



# THE SPECTRUM

NEWSLETTER

November 2015

## STATISTICS

Important concepts

## QADIS and SAAS

Novel tools for learning

## ANIMATED CHEMICAL

## PATHOLOGY

Creating fun in learning!!

## Cover Story

**Prof Lt Gen Syed Azhar Ahmed HI(M) (Rtd)**  
**Tribute to a Legend**



Issue 4

Volume 4

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The Spectrum' and PSCP welcome participants of 3rd Joint Conference of the Societies of Pathology and 7<sup>th</sup> National Conference of PSCP from 6th to 8th Nov 2015 at Pearl Continental Hotel, Lahore

#### **The PSCP sessions will be:**

Two Pre-Conference Workshops:

*Research Designs in Diagnostic Studies* – 5<sup>th</sup> November 2015 (Thursday) from 0900 h to 1300 h.

*Interpretation of ABG Reports* – 5<sup>th</sup> November 2015 (Thursday) from 1400 h to 1800 h.

- Plenary Session comprising talks by senior Chemical Pathologist on 6th Nov 2015 (Friday)
- Four Scientific Sessions of free papers of Chemical Pathology



## From the Chief Editor's Desk

Praise is with Allah (SWT) who gave us the chance to publish 4<sup>th</sup> edition of '*The Spectrum*'. This beautiful publication could not have been possible without the untiring efforts of **Dr Sara** and **Dr Maryam**, whose natural hidden talent is depicted in the superb and eye-catching lay-out of the newsletter. The tradition is kept alive and newsletter is being presented on the auspicious occasion of Joint Conference of Societies of Pathology. PSCP has always been a big advocate of unity of Pathologists. We cherish the efforts of **Prof Sohail Chughtai, (President PAP)** and **Prof (Brig) Abdus Sattar and Prof Asim Mumtaz (PSCP)** for arranging this Joint Conference. We pray that this harmony would continue not only on the forum of PAP but also in our day-to-day lab work. We can show to the medical community that in spite of the diversity of our job, which is widening with each passing year, we know how to keep ourselves gelled together. United we will rise in Shaa Allah.

*We dedicate this issue of 'The Spectrum' to Lt Gen Syed Azhar Ahmed, HI (M) (Rtd) and our cover story is attributed to this great teacher and 'Baba' of the Chemical Pathology. May Allah grant him long, happy and prosperous life!*

Articles in this issue include "*Animated Chemical Pathology*", which may become a permanent feature after we have received wide appreciation not only from Pakistan but also from abroad. In this issue it is an attempt to make the difficult topic of '*Analytical Techniques*' lively and palatable. '*Two Novel Tools for Teaching and Assessment*' is a medical education perspective of QADIS and SAAS which have already gained popularity in our community. "*A Hypothetical Address to the First Year Trainees of Pathology*" is a message for the new entrants in the field of Pathology. Articles on "*Garlic Tablets*", "*Vitamin D Deficiency*", and "*Fundamentals of Proteomics*" are full of scientific information. "*Statistical Concepts A Chemical Pathologist Should Know*" is to highlight the importance of statistics in daily work and research in our specialty. Meeting reports on "*Reference Intervals (in Tokyo)*" and "*World Osteoporosis Day (in AKU Karachi)*" are useful event news. Dr Saima shares her experience of "*Journal Club Meetings*". Last but not the least Dr Sumbal remembers our shaheeds in a beautiful poem "*The Martyrs*".

*So, I hope you will find this newsletter a nice blend of information and entertainment.*

Prof (Brig) Aamir Ijaz,  
Armed Forces Institute of Pathology,  
Rawalpindi.





## MESSAGE FROM THE PRESIDENT

This is my first newsletter as President of Pakistan Society of Chemical Pathologists. The newsletter was brought to life by honorable member of our society, **Prof. (Brig) Aamir Ijaz**. His services for the entire Chemical Pathology community are highly commendable. I have found this newsletter to be a very effective communication piece and a useful mechanism to bring attention to our association's activities. I appreciate the efforts of **Dr. Sara Reza** and **Dr. Maryam Rafiq**, who had worked tirelessly for this newsletter. You girls are doing a great job. I am really proud of you!!

I would like to take this opportunity to address the young budding Chemical Pathologists of our country. You all must be knowing that maximum hospital admissions anywhere in the world rely on laboratory to make diagnosis, pathology is actually at the core of modern healthcare systems. This is reflecting the fact that the focus of the profession has been shifted largely from the advance of diseases to the detection of the very first sign of deviation from normal, so that early treatment can be given to alter or avert the disease course. We have since adopted the role of a bridge between the bedside and the benchside, and constantly upkeep and evaluate the latest scientific progress, so as to transfer and transform new technologies into making clinical diagnosis ever more sensitive and specific.

