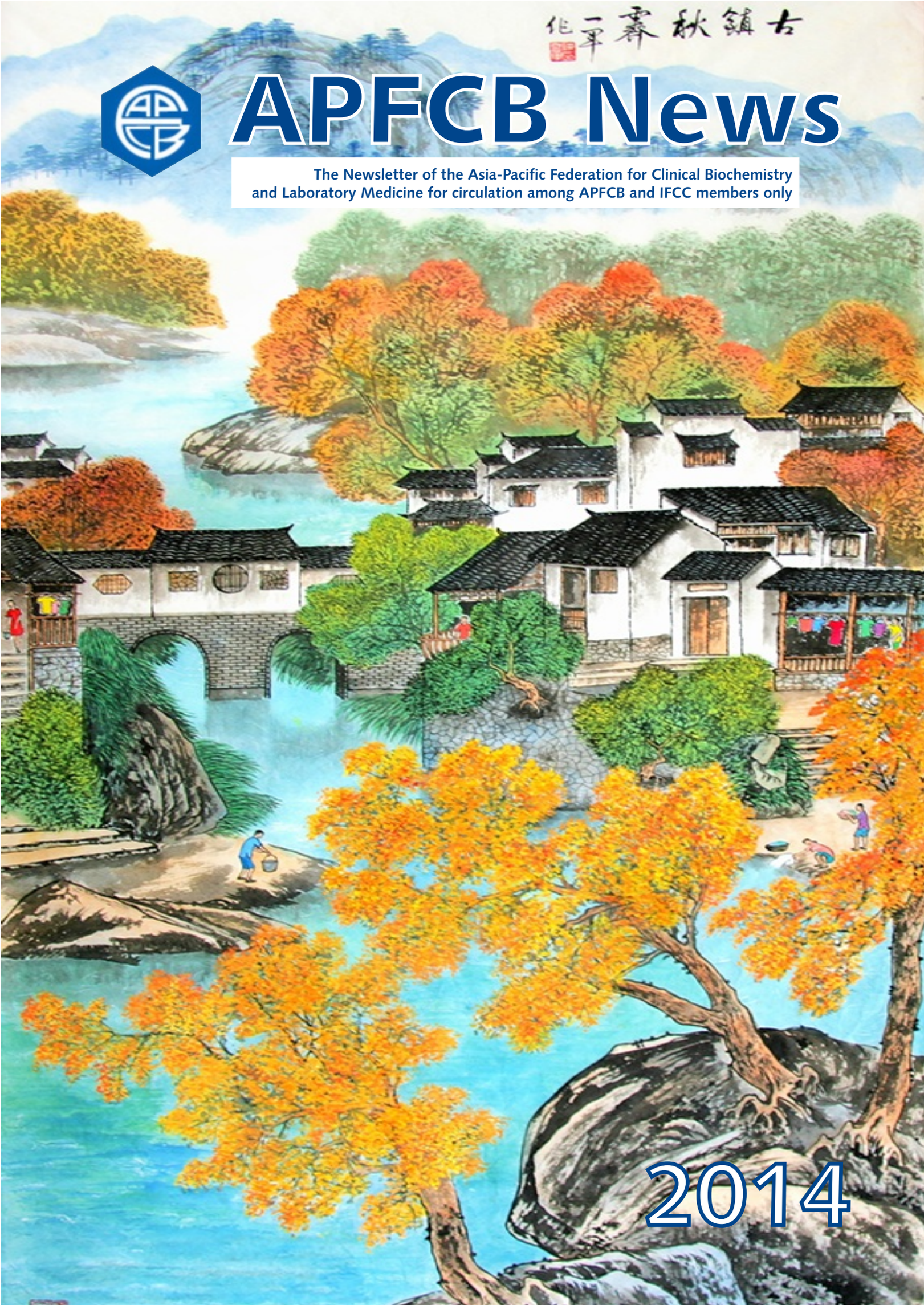
古鎮秋霖
APFCB News
The Newsletter of the Asia-Pacific Federation for Clinical Biochemistry
and Laboratory Medicine for circulation among APFCB and IFCC members only
2014

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APFCB Membership

Members

Australasian Association of Clinical Biochemists (AACB)
Chinese Society of Laboratory Medicine (CSLM)
Hong Kong Society of Clinical Chemistry (HKSCC)
Association of Clinical Biochemists of India (ACBI)
Indonesian Association for Clinical Chemistry (IACC)
Japan Society of Clinical Chemistry (JSCC)
Korean Society of Clinical Chemistry (KSCC)
Malaysian Association of Clinical Biochemistry (MACB)
Nepal Association for Medical Laboratory Sciences (NAMLS)
Pakistan Society of Chemical Pathologists (PSCP)
Philippine Association of Medical Technologists (PAMET)
Singapore Association of Clinical Biochemistry (SACB)
Association for Clinical Biochemistry, Sri Lanka (ACBSL)
Chinese Association for Clinical Biochemistry, Taiwan (CACB)
Thailand Association of Clinical Biochemists (TACB)
Vietnamese Association of Clinical Biochemistry (VACB)
Mongolian Association of Health Laboratorians (MAHL)

Corporate Members

Abbott Diagnostics
BD Diagnostics
Beckman Coulter
Bio-Rad
Diasorin Ltd
Diasys Diagnostic Systems, GmbH
Kopran Laboratories Ltd
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PM Separations
Randox Laboratories
Roche Diagnostics
Sekisui Chemical Co
Shenzen Mindray Bio-Medical Electronics Co Ltd
Siemens
Sukraa Software Solution Pvt Ltd
Sysmex
Technidata Medical Software

Affiliate Members

Chinese Association of Clinical Laboratory Management (CACLM)
Association of Medical Biochemists of India (AMBI)
Macao Laboratory Medicine Association (MLMA)

APFCB Executive Board and Chairmen of Committees, Elected October, 2013

Executive Board

President	Dr Leslie C Lai Consultant Chemical Pathologist, Kuala Lumpur, Malaysia lesliecharleslai@gmail.com
Immediate Past President	Mr Joseph B Lopez MAHSA University College, Kuala Lumpur, Malaysia jblopez2611@gmail.com
Vice-President	Dr Sunil K Sethi National University Hospital, Singapore patsks@nus.edu.sg
Secretary	Dr Endang Hoyaranda Prodia, Jakarta, Indonesia ehoya@prodia.co.id
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Corporate Representative	Mr Martin Fuhrer Siemens Healthcare Diagnostics Holding GmbH, Germany martin.fuhrer@siemens.com

Chairman of Committees

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Scientific	Prof. Kiyoshi Ichihara Yamaguchi University, Japan ichihara@yamaguchi-u.ac.jp
Congress and Conference	Mr Joseph B Lopez MAHSA University College Kuala Lumpur, Malaysia jblopez2611@gmail.com
Hon. Auditors	Prof. Leslie Burnett Pacific Laboratory Medicine Services ("PaLMS"), Sydney, Australia
	Prof. Jap Tjin-Shing Veterans General Hospital Taipei, Taiwan

Submissions

The APFCB News welcomes suitable contributions for publication. These should be sent electronically to the Chief Editor. Statements of opinions are those of the contributors and are not to be construed as official statements, evaluations or endorsements by the APFCB or its official bodies.

Cover page: "An ancient water village in mid-autmn"
Contributed by Tan It Koon
Founding and Past President APFCB

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Tel: 6223 9118 Fax: 6223 9131

Contents

From the desk of Chief Editor...

Dear Colleagues,

Greetings!
It is my pleasure to present to you the fifth Annual issue of APFCB news with great sense of gratification. I would like to thank those member societies and national representatives who have contributed by sending their respective societies' timely reports for the APFCB news 2014. However, this year we have not received many member societies' reports and it reflects in this issue. I request all the member societies to send their activity reports for the future APFCB news editions and make it a useful platform for all to share their work and views.

I am very grateful to our corporate partners Randox and Siemens for their continued support and contribution to the APFCB news. We hope to have their sustained support in future also.

The attractive painting on the cover page of the current issue of APFCB News "an ancient water village in mid-autumn" has been graciously contributed by Prof. Tan It Koon from his precious art work. Prof. Tan It Koon the founding and the past president of APFCB has been an active contributor to the progress and development of APFCB. I'm thankful to him for providing beautiful painting from his art treasure for the fifth consecutive issue of APFCB news. Prof. Tan has a multi-dimensional personality. He is a distinguished scientist, an accomplished pianist and a fine painter. He was invited by the Alumni of National University of Singapore for a grand presentation of his multifaceted personality at the onset of Chinese new year - 27th Feb 2015, where the audiences was treated to a great presentation of his experience, his art-work and his performance on piano.

