturer and other laboratories; use "data mining" techniques to gather information from your local pathology database; discuss proposed intervals with clinical colleagues when possible.

As the processes of setting good reference intervals is time consuming and complex, working collaboratively to establish the same intervals in a city, region or country is a viable way of sharing the effort and improving the quality.

Role of Chemical Pathology in Forensic Medical Practice

Rohan Ruwanpura

It is well known that the structural and physiological status of bodily systems is virtually based on complex biochemical interactions controlled by the genetic determinants, imbalance of which may result in morbidity and mortality. The chemical pathology is a branch of pathology dealing with biochemical aspect of the disease process, and chemical pathologist liaising with clinicians are also directly responsible to the patient as well. On the other hand, forensic pathology is also a branch pathology that studies anatomical, physiological, histological and biochemical abnormalities leading to death. Hence, both disciplines are naturally interconnected through the origin.

The current forensic practice is heavily dependent on scientific investigations attributed to sudden natural deaths, accidents and homicides. The range of scientific investigations presently carried-out by the Government Analyst Department is limited to qualitative identification of common toxic compounds. However, the actually required spectrum of biochemical investigations ranges from assessment of functional markers of liver, kidney, pancreas, heart, hormones and tumour markers to drugs of abuse and intentionally ingested poisons. In fact there are certain obscure deaths with no structural abnormality such as Sudden Death in Epilepsy and fatty liver, which are believed to be due to errors of biochemical controlling mechanisms. The opinion of an expert in chemical pathology regarding distribution of various chemical compounds in blood and other body fluids, their clinical effects, possible transformations and redistribution of those markers after death, methods available for surfacing trace elements etc., is very essential for the forensic pathologist to conclude the cause, mode and manner of death.

The examination of patients with medico-legal interest is other part of the forensic medical practice in Sri Lanka. The clinical forensic practice deals with drunkards, battered baby, victims of accidental and intentional poisoning, food intoxications, snake bites, sexual assault, work-place incidents etc., which demands wide array of biochemical assessments.

Finally, all medico-legal reports, either clinical or pathological, are submitted to the Court of Law and often subjected to challenge by lawyers during court trials. The assurance of standards and quality of hospital laboratory investigations by the chemical pathologist regarding accuracy and precision of the results, and sensitivity and specificity of the applied scientific techniques would invariably nurture the credibility of our medico-legal reports and opinions. Thus, forensic community expects broader role from chemical pathology services in uplifting standards of medico-legal investigations.

Drugs of Abuse Testing - Past Present and Future

Elina Raja Aziddin

Drug abuse is a growing global problem. In the last decade the drug trend has changed from the use of traditional drugs such as heroin, morphine and cannabis to many different synthetic drugs such as methylenedioxymethamphetamine (MDMA) and ketamine. Today hundreds of new psychoactive substances (NPS) have made their way into the streets. To detect drug use, a drug test is carried out on a biological specimen to determine the presence of specified parent drugs or their metabolites. Over the past several decades, drug testing has been used worldwide in a variety of settings including criminal justice, emergency medicine and clinical toxicology as well as the workplace. The conventional drug test is a two step process, the screening and the confirmatory test. Advancements in technology have made the evolution of drug testing possible. These new technologies have higher sensitivities allowing for more drug types to be detected. It also allowed automation and multiplex testing resulting in faster turnaround time. With these new capabilities, new laws and regulations have been developed in many countries which allow the use of alternative specimens such as oral fluid, hair and sweat in addition to the conventional urine matrix. Drug testing will continue to still be a challenge as more new drugs are continuously being synthesized. Thorough understanding of the test method as well as knowledge on the facts associated with metabolism and analysis are critical to ensure proper method selection and interpretation of the test result.

Is Salivary Diagnostic Ready for Personalised Medicine?

Chamindie Punyadeera

Personalised medicine is an emerging field in which physicians use diagnostic/prognostic tests to decide which medical treatments will work best for an individual patient. By combining diagnostic/ prognostic data with clinical assessment, health care providers are able to develop targeted treatment and prevention plans, moving towards realising precision medicine.

There is now increasing evidence linking oral health to systemic diseases. As such, human saliva is gaining momentum as a diagnostic fluid for the future. Saliva is ideal as a diagnostic medium due to its non-invasiveness, ease of sampling and the option of collecting multiple samples by non-healthcare persons. Saliva is produced by salivary glands, which are interconnected with blood vessels. We are using saliva as a diagnostic fluid to detect ischemic heart disease and heart failure.

The mean C-Reactive Protein (CRP) levels in the saliva collected from controls was 285 pg/mL and in cardiac patients was 1680 pg/mL ($p<0.01$). Analysis of CRP concentrations in paired serum and saliva samples from cardiac patients gave a positive correlation ($r2 = 0.84$, $p < 0.001$). Similarly, salivary NT-proBNP levels in the healthy controls and HF participants were <16 pg/mL and 76.8 pg/mL, respectively. The salivary NT-proBNP immunoassay showed a clinical sensitivity of 82.2% and specificity of 100%, positive predictive value of 100% and negative predictive value of 83.3%, with an overall diagnostic accuracy of 90.6%.

Epigenetic changes are a hallmark of oncogenesis, represented by DNA methylation and miRNA profiles. Salivary DNA methylation levels of RASSF1, p16INK4a, TIMP3, PCQAP 5′ and PCQAP 3′ combined into a panel, using logistic regression analysis, gave a sensitivity of 71% and a specificity of 80% discriminating healthy control smokers and non-smokers (n=122) from head and neck cancer (HNC) patients (n=133). Furthermore, using a multi-marker logistic regression analysis, a panel of nine salivary miRNA demonstrated a sensitivity of 95% and a specificity of 93% (AUC = 0.98) when discriminating HNC patients (n=100) from precancer patients (n=29).

Conversely, blood as a medium for 'Liquid Biopsy' has also come to the fore in HNC management. Metastases remains the major cause of death in HNC patients; circulating tumour cells (CTCs) derived from primary and secondary sites provide a comprehensive representation of the tumour burden in cancer patients' at any one time. We have demonstrated that CTCs can be isolated from HNC patients before clinically evident metastasis, using a novel, microfluidic technology and now we have exciting preliminary data correlating CTC presence to clinical outcomes during the course of treatment. This microfluidic technology has the ability to transform scientific findings into translational outcomes and tangible health benefits by identifying HNC patients at risk of developing metastasis earlier than conventional techniques can. Identifying HNC patients before clinical metastasis (via a blood draw to assess CTCs) will allow us to develop treatment strategies either by intensifying or de-escalating treatments, and could revolutionize the management of HNC patients with concomitant increase in survival rates and significant reduction of healthcare costs.

Evolution of Mass Spectrometry Techniques

Joe El-Khoury

The advent of soft ionization techniques such as electrospray ionization (ESI) and matrix assisted laser desorption ionization (MALDI) in the late 1980s, for which the inventors were jointly awarded the 2002 Nobel prize in Chemistry, rendered liquid chromatography-tandem mass spectrometry (LC-MS/MS) an indispensable tool for analyses of small and macro-molecules in biological fluids. Recent improvements in sensitivity and affordability have encouraged the adoption of this technology for routine applications in the clinical laboratory. However, the major driving force for the rapid expansion of this technology in the last decade remains the advantages it offered in comparison with other technologies, such as gas chromatography-mass spectrometry (GC-MS) and immunoassays. As a result, LC-MS/MS has found numerous applications in particularly challenging areas like endocrinology (steroids), therapeutic drug monitoring (immunosuppressants), inborn errors of metabolism (organic acids and acylcarnitines), clinical and forensic toxicology (drugs of abuse testing), and nutrition assessment (vitamins). Furthermore, with the advancement in MALDI-TOF and orbitrap technologies, these applications have been expanded to microbiology, metabolomics, proteomics and lipidomics. In this session, I will introduce how mass spectrometry made its way into the clinical laboratory, discuss current applications (with special emphasis on clinical chemistry), and predict what the future of mass spectrometry testing will look like.

Impact of Quality Systems on Laboratory performance: Development and Utilization of Quality Indices to Manage Clinical Laboratory Performance

Joe El-Khoury

Medical error is the third leading cause of death in the United States. While patient safety remains a struggle in many areas of healthcare, laboratory medicine has been a leader in reducing error, with an estimated total error rate of 0.33%, the lowest in diagnostic medicine. Major advancements in automation and analytical instrumentation have helped reduce laboratory-associated errors over the last decade, but with pre-analytical errors currently accounting for up to 75% of all mistakes, laboratory medicine professionals must keep expanding their focus to what is happening outside the lab. This session introduces the concept of monitoring quality indicators (QI) in the clinical laboratory to monitor the total testing process and reduce errors in all phases of testing. Recommended QIs for each phase of testing will be introduced, in addition to case examples on how these help improve quality in your laboratory.

How to Minimize Laboratory Errors

Elina Raja Aziddin

Laboratory testing is assuming an increasingly important position in the diagnostic process, in monitoring the effects of therapy and in monitoring health of the individual. As large number of tests are carried out by the laboratory, even a low incidence of laboratory error can have important health and patient safety implications. Laboratory error can occur in all phases of the testing process, the pre-analytical, analytical and post-analytical. In the past laboratory professionals have focused their attention on analytical errors. However, many studies have shown that pre- and post-analytical phases are more vulnerable to errors. Minimization of laboratory errors has been achieved by automation, improved laboratory technology, assay standardization, well-defined rules for internal quality control, effective quality assurance schemes, guidelines and standard operating procedures, computerisation and better trained staff. Use of reliable and universally agreed performance indicators has provided a valuable tool for identifying critical steps and reducing the risk of errors in the total testing process. To assure a patient-centred approach to error reduction, multidisciplinary co-operation and collaboration is mandatory.

Calibration of Laboratory Equipment

W M S Wijesinge

The importance of measurement in our daily lives cannot be overemphasized. Every new technology or science breakthrough, industrial development, or commercial success depends on one form of measurement or another. In these modern times, we practically measure everything we encounter: the weight of our food, the volume of our fuel, the distance between two points, temperature, pressure, humidity, light, current, voltage, power, speed, energy, etc. Needless to say, reliable measurement is very important to the industry for quality products for better life. In fact, it is so important that there's already a science behind it. Known as Metrology, it was developed and systematized to ensure that all measurements performed are meaningful and according to international standards. Good measurement relies on the integrity of the measuring equipment used. Unfortunately, no matter how sophisticated measuring equipment is, it degrades with time due to thermal, mechanical,

electrical, and environmental effects. This degradation is called drift, and it is unavoidable. However, the effects of drift on the reliability of the measurements may be offset by a process known as calibration.

Laboratory Accreditation: Our Ambiguous Partner on the Quality Journey

Doery JCG

Laboratory Accreditation has been in existence for over half a century.
It arose in non-medical contexts such as engineering and manufacturing as means of assuring quality and avoiding costly and tragic consequences.

Medical laboratory accreditation was a late starter, and perhaps that had something to do with the natural confidence of the medical and scientific community that 'science was always right' and 'Trust me. I'm a doctor/scientist'!! However progressively around the world accreditation has become compulsory in order to receive Government subsidy of pathology testing.

The world's first laboratory assessment authority, NATA (National Association of Testing Authorities), was formed in 1947 in Australia but has been joined by many other national bodies many of which are held together under ILAC (International Laboratory Co-operation).

The accreditation journey, like the quality journey, has been, and always will be, a journey of ongoing improvement in test reliability and fitness for purpose. Ultimately it is a peer review process but is guided by international (ISO 15189), and often national, somewhat generic standards. The interpretation of the standards is sometimes expanded in an Assessor Resource Kit but is also greatly enriched by the expertise of the voluntary peer technical assessors. The assessing authority provides the administrative support, staff officers who review the Quality System (QS) of the laboratory and considerable interpretive guidance of the relevant Standards and any other Government or regulatory body requirements that are all encompassed by the Accreditation process as well as assemble the final report.

Many laboratory staff hold an ambiguous mindset with respect to Accreditation. On the one hand they are understandably anxious about the possibility of the revelation of errors or omissions in the QS or other laboratory processes. On the other hand an accreditation visit is a fantastic opportunity for laboratories to benefit from an in-depth peer review process and to evaluate their comprehensive staff commitment to the ensuring of best imaginable patient service and outcomes. Laboratories pay for accreditation and they deserve thorough and frank feedback on how to advance their quality journey. The concept of the journey is highly appropriate because it implies beginning somewhere, but also it is a journey without a finishing line.

ICU Management; Role of Chemical Pathology Laboratory

Manoj Edirisoorya

Critical care medicine, which encompasses dysfunction of multi-systems in human body, is one of the newest and fastest growing specialties in medicine. Substantial progress in the acquisition of scientific knowledge concerning Chemical Pathology contributed not only to the inception in mid 20th century but to the surprising progress of the field of critical care. In this context, the role of Chemical Pathology is pivotal from the very onset of the critical illness to progression and sometimes, during end of life care decision making, considering the dynamic circumstances of critically ill.

Unfortunately, one of the key requirements for managing critically ill, the ultra-rapid availability of test results to make prompt clinical decisions is subjected to various limitations, particularly in resource limited settings. Therefore, in one hand, different strategies are suggested to improve the therapeutic turnaround time (TAT) for lab results, and on the other hand, the growing interest on decentralized lab testing, principally Point of Care testing as the state of art in Intensive Care Units is on rise amidst controversies. Finally, the routine screening of conventional and potentially insensitive biochemical investigations on organ functions not only exhausts the capacity of the laboratory, but indicates the need for generalisable biomarkers in the era of precision medicine to uplift critical care therapy.

Investigation of a Sick Baby

Nalin Kitulwatte

Laboratory investigations are targeted on the basis of the history and examination and help narrow the differential diagnosis. The following basic laboratory investigations should be available in all small hospitals that provide paediatric care in developing countries:

- Haemoglobin or packed cell volume
- Blood smear for malaria parasites
- Microscopy of CSF
- Blood grouping and cross-matching
- Full blood count
- Plasma glucose
- Urinalysis (including microscopy)
- HIV testing

In the care of sick newborns (< 1 week) serum bilirubin is also an essential investigation.
Other common valuable investigations are:

- Pulse oximetry
- Stool microscopy
- Chest X-ray
- Blood cultures

Indications for these tests are outlined in the presentation. Other investigations, such as pulse oximetry, chest X-ray, blood cultures and stool microscopy, are valuable in making a diagnosis.

The diagnoses also closely match the IMCI classifications, except that the expertise and investigative capacity in a hospital setting allow classifications such as 'very severe disease' or 'very severe febrile disease' to be defined more precisely, making possible such diagnoses as severe pneumonia, severe malaria, septicaemia and meningitis.