So my dear fellows, as you are ready to apply what you have learnt and integrate the best research evidence with clinical relevance into your service, you should also remember that the interconnectedness of your work to quality patient care and safety signifies that there should be a larger role waiting for you than practicing silently in the laboratory. Now that the door of opportunity of using your knowledge and skills to ensure patient's safe and speedy recovery is wide open, it is up to you to take up these and many new challenges.

Once again, my heartfelt congratulations to the entire team of THE SPECTRUM for bringing out such a spectacular issue. The next newsletter will hopefully be published next year and there will be more to come. Keep up the good work !!



**Prof. Dr Asma Shaukat**  
Quaid-e-Azam Medical College, BWP



**6TH ANNUAL PSCP COURSE AT AFIP RWP– MAY 2015**

## Prof Lt Gen Syed Azhar Ahmed HI(M) (Rtd)

### *The Founder of Chemical Pathology in Pakistan*

Lt Gen Syed Azhar Ahmed graduated from Patna (India) in 1952. After migration to Pakistan he joined Army Medical Corps and selected Pathology as his specialty. Later he went to UK and qualified PhD and FRCPath in Chemical Pathology. For several decades he remained the only FRCPath in Chemical Pathology in the country until this honour was conferred to Maj Gen Farooq Ahmad Khan (Rtd) in 2012. He joined Armed Forces Institute of Pathology in 1973 and during his 15 years of command, AFIP Rawalpindi became a real centre of excellence for Pathology. He patronized and groomed several young Pathologists who later became leading professionals in their disciplines. One of his most brilliant students was Maj Gen Farooq Ahmad Khan (Rtd) who continued his mission. Almost all the Chemical Pathologists in the country got their inspirations directly or indirectly from these two great teachers. After retirement in 1988, Gen Azhar joined Baqai University Karachi and rose to the appointment of vice chancellor. His devotion and dedication once again resulted into a great medical institute and Baqai University gained international fame. Recently he got retirement from this university and mashAllah he is continuing academic activities from his home in Karachi. It is very difficult to describe the personality of Gen Azhar in words; "a scientific scholar, great mentor and patronising teacher" are just a few.

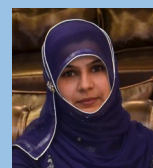


## Mitochondrial Eve and Female Scientists

Knock, knock. Millions of sperms attempt to enter the large villa (ovum). Only one lucky one enters but the guest is allowed only minimum luggage (just head and a small part of tail). So in this comparatively very large ovum, sperm contributes only nuclear DNA and just one odd mitochondrion which may also perish. These are powerhouses but also have small circular DNA called mDNA. This DNA is transferred only from mothers – matrilineal inheritance. In 1987 a paper appeared in 'Nature' with a surprising finding that every person on earth right now could trace his or her lineage back to a single common female ancestor who lived around 200,000

years ago in Africa. The scientists named this common female ancestor **Mitochondrial Eve**. More surprisingly the workers who made major discoveries about mitochondria were also females. **Lynn Margulis** who suggested bacterial origin theory of mitochondria in 1966 and the lead author of the 1987 paper **Rebecca Cann** were females!!

Dr. Maryam Rafiq  
Third year trainee  
Chemical Pathology  
QAMC, BWP





## Two Novel Tools for Teaching and Assessment

### Quick Assessment of Data Interpretation Skills (QADIS)

In the middle of the day telephone of a Consultant Chemical Pathologist rings. "I am Dr. Akram, Consultant Paediatrician, we have a neonate with .....(Then he narrates all the biochemical findings of the patient and seeks opinion of the Chemical Pathologist). This is a common scenario in many Chemical Pathologists' office when he/she has to give a candid and quick response on the data of the patient. Keeping this future employment of our postgraduate students in mind, QADIS has been developed. Although data interpretation module is being used in summative assessment (final exam) for more than two decades, it required formatting and standardization. So QADIS is not only new name of this exam tool but is also its characterization and extended application. QADIS is not only an examination tool but also a novel mode of information transfer (MIT). Since Jan 2015, QADIS is conducted simultaneously on last Wednesday of each month in 13 centres all over the country with a participation of nearly 80 PG students of Chemical Pathology (FCPS, MPhil and MCPS). This is followed by a key presentation with explanation slides along-with supporting literature for the facilitators to use it as an MIT in the class. In some lessons points of further discussion (PFD) were also initiated to increase the depth of knowledge of the students. Our PG students now fully own QADIS and PFDs as learning tool (though many humorous attires have also been created by the students). Lesson No 9 was conducted on 28 Sep 2015. A competition is also being held to select high achievers.