Praveen Sharma
Editor in Chief

Message from APFCB President...

Greetings to all members of the APFCB.

The IFCC Executive Board (EB) elections held in 2013 and 2014 yielded an executive board for the term 2015 till 2017 that excluded several regions, including the Arab Federation of Clinical Biology (AFCB), Asia-Pacific Federation for Clinical Biochemistry and Laboratory Medicine (APFCB) and USA and Canada which together will be forming the North American Federation for Clinical Chemistry (NAFCC). To prevent this unsatisfactory situation from occurring again in the future I approached two of our APFCB member societies in December 2013 which very gladly and extremely promptly proposed (AACB) and seconded (IACC) a motion that future IFCC EB should have regional representation and that this representative should be elected by IFCC member societies within regional federations.

Thanks to the support of the majority of IFCC member societies this will now be a reality from 2018. We will have to implement a procedure for nominating and electing the APFCB regional representative. Only IFCC member societies in the Asia-Pacific Region who are also APFCB members can nominate and vote for the APFCB representative on the IFCC EB. If we choose to use the IFCC election machinery that was introduced recently this will be at our disposal. To rectify the lack of regional representation on the new IFCC EB the Presidents of AFCB, APFCB, CSCC and AACC were invited to attend the recent IFCC EB meeting held on 30th and 31st January 2015 and have been invited to meet with the IFCC EB for two hours during the EB meeting in Paris prior to EuroMedLab 2015.

The APFCB renewed its MoU with WASPaLM (World Association of the Societies of Pathology and Laboratory Medicine) in August 2014 effective for a three year period from 27th August 2014 and also signed an MoU with AACC on 11th December 2014 effective for a two year period from 1st January 2015 till 31st December 2016. We have two projects planned with WASPaLM, namely, a regional Chronic Kidney Disease project and one on Laboratory Accreditation. APFCB will be sponsoring a scientific symposium at the WASPaLM World Congress to be held in Cancun from 18th till 21st November 2015.

The symposium is as follows:
1. Setting Quality Goals - Graham Jones (Australia)
2. Troubleshooting failed QC - lot to lot and rerunning - LohTze Ping (Singapore)
3. Pre analytical QA - Elizabeth Frank (India)

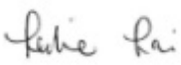
The APFCB Travelling Lecturer for 2015 and 2016 is Dr Graham Jones from Sydney, Australia. The topics he will lecture on are:
1. Chronic Kidney Disease - the role of the routine laboratory
2. Getting the right answer to manage the patient - the importance of traceability
3. HbA_{1c} - measurement and interpretation

The IFCC-Abbott Visiting Lecturer to the Asia-Pacific region for 2015 and 2016 is Prof Howard Morris from Adelaide, Australia and his topic is on vitamin D and bone disease.

PAMET celebrated their golden anniversary in December 2014 and the APFCB EB was privileged to have been invited to hold its EB meeting in Manila and to participate in the 50th Golden Anniversary celebrations. Congratulations to PAMET!

If any APFCB member society is approaching a major milestone such as 50th anniversary please do let me know so that the APFCB EB can plan to participate in your celebrations and present you with a memento from the APFCB to mark your society's major milestone.

All the very best to all our members and readers



Dr Leslie Charles Lai
President, APFCB

ASIA-PACIFIC FEDERATION FOR CLINICAL BIOCHEMISTRY AND LABORATORY MEDICINE

Annual Report for 2014

1. APFCB Matters

Ordinary Members

The following National Societies are members of the APFCB:

1. Australasian Association of Clinical Biochemists (AACB)
2. Chinese Society of Laboratory Medicine (CSLM)
3. Hong Kong Society of Clinical Chemistry (HKSCC)
4. Association of Clinical Biochemists of India (ACBI)
5. Indonesian Association of Clinical Chemistry (IACC)
6. Japan Society of Clinical Chemistry (JSCC)
7. Korean Society of Clinical Chemistry (KSCC)
8. Malaysian Association of Clinical Biochemists (MACB)
9. Nepal Association for Medical Laboratory Sciences (NAMLS)
10. Pakistan Society of Chemical Pathologists (PSCP)
11. Philippine Association of Medical Technologists (PAMET)
12. Singapore Association of Clinical Biochemists (SACB)
13. Association for Clinical Biochemistry, Sri Lanka (ACBSL)
14. Chinese Association for Clinical Biochemistry, Taiwan (CACB)
15. Thailand Association of Clinical Biochemists (TACB)
16. Vietnamese Association of Clinical Biochemistry (VACB)
17. Mongolian Association of Health Laboratorians (MAHL)

Corporate Members

1. Abbott Diagnostics
2. BD Diagnostics
3. Beckman Coulter
4. Bio-Rad
5. Diasorin Ltd
6. Diasys Diagnostic Systems, GmbH
7. Kopran Laboratories Ltd
8. Ortho-Clinical Diagnostics
9. PM Separations
10. Randox Laboratories
11. Roche Diagnostics
12. Sekisui Chemical Co
13. Shenzen Mindray Bio-Medical Electronics Co Ltd
14. Siemens
15. Sukraa Software Solution Pvt Ltd
16. Sysmex
17. Technidata Medical Software

Affiliate Members

1. Chinese Association of Clinical Laboratory Management (CACLM)
2. Association of Medical Biochemists of India (AMBI)
3. Macao Laboratory Medicine Association (MLMA)

Office Bearers (1 January 2014 till 31 December 2016)

Executive Board

President	Leslie Lai (Malaysia)
Immediate Past President	Joseph Lopez(Malaysia)
Vice-President	Sunil Sethi (Singapore)
Secretary	Endang Hoyaranda (Indonesia)
Treasurer	Elizabeth Frank (India)
Corporate Representative	Martin Fuhrer (Siemens)

Chairs of Committees

Communications (C-Comm)	Praveen Sharma (India)
Congress and conferences (C-CC)	Joseph Lopez (Malaysia)
Education Laboratory Management (C-LM)	Tony Badrick (Australia)
Scientific (C-Sci)	Kiyoshi Ichihara (Japan)

Executive Board meetings

The Executive Board held a meeting on 1st December 2014 during the Golden Anniversary Celebrations and 50th Annual Convention of PAMET in Manila, Philippines.

Corporate Members

Agappe Diagnostics Ltd informed the APFCB in November 2014 that it no longer wished to be a member of the APFCB.

Memorandum of Understanding (MoU) between APFCB and World Association of Pathology and Laboratory Medicine (WASPaLM).

An MoU between APFCB and WASPaLM was signed on 27 August 2014 during the International Congress of Pathology and Laboratory Medicine held in Kuala Lumpur by the Presidents of APFCB (Dr Leslie Lai) and WASPaLM (Distinguished Professor Datuk Looi Lai Meng).

Sitting down from left to right: Dr Leslie Lai (President of APFCB) and Distinguished Professor Datuk Looi Lai Meng (President of WASPaLM). Standing from left to right: Associate Prof Sunil Sethi (Vice President of APFCB), Prof Emeritus Dr Cheong Soon Keng (President, College of Pathologists, Academy of Medicine of Malaysia), Prof Dobrin Svinarov (WASPalm bureau member), Prof Jagdish Butany (Secretary-Treasurer of WASPaLM), Prof Marilene Melo (WASPaLM bureau member) , Dr David Wilkinson (WASPaLM bureau member), Prof MichaelOoellerich (WASPaLM Director for Europe), Prof Stewart Bryant (WASPaLM Director for Australasia) , Prof Masami Murakami (WASPaLM President-Elect).

Golden Jubilee Celebration

PAMET celebrated their Golden Anniversary and 50th Annual Convention from 1st to 3rd December 2014 in Manila. Dr Leslie Lai presented the President of PAMET, Dr Romeo Joseph Ignatio with a pewter plaque from the APFCB as a memento on 1st December 2014 during the opening ceremony.

From left to right: Dr Leila Florento (Immediate Past President of PAMET), Ms. Agnes Medenilla, Mrs. Norma Chang, Dr Leslie Lai (President of APFCB), Dr Romeo Joseph Ignatio (President of PAMET) and Mrs. Marilyn Atienza.