Classifications for conditions such as pneumonia and dehydration follow the same principles as in the IMCI. Young infants (< 2 months) are considered separately, as in the IMCI approach. Severely malnourished children are also considered separately because they require special attention and treatment if their high mortality risk is to be reduced.

In hospital, the stages of management for any child are :

- Emergency triage
- Taking a history
- Laboratory investigations (if required)
- Treatment
- Emergency treatment (if required)
- Examination
- Making a diagnosis or a differential diagnosis

Total Parental Nutrition

Anuja Abeydeera

Total Parenteral Nutrition (TPN) is a noteworthy achievement of modern medicine, which can be used as a therapeutic modality for all age groups. It is a life sustaining option when intestinal failure prevents oral or enteral nutrition. Use of total parenteral nutrition has increased in recent years. It greatly enhances the treatment of all types of critically ill patients, including those with malignancy, inflammatory bowel disease, short bowel syndrome, premature infants, and anorexia nervosa. Patients undergoing solid organ and bone marrow transplantation are also supplemented before and after transplant with TPN.

Provision of nutrition through a vein is expensive and leads to serious adverse events. The Board of Directors of the American Society for Parenteral and Enteral Nutrition (ASPEN) have developed consensus recommendations regarding appropriate PN use and the latest set of recommendations were published in March 2017. The recommendations aim to advise on appropriate PN use and promote clinical benefits while minimizing the risks associated with the therapy.

The complications that develop during TPN may be due to the specific regimen involved or due to the patients' pre-therapy nutritional status. Most of these changes are well documented and when recognized can be easily treated. It is important to consider the various changes in diagnostic laboratory parameters seen during the course of TPN. Some of these changes are clinically insignificant, others will return to the normal range within days or weeks after discontinuing TPN, and some will remain abnormal after long periods of time—the reasons for which are uncertain. We will look at how these changes are identified and managed for the best outcome of the patient.

Role of the Laboratory in Assisted Reproduction

Sumedha Wijeratne

Assisted reproductive technology (ART) is the application of laboratory and clinical procedures combined together to treat infertility. It includes fertility treatment procedures that handle gametes (human eggs and sperm) and/or embryos outside the human body (in-vitro) to assist in establishing a pregnancy. These procedures include controlled ovarian stimulation, ovulation triggering, removing eggs from the woman's body, fertilization of the recovered eggs with sperm in the laboratory to create embryos and replacement of the embryos in the woman's uterus. In vitro fertilization (IVF) and embryo replacement is the most commonly used ART procedure. The other procedures include,

but are not limited to, gamete intra-fallopian transfer, zygote intra-fallopian transfer, gamete and embryo cryopreservation, oocyte and embryo donation, and gestational surrogacy.

Infertile couples seeking assisted reproduction technology procedures have to go through an array of laboratory procedures that are essential for diagnosis of infertility, to decide their suitability for medically assisted conception, to find out the kind of treatment options which would be best for them, and to monitor the response to treatment during the procedure and in predicting what there success will be. In addition, monitoring of complications associated with assisted reproduction technologies also need extensive laboratory involvement.

The presentation will focus on Assisted Reproduction technologies with emphasis on the value of other laboratory investigations. As embryology and assisted reproduction techniques are developing rapidly and produce continuous changes in everyday practice, the tests that are currently used worldwide will be discussed.

Novel Biomarkers for Preeclampsia Screening and Diagnosis

Saswati Das

Preeclampsia (PE) is a major cause of maternal and perinatal mortality and morbidity. Pre-eclampsia (PE) affects about 2% of pregnancies globally. A major challenge in modern obstetrics is early identification of pregnancies at high-risk of preterm PE and undertaking of the necessary measures to improve placentation and reduce the prevalence of the disease. Early PE (requiring delivery before 34 weeks) rather than late PE is associated with an increased risk of perinatal mortality and morbidity and both short-term and long-term maternal complications. Early identification of women at high-risk for PE could potentially improve pregnancy outcome as intensive maternal and fetal monitoring in such patients would lead to an earlier diagnosis of the clinical signs of the disease and the associated fetal growth restriction and avoid the development of serious complications through pharmacological interventions starting from the first trimester. The underlying mechanism for PE is thought to be impaired placentation, documented by the findings of abnormal blood flow in the uterine arteries and reduced maternal serum levels of placental products. PlGF (Placental Growth Factor) has been shown to be the most discriminating biochemical marker for pre-eclampsia, and early-onset pre-eclampsia in particular. The patient-specific risk of developing PE in the first trimester can be predicted by a combination of factors in the maternal history, prior or family history of PE, and the maternal blood pressure(MAP), uterine artery pulsatility index (UtPI), Pregnancy associated plasma protein A (PAPP-A), PlGF. The antiangiogenic factor soluble fms-like tyrosine kinase 1 (sFlt1) and the sFlt-1:PlGF ratio has shown promise in clinical research as a biomarker for predicting and diagnosing preeclampsia in the second and third trimester.

Managing Lipid Disorders in a Lipid Clinic; Best Practice

David Blank

Hypercholesterolemia is a major risk factor for atherosclerotic heart disease. In Canada, lipid clinics have operated for over thirty years with Medical Biochemists (Chemical Pathologists) involved since the onset. These clinics, in conjunction with major public health initiatives, have raised awareness of the relationship between elevated lipids and atherosclerotic heart disease to the medical community as well as the general public.

An overview of the approach to lipid disorders from the perspective of a Medical Biochemist in a Canadian Lipid Clinic is provided. Current practice approaches will be outlined including the referral base, testing profiles, guidelines followed, evaluation of patients and the treatment approaches followed. Finally, cases highlighting the challenges of a lipidology practice will be reviewed.

Following the lecture, the participant should:

- Recognize the role a Medical Biochemist (Chemical Pathologist) plays in a lipid clinic
- Understand the current Canadian Lipid Guideline's approach to reducing cardiovascular disease
- Appreciate the advantages of measuring apolipoprotein B
- Comprehend clinical practice challenges

Markers of Inflammation and Infection

July Kumalawati

Infection will trigger an inflammatory response, but an inflammation is not always caused by infection. It is hard to differentiate infection from inflammation without microbiological culture. Many biological markers had been studied to detect inflammation and determine the presence of infection, especially severe infection such as sepsis. Those markers were white blood cell count with left shift and degradation of granulocytes, platelet count, coagulation system such as activated partial thromboplastin test, cytokines such as TNF- , IL-6, receptors (sTREM, suPAR, sRAGE, Toll-like receptor), acute phase proteins (CRP, pentraxin 3, procalcitonin), cell surface markers (CD64, presepsin), apoptosis marker (Gas6), endothelial markers (VCAM-1), detection of infectious microorganisms and their product (culture and nucleic acid), and markers of organ dysfunction (lactate, D-dimer).

Unfortunately, no one biomarker is likely to adequately reflect the rapidly evolving nature of the patient's infection. Multi-marker approach together with the patient's clinical features will be needed to properly manage severe infection.

Recent Advances in Molecular Diagnostics

N Vijayarangan

Molecular diagnostics has evolved dramatically over the past two decades. The molecular diagnostics tools have become a significant part of the clinical laboratories, which includes all tests and methods to identify a disease and understand the predisposition for a disease by analyzing genome or proteome of an organism. When laboratories begin to take advantage of these tools, we will see enormous changes in health care in ways never before imagined. This presentation will discuss recent advances in the molecular diagnostics arena and the potential that advanced molecular diagnostics tools could offer for earlier and accurate diagnosis.

Advantages of Having a Laboratory Information System and Future Developments

Srinivasan Periathiruvadi

Anything that can be measured can be monitored and anything that can be monitored can be improved. Laboratory Information System (LIS) is an excellent tool in this regard.

My first encounter with an LIS was in 1986 when a couple of us got together to write a programme for my first laboratory (Lister Laboratory) using dbase and C++ and ran it in a DOS environment on Intel 80186 CPU (6 MHz) with 64K memory! This application and its subsequent iterations were used till my retirement from the laboratory in 2005.

In April 2017, when I established a new laboratory, the hardware, software and networking environments were entirely different. I now have access to gigabytes of memory, terabytes of storage, cloud servers, fast internet connectivity and several robust platforms for programming.

However, the basic reasons for which the LIS is being used continue to remain the same. Some of the major advantages of an effective LIS are:

- Continuous improvement in the management of a database of requests, processes, results and result delivery.
- Track and improve the turnaround time (TAT) for the delivery of results to clients.
- Monitor and improve the effective usage of human resource, materials and resources to ensure profitability and ability to scale-up.
- Lean processing.
- Enhance the quality of results and thereby improv healthcare delivery system.
- Ability to link facilities across departments, hospitals, cities and countries.
- Data mining and facilitating research and publications.

With the adaptation of Artificial Intelligence (AI), we are heading for an interesting period in the deployment of LIS for the overall improvement of Laboratory Medical Science.

Assay Development in Complex Body Fluids

Chamindie Punyadeera

The use of immunoassays to detect biomolecules is vulnerable to the matrix components and other interfering substances in body fluids. Most of the current clinical immunoassays were developed to measure biomolecules in blood. This is because blood is the most commonly collected diagnostic medium. The matrix effects when using blood as a medium is overcome by using analyte free serum. However, with the emergence of alternative diagnostic medium, such as saliva, urine and tears, immunoassays need to be developed for these alternative fluids. The current trend in this field is to use homogeneous immunoassay rather than traditional ELISAs. Homogeneous immunoassay suffers from matrix effects since there is no washing step to remove a specific binding. Minimizing matrix effects in immunoassays is becoming increasingly important.

There are numerous ways of reducing matrix effects when developing immunoassays. Depending on the analyte that is being detected, it is possible to use the same type of medium collected from

a different species than the analyte of interest. An alternate method is to produce analyte free medium by immunodepletion. The development of immunoassays using viscoelastic biofluid, saliva, will be discussed.

Good Laboratory Practice – A Perspective

Anita Ittoop

Good Laboratory Practice (GLP) deals with the organization, process and conditions under which laboratory studies are planned, performed, monitored, recorded and reported. GLP practices are intended to promote the quality and validity of test data based upon Principles of GLP and other national regulations.

Good Laboratory Practice is a quality system
Laboratory services are an integral part of disease diagnosis, treatment, monitoring response to treatment, disease surveillance programmes and clinical research. Use of diagnostic techniques aid early diagnosis enabling appropriate and prompt intervention, thereby reducing overall disease burden and promoting health. Following good laboratory practices leads to reliable and accurate test results, which in turn fosters good patient care and promotes a positive attitude toward testing from providers' and patients' perspectives.

Studies have shown that education and training of laboratory personnel improve not only the quality of test results, but also clinicians trust in the laboratory. The principles of high-quality laboratory testing are the same anywhere in the world. It is one area of health care that can and should be standardized.

Main areas of GLP are - Organization and personnel, Facilities, Equipment, Reagent / test kits, Documentation, Inter-laboratory comparison.

The benefits of GLP include consistently achieving 'customers' requirements, Minimize errors, "waste" and complaints, Improve efficiency. It also reduces, negative impact on customers/patients, likelihood of litigation and communication breakdown.

In addition to this it improves safety and morale, Standardization. Ensure adequacy of resources, Build-in improvement tools, Facilitates changes & easier problem solving.

Because key decisions regarding treatment and diagnosis are based on laboratory derived results the importance of Good Laboratory Practice is critical in the clinical laboratory.

Quality in Medical Laboratory Testing is giving The right test result, at the Right time, on the Right specimen, from the right patient, with result interpretation based on Correct reference data, and at the Right price.

Application of Six Sigma in Clinical Laboratory: From Theory to Practice

Saswati Das

Clinical laboratories play an essential role in decision making, hence ensuring quality of laboratory services is the need of the hour. Keeping in mind the revolution ushered by six sigma concept in corporate world, health care sector may reap the benefits of the same. Laboratory errors are result of a poorly designed quality system in the laboratory. Six Sigma is an error reduction methodology that has been successfully applied at Motorola and General Electric.

Sigma (σ) is the mathematical symbol for standard deviation (SD). Six sigma provides a general methodology to describe performance on sigma scale. Six sigma concentrates, on regulating a process to 6 SDs, represents 3.4 DPMO (defects per million opportunities). It can be inferred that as sigma increases, the consistency and steadiness of the test improves. The performance of a laboratory can be gauzed by sigma metrics. A good laboratory practice requires that laboratories design their quality control (QC) procedures to assure that reported patient results meet the quality required for their intended use. The Sigma metrics is based on the statistical concept: laboratory errors can be reduced by maintaining 6 standard deviations between the parameter average and its upper and lower limits.

This session will focus on the practical application of sigma metrics to the analytical processes in the laboratory. This sigma calculation is easy in application as tolerance limits in the form of acceptability criteria are available from peer comparison and proficiency testing programs, QC data available for estimating method precision, and peer data available for estimating method bias. Based on the sigma values of the tests the internal quality control rules can be modified, thereby reducing the operating costs.

Cardiac Markers

Salvatore Di Somma

Acute Heart failure (AHF), is due to the impaired ability of the heart to pump out all the blood that leads to systemic congestion. In patients with AHF, delay in treatment is associated with: 250% increase in acute mortality and 150% increase in hospital length of stay. From the recent ESC guidelines, in order to start as soon as possible an appropriate therapy, there is a mandatory need for Congestion and Perfusion assessment in AHF patients. At ED presentation, AHF initial Phenotypes of Congestion plus a clinical global evaluation aimed to detect Edema, sound at Heart ascultation and Jugular vein distention is performed with Chest X-ray evaluation plus EKG, Echocardiogram and Natriuretic peptides assessments. Nevertheless, this could be not sufficient to evaluate total body fluid accumulation, and new technology assessments such as Chest Ultrasound and Bioimpedance vector analysis are suggested for evaluation of total congestion present in intravascular tissue and interstitial compounds. Moreover, it is well known that the presence of congestion at hospital discharge is the main reason of HF patient readmission.

In order to assess the tissue perfusion the evaluation of blood pressure per se is not sufficient to distinguish between low, normal or elevated stroke volume and peripheral resistances and new non-invasive devices such as NICaS are of potential utility. Moreover, old and new cardiac Biomarkers such as NtproBNP, BioAdrenomedullin and HsTroponins seem to be of utility in both better evaluating total body congestion and renal function in order to improve AHF patients outcomes and reducing hospital readmission.