### Structured Assessment of Analytical Skills (SAAS)

This tool has been developed purely to assess and teach analytical skills of Chemical Pathologists. It is a novel Workplace Based Assessment tool with proper key and well thought marking criteria. When used as a formative assessment it is followed by a detailed feedback sessions to highlight strengths and weaknesses of the students. SAAS is also conducted along-with QADIS on monthly basis since January 2015. Facilitators have whole-heartedly accepted this tool. In Karachi 10-15 PG students with their facilitators gather once a month at Zia-ud-Din Hospital under the able guidance of Dr Adnan Zubairi and Surg Cdre Raza Jaffar, to conduct this SAAS.

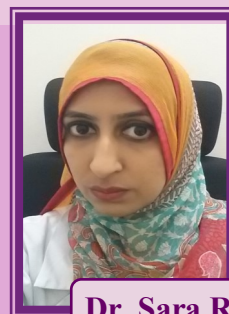
## Facilitations

We offer our warmest congratulations to Dr. Farheen Aslam and Dr. Sara Reza (Quaid-e-Azam Medical College, Bahawalpur) and Dr. Hafsa Majid (Aga Khan University Hospital, Karachi) on passing their FCPS II exam in May 2015. Wish you all a bright future filled with the promise of a

wonderful career.



Dr Hafsa Majid



Dr. Sara Reza



Dr Farheen Aslam

# A Hypothetical Address

## to the First Year Trainees of Pathology



"I welcome you all to the exciting specialty of Pathology. Although you belong to six different Fellowship and MPhil programmes, laboratory is your common home. You may be working on an auto-analyser, examining tissues under microscope, doing a bone marrow aspiration or dealing with culture plates, you have a common aim i.e. to help your clinical colleagues reach a plausible diagnosis. Probably you cannot imagine how much these colleagues depend on you for the diagnosis; in fact you are their brains, their think-tank. They can't understand intrigued biochemical pathways or complicated histological details or blood cell properties or bacterial characteristics. You should feel pride in this role but never look down upon them. They are good in other aspects of patient management, which may be alien to you. You and your clinical colleagues compliment each other – that is the best possible description.

Now coming to your own training. Your first priority should be your children – yes you heard me correct – your kids should never be ignored. Since most of you

have already become mothers (mostly) and fathers,

I can confidently say that those little angels deserve most of your attention! Now what should be next in the list? It is your training – gaining knowledge and skills and there is no third thing in the list. No TV, no movies, no gossips. Yes a family dinner on weekend may be an exception. These four years (lesser for MPhil) require a lot of sacrifice in terms of your time and in terms of vigorous effort. Remember if water is at 200 feet deep in the ground, you have to dig 200 feet once. Digging ten wells of 20 feet will not produce any water. You have to pass through this mill once. Half-hearted efforts will not yield success even done for a 10 years. Last but not the least; don't seclude yourself to the lab. Go to the wards, see patients and meet your clinical friends very often to discuss sick and sickness. Give full attention to patients visiting lab for advice. These activities are key to learning at a greater speed. Seeing one patient is better than reading many books!!"

## Role Of Garlic Tablets In Reducing Serum Lipids

In many countries of world, herbal medicines are replacing conventional therapies due to cost effect, low compliance of allopathic drugs regarding their frequent adverse effects and easy availability of medical herbs in natural environment.

Garlic is one of the medical herbs which is cultivated in many countries of world including China, South Korea, Egypt, India, Russia, Bangladesh and Pakistan. Since prehistoric times, Garlic was and is being used as cooking substance, its medicinal uses and beneficial effects are mentioned in far past historical references. New slant on pharmacology of herbal medicines has leaded new research design and trends of therapeutics.

Garlic's antihyperlipidemic effects are well explained and accepted by all disciplines of research schools, important is its acceptance on reduction in morbidity and mortality rates in humans due to myocardial infarction. Its effects on lipid metabolism of lipoprotein are still being researched. A single blind placebo controlled study was done at General hospital in 2010 in 120 male and female patient were taken they were divided into two groups one group was on placebo therapy and other on Garlic tablets 300mg thrice daily for period of three months their baseline cholesterol, triglycerides, LDL-C, HDL-C were taken. When results of lipid profile values of day 1 and day 90 were compared, it was observed that use of Garlic tab reduced total cholesterol, triglycerides, LDL-C and increased HDL-C. It was concluded from treatment trial that hyperlipidemic patients can get benefit to lower their harmful plasma resident fat particles and increased beneficial fat particle HDL-C and may safe their life time morbidity/mortality due to myocardial infarction.



Dr. Sadia Bashir  
F.C.P.S (Chemical Pathology)



## *Statistical Concepts A Chemical Pathologist should know*

Statistics looks very ugly to some people but if you develop friendship with it, you really start loving it. Chemical Pathologist has to play with numbers most of the time of the day and statistics is increasingly becoming essential part of this specialty. Here are some of the important concepts which are either required for day-to-day work or laboratory research. Please ensure we are NOT going to hold a statistics class here:

### Tests of Normality

Data type or nature is determined by these tests i.e. data is parametric or non-parametric. Mean and SD can be calculated only if data is parametric. For non-parametric data median and interquartile range has to be calculated.