2. APFCB Activities

I. APFCB Education and Laboratory Management Committee (C-ELM)

Chair: Associate Prof Tony Badrick (Australia)

1. APFCB Travelling Lectureship

The APFCB TL for 2013/14 is Associate Prof Sunil Sethi of Singapore. Prof Sethi gave lectures on Managing Laboratory Informatics, Middleware and Process Control at the MACB Annual Scientific Meeting in June 2013, in Vietnam in September 2013, during the APFCB Congress in Bali in October 2013, in Hong Kong at the HKSCC 13th ASM 11 January 2014; in Taipei during the CACB ASM 15 March 2014; in Australia at the AACB 52nd Annual Scientific Meeting, Adelaide 27 October 2014.

2. IFCC-Abbott Visiting Lecturer

Prof Howard Morris, (Vice President of IFCC) of the University of South Australia and South Australia Pathology has been nominated to be the IFCC- Abbott Visiting Lecturer for 2015/2016. His topic is Vitamin D and Bone Metabolism.

3. Clinical Comments Interpretation Program

The clinical comments interpretation program continues with a case every 4-6 weeks being sent to participants. The response varies between 30 -70 but there is strong support from a core of participants. A total of seven (7) cases were sent to participants in 2014.

4. Webpage

The Webpage is being populated with QA/QC material with support from Randox. It is hoped that this content will attract members to the website.

5. Pre-analytical Working Group

The APFCB Pre-analytical Working Group has been formed with the following terms of reference:

i. To promote the importance of the quality of the pre-analytical phase of laboratory medicine
ii. To define the best practices and provide recommendations for some critical activities in the pre-analytical phase
iii. To design and validate questionnaires for assessing the current practices in pre-analytical variables and to conduct surveys in the Asia-Pacific region on pre-Analytical practices.
iv. Organize symposia, workshops, webinars or training courses on pre-analytical phase issues
v. Work with Pre-analytical WG of EFLM
vi. Build guidelines for Pre-analytical phase

Deliverables

i. Validated questionnaires for assessing the key challenges that laboratories face in managing the pre-analytical phase.
ii. Surveys to assess the current pre-analytical challenges in laboratories and their Importance in order to define how best the WG can support laboratories in the Asia Pacific region.
iii. Solutions/guidance for laboratories to address the top pre-analytical challenges.
iv. Active webpage with pre-analytical tools

6. APFCB Scholarships

Four APFCB-Abbott scholarships of USD 2,000 each were awarded for participation in the IFCC World Lab Congress in Istanbul, 22 till 26 June 2014. All four recipients had abstracts accepted for presentation at the IFCC World Lab in Istanbul. Two APFCB-AACB scholarships of SGD 2,000 each were awarded to participate in the AACB Congress in Adelaide, Australia, 27 till 29 October 2014 although one scholarship was subsequently withdrawn as the recipient could not attend the AACB Annual Meeting.

7. Workshop at the IFCC WorldLab in Istanbul

The Education and Laboratory Management Committee also organised the APFCB-sponsored symposium on Awareness of Environmental Impact of Clinical Laboratories at the IFCC WorldLab Congress in Istanbul. The three speakers and the titles of their talks are:

Environmental guidelines for clinical laboratories
J. Lopez (Malaysia)

Adopting environmental guidelines and cost savings
T. Badrick (Australia)

Environmental laboratory facilities management
D. Jackson (USA)

ii. Scientific Committee (C-Sc)

Chair: Prof Kiyoshi Ichihara (Japan)

1. Collaboration on the global study on reference values

The study, planned and coordinated by C-RIDL (IFCC) was launched in December of 2011 after nearly two years of discussion by the committee, and a pilot study conducted in April of 2011. The objectives of the global study are 1) to establish country specific reference intervals (RIs) in a harmonized way using the common C-RIDL protocol, and 2) to explore sources of variations of major analysts across the countries after alignment of test results through common measurement of a panel of sera prepared by C-RIDL.

The following Asia-Pacific countries have completed their study:
China
India
Philippines

The following Asia-Pacific countries have joined the study:
Pakistan
Malaysia
Nepal
Bangladesh

A symposium, workshop and meetings were held recently at the JSLM annual congress in Fukuoka, 24 and 25 November 2014 to discuss the project with participants from countries involved in the project.

2. Regional project for harmonisation of mass spectrometry-based steroid assays

The mass spectrometry working group has been working steadily throughout 2014 to develop recommendations to support the harmonisation of testosterone analysis by LC-MS/MS. A number of activities have resulted from this group:

A) The method harmonisation pilot for serum testosterone by LC-MS/MS was presented as an oral communication by Dr Therese Koal on behalf of the group at the WorldLab meeting in Istanbul in June 2014

B) An interview was conducted for Metabolomic news in August 2014 which included a discussion of this project. The link is- http://www.metabonews.ca/Aug2014/Metab0News_Aug2014.htm#MetaboInterviews

C) A poster was presented at the AACB Annual Scientific Meeting in Adelaide in October 2014

D) The harmonised traceable method has been used to generate the first set of preterm neonatal reference intervals for serum testosterone

E) The New Zealand Quality Assurance Group have requested support for harmonisation of their immunoassay serum testosterone methods against our groups LC-MS/MS method

F) Initial recommendations have been established for the harmonisation of serum testosterone by LC-MS/MS

G) Bio-Rad laboratories is proposing to utilise the harmonised method to generate quality control ranges of the Liquichek and Lyphochek material for mass spectrometry methods using the results obtained from the harmonised laboratories

H) An open face to face group meeting was conducted in conjunction with the AACB Annual Scientific Meeting held in Adelaide in October 2014

3. Urine steroid metabolomic studies by gas chromatography mass spectrometry to aid the diagnosis of disorders of sexual development in Vietnamese children

Objectives:

- To develop and validate the urinary steroids profiling analysis using gas chromatography- mass spectrometry (GC-MS).

- To establish the urinary steroids reference values for Vietnamese newborns.
- To investigate age-related changes in steroid ratios for children and adolescents.
- To apply the GC-MS urinary steroids profile in diagnosis of inborn errors of steroid synthesis at National Hospital of Pediatrics.

This project has commenced with some initial purchase of materials. Dr Ronda Greaves' Honours student has trialled the proposed assay at RMIT and made some refinements to the method. Once the method is validated analysis of the patient samples will be commenced.

4. Project 3: Vietnam Chemical Pathology Course and POCT workshop

The 6th Vietnam Chemical Pathology Course was conducted in June 2014 with approximately 350 participants in Ho Chi Minh City and 200 participants in Hanoi attending the one day event. The course received television media coverage this year, in addition to the print media and Dr Ronda Greaves gave a live interview for the television station whilst in Ho Chi Minh City. Jan Gill from the RCPAQAP joined Dr Ronda Greaves to deliver this course. This course was conducted under the auspices of the APFCB and IFCC. The 2nd Vietnam Point of Care Patient Testing Workshop was conducted in Ho Chi Minh City in June 2014. As this was a workshop the course was initially limited to forty attendees but due to its popularity the number was increased to allow for 50 attendees. The course proved to be very successful and a booking has been made to conduct the course on site at RMIT University's Ho Chi Minh City Campus in District 3 for June 2015.

5. Publications in 2014 arising from the work of the Scientific Committee

Tran MT, Baglin J, Tran TT, Trung KH, Phung LT, Read A, Greaves RF. Biochemical diagnosis and monitoring of Neuroblastoma in Vietnam: Development of homovanillic and vanillylmandelic acid analysis by gas chromatography-mass spectrometry and establishment of reference intervals. Clin Biochem 2014; 47: 206-215.

Wang X, Ichihara K, Xu G. Itoh Y. Call for the use of a common equation for glomerular filtration rate estimation in East and South-east Asia. Clin Biochem 2014; 47: 1214-19.

iii. Communications Committee (C-Comm)

Chair: Prof Praveen Sharma (India)

1. APFCB e-News

The Chair of the Communications Committee is also the Editor of the APFCB e-News. APFCB news is the official communication newsletter for APFCB, published online since 2010. The publication team includes:

Leslie Lai (Editor)
Tester Ashavaid (Editor)
Aysha Habib (Editor)
Dr MVR Reddy (Web editor)
Dr Purvi Purohit (Assistant editor)

This has ensured wide reach of the APFCB e-News to all the members at no additional cost. It covers the-

- Activities of APFCB EC, other committees & working groups,
- Activities of APFCB members,
- Scientific activities
- Case studies
- Corporate corner
- Calendar of Congresses, meetings & webinars

The APFCB e-News 2013 is available online on the APFCB website. The earlier issues of 2010, 2011, 2012 are also available on the APFCB website. The next issue APFCB e-News 2014 will be released in the first quarter of 2015.