Chest pain is a common cause of emergency department visit (~ 4% of all visits) and, in case of missed diagnosis of acute coronary syndrome and improper discharge, results in a high mortality rate (2-4%). Early diagnosis and the consequent risk stratification are important objectives to be achieved in the clinical setting of acute coronary syndrome and it is in this context that the laboratory plays a key role. In clinical settings, a laboratory test that is able to exclude (negative predictive value) and to diagnose correctly (positive predictive value) acute coronary syndrome (ACS) is of utmost importance. In general, the cut-off for the diagnosis of myocardial infarction is indicated by a troponin value above the 99th percentile of the reference value in the normal population (URL, upper reference limit). The test must have a level of imprecision (expressed as CV, coefficient of variation) ≤10% at the 99th percentile, or in repeated measurements the values defined as the 99th percentile in a reference population must not vary by more than 10%. Many of the first-generation techniques for the determination of the troponin T and I did not meet these criteria, reaching levels of inaccuracy of up to 20%. Therefore, in recent years, high-sensitivity troponins capable of detecting the presence of the marker with a threshold of 10 to 100 times lower, have been introduced; hence able to meet the requirements of analytical precision. This way, you can identify acute coronary syndromes much more easily and with greater accuracy in patients presenting with chest pain.

Ethics in Laboratory Medicine: Are You Serious?

Doery JCG

Pathologists, scientists and technologists are about science and the search for truth. Isn't ethics about all that airy fairy stuff to do with right and wrong and what may (or may not) make us feel guilty or stay awake at night?

It turns out that the fundamentals of ethics and laboratory science have a great deal in common. They are both about seeking what is best for the patient and humanity!

Ethics in Pathology informs our attitude to quality, treatment of human tissues, relationships with our medical and patient clients, suppliers and laboratory staff.

There is an extensive literature on the subject and increasingly scientific and professional bodies are formulating codes of ethics.

This will be an interactive session in which some hypotheticals taken from every day practice will be posed to the audience to illustrate practical ethical issues pathology staff are likely to confront often or occasionally. Voting will be compulsory!

Getting the Right Answer – the Importance of Traceability

Graham Jones

Results of laboratory tests are used for medical decision-making with the aim of improving patient health. A fundamental part in the role of routine laboratory is getting the right result for a laboratory test. This means having assay with good precision, low bias and freedom from interferences. Bias in particular can affect all results for a test leading to incorrect medical decisions. As we now compare laboratory results with decision points and information in the medical literature from all parts of the world, in order to achieve safe, evidence-based laboratory medicine we need to ensure that all results for a test are comparable across the globe. This can be achieved through the process of metrological traceability.

A key component of traceability is selecting the international reference materials and methods that manufacturers should use for setting calibrator values. The Joint Committee for Traceability in Laboratory Medicine (JCTLM) has been formed by the major international organisations in measurement science, laboratory medicine and laboratory accreditation to help with this task. Manufacturers should use the best available materials and methods to assign values to calibrators and laboratories should select traceable methods and verify accuracy to ensure the best outcome for patients.

Assay results are derived by comparing values in patient samples with values in the assay calibrators. The values for concentrations in calibrators are set by comparison with other calibrators and reference materials. Furthermore, selecting the best reference materials, it is necessary to transfer those values to routine patient samples with a low uncertainty. In order to achieve accurate results for patient care, good practice is required from reference laboratories, manufacturers, routine laboratories, regulators and accreditors.

Risk Management in the Laboratory

Elina Raja Aziddin

Medical laboratory testing is a highly complex process. Despite the rapid development of new diagnostic technologies, no laboratory tests or devices are foolproof. Each procedure carries with it a risk and errors can occur at pre-analytical, analytical and post-analytical phases of testing. Evaluating possible conditions that could lead to errors and outlining the necessary steps to detect and prevent errors before they cause patient harm is therefore an important component of laboratory testing. This can be achieved through risk management, a process of identifying, analysing, evaluating, controlling and monitoring risk. Risk management provides a formal approach to identify potential failure modes in the lab, rank those modes in terms of their risk, and establish policies and procedures to prevent or reduce the risks. The goal of risk management is to control risk to a clinically acceptable level. The information gathered on the risks and control measures can then be used to construct the laboratory quality control plan.

Customer Satisfaction the Way Forward

P H R Suraweera

The external customer satisfaction mostly depends on the degree of satisfaction of internal customers (the workforce), visible and tangible physical resources, highly efficient and effective standard operative processors of the organization.

To make internal customers, the workforce happy, need to lounge a good human potential management program. It is highly important to select very talented individuals to the organization and then develop their knowledge and understanding of technical know-how as well as social interactive intelligence. Once the workforce become very intelligent, it should blend with highly positive attitudes, thereby reach the wisdom level of their lives.

Following factors may also be important to make workforce happy and explore their full potentials in to the organisation's developments. Reasonable wages, good promotion policy, supportive

co-workers, caring immediate supervisor, nature of work, handing over responsibility to individuals, recognition of all good works by superiors and providing them socio-economic advancements.

In service sector, external customer satisfaction can be achieved by providing lavish physical evidence and high technical and social performance of the staff.

To obtain and maintain sustainable customer satisfaction, the organization needs to satisfy their all stakeholders in all aspects.

ORAL PRESENTATIONS

A Community Study of Dietary Salt Intake Estimated by 24-Hour Urinary Sodium Excretion in a Group of Healthy Adults

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Association of Serum Uric Acid and Gamma-Glutamyltransferase with Components of Metabolic Syndrome in Obese Children in a Tertiary Care Centre

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Distribution and Associations of HbA1c in an Apparently Healthy hospital Based Adult Population

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Comparison of Capillary Electrophoresis and Bromocresol Green Methods for Quantification of Serum Albumin on Patients Referred to Serum Protein Electrophoresis from Medical Wards at Teaching Hospital, Jaffna

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Serum Cystatin C as a Marker of Early Nephropathy in Sri Lankan Patients with Type 2 Diabetes Mellitus

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CASE REPORTS

CR 1

A Sri Lankan Migrant Feeling Cold in Europe: Normal or Abnormal?

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Introduction

For those accustomed to the hot tropics, cold intolerance in temperate climes is not unusual. However, when there is associated ulceration or pain, there may be an underlying pathology.

Case Presentation

A 62-year-old male, who migrated to Europe during the Northern conflict in Sri Lanka, returned on holiday at X'mas time, and presented to the dermatologist with multiple ulcers along both arms and legs. He gave a history of cold intolerance and rubbed the phlebotomy seat 'to make it warm', before sitting down to get a few selected investigations done.

He was found to be strongly positive for cryoglobulins. Serum protein electrophoresis on the same sample showed an abnormal monoclonal band of approximately 4 g/L in the mid-slow gamma region. This band was very prominent when the washed cryoprecipitate was subjected to electrophoresis. Serum IgA, IgG and IgM were normal at 217, 1317 and 95 mg/dL respectively.

Discussion

He had cryoglobulinaemia which may be due to a paraprotein (Type 1 cryoglobulinaemia associated with multiple myeloma). Further investigations weren't done as he left for home.

Meticulous attention to detail is required to successfully identify cryoglobulins in the laboratory. If not, the cryoglobulin will be lost. We collected the sample into a pre-warmed tube and immediately allowed it to clot in a 37˚C water bath. The serum was separated into thin ESR tubes and left overnight at 4˚C with a normal control. The test had a precipitate which re-dissolved on warming to 37˚C. It was observed that a precipitate appeared immediately on removing the tube from 37˚C to room temperature, which was compatible with severe cold intolerance. In order to concentrate the cryoprecipitate, we washed it in cold saline and centrifuged at 4˚C.

Keywords

Cryoglobulin, cold intolerance

CR 2

Dopamine Interference in Enzymatic Creatinine Assay: A Sri Lankan Experience

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Introduction

Measurement of creatinine by the creatininase method, known to have less interference in routine assay conditions compared to the Jaffe method, has compelled medical laboratories to move towards it, in spite of the higher cost.

Case Presentation

A 57-year-old male was admitted with chest pain. His BP was 200/130, RBS 461 mg/dL, and ECG showed ST elevation from V1 – V3. Serum Troponin T was 0.825 ng/mL (positive) and serum creatinine by enzymatic assay on Roche Cobas c311 was 1.3 mg/dL (0.8 – 1.3). An anterior STEMI was diagnosed and emergency coronary angiogram and stenting was done for occlusive double vessel disease.

The serum creatinine by the same method the next morning was 0.28 mg/dL, which alerted the laboratory staff to a possible interference. Blood urea was 65 mg/dL (10 – 45). Serum creatinine by the Jaffe method on Siemens Dimension RxL was 1.8 mg/dL, which was reported. It later transpired that the previous night, he was given a Dobutamine infusion as the BP dropped to 80/55 and changed over to Dopamine later.

Discussion

Significant negative interference to the creatininase method by Dobutamine and Dopamine is already documented. However, awareness is lacking in Sri Lanka as this method is not yet popularised. We observed a negative interference of 85%. Interference is presumably at the peroxidase reaction, which is shared with other tests.

The interfering drug is rapidly metabolised, and by the time a complaint is received from the clinician, it may not be present in the left-over sample to cause interference on repeating the test. Clinicians using dobutamine or dopamine should alert the laboratory to perform the creatinine test using the Jaffe method and any mismatch should be conveyed to the laboratory quickly. Direct venipuncture could negate this problem compared to line-draw samples.

Keywords

Creatininase, interference, dopamine, dobutamine

CR 3

A Novel *MTTP* Splice Variant c.394-2A>C in an Infant with Abetalipoproteinemia

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Introduction

Abetalipoproteinemia (ABL) is a rare autosomal recessive disorder of lipoprotein metabolism caused by defects in the microsomal triglyceride transfer protein (*MTTP*) gene. It is characterized biochemically by the absence or extremely low levels of low-density lipoproteins in the blood.

Case Presentation

We report a four-month-old girl, born to consanguineous parents, who presented with steatorrhea, failure to thrive, total cholesterol 48 mg/dL (112 -200) and acanthocytosis. Her 11-year-old sister, who also presented with similar clinical symptoms had total cholesterol 41 mg/dL (125 - 205) and was diagnosed biochemically with ABL at 2.5 years of age. At present she has mild learning difficulties. Parents' lipid profiles are within normal limits. DNA sequencing revealed the infant to be homozygous for a novel pathogenic *MTTP* splice variant c.394-2A>C. Family screening revealed her sister to be homozygous for the same *MTTP* variant while her parents were heterozygotes.

A similar clinical picture to ABL can be seen in homozygous familial hypobetalipoproteinema (FHBL), an autosomal codominant disorder due to mutations in *APOB.* Therefore it is a challenge to the clinician to diagnose ABL solely on clinical grounds.

Discussion

Obligate heterozygous parents of homozygous FHBL patients usually have half-normal plasma levels of apo B and LDL-cholesterol level, while obligate heterozygote parents of ABL patients have normal plasma lipoprotein profiles. Our proband's parents were normolipidemic, consistent with a diagnosis of ABL.

The cornerstone of treatment is dietary modification and the replacement of fat-soluble vitamins. Early diagnosis and treatment of ABL in the form of a low-fat diet and replacement of fat-soluble vitamins can mitigate neuropathy and retinopathy.

Keywords

Abetalipoproteinemia, microsomal triglyceride transfer protein, hypocholesterolemia, failure to thrive, fat malabsorption

CR 4

A Case Report of Primary Hyperparathyroidism with Severe Bone Lesions and Fracture

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Introduction

Primary Hyperparathyroidism (PHPT) is the third most common endocrine disorder characterized by hypercalcaemia due to over production of parathyroid hormones (PTH) by one or more of the parathyroid glands.

Pathological fractures that lead to a diagnosis of primary hyperparathyroidism are not commonly described.

We report a case of primary hyperparathyroidism due to a parathyroid adenoma that presented with the fracture of neck of left femur and multiple bone lesions.

Case Report

A 43-year-old woman presented to our orthopaedic unit with the history of insidious onset of progressing difficulty in walking, bilateral lower limb pain and back pain of about three years of duration. Biochemical screening revealed hypercalcaemia (3.07 mmol/L), low phosphate (0.74 mmol/L), elevated ALP (1800 IU/L) and high parathyroid hormone (275.7 pmol/L)

Her skeletal survey showed well defined areas likely of brown tumours in the right scapula, neck of the right humerus and right proximal femur, subchondral bone resorption in the symphysis pubis, sub periosteal erosions in the phalanx on the hands and healed fracture of the neck of left femur.

Ultra-sound scan of neck showed parathyroid adenoma with no lymph node involvement. Computer tomography of neck showed parathyroid adenoma over posterior aspect of right lobe of thyroid. Her serum protein electrophoresis, bone marrow biopsy and bone biopsy were normal.

Parathyroidectomy was performed and confirmed right lower parathyroid adenoma. Patient experienced spontaneous and progressive regression of the bone lesions and could be able to walk.

Discussion

PHPT can easily be missed as it presents clinically and radio logically mimicking other diseases such as giant cell tumours, multiple myeloma. Reaching the correct diagnosis requires a combination of clinical manifestations, routine biochemical screenings, radiographic examinations of bone and parathyroid and bone biopsy.

Keywords

Primary hyperparathyroidism, parathyroid adenoma, hypercalcaemia, pathological fracture

CR 5

Many Guises of Acute Intermittent Porphyria

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Introduction

Acute intermittent porphyria is a rare autosomal dominant disorder caused by a deficiency of the enzyme, hydroxymethylbilane synthase. Recognition of acute neurovisceral attacks can be difficult due to the nonspecific nature of symptoms.

Case Presentation

We report a case of 33-year-old male patient who presented with recurrent episodes of severe abdominal pain, nausea, vomiting, constipation and numbness of bilateral lower limb extremities. These nonspecific neurovisceral attacks were subject to medical and surgical misdiagnoses of acute appendicitis, sinus tachycardia, renal calculi, drug-induced acute interstitial nephritis and two episodes of partial intestinal obstruction. The seventh acute attack raised the suspicion of an acute porphyria. Watson and Schwartz test was positive for porphobilinogen in urine. A urine sample collected during the acute illness and sent to an overseas laboratory for quantitative analysis of Delta-aminolevulinic acid and porphobilinogen yielded positive results. Mutation analysis by DNA sequencing of the extracted DNA of the proband revealed a previously reported missense mutation, c.517C>T encoding p.R173W in the *HMBS* gene, confirming the diagnosis of Acute Intermittent Porphyria (AIP). Four out of five family members who underwent targeted mutation analyses were mutation-positive.

Since heme arginate is not available in Sri Lanka, the patient was managed symptomatically and with carbohydrate loading. The patient was educated regarding precipitating factors of acute porphyria. A list of medications to avoid was provided to the patient.

Discussion

The most common clinical presentation of Acute Intermittent Porphyria is abdominal pain with neurovisceral manifestations which are common to several medical, psychiatric and surgical pathologies. This leads to underdiagnosis and misdiagnosis of this disorder, incorrect management, and severe complications.Therefore, a high index of suspicion and awareness of front line laboratory investigations is important for diagnosis. Definitive diagnosis enables implementation of strategies to prevent acute attacks, and also triggers genetic testing and genetic counseling of at-risk family members.

Keywords

Acute intermittent porphyria, hydroxymethylbilane synthase, delta-aminolevulinic acid, porphobilinogen, mutation analysis, genetic counseling.