### Reference Values:

are part of every Chemical Pathology report involves a lot of statistics e.g. detection and removal of outliers and calculation of mean and 2 SD.

### Mean, SD and CV

It is required for daily handling of the quality control data

### Correlation Studies and 't' statistics

Are also used in method validation experiments.

### ROC curve

is used for determination of cut-off values as well as validation of test as a discriminator between disease and health states

### Bland-Altman plot

If you want to compare two sets of values generated by two different methods, then this is a good tool.

### Linear Regression (LR):

The most complicated statistical complex is used in day-to-day calibration curves and method validation experiments.

### Deming Regression

It's a type of LR employed mostly in method validation experiments.



## REPORT OF THE COMMITTEE ON REFERENCE INTERVALS AND DECISION LIMITS (C-RIDL) MEETINGS IN 2014 AND 2015



The Committee on Reference Values and Decision Limits (C-RIDL) of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) started planning a worldwide multicenter study on development of reference intervals progressively since 2010. With this background, the C-RIDL held a series of discussions between 2010 and 2011 on the feasibility of launching a global study and generated a protocol to be used by all participants in the study. C-RIDL is currently coordinating a multi-country reference interval study with recruitment of a sufficient number of individuals to ensure traceability and harmonization of the test results.

Consecutive International representation was observed by the Pakistan team in the Committee on Reference Intervals and Decision Limits (C-RIDL), IFCC Meeting. Representatives invited from Pakistan were Dr Lena Jafri, from Section of Chemical Pathology, Department of Pathology & Laboratory Medicine AKUH and Prof. Dr Brig. Dilshad, from Armed Forces Institute Rawalpindi. The meeting was chaired by Professor Kiyoshi Ichihara, Professor Department of Clinical Laboratory Science, Yamaguchi University Graduate School of Medicine. He updated the group that there were nineteen countries from 5 continents collaborating in this global study. He displayed the current status of each country, the number of analytes proposed, country codes, sample size, test panels and financial support of each region. The meeting continued as each country representative gave a quick update and progress report of their study. This meeting was followed by a workshop "Hands-on: Statistical methods for the reference interval study". The new and latest software 'RI-Master' was also introduced to the group. Following the meeting in November, the committee met again at le Palais des Congrès, Paris, France on 21<sup>st</sup> and 23<sup>rd</sup> June 2015. Dr Lena Jafri presented the following findings for her study on Pakistan in this meeting. Her team in Karachi just finished initial data analysis, which still needs alignment to other countries' results. There were no significant differences among ethnic groups, which can probably be pooled for final analysis. There were some differences due to diet, however. The meeting members were introduced to the IFCC's new Evidence-based Laboratory Medicine (EBLM) website. Prof. Ichihara presented his new software for calculation of reference intervals. Major findings from the global study were discussed in the meeting. This was followed by interactive extensive discussion on statistical tools like parametric versus non-parametric, bootstrap method for smoothing the reference intervals and prediction of 90% confidence interval of reference intervals limits was done.

Dr Lena Jafri  
Assistant Professor,  
Aga Khan University  
Karachi



### CHEMICAL KINETICS

#### A FORMAL LAB REPORT



Maria Mahmud  
Ottawa University  
Canada

The purpose of this lab is to observe the effect of temperature and concentration on the rate of chemical reaction. In first part of the experiment, a set of solutions were mixed together ( $\text{H}_2\text{O}_2$ , KI,  $\text{Na}_2\text{S}_2\text{O}_3$ , starch, buffer,  $\text{HC}_2\text{H}_3\text{O}_2$ ) in different concentrations in seven separate flasks. In each flask, different volumes of  $\text{H}_2\text{O}_2$  was added and the time was noted for the color of the solution to change to blue. By using different mixtures of reactants and measuring the time it would take for the solution to turn blue, which is a result of the  $\text{I}_2$  interacting with the starch, the dependence of the reaction rate on concentration was demonstrated. With greater concentration of the reactants,  $\text{I}^-$ ,  $\text{H}_2\text{O}_2^-$ , and  $\text{H}^+$ , the time it took for the color change was faster. In the second part

of the experiment, three mixtures of the above listed solutions were obtained. All had the same concentration but different temperatures. Here it was proven that the reaction rate also depends on temperature change; the reaction was faster when it was performed at 40-45 degrees Celsius in comparison to 0 degrees Celsius. Therefore, the two separate parts of this experiment show how concentration and temperature affect the reaction rate. The individual orders for  $\text{I}^-$ ,  $\text{H}_2\text{O}_2^-$ , and  $\text{H}^+$  are 1, 1, and 0 respectively. overall order of reaction is 2 and the activation energy is - 63.2 kJ/mol.