2. APFCB website

The APFCB website was launched in 2011 and is being maintained by the Communication Committee. The website is dynamic and gives regular updates of the activities of member societies like Conferences, Workshops or lectures being held. Access is made available through the website to the ongoing Scientific, Education and Laboratory Management Committee programmes of the APFCB as well as the activities of the Communications and Congress and Conferences Committee. There is also a photo gallery of relevant events. The website is also a source of information on the APFCB Congress and regional meetings, the APFCB Travelling Lecturer programme as well as future events.

3. Public Relations

A power point presentation on the APFCB, its members and its activities has been developed by Mr. Martin Fuhrer, Corporate Representative to the EB and is ready for use at member society conferences and at regional and international meetings to promote the APFCB. This presentation is being regularly updated by Mr. Martin Fuhrer.

iv. Congress and Conferences Committee (C-CC)

Chair: Joseph Lopez (Malaysia)

1. APFCB Auspices

The following conferences in 2014/15 have been granted APFCB auspices:

- 9th International Conference of Anticancer Research, Sinthonia, Halkidiki, Greece, 6 to 10 October 2014
- AACB Annual Scientific Conference, Adelaide, Australia, 27-29 October 2014
- Chemical Pathology Course, 2014, 10th June 2014 at Hanoi and 14th June 2014 at Ho Chi Minh City, Vietnam
- EFLM-IFCC EuroMedLab, Paris, 21-25 June 2015

2. Turning Science into Caring (TSIC)

Abbott Laboratories has held TSIC meetings in the Asia-Pacific region over the past few years in conjunction with the IFCC. The purpose of these meetings is to bring laboratory and other healthcare professionals together to exchange information on trends in laboratory medicine. Following a discussion with a representative from Abbott at the EuroMedLab in Milan in May 2013, the APFCB was invited to become a partner of these meetings.

An agreement to this effect was signed between the APFCB and Abbott on 22 July 2013 which will enable the APFCB to contribute to the planning of the scientific programme future TSIC meetings. A TSIC meeting was held at Ho Chi Minh city, Vietnam from 20th till 21st October 2014. The APFCB President represented the APFCB at this meeting

3. APFCB Congress 2013 in Bali

The APFCB congress held in Bali in October 2013 was highly successful from several stand-points, including scientifically, socially and financially. The APFCB received 23% of the profits of the APFCB Congress 2013 in June 2014 which amounted to SGD 61,589.23.

4. Progress report from the Chair of the APFCB Congress 2016 Orga-nising Committee

A contract has been signed with Enjoy Professional Conference Organizer Corp. to help us organize the congress 2016. They have organized hundreds of international conferences successfully. Website:www.weplanwell.com.tw

The dates for the APFCB Congress 2016 are confirmed as 26-29 November 2016. The symposia, workshops, and plenary lectures will be held at the Taipei International Convention Center, and the exhibition will be held at the Taipei World Trade Center. The flyers and postcards were designed for promotion.

The congress website has been established: http://www.apfcbcongress2016.org/

The tentative program, sponsorship prospectus, and information about conference venue have been posted on the website. Auspices have been granted by WASPaLM, EFLM, and AFCC, and the logos are shown on the Congress website

Report prepared by Leslie Lai with contributions from Joseph Lopez, Endang Hoyaranda, Martin Fuhrer; Kiyoshi Ichihara, Tony Badrick, Praveen Sharma, Ronda Greaves and Woei-horng Fang (Chair of the APFCB Congress 2016 Organising Committee).

APFCB WORK PLAN FOR 2015

1. EB, Committee Chairs and Committee Members

1. Promotion of the APFCB internationally, regionally and nationally, including at workshops, conferences, scientific meetings and during visiting lectureships
2. Recruiting new Full members, Affiliate members and Corporate members
3. Maintaining good and strong relationships with other regional clinical biochemistry organisations, AACC, IFCC and WASPaLM
4. The Memorandum of Understanding (MoU) between APFCB and WASPaLM was renewed for a further three years on 27 August 2014. APFCB will sponsor a symposium at the WASPaLM World Congress in Cancun, 18-21 November 2015 and WASPaLM will sponsor a symposium at the APFCB Congress in Taipei, November 2016. Joint projects were discussed at the APFCB Congress in Bali including a regional chronic kidney disease project and accreditation workshops
5. An MoU was signed on 11 December 2014 between APFCB and AACC effective for a period of two years beginning in 2015. AACC will develop a symposium to be considered for inclusion at the APFCB Congress in Taipei in November 2016 and the APFCB will be invited to develop a scientific session for consideration for inclusion in the scientific programme for the 2016 AACC Annual Meeting. APFCB and AACC will collaborate to provide education activities to the Asia-Pacific region in the field of Clinical Chemistry and Laboratory Medicine

2. Education and Laboratory Management Committee (C-ELM)

Chair: Associate Prof Tony Badrick

i. IFCC-Abbott Visiting Lecturer for 2015: Prof Howard Morris (Australia)

The topic of Prof Howard Morris's visiting lectureship is Vitamin D and bone disease. The Chair will organize Regional Societies to host the IFCC-Abbott Visiting Lecturer either as a component of a local Annual Meeting or a standalone meeting. Prof Morris is speaking in Hong Kong in January (HKSCC) and in Taiwan in March (CACB).

ii. APFCB Travelling Lecturer for 2015 and 2016: Dr Graham Jones

The three topics on offer are:

1. Chronic Kidney Disease - the role of the routine laboratory
2. Getting the right answer to manage the patient - the importance of traceability
3. HbA1c - measurement and Interpretation

Planned lectures thus far for 2015: Singapore

iii. Planning for the APFCB-sponsored Quality/Accreditation workshop at the WASPaLM World Congress in Cancun, 18-21 November 2015

1. Setting Quality Goals - Graham Jones (Australia)
2. Troubleshooting failed QC - lot to lot and rerunning - Loh Tze Ping (Singapore)
3. Pre analytical QA - Elizabeth Frank (India)

iv. Planning for a Chemical Pathology Course in 2015. Country to be Decided

v. Pre-Analytical Working Group to work together with EFLM Pre-Analytical Group. One workshop will be conducted

vi. Development of Material for self-directed learning for QA/QC/Lab Accreditation on the webpage

vii. Awareness of Environmental Impact of Clinical Laboratories

viii. Scholarships

Selection of two APFCB Travel Awardees to the AACB Scientific Meeting in Sydney, September 2015

ix. Interpretative comments program

Another six (6) cases will be sent to Registrants in 2015

3. Congress and Conferences Committee (C-CC)

Chair: Mr Joseph Lopez

1. Assist in the preparations of the 14th APFCB Congress
2. Visit to Taipei by APFCB President and Chair C-CC to Taipei to be briefed on preparations by the organizing committee and to inspect facilities
3. Providing AFPCB auspices to scientific meetings within and outside the region that are of a non-commercial nature

4. Communications Committee (C-Comm)

Chair: Prof Praveen Sharma

1. To publish online APFCB news 2014 in the first quarter of 2015
2. To maintain and further enhance the quality of APFCB website
3. To ensure that the information on the APFCB website is relevant and up to Date
4. Uploading learning materials developed by APFCB members and APFCB Committees on APFCB website
5. To provide more active support for the web-based distance-learning activities like webinars planned by the C-ELM
6. Multidisciplinary approach to patient care by obtaining educational material, making it available on the website and by providing links to other relevant resources
7. Develop a new Public Relations brochure targeted to the general public, governments, industry, etc
8. Publicise and promote APFCB through participation at various National and International congresses and exhibit & promote 'Clinical Biochemist Reviews'
9. Establish a communication process among the committee members and national representatives of member societies to update and work on agreed activities and initiatives