CR 6
Pyrexia of Unknown Origin; a Case of Extreme Hyperferritinaemia

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Introduction
Clinical biochemistry investigations alone help to diagnose diseases in patients with complex clinical background. This report describes a patient with pyrexia of unknown origin who had extreme hyperferritinaemia.

Case Presentation
A 36-year-old woman was presented with urticarial rash associated with fever for three weeks duration. She had a history of recent travel to India. Examination revealed tender abdomen with palpable liver, but no lymphadenopathy or splenomegaly. Broad-spectrum antibiotics were commenced suspecting sepsis, but symptoms were not improved.
Full blood count showed neutrophil leukocytosis. Inflammatory markers were raised; C-reactive protein was 69 mg/L. Blood and urine cultures did not show evidence of bacterial, viral and fungal infections. Biochemistry revealed mild hyponatraemia, hypokalaemia and elevated Alanine Aminotransferase. Bone and renal functions were normal.
Fever and rash lead the investigations towards a systemic inflammatory disease thus serum ferritin was measured. It was extremely elevated to 117,884 µg/L (10-200 µg/L). Serum iron, transferrin, B12 and folate were normal.
Serum autoimmune markers were negative. Whole body scan revealed no evidence of malignancy. Hepatitis, cytomegalovirus, Epstein-Barr virus and other possible infection screens were negative. There was no evidence of lymphoma on lymph node biopsy. Bone marrow examination showed no evidence of haemophagocytosis.

Discussion
Hyperferritinaemia of >10,000 µg/L could be observed in inflammatory processes, liver failure, extra hepatic biliary obstruction, malignant and autoimmune diseases, haemochromatosis, benign hyperferritinaemia, and drug induced hypersensitivity syndrome. Extreme hyperferritinaemia can be found in rare clinical conditions namely Adult Onset Still Disease or haemophagocytic lymphohistiocytosis. Given clinical and laboratory findings Adult Onset Still Disease was the working diagnosis. A short course of steroids and cyclosporine were commenced. Patient recovered and was discharged to primary care.
Adult onset Still disease is a rare inflammatory disease of unknown aetiology and extreme hyperferritinaemia is usually found as a useful marker for diagnosis.

Keywords
Hyperferritinaemia, adult onset Still disease

CR 7

A Patient with Rhabdomyolysis and High Creatine Kinase

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Introduction

McArdle disease is a pure myopathy caused by an inherited deficit of the skeletal muscle isoform of glycogen phosphorylase. It exhibits clinical heterogeneity, but patients typically experience exercise intolerance, acute crises of early fatigue and contractures, sometimes rhabdomyolysis and myoglobinuria, triggered by static muscle contractions or dynamic exercise. We report a case of a young boy presented with rhabdomyolysis, showing significantly raised creatine kinase (CK) for the first time in his life.

Case Presentation

A 16-year-old school boy was admitted to the hospital having collapsed following an absence seizure while playing tennis with friends. He was previously well and had no similar episodes before. He did not have fever, or other associated symptoms. He has never had trauma. He denied use of recreational drugs and alcohol. There was no family history of neuromuscular diseases.

He was conscious, rational and haemodynamically stable. Neurological examination was unremarkable. A few hours after, dark brown urine was noted with normal urine output.

On admission, he had a normal renal profile with significantly raised CK at 100,000 IU/L. Other abnormalities noted were high alanine aminotransferase, lactate dehydrogenase, inorganic phosphate and magnesium. Urine full report showed no red cells. Blood gas did not suggest acidosis.CK increased up to 539,000 IU/L at its peak in 36 hours. Underlying neuromuscular or metabolic disorder was suspected based on elevated CK and rhabdomyolysis. Plasma lactate and ammonia were normal. Metabolic investigations showed normal acylcarnitine, very long chain fatty acids, amino acids and urine organic acid profiles. Genetic studies identified a pathogenic mutation causing deficiency of muscle glycogen phosphorylase. This confirmed the diagnosis of McArdle disease. His CK was 560 IU/L on discharge. He was advised to maintain regular moderate exercise and provided physiotherapy guided techniques.

Discussion

Rhabdomyolysis is a form of presentation of McArdle disease that often poses a diagnostic challenge. Interestingly, high CK can be the only sign of McArdle disease in childhood.

Keywords

Creatine kinase, rhabdomyolysis, McArdle disease

CR 8

Pseudohypoaldosteronism-II in a Patient with Renal Impairment and on Losartan; a Diagnostic Challenge

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Introduction

Pseudohypoaldosteronism-II (PHA-II) is a rare genetic disorder of renal tubular electrolyte handling due to defective sodium and potassium channels. These patients classically present with hypertension, hyperkalaemia (despite normal glomerular filtration), metabolic acidosis and hyperchloremia. A similar biochemical abnormality can occur in patients with chronic kidney disease and on angiotensin receptor blockers. However; metabolic derangements in PHA-II, characteristically respond to thiazides if due to overactive NaCl co-transporter (NCCT) at distal convoluted-tubules (DCT).

Case Presentation

A 70-year-old female presented with generalised body weakness for one month and difficulty in walking for one week duration. She had a history of hypertension (>20 years) for which she was recently started on losartan. Two years back, she had an episode of hyperkalemic periodic paralysis.

On this admission, her blood pressure was 160/100 mmHg and there was mild weakness in all four limbs. Her investigations revealed hyperkalaemia (8.9mmol/L), hyperchloremia (110 mmol/L), metabolic acidosis (pH 7.277, HCO_3^- 15.1 mmol/L), and moderately tall T waves in ECG. Her serum creatinine was 154 µmol/L and aldosterone was 452 pmol/L.

A trial of HCT was able to correct above metabolic derangements (K^+ 4.8 mmol/L, pH 7.392, HCO_3^- 25.8 mmol/L) with evidence of increased fractional excretion of potassium. During follow-up a week later, she remained normokalaemic on HCT and frusemide.

Discussion

In PHA-II, overactivity of NCCT increases sodium, water reabsorption at DCT leading to hypertension and reduced Na^+ delivery to collecting ducts (CD). This retards the development of a potential gradient through Na^+ reabsorption, along which K^+, H^+ are excreted at CD. By inhibiting Na^+ reabsorption at DCT, thiazides facilitate aldosterone regulated K^+, H^+ excretion at CD, correcting hyperkalaemia and acidosis.

Considering the response to HCT, diagnosis of PHA-II was made in this patient, which awaits conformation by genetic studies. Although rare, channelopathies should be considered in patients presenting with electrolyte abnormalities.

Keywords

Pseudohypoaldosteronism, hyperkalaemia, hypertension, renal tubular acidosis, channelopathies

CR 9

Overcoming Spurious Hyperkalaemia due to Platelets

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Introduction

The occurrence of spuriously high serum potassium levels have been associated with high platelet counts. It is due to the degranulation of platelets during clotting in vitro, releasing potassium into the serum.

Case Presentation

A 69-year-old man was admitted following a fall. On admission the white cell count was 12,920/µL, haemoglobin 83 g/L and the platelet count 1,550,000/µL (150,000 – 450,000).

Serum sodium, potassium and chloride were respectively 141, 5.8 (3.5 – 5.1) and 113 mmol/L. Plasma sodium, potassium and chloride (on a sample collected into lithium heparin at the same time) were 141, 4.3 and 112 mmol/L, respectively. Serum creatinine was 1.5 mg/dL (0.8 – 1.3).

The Blood picture showed macrocytes andspherocyteswith normal leucocytes, together with severe thrombocytosis.Bone marrow was normocellularand had increased megakaryocytes with some dysplastic forms. Platelet lakes/clumps were prominent. The myeloid series was normal and the erythroid series had reduced precursors.The trephine biopsy showed increased megakaryocytes with clustering, without significant fibrosis.JAK2 V617F mutation was detected. The patient was diagnosed to have Essential thrombocythaemia.

Discussion

This case illustrates the occurrence of spurious hyperkalaemiaassociated with marked thrombocytosis. The collection of a sample into lithium heparin at the same time, allowed the laboratory to issue the true potassium level.

Essential thrombocythaemia is identified by an increased platelet count due to abnormal pluripotent stem cell proliferation resulting in excessive megakaryocyte division. The above investigations support this diagnosis as against a secondary thrombocythaemia. The clinical complications involve the sequelae of abnormal platelet function, namely haemorrhage or thrombosis.

Potassium measurement should be performed in a plasma sample (and not in serum) in the presence of marked thrombocytosis.

Keywords

Thrombocythaemia, spurious potassium, thrombocytosis

CR 10

Chyloperitonium; a Rare Presentation

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Introduction

Milky ascites is subdivided into 3 groups as true chylous ascites (fluid with high triglyceride content), chyliform ascites (fluid with a lecithin-globulin complex due to fatty degeneration of cells) and pseudochylous ascites (fluid that is milky in appearance due to the presence of proteins). Ascitic fluid triglyceride level greater than 110 mg/dl is diagnostic of chylous ascites.

Case Presentation

A 70 years old male presented with bilateral leg swelling, abdominal distension and difficulty in breathing for one month. He had a past history of hepatocellular carcinoma, which responded well to ethanol injections.

Patient underwent peritoneal tap and fluid was milky in appearance. Peritoneal fluid protein concentration was < 3g/dl, which excluded the possibility of an exudate. However, there was a heavy lymphocytic infiltration in fluid with an elevated triglyceride concentration of 197 mg/dl.

Initial computed tomography (CT) report was suggestive of liver cirrhosis with multi focal hepatoma and ascites. However, further evaluation of computed tomography scan revealed mesenteric mass suggestive of carcinoid tumor with liver metastasis.

24 hour urine excretion of 5-hydroxy indole acetic acid (5-HIAA) was 23.2 mg (3-17) and chromgranin A was 1250.0 µg/ L. (< 100.0 µg/ L)

Histological appearance was compatible with neuroendocrine tumor grade 2 and confirmed by immunostaining.

Discussion

Small bowel carcinoid tumor was suspected according to CT findings, 5-HIAA and chromagranin A results. Diagnosis was confirmed by immunohistochemistry. Patient didn't show any symptoms of carcinoid syndrome because serotonin produced by the foregut was metabolized by the liver.

Method of fluid protein measurement is very important in this case. If turbidimetry (sulphosalysilic acid) was used to measure proteins there could have been false positive results due to background turbidity from chyle. This patient's fluid protein was assayed by dye binding method, which has a minimal effect from high triglycerides.

Keywords

Chyle, peritoneal fluid, triglyceride, serotonin, neuroendocrine tumor

CR 11

A Patient Presenting with Multiple Myeloma Complicated with Multiple Pathologies

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Introduction

Multiple myeloma (MM) is a male predominance haematological malignancy, occurs frequently during old age. Light chain amyloidosis is one of the common associations that can be seen with MM accounting for 20 - 35%.

Case Presentation

A 60-year-old man presented with gradual onset generalized body swelling with back pain and shortness of breath associated with loss of weight and loss of appetite. He was a heavy alcoholic and a smoker.
He had generalized oedema with a purpuric rash scattered over bi-lateral forearms and legs. He was hypertensive and had signs of pulmonary oedema with hepatospleenomegally.
He had evidence of a chronic alcoholic liver disease and a stage IIIb renal disease with severe proteinuria accompanied by diabetes mellitus and secondary hyperlipidaemia. Radiological investigation showed enlarged kidneys with numerous lytic lesions in skull x-ray associated with pathological fractures. 2D Echo showed ejection fraction of 35% and left ventricular hypertrophy.
During extensive evaluation, a monoclonal band in α2 region in serum protein electrophoresis with a paraprotein level of 18.4 g/L and urine protein electrophoresis revealed heavy albuminuria with monoclonal excretion of proteins in α2 region. According to immunofixation electrophoresis, that monoclonal band was IgA lambda. Bone marrow aspiration and trephine biopsy showed abnormal plasma cell count of 20 – 23% with positive CD38 (66%), CD138 (64%) and lambda (90%). Renal biopsy revealed amyloidosis.

Discussion

The diagnosis of symptomatic MM associated with light chain renal amyloidosis was made. His multiple pathological conditions were managed appropriately with a combined chemotherapy regimen. He had a high level of serum β2 microglobulin (19.67 mg/dL, ref. range 0.9 – 2.0) with renal failure and positive CD19 (63%) and CD117 (43%) indicating bad prognosis. He was passed away due to a STEMI which is contributed by hypertension, diabetes, secondary hyperlipidaemia, renal failure, chronic alcoholism and smoking.

Keywords
Multiple myeloma, light chain amyloidosis, proteinuria

RESEARCH PAPERS

RP 1

Salivary Galectin-3 in Heart Failure Management

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Introduction

Heart failure (HF) is a complex syndrome that is associated with a high incidence of morbidity and mortality. Due to an aging and a growing population, HF is becoming pandemic worldwide and re-hospitalization due to HF significantly impacts on the healthcare system. Recent studies have shown the prognostic value of serum galectin-3 levels in HF. Galectin-3 plays an important role during inflammation and cardiac remodelling leading to the development of HF. Recent scientific evidence supports that saliva can be used in detecting systemic events. Our aim was to investigate the potential diagnostic and prognostic utility of salivary galectin-3 levels in the management of HF patients.

Methods

Blood and saliva samples were collected from patients with HF (n=38, stable and unstable) at baseline (at hospital discharge) and after 1-month. HF patient selection criteria includes a left ventricular ejection fraction of ≤ 40% according to Framingham criteria. Stable HF patients (NYHA class II and EF ≤ 40%) were recruited from the cardiology outpatients. We modified R&D® Duoset Galectin-3 ELISA kit (cat#: DY1154) for the measurement of salivary galectin-3 levels. GraphPad Prism 7 software was used to calculate galectin-3 levels between controls and patients. The clinical performance (sensitivity and specificity) of salivary galectin-3 was evaluated by receiver operator characteristic (ROC) curve analysis.

Preliminary Results

Salivary galectin-3 levels were found to be higher in HF patients' saliva samples (median=112.9 ng/mL, n=38) compared to healthy controls (median=70.61 ng/mL, n=38). A positive galectin-3 correlation was found at baseline and at one month follow up for salivary galectin-3 (p=0.0003, Pearson r=0.572). This was not achieved using serum galectin data.

Conclusion

Salivary galectin-3 level shows promise as an alternative medium due to its non-invasive, cost-effective way to identify at risk HF patients who will require re-hospitalisation and/or who will develop HF complications. Further studies are needed to fully validate the potential clinical utility of salivary galectin-3 in HF patients.