# Animated Chemical Pathology

In the previous issue we animated some pathophysiological aspects, which was liked by many readers. Now we have given life to the **Analytical Techniques**, otherwise difficult and boring for some students. The purpose is to create fun in learning what is called 'edutainment'



## Six Sisters (Optical Techniques)

There are six sisters namely *photometry*, *fluorescence*, *light scattering*, *chemiluminescence*, *flame emission* and *atomic absorption*. Let's read the story of these six sisters:

- **Photometry, fluorescence and light scattering** are never at good terms with each other. They cannot tolerate each other's presence. If one of them is present, the others two can't work properly (when working on photometry, light scattering and fluorescence are sources of error, for example, particles present on a dirty reaction cuvette can cause light to scatter and error in photometry and natural fluorophores can also cause error. Similarly absorbance is a source of error in fluorimetry called *inner filter effect*). Each of these techniques works well only if two others are NOT present.
- **Chemiluminescence** is married in a privileged family. She has financial independence, too (produces her own light and does not require an external source of light). She keeps herself aloof from the politics of other sisters and work in entirely different atmosphere (dedicated instruments and labs).
- **Flame emission** is in the habit of making a lot of noise (interferences) and gives importance only to the 5% people, which make agitations (i.e. only fewer excited atoms are counted) while *atomic absorption* is a silence-loving girl. She makes minimum noise (interference) and gives importance to people who remain quite (accounts for 95% ground state atoms). This leads to the success of *atomic absorption* and unpopularity of *flame emission*.

**A Postgraduate Class (Chromatography):** It's a separation technique resembling a class of postgraduate students. All these students start their journey (at the one end of the column). There are two opposing forces; one trying to distract them (Stationary Phase) so that they cannot reach their targets and earn a degree (i.e. end of the column). While the other is a friendly force (Mobile Phase) who is trying to facilitate their journey towards the goal. Those students (substances) who heed to their facilitators (stationary phase) achieve their goals earlier as compared to those who are distracted (by the stationary phase). On the basis of the time each student requires to reach the target (retention time), these students are sorted out (substances are separated in chromatography).

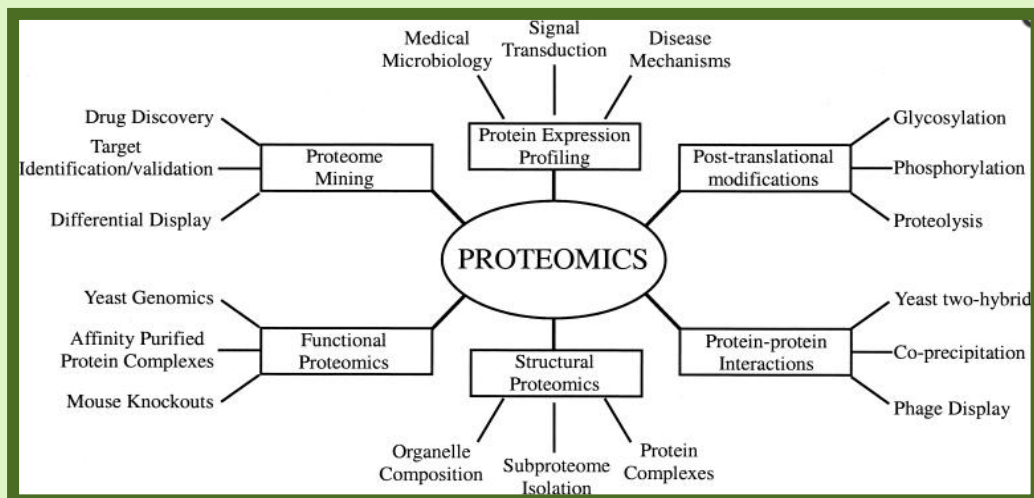
**A Short race of Schoolboys (Time of Flight Mass Spectrometry TOF-MS):**

A short race has been arranged between schoolboys to check their fitness. Over-weight boys will lag behind the smarter lower weight ones. Simple formula – heavier you are slower you move. (In TOF larger ions reach the detection device later as compared to lighter ions and identified on basis of travelling time).

## FUNDAMENTALS OF PROTEOMICS

The terms “proteome” and “proteomics” were coined in the early 1990s by Marc Wilkins, a student at Australia's Macquarie University, in order to mirror the terms “genomics” and “genome”, which represent the entire collection of genes in an organism. The word “proteome” is derived from PROTEins expressed by a genOME, and it refers to all the proteins produced by an organism. Proteomics is the large-scale study of protein, particularly their structures and functions

the proteome differs from cell to cell and is constantly changing through its biochemical interactions with the genome and the environment. A surprising finding of the Human Genome Project is that there are far fewer protein-coding genes in the human genome than there are proteins in the human proteome (~20,000 to 25,000 genes vs. ~1,000,000 proteins). The large increase in protein diversity is thought to be due to alternative splicing and post-translational modification of proteins. This discrepancy implies that protein diversity cannot be fully characterized by gene expression analysis alone, making proteomics a useful tool for characterizing cells and tissues of interest.