5. Scientific Committee (C-Sci)

Chair: Prof Kiyoshi Ichihara

I. The regional multicenter study on reference values

As of now, 8 countries in the APFCB region are in active collaboration having joined the global multicentre study on reference values: Japan, China, India, Nepal, the Philippines, Pakistan, Bangladesh and Malaysia. All the results will become available in the fall of this year and full analytical results are to be revealed by the end of this year:

1. The Japanese study led by K. Ichihara of Yamaguchi University was completed by the end of 2012 (n=651). The results will be included in an interim report on the global study to be written this year

2. The Chinese study led by Dr. Ling Qiu of Beijing Union University Hospital was completed by the end of 2013 (n=3200 from 6 provinces nationwide). The manuscript reporting the study is in preparation to be reported this year

3. The Indian study led by Dr. Tester Ashavaid of Hinduja National Hospital was completed in November 2013 (n=512). The first manuscript will be submitted soon. An additional report on method comparison among Abbott, Beckman Coulter and J&J reagents is being planned this year

4. The Nepalese study led by Dr. Binod Yadav representing NAMLS finished testing for chemistry (n=600). Data analysis will be completed soon. Additional testing for immunoassays are planned this year

5. The Philippines study led by Mr. Reynan Rolle is being done under the auspices of PAMET. There has been a long delay due to analytical problems in the Diasys analyser. Additional recruitment will be made for balancing age and sex distribution (currently n=850). A part of target analytes will be measured in Japan this year and data analysis will be completed within this year

6. The Pakistan study led by Prof. Dilshad Khan (AFIP, Rawalpindi) representing PSCP and Dr. Farooq Ghani of Aga Khan University (Karachi) is under way to be completed by the middle of this year targeting a total of 1200 subjects

7. The Bangladesh study led by Dr. Firoz Ahmed of the International Center for Diarrheal Disease and Research will be launched in February 2015 targeting 750 volunteers in Dhaka

8. The Malaysian study led by Dr. Raja Elina of MACB is being planned to be launched this year as a nationwide project

ii. Distribution of computer software for derivation of reference interval (RI-Master)

The beta version of the software distributed at the pre-congress workshop during the APFCB congress in 2013 was upgraded last year. It will be distributed with the user manual this year on request to those who took part or are interested in the study.

iii. Analysis of data from the Asian multicentre study on reference values

The data obtained from the 2009 Asian study had plenty of information which can be used as source data for analysis of biological sources of variation and association among 72 laboratory parameters measured simultaneously. Two new articles are to be submitted soon and at least two more papers are being prepared for publication this year.

iv. Discussion regarding feasibility of building a database aimed at supporting clinical laboratory diagnosis

Accumulation of clinical laboratory database targeting major diagnostic categories, such as common haematological malignancies and autoimmune diseases are being planned in Japan by the collaboration of five national universities. The database is to be used as a source reference data for evidence-based laboratory medicine (EBLM). The test results across the institutions are to be harmonised by use of serum panel produced for the global multicentre study on reference values. An interest has been shown by colleagues from three countries in the APFCB region. Therefore, there will be further discussion this year looking at the feasibility of expanding the Japanese project internationally.

v. Provision of web-based EBLM system

The prototype of an interactive website was built in 2013 to provide evidence on biological sources of variation (BSOV) for commonly tested laboratory tests. It allows dynamic access to the reference values gathered by the 2009 Asian projects for derivation of common reference values. Although any effort of implementing the system to the APFCB website was not done during 2014 for lack of proper documentation of the system it will be done this year before publicising the system at the time of 2016 APFCB.

vi. Regional project for harmonisation of mass spectrometry-based assays (chaired by Dr Ronda Greaves).

This regional activity currently includes members from Australia, Austria, Hong Kong, New Zealand, Singapore and Vietnam. Laboratories in Malaysia, Korea and mainland China have also expressed their interest to participate in the future. Significant engagement with industry partners includes: Agilent Technologies; Biocrates; National Measurement Institute of Australia; PM Separations; Australian Scientific Enterprises; and the RCPAQAP. In addition, two European institutions have offered support as we move forward in this initiative. In October 2014 we met face-to-face and via teleconference at the AACB meeting held in Adelaide to summarise our current activities and plan for 2015. The resulting work plan for 2015 incorporates:

1. Write up of the survey and common calibrator study for peer review publication

2. Expansion of the current testosterone initiative to other steroids of interest. This will be based on survey conducted and availability of an EQA program

3. Ongoing review of EQA performance for steroids analysed by MS

4. Establishment of a pilot EQA program for dihydrotestosterone (DHT)

5. Investigation of third party sources of quality control material and support establishment of MS appropriate ranges for package insert

6. Provision of longitudinal data for preterm infant steroids using traceable common calibrator. (Note: reference intervals already established and published for this group)

7. Conduct a literature search of recently published reference intervals for steroids analysed by mass spectrometry

8. Comparison of the common calibrator based MS testosterone method with patient results obtained from immunoassay platforms

9. Travel to Vietnam and Hong Kong to promote harmonisation collaboration

vii. Development of regional appropriate methods and reference intervals for complex biochemical tests for children. (coordinated by Dr Ronda Greaves and Dr Tran Mai with supported by a qualified statistician Dr James Baglin)

1. Expansion of Vietnam urine HVA method and reference interval project for the biochemical diagnosis and monitoring of neuroblastoma to other interested APFCB countries. A laboratory in Malaysia has expressed interest in joining this study. (carried over from 2014)

2. Disorders of sexual development urine steroids metabolomics project. This - project aims to develop a regional method for urine steroid profiles measured in fresh and blotter urine samples. The project is conducted at the National Hospital of Paediatrics (NHP) in Hanoi, Viet Nam. In December 2014, the initial method was developed; in association with a visit to NHP by Dr Greaves. Throughout 2015 it is planned to validate this method and establish paediatric age-related reference intervals

Objectives:

- To develop and validate the urine steroids profiling analysis using gas chromatography mass spectrometry
- To establish the urinary steroids reference values for Vietnamese newborns.
- To investigate age related changes in steroid ratios across childhood, with emphasis on the timing and significance of change at adrenarche and puberty.
- To apply the GC-MS urinary steroids profile in diagnosis of inborn errors of steroid synthesis at National Hospital of Pediatrics for Vietnam.
- Additional collaboration: Once established, it is anticipated that the laboratory will act as a regional centre for the metabolomics studies of steroids collected on filter paper. (Current discussions with clinicians/laboratories in India and Africa in progress).

viii. Training (co-ordinated by Dr Ronda Greaves in conjunction with Roche Diagnostics Vietnam)

Training activities proposed for 2015 to underpin quality scientific research and establish further collaborations for APFCB are:

1. 2015 Vietnam Chemical Pathology Course conducted in Ho Chi Minh City (HCMC) and Hanoi

2. 3rd Point of care testing workshop to be conducted in HCMC. This year's workshop will be conducted at RMIT's HCMC campus in District 3

3. 1st Myanmar Chemical Pathology Course this course has been proposed but a date is currently not set

ix. CKD in the Asia Pacific Region (Chaired by Associate Prof Gra-ham Jones)

Goal: Improve testing for Chronic Kidney Disease in the Asia-Pacific Region

Strategies:

1. Seek to establish relationships with the Asian Pacific Society of Nephrology and the Asian Forum for CKD Initiative (AFCKDI)

2. Seek relationships with representatives of APFCB member organisations which have an interest in national programmes for CKD testing. One goal of this would be to promote relationships between national clinical chemistry organisations with national nephrology organisations

3. Continue to co-operate with the IFCC-WASPaLM TF-CKD on related matters

4. Promote the KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease as a high level template for CKD testing services

5. Use opportunities provided by the APFCB travelling lectureship to educate and engage with local societies on laboratory issues with CKD testing

Prepared by the APFCB Executive Board together with the Chairs of Standing Committees and Working Groups 27 January 2015

IFCC-TASK FORCE YOUNG SCIENTISTS EDUCATIONAL SYMPOSIUM AT ACBICON-2014, JODHPUR, INDIA

"Research Design & Methodology-Identification of Need"

Jodhpur, Rajasthan, India 11th Dec2014. Research in common parlance refers to a search for knowledge. Once can also define research as a scientific and systematic search for pertinent information on a specific topic. Thus, the purpose of research is to discover answers to questions through the application of scientific procedures.