Keywords
Heart failure, galectin-3

RP 2

A Study of Insulin Resistance by HOMA-IR and McAuley Index on the Sleep Quality and Sleep Duration among Healthy Young Adults

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Introduction
In a recent recommendation by the American Diabetes Association (ADA) the assessment of sleep pattern and duration is a part of the comprehensive medical evaluation. There has been emerging evidence of a relationship between the quality of sleep and glycaemic control. Sleep hygiene is being recognized as an important modifiable risk factor for diabetes mellitus. Young individuals are also presenting with diabetes, possibly due to sleep deprivation. It is imperative that the body bears this insult of poor sleep hygiene for quite some time, in the adolescent and young adult period before presenting as diabetes. The aim of this work is to evaluate the association of sleep quality and duration with markers of Insulin Resistance (IR) in apparently healthy young adults.

Methods
We conducted a cross-sectional study among medical students by voluntary participation. A predesigned questionnaire was filled up followed by recording of blood pressure, height, weight, waist and hip circumference. A fasting blood sample was collected for glucose, lipids and insulin levels. HOMA-IR and McAuley indices to assess IR were calculated. A fasting insulin level ≥12mU/L has been proposed as the cut-off for subjects with insulin resistance. Data were analysed using t-test, chi-square test and spearman correlation coefficient. Odds ratio (OR) was estimated for risk category stratified by sleep quality and sleep duration.

Results
Of the 90 students recruited, 49 had adequate sleep (≥7 hours) and 41 had inadequate sleep (< 7 hours). BMI was more in subjects with inadequate sleep duration (IASD) than with adequate sleep (25.2 ± 3.4, p = 0.01). Fasting insulin was significantly higher (15.9 mU/L ± 0.3, p = 0.01) and McAuley index significantly lower (6.6 ± 1.5, p = 0.03) in IASD than with adequate sleep (Insulin 13.7 mU/L ± 4.1, McAuley index = 7.2 ± 1.2) with no significant change in HOMA-IR in both the groups. The odds of having IR was 2.25(0.96-5.24 CI, p = 0.05) with poor quality sleep and 2.7(1.16-6.55 CI, p = 0.02) with IASD.

Conclusion
Both poor sleep quality and short duration of sleep can develop IR. McAuley index was more sensitive measure of IR on the impact of sleep than HOMA-IR.

Keywords
HOMA-IR, insulin resistance, McAuley index, sleep quality

RP 3

Comparison of Conventional Chemical Method to Immunochemical Method for Faecal Occult Blood Testing

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Introduction
Faecal occult blood testing (FOBT) is one of the effective methods to screen for colorectal cancer and to assess for gastrointestinal bleeding in suspected patients. Chemical method for faecal occult blood is based on peroxidase like activity of haemoglobin. This method is not specific as other chemicals present in stools also can give reaction leading to false positivity, whereas, immunochemical method is based on specific antibody against haemoglobin molecules of red blood cells. Differences in the sensitivity and the specificity between these 2 methods result in significant effects on further investigations. In this study we check whether there is a significant difference between traditional chemical method and immunochemical method for faecal occult blood testing.

Methods
We evaluated the analytical performance of two different methods (traditional chemical method and immunochemical method) using 25 patients. Both males and females referred to gastroenterology clinic of a Teaching Hospital were included in this study. From a single patient 3 consecutive samples were taken as per requirement for chemical method. Colonoscopy evidence of each of the patient was taken as the “gold standard”.

Results
Chemical method revealed 7 true positives, 5 false positives, 7 false negatives and 6 true negatives out of the 25 patients. The analytical sensitivity and specificity of chemical method was 50.0% and 54.5% respectively. Immunochemical method gave 12 true positives, 1 false positive, 2 false negatives and 10 true negatives. Immunochemical method produced 85.7% of sensitivity and 90.9% of specificity.

Conclusion
These results demonstrate significant differences in the analytical performance among two faecal occult blood testing methods. The immunochemical method which showed superior sensitivity and specificity is more suitable than the chemical method for screening for colorectal carcinoma or for the assessment of gastrointestinal bleeding in suspected patients.

Keywords
Faecal occult blood test, colorectal carcinoma

RP 4

A Community Study of Dietary Salt Intake Estimated by 24-hour Urinary Sodium Excretion in a Group of Healthy Adults

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Introduction
Increased salt intake is associated with non-communicable diseases such as hypertension, coronary artery disease and carcinoma of stomach. Hence, it is a public health concern worldwide. In many countries, the average salt (NaCl) consumption is greater than the recommended intake of less than 5 grams per day (by the world Health Organization). There are limited studies that have been done in the local community in order to investigate the salt intake.

Objective
To assess the dietary salt intake based on 24 hour urinary sodium excretion in a group of healthy adults.

Methods
It was a community based cross-sectional study done in Galle in 2017. Data were gathered from apparently healthy individuals after informed written consent. A 24 hour-sample of urine was collected as per the standard protocol. Participants were instructed to collect a complete 24 hour sample by maintaining the time records. Urine samples of less than 300 mL were excluded from the analysis. Concentration of sodium in urine was estimated by using direct Ion selective Electrode method. The 24 h urinary sodium excretion was calculated by multiplying the concentration of sodium in urine (mmol/L) by the urinary volume (L/day). The Na in mmol was divided by 17 and converted to NaCl in grams. Data was analysed by the descriptive statistics and Mann-Whitney test.

Results
There were 64 females and 39 males (Total=103) in the age range of 21-67 years with the median of 42 years. 24 hour- urine volume ranged from 0.435 to 3.305 with a median of 1.235 L. The 24 hour-sodium excretion varied from 17.1 to 618.6 with a median of 142.3 mmol per day. The dietary intake of NaCl ranged from 1.0 to 36.4 with a median of 8.4 g per day. Among them, 31 (30.1%) study subjects had taken salt < 5.0 g/day and 72 (69.9%) had taken ≥ 5 g/day. Salt intake was not significantly different between males and females (median; 8.4 g/day VS. 8.2 g/day, p=0.986).

Conclusion
Salt intake was more than the recommended intake among the majority of the individuals. Therefore, necessary public health measures should be taken to reduce the salt intake.

Keywords
Dietary salt intake, urinary sodium, 24 hour urine sample

RP 5

Salivary Cortisol: a Non-invasive Measure of Adrenal Function in Patients Following Steroid Use

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Introduction

All forms of steroid use may result in short or long- term suppression of adrenal function. Recovery from suppression may be monitored by baseline morning plasma cortisol levels or stimulated plasma cortisol levels post Synacthen. We investigated the potential of morning salivary cortisol as an alternative non-invasive measure.

Methods

An LC-MS/MS salivary cortisol assay utilising 0.2 mL saliva was established using liquid-liquid extraction, C18 HPLC column and detection on Sciex 5500 MS/MS. The limit of quantitation was <1 nmol/l.

A published morning salivary cortisol reference range was validated using 21 volunteers (3-20 nmol/L)

Patients (n=3, 40-43 years) with sub-glottic stenosis undergoing intralesional triamcinolone injections (60-80 mg) had 7 am salivary cortisol levels measured pre-injection and daily for one week post injection . Morning plasma cortisol levels were also obtained on day 0, 1 and 7.

Patients (n=8, 24-77yrs) receiving dexamethasone (1mg at midnight) had 9 am salivary and serum cortisol levels measured the following morning.

Results

Paired serum total, and salivary free, cortisol levels established a good linear relationship over the range of serum cortisol 0-350 nmol/L ($y = 0.0445x-1.1489$, $R^2=0.8293$).

Patients receiving sub-glottic triamcinolone showed suppressed morning salivary cortisol (<3 nmol/L) for 2-4 days with full recovery by day 7.

In the dexamethasone group, morning salivary cortisol levels were suppressed <3 nmol/L in all patients with a suppressed serum cortisol.

Conclusions

We have established a simple non-invasive approach to monitor duration and extent of adrenal suppression following short term steroid treatment.

Furthermore, salivary cortisol has particular appeal in paediatrics and may have additional research application in studies of the stress response because it bypasses the potential stress of blood collection.

Keywords

Salivary cortisol, liquid chromatography-mass spectrometry

RP 6

Prevalence and Incidence of Severe Hypomagnesaemia in Proton Pump Inhibitor Users in a Tertiary Care Hospital

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Introduction
In spite of strong evidence for proton pump inhibitors (PPI's) being associated with severe hypomagnesaemia, product literature suggests that severe hypomagnesemia is seldom reported in patients on PPI's. Following three cases of severe hypomagnesemia in patients on PPI's a study was performed to assess frequency of severe hypomagnesaemia among PPI users.

Methods
All cases of serum magnesium (Mg) < 0.4 mmol/L (reference range 0.74 - 1.03) over a 12-month period were extracted from the laboratory information system (LIS) in a retrospective audit and their medical histories were examined. A prospective study was then conducted on all patients on regular PPI's admitted into medical wards and their serum biochemistry including Mg was performed.

Results
In the 12-month retrospective audit 125 patients had severe hypomagnesaemia and 85% of these were on PPI's (pantoprazole 45, esomeprazole 41, omeprazole 12 and rabeprazole 7) with less than half also on a diuretic. Only 4 patients were on chemotherapy. 13/125 had diarrhoea. 26/125 also had atrial fibrillation; 15/125 had hypocalcaemia. The total number of Mg requests over this period was 186,434.
In the prospective study only two out of 50 patients admitted on regular PPI's had severe hypomagnesaemia.

Conclusion
PPI's are the most common drug associated with severe hypomagnesaemia however the overall incidence of severe hypomagnesaemia (Mg<0.4 mmol/L) in PPI users remains low. Susceptibility of hypomagnesaemia in PPI users varies and the serum magnesium levels should be monitored in regular PPI users.

Keywords
Proton pump inhibitors, severe hypomagnesaemia

RP 7

Preoperative Hypomagnesaemia and Its Impact on the Development of Postoperative Biochemical and Symptomatic Hypocalcaemia following Total Thyroidectomy

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Introduction
Hypocalcaemia is a common complication after total thyroidectomy and produces potentially severe symptoms. Monitoring of serum calcium and magnesium is important and correction of those deficiencies facilitates early recovery.

Methods
Hospital and laboratory based prospective, analytical cross sectional study was conducted including 63 patients, underwent total thyroidectomy, recruited from a surgical unit of a Base Hospital by using a random sampling method. Plasma iPTH, eGFR, serum albumin corrected total calcium (SACTC) and magnesium were analysed on, the day before the surgery. SACTC was measured on postoperative (Postop) D1 and D14, and symptoms of hypocalcaemia were assessed on Postop D1. Data were analysed using Mini Tab version 16® and descriptive and inferential statistics were used.

Results
The mean age was 48.25 years (SD = 12.36) and 89% (n = 56) were females and 11% (n = 7) were males. 85% (n = 55) had benign conditions and 13% (n = 8) had malignancies.
40% (n = 25) patients were hypomagnesaemic (level < 0.7 mmol/L) preoperatively and out of those 88% (n = 22) got biochemical hypocalcaemia (BHC) (level < 2.15 mmol/L) on Postop D1. Patients who developed BHC, 23% (n = 5) had symptoms of hypocalcaemia and all of them had serum Mg level of less than 0.5mmol/L and none of them had malignancies. Out of normomagneseamic patients preoperatively (n = 38), 42% (n = 16) had biochemical hypocalcaemia with symptoms.
There was no statistically significant correlation between preoperative (Preop) serum magnesium level and the SACTC level on Postop D1, among patients who had both Preop hypomagnesaemia and BHC on Postop D1.(Pearson correlation = (-)0.001, adjusted R^2 = 0.00%, P = 0.996 and OR = 0.863,CI for OR = 4.23 - 0.18)
Out of 5 patients who developed symptomatic hypocalcaemia on Postop D1, only 20% (n = 1) recovered from BHC by Postop D14 with standard calcium replacement therapy.

Conclusion
It is preferable to measure serum magnesium level preoperatively to exclude any deficiency which is a contributing factor for postoperative hypocalcaemia.

Keywords
Hypocalcaemia, hypomagnesaemia, total thyroidectomy

RP 8

To Determine the Interference by Oral Thyroxine in Serum Free Thyroxine Assay in Indoor and Outdoor Hypothyroid Patients in Teaching Hospital Colombo South

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Introduction
Oral thyroxine is the treatment of choice for hypothyroidism. Measurements of serum free thyroxine (FT4) and TSH levels are recommended for diagnosis and assessment of the effectiveness of the treatment. Interference of oral thyroxine in FT4 assay can cause misinterpretation of the FT4 level and mismanagement of the patient.

Objective
To determine the interference of oral thyroxine in serum FT4 assay in outdoor and indoor hypothyroid patients in Teaching Hospital Colombo South.

Methods
Case series study was done in indoor and outdoor hypothyroid patients at Teaching Hospital Colombo South from 1st of February to 30th of April. One hundred and one patients were recruited after reviewing clinical notes and getting informed consent. Blood samples were collected prior to and two hours after taking oral thyroxine dose.

Results
Out of 101 patients who have participated in the study, 26 were males. Selected 101 cases were distributed with mean age of 48.4 (SD +/- 11.16 years) and their serum FT4 levels were analysed by competitive chemiluminescence assay. The difference between second and first value was analysed by using paired sample test and P value was < 0.05.

Conclusion
There was a significant difference in serum FT4 level before and two hours after ingestion of oral thyroxine dose. It indicates that oral thyroxine interferes in serum FT4 assay.

Keywords
Hypothyroidism, oral thyroxine

RP 9

Correlation between Plasma and Salivary Glucose Levels on Diabetic Patients Attending Diabetic Centre at Teaching Hospital, Jaffna

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Introduction
Diabetes mellitus (DM) is being diagnosed and monitored by invasive, painful procedures causing discomfort to patients. Saliva can be used as an alternative to blood as saliva collection is non-invasive and associated with fewer compliance problems.

Methods
This laboratory-based experimental study consisted of 83 diabetic patients (49 females and 34 males) who attended Diabetic Centre, Teaching hospital, Jaffna. Patients with salivary gland surgeries, pregnancy, who chew betel, arecanut and chewing gum were excluded. Fasting venous blood and un-stimulated saliva were collected into fluoride-oxalate and sterile plastic container respectively. Salivary glucose was estimated by an improvised glucose oxidase-peroxidase method. The LOQ for this method is 0.2 mg/dL, however, extensive testing around the lower limit is needed. Precision test was performed to validate the test results. Pearson's correlation coefficient was used to assess the correlation.

Results
Mean (±SD) plasma and salivary glucose levels were 139.05mg/dL (±49.62) and 1.02mg/dL (±0.59) respectively. Plasma and salivary glucose were within the range of 57.04 to 251.43 mg/dL and 0.24 to 2.32 mg/dL respectively. Salivary glucose level was significantly increased with the increase of plasma glucose (Pearson's correlation coefficient = 0.694, $p < 0.0001$; $R^2 = 0.43$). Higher degree of correlation was found in females ($r = 0.844$, $p < 0.001$; $R^2 = 0.71$) than males ($r = 0.417$, $p = 0.014$; $R^2 = 0.17$). Study population was subdivided based on plasma glucose levels and the correlation was evaluated between plasma and salivary glucose. Pearson's correlation coefficients of the subgroups "< 126 mg/dL", "126 to 200 mg/dL" and "> 200 mg/dL" were 0.33 ($p = 0.033$), 0.49 ($p = 0.009$) and 0.71 ($p = 0.007$) respectively.