Dr. Adnan Zuberi, Dr. Sahar Iqbal, Dr. Sameena Ghayur and Dr. Abdus Sattar with Dr. Aw Tar Choon at 14th Laboratory Management and Medicine Congress, Paris-Jan 2015



### Key technologies used in proteomics

**One- and two-dimensional gel electrophoresis** are used to identify the relative mass of a protein and its isoelectric point.

**X-ray crystallography and nuclear magnetic resonance** are used to characterize the three-dimensional structure of peptides and proteins. However, low-resolution techniques such as circular dichroism, Fourier transform infrared spectroscopy and small angle x-ray scattering can be used to study the secondary structure of proteins.

**Tandem mass spectrometry** combined with reverse phase chromatography or 2-D electrophoresis is used to identify (by de novo peptide sequencing) and quantify all the levels of proteins found in cells.

**Affinity chromatography**, yeast two hybrid techniques, fluorescence resonance energy transfer (FRET), and Surface Plasmon Resonance (SPR) are used to identify protein-protein and protein-DNA binding reactions.

**X-ray Tomography** used to determine the location of labelled proteins or protein complexes in an intact cell.

Dr. Farheen Aslam  
FCPS Chem Path  
QAMC, BWP



## THE MARTYRS

*Walking down the road,  
Struggling to find a board.*

*Board with the names,  
Names of the men burnt in flames.*

*Flames that tore the bodies a part,  
Leaving bones and dust in a cart.*

*Blood trickling down the flesh,  
Flesh that was once fair and fresh.*

*I see their sparkling souls,  
Riding on the horses achieving the goals.*

*Goals of the heaven so pure,  
For which every mortal yearns to endure.*

*Endure the pain of Death,  
Yet trading it for everlasting wealth.*

*I see their marry faces gleaming,  
And the bodies like the diamonds beaming.*

*Leaving behind enchanting scent,  
Halting the time as the ladder descends.*

*And up they go into the clouds of heaven,  
There to live for eternity with a rainbow of Seven.*

*(This poem is dedicated to all the martyrs especially the team of doctors who embraced shahadat in a recent heli crash while evacuating a patient)*



Dr. Sumbal Nida  
3rd Year Trainee  
Chemical pathology  
AFIP, RWP

### World Osteoporosis Day – Oct 2015 At AKUH, Karachi



### PSCP workshop on SPSS-June 2015 at AFIP RWP



## D for Deficiency, D for Diseases, so what is actually 'The D', a Vitamin or a Hormone??

Vitamin D is referred to either **Vitamin D3 (cholecalciferol)** or **Vitamin D2 (ergocalciferol)**. It is structural raw material that one or more hormones or prehormones (not prohormones) are made from. It meets the strict definition of a vitamin, namely an organic substance present in minute amounts in the natural diet essential to normal metabolism, and insufficient amounts of which in the diet may cause deficiency diseases. Vitamin D itself (whether D3 or D2) is not a hormone which is strictly defined as a substance formed in one organ but transported in the blood to another organ and capable of altering the functional activity of that target organ. In addition, the set of compounds derived from the cholecalciferol molecule are known as secosteroids. These are two hormonally-active substances, known as (fat-soluble) secosteroids, derived and distinct from Vitamin D (either D2 or D3), these being:

**1,25-dihydroxyvitamin D (calcitriol)** which is a **calcium-regulating hormone**, an adaptive hormone produced in response to calcium deficiency, it functions by interacting with its cognate vitamin D receptor (VDR)

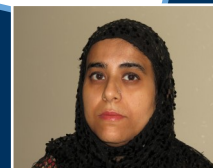
**25-hydroxy-Vitamin D** which is a **prehormone** (not a prohormone), a glandular secretory product, having minimal or no

inherent biologic potency, that is converted peripherally to an active hormone. 1,25-dihydroxyvitamin D which is the metabolic product of vitamin D, is itself a potent, pleiotropic repair and maintenance secosteroid hormone acting as a molecular switch targeting over two hundred known human genes across a wide variety of tissues, and functions as an adaptive hormone (being produced in response to calcium deficiency). The actions of calcitriol are mediated by the **Vitamin D receptor (VDR)**, a ligand-activated transcription factor that controls gene expression, calcitriol thus serving as a transcriptional regulator of various genes. Recent data shows that 1,25-dihydroxyvitamin D activated VDR modulates the expression of genes at both single gene loci and also at the level of gene networks.