Continuing efforts, **IFCC-Task Force Young Scientists** (IFCC-TF YS) in collaboration with Association of Clinical Biochemists of India (ACBI) conducted a 5th Symposium on 11th Dec 2014 for young colleagues from laboratory medicine. The programme was well attended by more than 100 participants from India & abroad including senior members IFCC, APFCB & ACBI. The event was hosted by organising committee **ACBI Conference (ACBICON) 2014 & Dr Praveen Sharma** (Organising Secretary). It was organised at All India Institute of Medical Sciences (AIIMS), Jodhpur, India.

This workshop covered the research process, an overview of qualitative and quantitative methods, data collection, recording and analysis and final output of a research proposal. It helped students to understand the basics of research process including the identification of a topic, preparation of a research proposal and final research report, assessment criteria for this and associated timelines. The concept of these activities is to encourage interactions & networking between young scientists alongwith education in the field of laboratory medicine & research. In India with collaborative efforts of ACBI & IFCC, the IFCC-TFYS is organising educational workshops/symposium every year in National Conference i.e, 2010, 2011, 2012, 2013 & 2014.

Addressing the conclave, **Dr Graham Beastall** (President-IFCC) praised the Task Force initiatives and stressed upon the need to share experiences and strong networking activities. **Dr. Jayashree Bhattacharjee** (President ACBI) given welcome addresses and summarised the ACBI initiatives for the young biochemists.

Dr. Pradeep Kumar Dabla (Convener and Chair IFCC-TF YS) summarized the Task Force objectives, members & activities conducted. He assured the commitment of focused Trainings and education to strengthen the future prospects of young laboratorians.

The first session was chaired by **Dr. Maurizio Ferrari & Dr. Howard Morris. Dr. Graham Beastall** initiated the session by sharing his academic experience in UK & worldwide as researcher & granting authority. He explained the increasing role of Health authorities in medicine. The future specialist in Lab Medicine will require a strong background in the basic medical sciences as well as highly developed clinical skills. It is needed to develop the robust Lab Med and clinical research programmes to improve health care and wellness of the population. Next **Dr. Pradeep Kumar Dabla** (Chair IFCC-TFYS) given basic Introduction to Research Design explaining what is research and its various steps in brief. Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. Research comprises of defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organising and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis. **Prof. Venkat Parameswaran** (School of Medicine, Univ. of Tasmania) continued detailing Literature Review using the Internet Support & Theoretical Approaches. He said "One of the most difficult steps when considering research is to choose a right topic of interest". This job of locating the background information through systematic literature review nowadays has been made easier through web based "virtual library" facilities. Experimental approaches and analysis defines the information that is obtained.

Second session was chaired by **Dr. Endang Hoyaranda & Dr. Jayashree Bhattacharjee. Dr.Archana Singh** (Asst. Prof., Biochemistry, AIIMS Delhi) described various quantitative and qualitative methods in detail. Generally, health science research follows the empirical approach, i.e. based upon observation and experience and deals with information of a quantitative nature. In either approach, statistical reasoning using the laws of probability guides the inferential process. Based on these calculated probabilities, the hypothesis is accepted or rejected. In end **Dr. Graham Beastall** guided how to draft a research proposal and fine details required. He said "The way in which a research proposal is structured and worded will have a significant impact on its likely acceptance". He stressed on allowing plenty of time to prepare the submission. Formulate your research proposal into a hypothesis or series of questions informing the 'Aims, Objectives and Outcomes' of your proposal to submit in time.

To summarize, the workshop has provided attendee's sufficient understanding of the major paradigms of qualitative and quantitative research and to provide a basis for further examination using preferred method. This session has provided a vision to understand the research process including the identification of a topic, preparation of a research proposal and final research report and associated assessment criteria to prepare research proposal.

For more information and queries:

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ASSOCIATION OF CLINICAL BIOCHEMISTS OF INDIA ANNUAL REPORT 2014

The year 2014 started with a large number of scientific meetings & workshops which were arranged by the different State/Regional Chapters of the Association.
The major ones were :

1. DELHI STATE BRANCH

The DELHI STATE BRANCH in association with the Department of Biochemistry, Sir Ganga Ram Hospital, New Delhi organized a CME on 23rd March, 2014 with the theme of "Thinking Beyond the Routine" with talks on Fertility Markers, PAPP-A, a novel cardiac biomarker, Prostatic Health Index in the early detection of Prostatic Cancer, Establishing Biological Reference Interval and Current Genetic Markers in CAD.

2. HARYANA STATE BRANCH

A one day CME on "Clinical implication and significance of Vitamin B12, Porphyria and Hypercalcemia: Clinical Inputs" was organized by Department of Biochemistry, Medanta The Medicity under the banner of ACBI Haryana Chapter. on 17th Dec'2013. More than 150 ACBI members of Haryana and Delhi state and other participants from various Medical Colleges, Hospitals and prestigious Laboratories in Delhi-NCR region.

3. ANDHRA PRADESH BRANCH

ACBI AP chapter conducted a one day CME on 30-1-2014 at Vijaya Diagnostic Centre, Himayatnagar, Hyderabad on Screening of New Born and inborn errors of Metabolism. It was attended by approximately 30-40 members. Speakers delivered lectures on screening of new borns and methods and precautions for sample collection and transportation to lab, inborn errors of metabolism with special reference to Phenylketonuria.

4. TAMIL NADU BRANCH

The Tamil Nadu branch organized two CME's during the year.

The First CME programme was conducted on 16th September 2014 at SRM Dental College, Chennai. Professor K.N.Sulochana, Director, R.S. Mehta Jain Department of Biochemistry and Cell Biology, Vision Research Foundation, Sankara Nethralaya, Chennai spoke on the topic “In search of Information for drug development in Endogenous Proteins to target angiogenesis”. This was followed by a talk by Dr.R.Vijayalakshmi, Associate Professor, Preventive Oncology Department, Cancer Institute, Adyar, on the topic “Molecular biology in Dental health -Scope and Scheme”. More than140 persons participated in this very informative CME.

The 2nd CME was conducted on 11th October 2014 at Cancer Institute, Chennai.A total of 100 participants were present in the meeting in which subject of "PITFALLS IN THE INTERPRETATION OF LABORATORY REPORTS" and "QUALITY MANAGEMENT SYSTEMS FOR LABORATORY SERVICES" were discussed.

5. KERALA STATE BRANCH

The ACBI Kerala Chapter organized a two day seminar cum workshop on 9th and 10th of August 2014 at the MES Medical College. The workshop and seminar was attended by more than 250 junior and middle level faculty members, researchers, scientists, laboratory personals and post graduates from Kerala, Tamilnadu, Karnataka, Pondicherry, Andhra Pradesh and Maharashtra. The work shop gave in depth training in Karyotyping, FISH, Film array and PCR techniques. The invited speakers gave talks on Advances in clinical research, Ethics and institutional ethics committee, Research tools, Saliva the research tool for future, Advances in hematology analyzers, Implanting pancreatic islet cells and Clinical Trials current scenario.

6. MADHYA PRADESH BRANCH

ACBI Madhya Pradesh chapter conducted a one day CME on 14 August 2014 at Department of Biochemistry, GR Medical College Gwalior on clinical research methodology in which recent trends in clinical methodology and also research paper writing were delivered.

7. UTTAR PRADESH BRANCH

A scientific meet was held on 1st Sept 2014 at BRD Medical College, Gorakhpur. Scientific meet was organised by the Uttar Pradesh ACBI representative Dr Brijesh Rathore in which more than 60 delegates participated.

8. RAJASTHAN STATE BRANCH

"A National Symposium on Lead Awareness and Sensitization Program" was organized jointly by the National Referral Centre for Lead Projects in India and ACBI, Rajasthan Chapter to create awareness in school teachers to spread the message regarding Lead and its adverse effects on human health. School teachers from private and government schools along with members of Rajasthan Education Department, Rajasthan Pollution Control Board, faculty members and students participated in this programme. Talks were delivered by Prof. T. Venkatesh, Prof N Shashidhara and Dr Praveen Sharma.

9. WB CHAPTER ACBI

A four day training course on Quality Management System & Internal Auditors training was held in Desun Hospitals, Kolkata from 9th to 12th April,2014 and North Bengal Medical College & Hospitals, Siliguri from 25th to 28th August, 2014.

Also a one day seminar was arranged on 9th April. 2014 on 'Water Quality in Medical Testing Laboratory' by Dr Ipsita Mazumdar in Desun Hospitals.