Conclusion
Fasting salivary glucose level can be used as a non-invasive diagnostic and monitoring fluid to assess the glycaemic status in DM patients. However, there is pronounced correlation in females and patients with plasma glucose > 200 mg/dL. Further studies including larger populations from different geographical areas are required to establish saliva instead of blood for diagnosis and monitoring of DM.

Keywords
Salivary glucose, diabetes mellitus

RP 10

Correlation of eGFR (CKD EPI 2009) Reported Using Serum Creatinine Measured by Two Different Reagents for Jaffe Method

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Introduction

Most of the government sector hospital laboratories in Sri Lanka use serum creatinine based formulae to determine eGFR. Current guidelines for reporting eGFR recommend to use IDMS traceable reagents to measure creatinine. Commercially prepared reagents available in the market at present are IDMS aligned. Using in-house prepared reagents is a cost effective alternative. The aim of this study was to assess the correlation between eGFR reported using serum creatinine measured using a commercial reagent kit and an in-house prepared and validated regent for Jaffe method.

Methods

A descriptive cross sectional study was performed at a tertiary care hospital, in 2014, using 143 blood samples collected from Chronic Kidney Disease patients and healthy individuals. Serum creatinine concentration was measured using modified kinetic Jaffe method by two different reagents, a commercial reagent and in-house prepared and validated reagent. Both assays were made IDMS traceable by using a standard reference material. The eGFR was estimated using CKD EPI-2009 equation. Correlation of eGFR determined by the two methods was assessed.

Results

The results demonstrated an excellent correlation between eGFR predicted using commercial regent kit and the in-house prepared reagent. The Pearson correlation coefficient of the two estimates was 0.972.

Conclusion

In-house prepared and validated reagents can be used as a cost effective alternative in the measurement of creatinine, provided the Jaffe method is standardized by IDMS traceable standard reference material.

RP 11

Evaluation of the Interference of Different Bilirubin Concentrations on Determination of Serum Triglyceride Concentration by Glycerol Phosphate Oxidase Method at Different Wavelengths in Pooled Serum

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Introduction
Triglyceride measurement is important for heart health analysis as it is included in lipid profile and contributes to calculating Low-Density Lipoprotein cholesterol. In hyperbilirubinaemia, bilirubin may cause chemical and spectral interference in triglyceride estimation by Glycerol Phosphate Oxidase method. Spectral interference of different concentrations of bilirubin at different wavelengths was evaluated by this study.

Methods
Different concentrations of bilirubin (20, 40, 60, 80 and 100 mg/dL) were prepared by diluting bilirubin standard (200 mg/dL) in prepared pooled serum (25 mL). Triglyceride values in different concentrations of bilirubin treated pooled serum were measured at four wavelengths (490, 505, 545 and 555 nm) by glycerol phosphate oxidase method and were compared with baseline triglyceride values in two categories where one based on wavelengths and the other based on added bilirubin concentrations.

Results
When comparing the different concentrations of bilirubin treated triglyceride levels with baseline triglyceride level measured at different wavelengths, there were no significant variations observed at 545 nm and 555 nm up to 60 mg/dL and 20 mg/dL added bilirubin concentrations respectively ($P>0.05$). However, there were significant variations observed in all bilirubin concentrations at 490nm and 505 nm ($P < 0.001$). When comparing bilirubin treated triglyceride concentrations with baseline triglyceride at each wavelength, there were no significant variations observed in 20, 40 and 60 mg/dL bilirubin treated serum at 545 nm.

Conclusion
This study revealed that 545nm wavelength is preferable for triglyceride measurement as it gives negligible bilirubin interference up to 60mg/dL.

Keywords
Triglyceride, bilirubin, interference, wavelengths

RP 12

Association of Serum Uric Acid and Gamma-Glutamyltransferase with Components of Metabolic Syndrome in Obese Children in a Tertiary Care Centre

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Introduction
Obesity among the young is an emerging health problem. Although gamma glutamyltransferase (GGT) and serum uric acid (UA) are not used in the definition of metabolic syndrome (MetS) there are studies showing their associations individually contributing to cardiovascular disease in obese children. Our objective was to determine the association of UA and GGT with components of MetS.

Methods
A cross sectional analytical study was conducted at the obesity clinic among 5-15 year old obese children whose body mass index was >2 standard deviation from the median. After a 12-hour overnight fast, blood was drawn for glucose, lipid profile, alanine aminotransferase (ALT), aspartate aminotransferase (AST), UA and GGT. Oral glucose tolerance test (OGTT) was done with 2-hour plasma glucose. Height, weight, waist circumference, blood pressure and fat mass were measured. Ultra sound scan of abdomen was performed. Chi square test was utilized for associations while validity of GGT and UA in predicting MetS was evaluated using receiver operating characteristic (ROC) curves.

Results
We studied 205 children and 16.1% (11.07-21.13 95% CI) had elevated GGT and 2.9% (2.81-2.98 95% CI) had elevated UA. Chi square test showed a statistically significant association between GGT and UA with triglyceride, AST, ALT, AST/AST ratio and fatty liver. Additionally UA showed a significant association with OGTT.
With existing cut offs GGT (>30 U/L) and UA (>330 µmol/L) the sensitivity and specificity of GGT in predicting MetS was 19% (13.63-24.37) and 88.4% (92.78-84.02) respectively while for UA is 28.6% (34.78-22.42) and 80.2% (85.65-74.75) respectively.
A cut off value of 19.5 U/L (sensitivity 56% and specificity 55%) for GGT and 275.50 µmol/L (sensitivity 61% and specificity 54%) for UA predicted MetS.

Conclusion
GGT and UA are associated with metabolic derangements and these biomarkers can be used to predict MetS.

Keywords
Serum uric acid, gamma-glutamyltransferase, metabolic syndrome, obesity

RP 13

Evaluation of Fibroblast Growth Factor-21 ELISA Method and Its Performance for the Investigation of Mitochondrial Disease

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Background
Recent work has suggested that fibroblast growth factor-21 (FGF-21) as a useful biomarker of mitochondrial disease (MD). A commercial kit for measuring FGF-21 by Enzyme immunosorbent assay (ELISA) is available. The aim of this study was to evaluate the ELISA method for FGF-21, and to assess its suitability as an in-house assay. The diagnostic performance of the test was based on analysis of specimens received from patients investigated for MD. Manufacture's reference range evaluated using age and sex-matched local healthy population.

Methods
Method evaluation experiments include linearity, recovery, precision, stability studies and interference testing. Serum was the type of specimen used. One hundred and thirty-three patients' samples from Oxford MD service were analysed. One hundred and six of these patients had molecular evidence for MD, 27 were deemed to have disorders other than MD (non-MD). FGF-21 results from 78 local healthy volunteers were compared with manufacture's claimed reference data.

Results
The overall analytical performance of the FGF-21 assay was acceptable. Serum FGF-21 is stable in room temperature up to a week. Patients with defects in mitochondrial DNA (mtDNA) maintenance (n=33) and mtDNA rearrangements (n=17) had the highest median FGF-21 amongst the MD group. Other MD patients harbouring mtDNA point mutations (n=41) or mutations in other autosomal genes (n=7) and those with partially characterised MD (n=8) had lower FGF-21. The area under the receiver operating characteristic curve (ROC) to distinguish MD from non-MD patients was 0.728.

Conclusion
Good overall analytical performances and stability studies support FGF-21 ELISA method as a reliable laboratory investigation for patients suspected having MD. ROC analysis showed that FGF-21 has a sensitivity of 86% for detecting MD at 189 ng/L. Therefore, we suggest that a high serum concentration of FGF-21 is clinically useful in MD and can use as a screening test that supports diagnostic pathway for mitochondrial service in Oxford.

Keywords
Mitochondrial disease, FGF-21

RP 14

Evaluation of Calcium Levels in Patients with Differentiated Thyroid Carcinomas Presented to the National Cancer Institute, Maharagama, Sri Lanka

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Introduction
Postoperative hypocalcaemia is the most frequent complication of total thyroidectomy but routine administration of calcium and/or vitamin D supplement may cause hypercalcaemia.

Objectives
The aim of this study was to assess the serum calcium levels among Differentiated Thyroid Carcinoma (DTC) patients who underwent total thyroidectomy.

Methods
The target population of this study was patients who underwent total thyroidectomy for differentiated thyroid malignancies, presented for thyroglobulin assay to the National Cancer Institute, Maharagama. One hundred and seventy six patients were recruited for the study and all samples were analysed for total calcium and albumin. Relevant information of the population and histology was acquired by using an interviewer administered questionnaire sheet and clinical records respectively. Results were expressed as absolute values and percentages.

Results
176 subjects were recruited for the study. 83% (146/176) were females and 85.2% (150/176) of them had papillary carcinomas and 14.8% (26/176) had follicular carcinomas. Mean duration after total thyroidectomy was 4.28 years. 26.1% (46/176) had shown hypocalcaemia, 17.6% (31/176) had shown hypercalcaemia, and the remaining 56.3% (99/176) had shown normocalcaemia. 71.6% (126/176) were on calcium supplements. Overall incidence of hypocalcaemia was 26.1% and that of permanent hypocalcaemia was 19.31% (34/176). Among patients with hypocalcaemia 54.34% (25/46) were on calcium supplements out of that 56% (14/25) received only calcium lactate, 12% (3/25) received only 1α-cholecalciferol and other 32% (8/25) received both. 45.65% (21/46) were not on calcium supplements. In this study 17.6% (31/176) of patients were found to have hypercalcaemia and all were on calcium supplements.

Conclusion
Once patients have undergone total thyroidectomy, they have to be followed up with serum calcium, to adjust replacement therapy and prevent hypo and hypercalcaemia.

Keywords
Hypocalcaemia, total thyroidectomy, differentiated thyroid malignancies

RP 15

An Internal Audit to Assess the Completeness of Data in Request Forms of Methotrexate Received at Department of Chemical Pathology, National Cancer Institute, Maharagama, Sri Lanka

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Introduction

Methotrexate (MTX) is an antifolate cytotoxic medication used to treat certain types of adult and childhood cancers. MTX has many serious adverse effects such as myelosuppression, hepatic, renal and pulmonary disorders. The monitoring of plasma MTX level is very important to prevent toxicity of MTX therapy. Plasma MTX levels are usually measured at 24, 48 and 72 hours after starting MTX infusion. Accurate timing of sampling is crucial as reference ranges are based on time.

Objectives

To assess the completeness of data in routine request forms for MTX and to take the necessary steps to improve the completeness.

Methods

A retrospective cross sectional descriptive study was carried out reviewing the routine "Health 350" request form for MTX from1st 0f July 2016 to 30th of September 2016. Subsequently an education program was done while introducing a new specific request form. A re-audit was performed from10th of October 2016 to 10th of January 2017 to assess the improvement. Results were expressed as absolute values and percentages.

Results

Among 130 request forms in the initial audit more than 95% mentioned general information of the patient other than the age. Age was mentioned in 83% (108/130). Starting time of the infusion was mentioned in 55% (72/130) and requesting time was mentioned in 87.7% (114/130). Among 124 request forms in the re audit, general information was similar as the previous one and also age was mentioned in 95% (118/124), starting point of the infusion was mentioned in 97% (120/124) and request time was mentioned in 98.4% (122/124).

Conclusion

There is significant improvement after the education program and the introduction of a new specific request form.

Keywords

Methotrexate, internal audit

RP 16

Proportion of Thyroglobulin Antibody Positivity among Patients with Differentiated Thyroid Carcinoma, Presented to a Tertiary Care Centre

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Introduction
Serum thyroglobulin (Tg) is useful for monitoring patients with differentiated thyroid cancer but is limited by interference from anti-thyroglobulin antibodies (TgAb). The sensitivity of serum Tg measurement for detecting recurrences is enhanced by an elevated Thyroid Stimulating Hormone (TSH) concentration.

Objectives
We assessed the proportion of patients with anti-thyroglobulin antibody positivity, Tg levels and TSH levels among patients with differentiated thyroid malignancies.

Methods
The target population of this study was patients with differentiated thyroid malignancies presented for thyroglobulin assay to a tertiary care centre. One hundred and seventy six (176) were recruited for the study and all samples were analysed for Tg, TgAb and TSH. Relevant information of the population and histology was acquired by using an interviewer administered data compilation sheet and Clinical records respectively. Results were expressed as absolute values and percentages.

Results
One hundred and seventy six (176) patients were reviewed, 83% (146/176) were females. 85.2% (150/176) of them had papillary carcinoma and 14.8% (26/176) had follicular carcinoma. The proportion of patients with detectable TgAb was 13.1% (23/176). 98.3% (173/176) patients were on thyroxin treatment. Among them only 13.29% (23/173) were undergone Thyroid Hormone Withdrawal (THW). 12.5% (22/176) patients had TSH >30 mIU/L. 82.6% (19/23) achieved TSH level >30 mIU/L by 2 weeks of THW.

Conclusion
The proportion of patients with detectable TgAb was 13.1%. It is the standard practice to measure TgAb whenever Tg is measured. Tg should preferably be measured when the serum TSH is more than 30 mIU/L. The majority of patients 82.6% achieved TSH >30 mIU/L by 2 weeks THW. As recombinant human TSH is expensive and not readily available, THW is the only available measure to increase serum TSH level in Sri Lanka.

Keywords
Differentiated thyroid malignancies, anti-thyroglobulin antibodies

RP 17

Serum Cystatin C as a Marker of Early Nephropathy in Sri Lankan Patients with Type 2 Diabetes Mellitus

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Introduction
Diabetic nephropathy is a significant cause of end-stage renal disease and therefore its early detection is essential. The effectiveness of cystatin C in detecting diabetic nephropathy in Sri Lankan patients with type 2 diabetes remains uncertain as many studies have been conducted in western populations.

Methods
An observational, cross sectional study was conducted at the diabetic clinic at National Hospital of Sri Lanka. We recruited 140 patients consecutively excluding those with malignancy, thyroid disease, blood pressure > 130/80 mmHg, CKD, steroid therapy, liver disease and acute illness. Blood for fasting plasma glucose, serum creatinine, cystatin C and 2nd void urine for creatinine and albumin were obtained on a subsequent date and those were analyzed using Kone 60i automated analyser. Patients' blood pressure was measured twice before sample collection to confirm normal blood pressure. Patients were grouped according to urine albumin: creatinine ratio (ACR) as follows. If it was <3 mg/mmol, it was considered normoalbuminuria (97 patients – group 1) and if it was between 3 mg/mmol and 30 mg/mmol, it was considered early diabetic nephropathy (35 patients - group 2). Eight patients were excluded as their ACR was over 30 mg/mmol. Receiver operating curves (ROC) were generated to assess diagnostic efficiency of serum creatinine and cystatin C to predict diabetic nephropathy.