### Functions Of Vitamin D

- Immune system, which helps you to fight infection
- Muscle function
- Cardiovascular function, for a healthy heart and circulation
- Respiratory system –for healthy lungs and airways
- Brain development
- Anti-cancer effects

Dr Sabiha Waseem  
(Chemical Pathology trainee)  
Canada



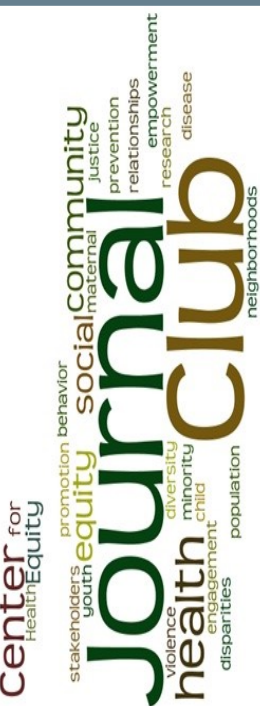
## Journal Club Meeting

### Space to think

The earliest reference to a journal club is found in the biography of Sir James Paget in 1854. According to Eugene Lloyd, of Bristol University, "Journal clubs are a good way of introducing students to science as a dynamic experimental subject and to illustrate scientific reasoning". They help keeping up to date with relevant literature and give confidence to formulate own opinion on topics and critical analysis of the literature resulting in optimization of patient care. With fortune of having teachers who are committed to the concept, Journal Club meeting (JCM) has been a very regular weekly event in the Department of Chemical Pathology and Endocrinology, AFIP Rawalpindi for the last many years. Here is a practical and feasible method of holding JCM in a busy department like ours:

JCM is held on every Friday and participants include all the consultants, residents and rotational trainees of the department. Regular schedule of presenters for the whole month is prepared and displayed on department notice board before start of the month. Interesting and well-written papers relevant to our specialty from reputed international journals are selected for discussion. All members receive a copy of the research article through emails one week before JCM. It helps in the constant exchange of ideas, opinions, and interactions among those in attendance that optimizes the educational value of the meeting. Without making a PowerPoint presentation, the presenter critically reads the article and projects the original PDF version from the Journal during the meeting. With the help of intensive faculty involvement and facilitation, our JCM is designed so that it focuses both on Research Methods and statistics including study design, epidemiology as well as scientific content. Research critique at JCM includes discussion on study background, rationale, study methodology, points of our own interest including the implication of the findings for clinical practice and research needs at AFIP. Active participation of those attending is made obvious by using the discussion questions by meeting leaders. These JCMs have helped in developing research attitude in postgraduate trainees, encouraging them to conduct studies and write scientific papers.

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## Meeting Report: “Les Confluences”

The Society for the Study of Inborn errors of Metabolism (SSIEM) Annual Symposium 2015 in Lyon, France



**S**SIEM is aimed to foster the study of inherited metabolic disorders and related topics. It promotes exchange of ideas between professional workers in different disciplines who are interested in inherited metabolic disease.

The annual symposium of SSIEM 2015 was held in Lyon from 1<sup>st</sup> till 4<sup>th</sup> September at Lyon Convention Centre which was located at the Cité Internationale de Lyon between the Parc de la Tête d'Or and the Rhône River. The theme of the symposium was taken from the word “Les Confluences”: where Rhône and Saone rivers join in French. In SSIEM, all health professionals work together and when basic research helps clinicians. This symposium was attended by two Chemical Pathologist Dr. Aysha Habib Khan and Dr. Noreen Sherazi and Metabolic Physician Dr. Bushra Afroze from Aga Khan University, Karachi. Abstract regarding frequency of selective screening of organic acidurias and amino acidopathies was selected for poster presentation and two other abstracts were published in abstract book related to quality control and proficiency testing of biochemical genetics laboratory, AKU.

The day 1 commenced with scientific program including informative ERNDIM meeting regarding critical errors in proficiency testing followed by Industry Sponsored Symposia on PKU, lunch and poster walk. There was opening ceremony and plenary session on “confluence of research and inborn errors” followed by a refreshing welcome reception towards the end of a hectic day.

Day 2 started with the parallel session on Organic acidurias/Urea cycle disorders, Amino acids disorders and Mitochondrial disorders where researchers from France, Switzerland and Italy presented their work on various topics including MMA, propionic acidurias, GA type 1, OTC deficiency and mutations causing 3-methylglutaconic acidurias etc. A very informative plenary session on “Antenatal manifestations of IEMs discussed fetopathological investigations, diagnostic workup and imaging findings of IEMs in antenatal period after the lunch.