10. SOUTH ZONE REGIONAL MEET

Dr Poornima Manjrekar, Head, Department of Biochemistry, Kasturba Medical College, Mangalore, organized the 2nd South Regional Conference of the Association of Clinical Biochemists of India 2014, on 22nd & 23rd May, 2014,with the theme of "Surging ahead with quality, research and diagnostics". About 250 delegates from Maharashtra, Goa, Andhra Pradesh, Tamil Nadu, Pondicherry, Kerala & Karnataka attended the conference.

11. WEST ZONE REGIONAL MEET

Dr. T. F. Ashavaid, South Zone representative & Dr Sucheta Dandekar, Past President, ACBI, organized the first of the series of 1 day lectures "Secrets of Quality" on 19th October 2014 at PD Hinduja Hospital, Mumbai. Every aspect of lab processes, preanalytical as well analytical, were presented as an overview which was followed by case histories. A large number of delegates attended this meet.

12. NORTH ZONE REGIONAL MEET

Dr. Seema Bhargava, North Zone Representative had taken the initiative to organize the first North zone meet at Government Medical College, Srinagar, Kashmir. It was scheduled to be held on 27th& 28th September 2014 under the stewardship of Dr. Sabhiya Majid , Prof.

& Head, Dept. Of Biochemistry at Govt. Medical College Srinagar,Kashmir. But it had to postponed due to the unprecedented floods in Srinagar & adjoining areas of Kashmir. Dr Sabhiya has not given up and has promised to hold it this year.

The following were elected Office bearers of the Association for the year 2014:

President: Dr. Jayshree Bhattacharjee (New Delhi),**Organizing Secretary:** Prof. Praveen Sharma(Jodhpur), **Vice-Presidents:** Dr. Monika Gupta (Jodhpur), Advisor: Dr. K. P. Sinha, **General-Secretary:** Dr. Rajiv Ranjan Sinha (Patna), **Joint Secretaries:** (1) Dr. H. V. Singh (Delhi), and (2) Dr. R. B. Sinha (Patna) and **Treasurer:** Dr. K. R. Prasad (Patna).

The ACBI-CMC External Quality Assurance Program me is being run smoothly by Dr. Victoria Joband her team at C.M.C. Vellore. A total of 3810 labs participated in this years QC programme with 1378 new labs joining this year. You will be happy to note that the ACBI-CMC EQAS crossed another mile stone by obtaining the NABL/ISO 17043:2010 accreditation. Accreditation of this EQAS scheme was a long desired goal and it was achieved this year.

It is first EQAS program to be accredited by NABL under ISO 17043: 2010 standards in India. To add feather to the cap, the EQAS programmewas approached by the Tamil Nadu Health Delivery system to start The Tamil Nadu NCD project and from January 2014 samples were supplied to 777 labs. It is encouraging to observe the gradual improvement in the performance of these labs during the cycle.

This year saw the superannuation of Dr R. Selvakumar in July 2014.Under his efficient leadership, the EQAS scheme has expanded in all dimensions like, the major shift from bovine to human sera, liquid to lyophilized samples as well as accreditation of the program. We all salute Dr. Selvakumar who haskept the momentum rolling to a project initiatedby the ACBI Executive council decades ago and translated it into what it is today by the pioneers in this field, Dr. A.S.Kanagasabapathy and Dr.S.Swaminathan with full and active support of the management of CMC Vellore. We all must thank Dr Victoria, Dr Geethanjali, her team & the management of CMC Vellore for keeping this flagship project of ACBI moving smoothly. Special thanks also to Mr. Manigandan and Mr.Saravanan, technical staff in the EQAS section for their enthusiasm and hard work in running this program.

Membership of Indian Board of Clinical Biochemistry (MIBCB)

This course was started on 1st January 2013 and is being conducted by the Indian Board of Clinical Biochemistry (IBCB) under the auspices of Association of Clinical Biochemists of India (ACBI) and is approved by the Quality Council of India (QCI). At present, 3 batches of students have been admitted to this course. We must thank Dr. D. M. Vasudevan and his team at IBCB for their zeal and effort in managing this very important course and fructifying the vision of our Advisor, Dr K. P. Sinha and initiated by the Association for the betterment of Clinical Biochemistry in this country.

41st. Annual National Conference ACBICON 2014

The year ended with the highly successful **ACBICON 2014**, the 41st. Annual National Conference of Association of Clinical Biochemists of India was hosted by Department of Biochemistry, All India Institute of Medical Sciences, Jodhpur (Rajasthan) and Rajasthan State Branch of ACBI, from 10th to 13th December 2014. It was a four days event, beautifully segregated into Workshops, CME's,Orations, Plenary, key notes, oral and poster presentations and 5 Industrial lectures by Beckman & Coulter, Randox, Transasia, Diasorin and Meril. There was a grand trade exhibition with 62 stalls of more than 30 corporate vendors.

Trade exhibition

The conference was preceded by pre-conference workshop and CME on 10th December 2014. The first one was the workshop on Basics of Flowcytometry coordinated by Dr Sudip Sen and Dr Sanjeev Kumar Gupta from AIIMS New Delhi. The workshop included lectures by the coordinators on basic and applied Flowcytometry and was followed up by practical hands on session. The workshop was attended by 50 participants.

The pre-conference CME was on Intergrating Biochemistry in the Medical Curriculum, coordinated by Dr. Sucheta P. Dandekar, Dr. Ishtiyaq Ahmad Shaafie, Dr KG Gomathi and Dr Pankaj Bhardwaj.

The CME had active participation by all the participants with active discussion on modalities for integration of Biochemistry in medical curriculum. This was followed by Editorial Board Meeting, Corporate Meeting and Pre G.B Executive Meeting and Corporate dinner at Nirali Dhani, showcasing the traditional Rajasthani folk dances by kalbalia and songs by the Langas. Also there was some exquisite Rajasthani cuisine for the delegates at "Nirali Dhani, Jodhpur".

Pre-conference CME

Pre-conference Workshop

The conference commenced with the Awadesh Saran Memorial Oration delivered by **Dr Neeta Singh**, AIIMS, New Delhi. This was followed by K. L. Gupta Memorial Oration delivered by **Dr. Sanjeev Misra**, Director, AIIMS, Jodhpur.

This was followed by parallel sessions which had IFCC VLP lectures by Dr Graham Beastall and Dr Maurizio Ferrari and Talks on Common genetic disorders, Biomarkers of cardiovascular diseases and Vitamin D, CVD & Inflammation. This was followed by the Poster session. After this, all the delegates enjoyed their lunch in the lovely winter sunshine.

Post Lunch session had parallel sessions in which Howard Morris & Maurizio Ferrari gave the IFCC VLP, V. Parmeswaran and Udayan Ray talked on Value adding laboratory services. The topic of Lead toxicity was discussed by T. Venkatesh, Praveen Sharma and Abbas Ali Mahdi.

The IFCC TFYS was organized under the Chairmanship of Dr. Pradeep K. Dabla during the session Prof. Graham Beastall, Dr. Archana Singh, Dr. V. Parameswaran delivered and Prof. Praveen Sharma, Prof. Jayashree Bhattacharjee and Dr. Endang Hoyaranda chaired the session.

Inauguration of the 41st ACBICON 2014 was done in presence of many eminent personalities. Prof. Graham Beastall was the Chief Guest and Prof. Maurio Ferrari was the Guests of Honour of the function. The inauguration began with the lighting of the lamp by the honored guests on the dice, followed by the unveiling of the Abstract booklet and Souvenir of ACBICON 2014. During the inaugural function, Prof Praveen Sharma was installed as the new President of ACBI (2014 -15). Also the inaugural function was marked by the bestowing of lifetime award to Prof. D. M. Vasudevan. He was presented a Shawl & Silver plate **and was conferred with the ACBI-A.J. Thakur Award for Distinguished Services to Clinical Biochemistry and Laboratory Medicine.** Prof T. Ashavaid, Prof. U Satyanarayan and Prof. Abhay Pratap were admitted as Fellow of Association of Clinical Biochemists of India. This was followed by the inaugural function.