Results
There was a significant increase ($p < 0.01$) in both serum cystatin C and creatinine in group 2 compared to group 1. ROC analysis showed that cystatin C had a higher area under the curve (0.826 – 95% confidence interval 0.728 to 0.92) compared to creatinine (0.779 – 95% confidence interval 0.688 to 0.869) in detecting diabetic nephropathy when microalbuminuria was considered as the gold standard.

Conclusion
Serum cystatin C is an effective biochemical marker for detection of early diabetic nephropathy.

Keywords
Cystatin C, early diabetic nephropathy, ACR

RP 18

Establishing Measurement Uncertainty across Two QC Lots; How to Approach?

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Introduction

Determination of Measurement Uncertainty (MU) of each analyte is a prerequisite for ISO 15189 accreditation. Deriving MU using Internal QC data at each level is the common practice, where a MU = (Observed CV) ×2 or MU = (Observed SD) ×2. This process gets complex when two QC lots are used during the period under consideration.

Objective

Determine the best method to derive MU when two QC lots are used.

Methodology

Calculate MU for TSH by the 'Pooling of Data' & by 'Using the pooled variance'. Both MU (CV) & MU (SD) were calculated using standard formulae.

Results

QC values obtained for TSH using BIORAD Immuno plus Control (lot 40330 & 40340) from March 01, 2017 to September 30, 2017 were included in this study. The mean for three levels of QC lot 40330 were 0.53, 5.62 & 33.49 µIU/mL while the corresponding value for lot 40340 were 0.49, 5.76 & 32.96 µIU/mL.

The MU (CV) (%) obtained using the pooling of data for three levels were 11.84, 9.64 & 7.26 while the use of pooled variance gave values of 8.74, 6.48 & 7.10. The MU (SD) (µIU/mL) obtained using the pooling of data for three levels were 0.06, 0.40 & 2.42 while the use of pooled variance gave values of 0.04, 0.36 & 2.36.

Conclusion

Calculation by pooling data tends to overestimate the MU while the use of Pooled variance & mean gives a more favorable representation on MU. Considering the fact that unlike variance there is no statistical mean available for the pooling of CV, the use of MU (SD) rather than MU (CV) would be more appropriate. Pre-planning the procurement of QC to avoid QC lot changes during the period under consideration must be considered the first option.

RP 19

Distribution and Associations of HbA1c in an Apparently Healthy Hospital Based Adult Population

Panapitiya NP, Ginige L, Lankananda BD, Jainulabdeen FF, Munasinghe D, Navodika LHD, Jayasekara LPCP, Aththanayake AMIS, de Silva TSTM, Katulnada P, Katulanda GW
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Introduction
HbA1c is the vital biochemical test in diabetes. Incidence of complications of diabetes such as nephropathy, neuropathy, retinopathy and cardiovascular disease increases with HbA1c level. We studied distribution of HbA1c and correlations with age, gender, blood pressure, Body mass index (BMI) and lipid levels.

Methods
The descriptive cross-sectional study had 472 apparently healthy participants (304 women and 168 men) aged 18 - 86 years. Height, weight, waist circumference and blood pressure were measured and blood samples were obtained after 12 hour fast. Data evaluated using Microsoft Excel and Python3.

Results
Mean age for women and men were 40.2 (SD=12.03) and 40.9 (SD=12.15) years. HbA1c ranged from 3.9-12.1% with a mean of 5.76% SD=0.93). Women and men had mean HbA1c values of 5.6% (SD=0.71) and 5.88% (SD=1.2). Percentage with HbA1c ≥ 6.5% (diabetes) was 14.8% while percentage with HbA1c ≥ 6.0% (pre-diabetes and diabetes) was 29.8%. Participants with HbA1c ≥ 6.0% had significantly higher total cholesterol, LDL cholesterol, non-HDL cholesterol and TC/HDL cholesterol ratio compared to those with HbA1c < 6.0%. Triglycerides, HDL cholesterol and VLDL cholesterol showed no difference between two groups.
Mean HbA1c values for different age groups were as follows: <30 years: 5.35% (SD=0.7), 30-39 years: 5.66% (SD=0.85), 40-49 years: 5.81% (SD=0.96), 50-59 years: 6.11% (n=98, SD: 0.8), 60 and above: 6.34% (SD:1.49).
HbA1c showed positive correlation with age (PCC=0.31), systolic blood pressure (PCC=0.27), total cholesterol (PCC=0.14), LDL cholesterol (PCC=0.12), VLDL cholesterol (PCC=0.1) and triglycerides (PCC=0.1). With HDL, the correlation was negative.

Conclusion
Almost 30% of the urban-based apparently healthy population had HbA1c of □ 6.0%. They had significantly higher Total cholesterol, LDL cholesterol, non-HDL cholesterol and TC/HDL cholesterol ratio. HbA1c had fairly strong positive correlations with age and systolic blood pressure. Positive correlations with lipids, body mass index, waist circumference and diastolic blood pressure were weak.

Keywords
HbA1c, correlations

RP 20

Distribution and Associations of Lipid Parameters in an Urban Population

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Introduction
Hyperlipidemia is a major contributory factor for onset and progression of cardiovascular disease (CVD). Understanding the prevalence of hyperlipidemia and distribution of different lipids in a population is important for implementation of preventive methods, which could aid in reduction of CVD burden.

Methods
The descriptive cross-sectional study had 428 apparently healthy participants. Blood samples were obtained to measure Total Cholesterol (TC), Triglycerides (TG), High Density Lipoprotein Cholesterol (HDL-C). Very Low-Density Lipoprotein Cholesterol (VLDL-C), Low Density Lipoprotein Cholesterol (LDL-C), Non-HDL Cholesterol (non-HDL-C) and TC/HDL-C ratio were calculated. Data was evaluated using Python3 and Microsoft Excel.

Results
63.6% of the participants were women with a mean age of 40.4 (SD=11.7) while men had mean age of 40.8 (SD = 11.65) years.
VLDL-C (range: 3.86 - 108.4mg/dl) and TG (range: 27 - 542mg/dl) showed positively skewed distributions with medians of 23.2 and 116 respectively.
Means (mg/dl), SDs and Reference Intervals (2.5^{th} and 97.5^{th} percentile values) for lipid parameters with Normal Gaussian distributions were; TC: 216.5, 37.6 and 142.8 - 290.2; LDL-C: 142.8, 35.5 and 73.4 - 212.3; HDL-C: 46.3, 9.3 and 28.1 - 64.7; TC/HDL-C ratio: 4.82, 1.1 and 2.6 - 7.01. The percentages of the participants who exceeded expected cutoff values for healthy population were, TC > 200: 64.5%, LDL > 130: 62.1%, non HDL-C > 130: 84.3%. HDL < 40: 21.7%.
Best positive correlation observed was between TC and LDL-C (PCC: 0.91). PCC between TC/HDL-C ratio and LDL-C was 0.6. VLDL-C and TG also had good positive correlations with TC/HDL-C (PCC: 0.39 and 0.4 respectively).

Conclusion
As majority of the study population had lipid levels over expected values, prompt implementation of community based screening programs in urban areas is important.

Keywords
Lipids, cut-off values

RP 21

Comparison of Capillary Electrophoresis and Bromocresol Green Methods for Quantification of Serum Albumin on Patients Referred to Serum Protein Electrophoresis from Medical Wards at Teaching Hospital, Jaffna

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Introduction
Serum albumin determination is used for prognostic assessment of diseases and low serum albumin levels correlate with an increased risk of morbidity and mortality. Among the different methods, this study compares capillary electrophoresis and Bromocresol green (BCG) methods. The CE method relies on total protein measurement, hence bias from total protein estimation can affect the results. Some hospitals use CE for their diagnostic purposes. Therefore, it must be well correlated with quantitative methods for the interpretation of results. This study compares albumin concentration by CE with BCG method.

Methods
A total of 67 blood samples were collected from patients who underwent serum protein electrophoresis testing from medical wards at Teaching Hospital Jaffna. Serum albumin was measured by manual BCG method and CAPILLARYS SEBIA. In CE, albumin was estimated as a percentage of total protein in capillary electropherogram. Actual concentration of albumin was calculated by estimating total protein by manual Biuret method. Student t-test was used for mean comparison.

Results
Mean (±SD), median and interquartile range of serum albumin by BCG were 34.44(±5), 34.64 and 6.92 g/L respectively. Mean (±SD), median and interquartile range by CE were 34.07(±6.41), 34.31 and 9.21 g/L respectively. Mean difference between BCG and CE was 0.37, which was not statistically significant (p= 0.335). Correlation between BCG and CE was statistically significant with strong positive correlation (r=0.884, p<0.001, n=67).

Conclusion
Serum albumin measured by CE has not significantly differed from BCG method. Mean difference between BCG and CE was statistically insignificant (p>0.05). There was statistically significant strong positive correlation between BCG and CE *(r=0.884)*. Therefore, the errors occurred during CE and Total protein estimation can be ignored. This denotes both BCG and CE can be used for serum albumin estimation. Further studies on larger population with varied geographical distribution are recommended.

Keywords
BCG, CE, albumin

RP 22

Validation of 14-P Urine Strip as a Field Method for the Detection of Albuminuria and Proteinuria in Chronic Kidney Disease

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Introduction

Chronic Kidney disease (CKD) has become an emerging health issue in Sri Lanka. Since, most of the investigations available for detection of CKD are time consuming and expensive, a rapid screening test which can be used as a field method has become a need of the hour. Protein creatinine ratio (PCR) and albumin creatinine ratio (ACR) are two important parameters used for the assessment of kidney function. Hence, the objective of the present study was to evaluate the validity of PCR and ACR in the DIRUI 14-p urine strip for the detection of albuminuria and proteinuria in patients with CKD.

Methods

A descriptive cross sectional study was performed in Teaching Hospital Karapitiya. Study was to evaluate the validity of the 14- p urine strip using urine samples of 45 patients diagnosed with CKD, attending the nephrology clinics and wards related to kidney dysfunctions in Teaching Hospital, Karapitiya. Normal healthy individuals (68) at the age of 20 – 60 years were selected as the control group. Creatinine, protein and microalbumin concentrations measured by DIRUI 14 – p urine strip were validated using Jaffe, pyrogallol red and turbidometric methods respectively using INDIKO PLUS fully automated Biochemistry analyser.

Results

According to the results, the average rate of agreement, sensitivity and specificity of dipstick method for creatinine were 85%, 90% and 100% respectively. The results were similar for urine protein giving 96% average rate of agreement, 100% sensitivity and 93% specificity. The results were 82%, 100% and 74% respectively for urine albumin concentration. A positive correlation was observed between the findings of PCR (R^2 – 0.81) and ACR (R^2 – 0.78) by dipstick method and the analyser method. Quality control results (Liquichek 1 & 2 quality control samples) were satisfactory in both strip method (+/- 1SD) & analyser method (+/- 2SD).

Conclusion

The 14 - parameter DIRUI urinalysis reagent strip exerts satisfactory results in the detection of albuminuria and proteinuria, being a useful screening tool for the detection of CKD.

Keywords

Chronic kidney disease, 14 – p urine strip, protein creatinine ratio, albumin creatinine ratio

RP 23

Establishment of Reference Ranges for Eight Common Analytes (Serum Urea, Creatinine, Aspartate Aminotransferase, Alanine Aminotransferase, Total Protein, Albumin and Serum Sodium and Potassium)

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Introduction

Reference ranges are sets of values used by the health professionals to interpret laboratory results and are considered the most authoritative tools in laboratory science to assist in the decision making phase. These are defined as sets of values within which 95% of the normal healthy population fall.
In Sri Lanka there are no published reference range studies. Commonly laboratories use the reference range given by the manufacturers. Three principal methods are used to determine reference ranges. 1) Conventional method or *priori* which conducts a comprehensive reference range determination study using the International Federation for Clinical Chemistry (IFCC) recommendations, 2) *Posteriori* method. 3) Indirect method.

Methods

Blood samples were collected from 150 male and female blood donors between 20 – 60 years of age, who attended the blood bank. Those who are having chronic illnesses or on treatment, acute illnesses within past three months, recent surgeries and current smokers were excluded from the study. Samples were separated within two hours and analysed on the same day of collection.

Reference ranges were calculated using the interquartile ranges after omitting outliers. Statistical assessment on significant difference calculated.

Results

According to the above results there is a statistically significant difference of reference ranges between the existing and established reference ranges of total protein, ALT, AST, BU and potassium. Manufactures reference ranges for total protein, ALT, AST, BU and potassium were 6.0-8.5 g/dL , 0-40 U/L, 0-40 U/L, 10-50 mg/dL and 3.1-5.1 mmol/L and established reference ranges for those analytes were 6.4-8.0 g/dL, 0-66 U/L, 0-58 U/L, 11-31 mg/dL, 3-4.6 mmol/L respectively.

Conclusion

Laboratories should establish their own reference values for the population that they serve to.

Keywords

Reference range, interquartile ranges.

RP 24

Audit on Unnecessary Repetitions and Cost of Selected Chemical Pathology Investigations in Teaching Hospital, Jaffna

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Introduction
The excessive and inappropriate use of laboratory investigations is widely prevalent in hospital practice, which entails patient discomfort, faulty results, overloading of the diagnostic services, and waste of valuable healthcare resources and most importantly undermines the quality.

Methods
An audit was carried out in the Department of Chemical Pathology at Teaching Hospital, Jaffna over a period of one month. Minimum retesting intervals were used to appreciate the unnecessary repetitions. Costs per reportable results were calculated. Descriptive statistics (percentile) was used for analysis.

Results
Among the 44,667 individual tests performed, serum electrolytes (SE) (20.61%) and blood urea (18.65%) were the most commonly performed investigations. Alanine aminotransferase (ALT)/ Aspartate amino transferase (AST) (12.08%), Creatinine (12.01%) and C-reactive protein (CRP) (11.64%) were also performed in large numbers. There were 16,182 (36.2%) repetitions out of which 42.4% were considered unnecessary. Serum electrolytes (20.61%) and blood urea (18.65%) were the most commonly repeated investigations, while AST/ALT was the commonest (28%) unnecessary repeats followed by electrolytes (14.8%). In this study, 87.4% of the AST/ALT repeats were unnecessary. Magnesium (0.3%) and Phosphate (0.3%) were the least unnecessarily repeated tests. 73.5% of the unnecessary repeats were from the medical wards. The least number of unnecessary repetitions (0.1%) was from the ophthalmology wards. The cost per reportable results was calculated for each test and the total expenditure was LKR 2,485,942.34, whereas LKR 395,506.21 (15.91%) was spent on unnecessary repetitions.