Day 3 had various plenary sessions on riboflavin and fatty acid oxidation, neurometabolic disorders, vita-

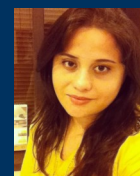
mins and cofactors and disorders of lysosomal storage. One hour industry sponsored session on “Metabolic decompensation in PA and MMA” was very practical and interactive session. Last day was also concluded with plenary sessions, hot topics and late breaking news, Garrod award lecture on transcobalamin deficiency and closing remarks with SSIEM Rome 2016 presentation and awards.

Over all the sessions were clinical oriented and research based but as a pathologist these sessions were beneficial in gaining clinical perspective in the area of IEM as it will enhance the understanding of inherited disorders and quality of diagnostic reporting along with the future developments in the field of IEM.

Lyon is internationally known for its gastronomy, which was shared with us during the networking afternoon on day 3 where we had the opportunity to discover different aspects of the Capitale des Gaules, a UNESCO World Heritage site since 1998.

It was great honor to present the biochemical genetics laboratory two years data on selective screening of organic acidurias and amino acidopathies from AKUH at the international symposium of SSIEM 2015. This was first local data of IEM diagnosed with locally available expertise in Pakistan. Not only abstract was selected for poster presentation but they have also awarded travel scholarship to Dr. Noreen Sherazi in order to attend the annual symposium 2015. This project was the collaborated efforts of Faculty of Section of Clinical Chemistry, Department of Pathology and Laboratory Medicine, Technical staff of Biochemical genetics unit and Metabolic Physician, Dr. Bushra Afroze from Pediatrics Department AKUH.

Noreen Sherazi  
Chemical Pathologist  
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## Implementation, management and continuous quality improvement through point of care testing in a tertiary care hospital in Pakistan

College of American Pathologist (CAP) defines Point of Care Test (POCT) as 'testing that is performed outside the physical facilities of the clinical laboratory, in proximity to the patient on whom the testing is performed'. Unlike core laboratory testing implementing and managing POCT is challenging. Considering the fact that tests are done without the presence of laboratory experts, structuring of the management system of POCT by the laboratory and its operation are important issues. Hereby we are reporting our experience in establishment of POCT program at Aga Khan University Hospital (AKUH). At AKUH while most laboratory testing was performed in the main clinical laboratory, arterial blood gas (ABG), electrolytes, glucose, urine analysis were performed in wards and critical care areas without proper policies, absence of report generation, manual recording of patient results, lack of training and lack of evidence of quality control. Our aim was to introduce a POCT program at AKUH to ensure patient testing is performed in compliance with regulatory standards to produce accurate test results.

A proposal delineating the scope of services was developed by the Pathologists at the Section of Chemical Pathology, Department of Pathology & Laboratory Medicine. The test menu proposed included arterial blood gases, electrolytes, glucose and urine dip stick analysis. Approval from senior management was sought. A team comprising of representatives from Pathology, Biomedical Engineering (BE), and Material and Management Division (MMD) performed a detailed comparison of the available equipments for selection according to the preset criteria. A POCT Coordinator was identified.

A multidisciplinary team comprising of representatives from Pathology, MMD, Information technology (IT), BE, nursing was formalized for execution of POCT program. Needs assessment was done by the team and sites, instruments and vendor were identified. Quality management plan, policies and testing procedures were written down and simultaneously POCT training program and curriculum were designed and shared with Nursing Education Service (NES) of AKUH. Equipment procurement was followed by validation of equipment, test method verification and

instrument to instrument comparison according to CLSI guidelines at the Central Laboratory by POCT Coordinator. Connectivity of POCT equipment to server and then to integrated laboratory management system was established by manufacturer and IT at AKUH. Training of trainers (TOT) from nursing education service was done followed by training of the end users. A 24/7 hotline was made to resolve POCT related query/ troubleshooting. The whole process was conscientiously monitored by the POCT team.

Fifty nine glucometers, five urine analysis devices and five arterial blood gas analyzer were installed at 22 sites (including emergency department, critical care units and wards). Fifty eight TOTs were trained from NES by POCT Coordinator and manufacturer. Monitoring of multilevel daily quality control and compliance of POCT analyzers is now routinely performed by POCT Coordinator through online connectivity at the Central Lab. All POCT sites are participating successfully in College of American Pathologists since this year.

The control of training, competence assessment, policies, procedures and quality is now under the guidance/oversight of Clinical Laboratory. The connectivity for our POCT program and the data management capabilities has given us the ability to monitor our whole program of >1000 operators and to produce accurate audit trail. Our POCT operators understand that the laboratory is overseeing every aspect of testing and monitoring it closely. Development of this program provides continuous monitoring and evaluation of POCT workflow. Key to the success of establishment of POCT infrastructure was a dedicated project lead and a multidisciplinary, multimodal approach involving all stakeholders. Long term, however, we hope to be able to repeat this model for outpatient clinics and expand the test menu.

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