Conclusion
Serum ALT/AST and electrolytes were unnecessarily repeated before the minimum retesting interval has passed. Most unnecessary repetitions were from the medical wards. 15.91% of the total expenditure was due to unnecessary repetitions. It is recommended to do an intervention and repeat the audit over prolonged period to assess the effects.

Keywords
Minimum re-testing interval, cost per reportable result

RP 25

Study of the Effect of Storage Temperature and Serum-Clot Contact Time on Serum Sodium and Potassium Levels

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Introduction
Sodium and potassium are the most commonly measured electrolytes. Sodium-potassium pump is the principle mechanism for active ion transport across cell membranes. Glucose is spent over time in-vitro and leads to Na^+/K^+ pump failure, when the serum separation is delayed. Further delay leads to passive diffusion of potassium and sodium. Different shifts of Na^+ and K^+ have been observed when un-separated blood is stored at different temperatures.

Objectives
To find out the maximum acceptable time delay between collection of blood and serum separation and the optimum storage temperature that should be maintained during this period for sodium and potassium assay.
To study the time and temperature dependent changes in serum potassium and sodium levels during this period of delay.

Methods
A descriptive cross-sectional study was performed on 50 volunteers who had been requested for serum sodium and potassium. All specimens were analysed using direct ISE method after 1,2,3,6 and 24 hours of serum-clot contact time and at 21-25^0 C and 2-8^0 C storage temperatures.

Results
Serum potassium initially decreased and then increased after 6 hours of serum-clot contact time at 21-25°C and 2-8°C storage temperatures. The initial decrease was statistically not significant ($p > 0.05$). Potassium was significantly increased at 24 hour of serum-clot contact time at both storage temperatures ($p < 0.05$). The changes of serum sodium level at different serum-clot contact times and storage temperatures were statistically not significant ($p > 0.05$).

Conclusion
The samples for serum electrolytes should be separated before 6 hours since collection and preferably stored at room temperature (21-25^{0}C). It needs further studies to investigate the effect of serum-clot contact time at different points of 6 to 24 hour time interval which was not tested during this study to come to a conclusion on maximum acceptable period of delay in separation.

Keywords
Serum sodium, serum potassium, storage time, effects of temperature, serum-clot contact time

RP 26

Glycaemic Control and Pre-Dialysis Blood Pressure in a Group of Patients with End Stage Renal Failure on Routine Haemodialysis Attending a Tertiary Care Hospital

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Introduction
End stage renal failure (ESRF) has become a major health issue in Sri Lanka. According to the National Kidney Foundation (NKF) clinical practice guidelines, pre - dialysis blood pressure (BP) should be maintained at <140/90 mmHg and glycated haemoglobin (HbA1c) levels at 7% in diabetics with ESRF. Studies have shown a wide variation of relationship between glucose – HbA1c among patients with ESRF. Factors that may contribute include reduced red cell life span, blood transfusions and haemolysis. The objective**s** of this study were to determine the proportion of patients with ESRF who have achieved the adequate glycaemic and blood pressure control and to determine whether there is significant relationship between the HbA1c and Haemoglobin (Hb) levels.

Methods
A group of 27 patients with ESRF on routine haemodialysis awaiting kidney transplant between the periods of December 2016 to December 2017 were assessed. HbA1c, fasting plasma glucose (FPG) and Hb concentrations were estimated.

Results
Mean (±SD) age of 27 patients (19 males) was 42 (±10) years. Mean (±SD) systolic blood pressure (SBP) of the group was 163 (±26) mmHg, while the mean (±SD) diastolic blood pressure (DBP) of 96 (±13) mmHg. Twenty (74%) patients had SBP >140 mmHg and 17 (63%) patients had DBP > 90 mmHg. Mean (±SD) HbA1c was 5.9 (±1.6) %. Of the 27, nine (33%) had diabetes mellitus (DM) and HbA1c level was >7% in 3 of them. Mean (±SD) Hb level was 10.1 (±1.6) g/dL. A significant and positive correlation was observed between FPG and HbA1c (r= 0.561, p=0.003). There was no significant correlation between Hb and HbA1c (r = - 0.271, p=0.171).

Conclusions
Most of the patients did not achieve the pre-dialysis BP targets. Number of patients with DM was small to make a conclusion on glycaemic control. Although, in general, Hb has an influence on HbA1c level among CKD patients on HD, we did not find a significant correlation between Hb and HbA1c. This could be due to the relatively high Hb level seen among our patients.

Keywords
End stage renal failure, haemodialysis, glycemic control, blood pressure
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RP 27

Derivation and Internal Validation of an Equation for Albumin-Corrected Serum Calcium

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Introduction
Ionized calcium estimation is neither easy nor routinely available in all laboratories. Many laboratories use previously published equations to adjust serum total calcium according to the albumin concentration. This practice may generate erroneous results because of the differences in the local population, estimation methods and the analytical platforms.

Objectives
To derive a new formula and subsequently validate it to estimate corrected serum calcium accurately.

Methods
We examined samples from 396 (n=396) inward and outpatients for serum total calcium (Arzenazo III dye binding method) and albumin (BCG dye binding method).Results from 308 out of 396 subjects were used to construct the linear regression equation of total calcium on albumin concentration. 81 subjects with hypoalbuminaemia (Alb < 3 5g/L) were used to compare the performance of new equation and conventional equation: *Adjusted Ca(mmol/L) = Total Ca(mmol/L) + 0.02 {40-[Alb](g/L)}*. Separate 12 subjects were used to compare the new and conventional formulae with the gold standard (Direct Ion Selective Electrode method).

Results
The newly derived equation*: Adjusted Ca = Total Ca + 0.01 (41.9 – [Alb])* had a good internal validity (r^2 = 0.973). 29 (35%) out of 81 subjects were different in the classification of calcium status with the new formula than the conventional formula. The new formula had sensitivity- 100%, specificity-20%, PPV- 60% and NPV- 100% when compared with the gold standard (direct ISE method). The Old formula had sensitivity- 57%, specificity-60%, PPV- 66% and NPV- 50% when compared with the gold standard (direct ISE method).

Conclusion
The total calcium results obtained from the new formula has better correlation with the results obtained from the gold standard method (direct ISE) than those obtained from the old formula. Therefore, it is very important for us to derive our own equation for corrected serum calcium estimation as it would serve better the local population.

Keywords
Albumin corrected calcium, new formula, derivation, validation

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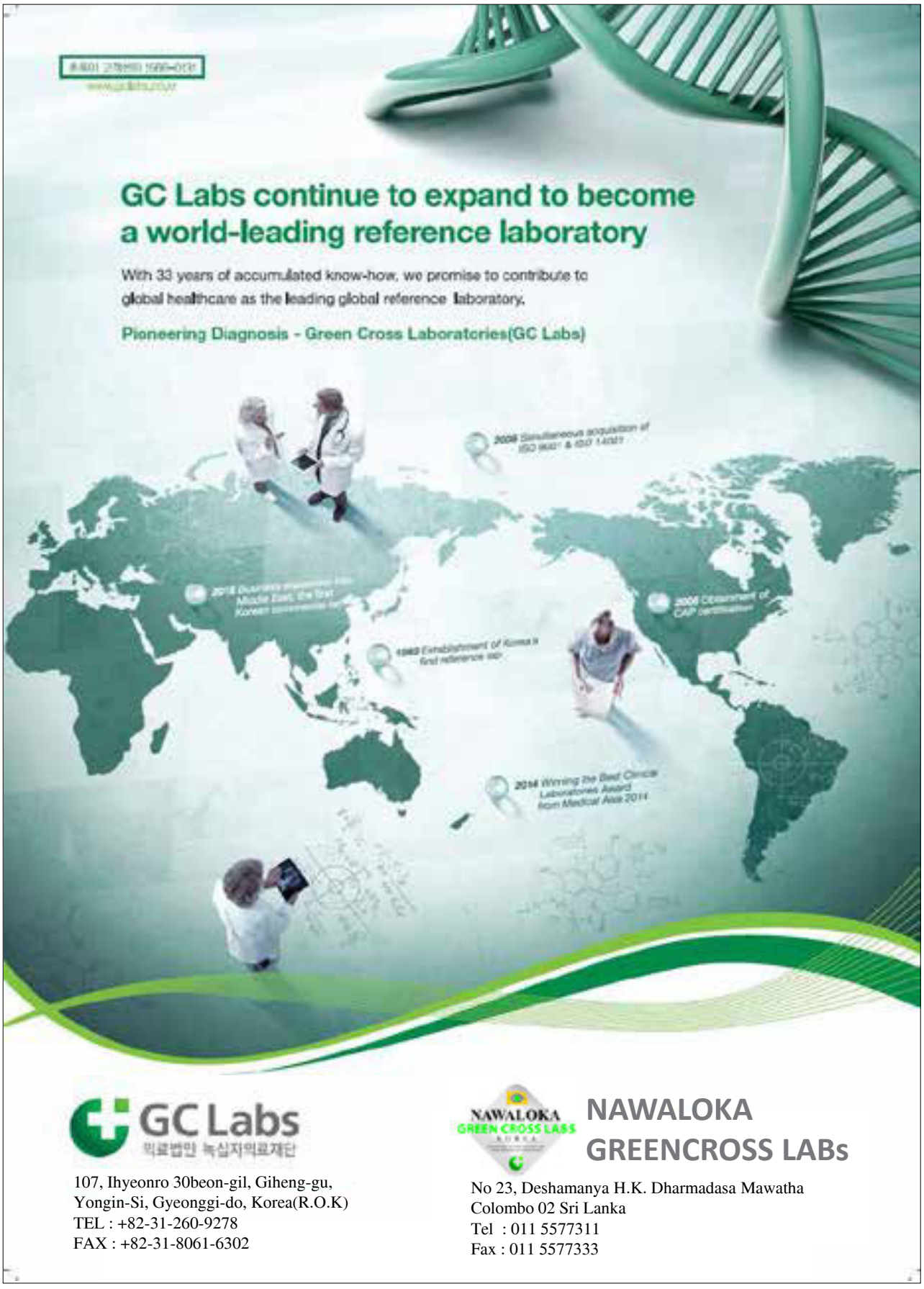

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Dengue Antigen
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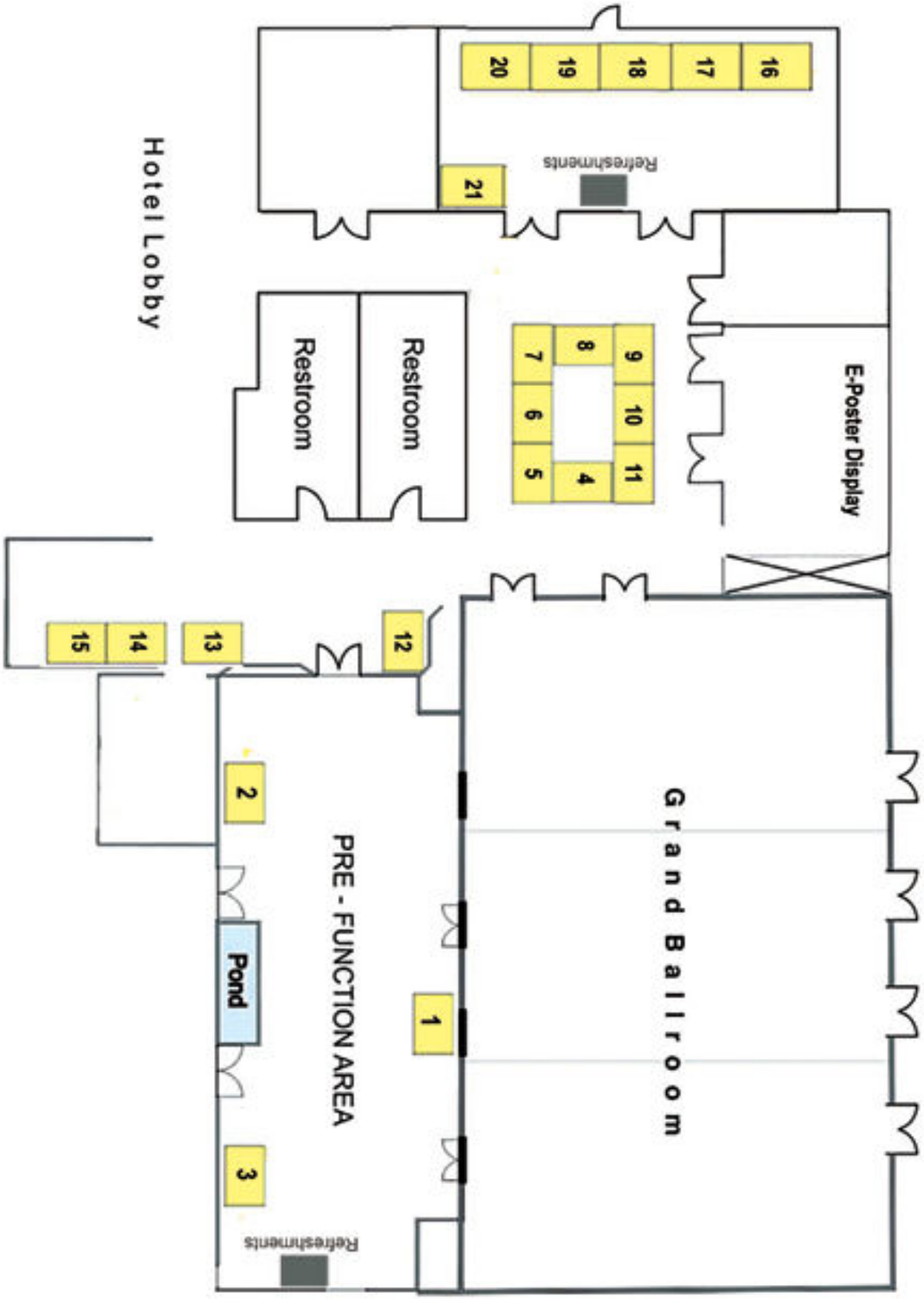
FLOOR PLAN


Hotel Lobby
Restroom
Restroom
E-Poster Display
Refreshments
Refreshments
PRE - FUNCTION AREA
Pond
Grand Ballroom
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LIST OF EXHIBITORS

Stall No	Exhibitor Name
1	MORISON PLC
2	CIC HOLDINGS PLC TOGETHER WITH ORTHO CLINICAL DIAGNOSTICS
3	SUNSHINE HEALTHCARE LANKA LTD
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- Asia Pacific Federation for Clinical Biochemistry & Laboratory Medicine (APFCB)
- Chairpersons
- College of Pathologists of Sri Lanka
- Authors of abstracts
- Reviewers of abstracts
- Judges of the poster presentations
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