Lighting the lamp

Unveiling the Abstract book

Installing the new President


Inauguration Ceremony
ACBICON 20
41st Annual Conference of Association of Clinical
10th - 13th December, 2014 - Jodhpu
Organized by:
Inauguration Ceremony
ACBICON 2014


Inauguration Ceremony
ACBICON 2014
10th - 13th December, 2014 - Jodhpur
Organized by:


Inauguration Ceremony
ACBICON 2014


Inauguration Ceremony
ACBICON 2014


Inauguration Ceremony
ACBICON 2014


41st Annual

The second day of the conference began with the plenary lecture delivered by Prof. Ravi Sirdeshmuk on "Proteomic approaches and potential of Clinical Applications: Glioma Perspective". There were two prestigious, popular oration awards -Dr Taranath Shetty Memorial Oration delivered by K V R Tagore and Mrs & Dr G. P. Talwar Oration delivered by Prof. M V R Reddy on "Autoimmune Diseases: Therapeutic role of Helminth-derived Immuno-modulatory molecules".The scientific session was spread over delightful range of invited lectures from Infectious diseases, Genomics,Proteomics pre lunch to Cancer Biology and Mass spectrometry post lunch sessions. The evening witnessed Conference Banquet and gala dinner at Hotel Taj Gateway.

The final day of the conference commenced with the popular oration awards Dr. T. N. Pattabhiraman award delivered by Dr. Barnali Das on "Cutting the extra flab from your lab platter: Lean-Six sigma" and Seth G. S. Medical College & KEM Hospital

Oration delivered by Prof. Sadan and S.Naik on " One carbon metabolism and fetal growth". These were followed up by special talks and award paper orations Sita Devi award and P S Murthy award.

The GB elected the following as Executive Committee members for the year 2015. Dr. Praveen Sharmaas **PRESIDENT**, Dr. Rajendra Prasad,**VICE PRESIDENT** (**I) &Organzing secretary, ACBICON 2015,** Dr . S. V. Rana - **VICE PRESIDENT (II), ADVISOR**-Prof. K.P. Sinha, **GENERAL SECRETARY**- Dr. Rajiv Ranjan Sinha,**TREASURER**- Dr Krishna Ranjan Prasad,**JOINT SECRETARY**: Dr. Jairam Rawtani (Jodhpur) & Dr. Ram Binay Sinha (Patna). **ZONAL COUNCIL MEMBERS**- Dr. Seema Bhargava (North Zone), Dr T. Vijayakumar (South Zone), Dr. Abhijit Pratap (East Zone), Dr. T. F. Ashavaid (West Zone) & Dr Sanjeev Singh (Central Zone).

This was followed by the Valedictory Function bringing the curtain down on 4 days of intense, high level scientific sessions. The organizing Secretary, Prof.Praveen Sharma thanked all the delegates and volunteers for making the conference a grand success. The Director, AIIMS, Jodhpur, Prof.Sanjeev Misra congratulated Prof.Sharma & his team for the successful organization of the conference. After this he distributed the award certificate & cash prizes to all the award winners. The General Secretary, ACBI, Dr Rajiv R. Sinha in his valedictory address heartily congratulated all the organizing committee members and volunteers for their untiring effort in making the 2014 National conference a great success.

HKSCC ANNUAL REPORT OF 2014

The year 2014 education activities started with the society's Annual Scientific Meeting/Annual General Meeting on 11 January. The theme was the Asia Pacific Federation of Clinical Chemistry (APFCB) Travelling Lecture: "Managing Laboratory Informatics, Middleware and Process Control" delivered by Prof Sunil Sethi, Department of Laboratory Medicine, National University of Singapore. To keep abreast of the recent advances and service developments of Clinical Chemistry in Hong Kong locality, a series of presentations were followed and delivered by three distinguished members: Dr CS Ho, Dr Robert Cheung, and Dr Doris Ching on clinical chemistry topics of diverse interests: "Development of a Trace Element Analysis Service in Hong Kong" (Dr Robert Cheung), "Surveillance of Emerging Drugs of Abuse in Hong Kong" (Dr Doris Ching), "Routine Steroid Hormones Service by Mass Spectrometry" (Dr CS Ho). The 14 industrial booth exhibitions and lectures were well attended by over 170 members and guests.

Education activities for the year carried on with presentations by distinguished academia and scientists. Six scientific meetings were organized in 2014:

1. Dinner lecture sponsored by Thermo Fisher was held on 20 February with Dr Michael Meisner delivered the talk on" Procalcitonin: Biochemistry & Clinical diagnosis". The event was attended by over 100 members and guests

2. Dinner Lecture by Prof Greg Miller, External Examiner for Chemical Pathology, The Chinese University of Hong Kong was held on 10 April. The topic was: Harmonization and traceability of results" The event was attended by 126 members and guests.

3. A Lecture by Dr Steve Wong, President American Association of Clinical Chemistry (AACC) was held on 17 April at Queen Elizabeth Hospital. Dr Wong shared members his vision and experiences on "Pharmacogenomics and Pharmcometabolomics for Transplant, Pain Management and Toxicology." The lecture was attended by over 60 members and guests

4. BioRad Hong Kong has hosted a dinner symposium addressing the importance of QC practice on 9 July under HKSCC auspices. The speakers for the symposium were: Jeremie Gras, MD, PhD (Belgium) (Practical Applications of Sigma-metrics in QC Design), Michael Noble, PhD (Canada) (QC as the Cornerstone of Quality Lab Results). Over 150 guests and members attended the symposium

5. A joint evening seminar with Hong Kong College of Pathology (HKCPath) was held at Queen Elizabeth Hospital on 11 September. Dr Penelope Coatesm, External Examiner of the college specialist examination has delivered her talk on " Bone Turnover Markers in Osteoporosis: Assessing Risk and Monitoring Treatment." The seminar was attended by over 60 members and guests

6. The 2014 Macau Symposium in collaboration with the Macau Laboratory Medicine Association was held on 22 November. Invited speakers and topics from HKSCC were: Dr Liz Yuen (Molecular Diagnosis of Hereditary Renal Diseases), Prof CW Lam (Biochemical and Genetic Testing of Autistic Spectrum Disorders), Ms Judy Lai (Lab Accreditation: An Assessor's Perspective), and Mr Eric Wong (The Journey for Accreditation-A Means Not an End).

Twenty-five HKSCC members and guests travelled to Macau for the symposium. The event was held in the Hotel Royal of Macau and was well attended by local participants


Dinner Lecture (9 Apr 2014): Professor Greg Miller
Questions / Comments
LANGHAM PLACE


Lecture at QEH (17 Apr 2014)
Speaker: Dr Steven Wong
Wake Forest
School of Medicine
Pharmacogenomics and Pharmcometabolomics for Transplant, Pain Management and Toxicology
Steven H Y Wong, Ph.D., DABCC (TC), FACB
AACC President
Hong Kong Society of Clinical Chemistry


Dinner Lecture (9 Jul 2014)
Speakers: Prof Michael Noble & Dr Jeremie Gras


Lecture 5 at QEH (11 Sep 2014) Dr Penelope Coates


澳門檢驗醫學會2014年度學術會議
暨香港臨床生化學會澳門研討會
Annual Academic Conference of Macao Laboratory Medicine Association and
Hong Kong Society of Clinical Chemistry Macau Symposium 2014
Date:
22 Nov 2014 (Saturday)

INDONESIAN ASSOCIATION OF CLINICAL CHEMISTRY 2014

1.EDUCATION AND SCIENTIFIC

a. Guest Lecture by A/Prof. Andrew Sikaris Australia - Reference Range & Harmonization of Wet and Dry Clinical Chemistry Seminar.

Reference Intervals are specifically used to define the usual spread of results seen in healthy population. There are two essential requirement: define the analytical method used and the reference population. In reality analytical methods are seldom truly standardized and EQA Surveys demonstrate method different. There also many factors affecting the populations that aren't assessed in our reference intervals. Our use of reference intervals have therefore always been compromised. We need to acknowledge that the perfect reference intervals cannot be achieved. A process of compromised agreement is possible and has been called "harmonization"

Associate Proffesor Andrew Sikaris from Australia kindly presented the importance to set the reference range and harmonization of wet and dry clinical chemistry in half day seminar which held in Aryaduta Hotel Jakarta on 28th March 2014. This seminar is held by Indonesian Association for Clinical Chemistry (IACC) cooperated with Indonesian Association of Clinical Pathology and sponsored by Ortho Clinical Diagnostics. The other speaker is Dr. Baizurah Hasan from Malaysia who shared her experience in Dry Chemistry Technology, its benefit and advantages.

b. Project of Indonesian Pediatric Reference Interval (PIPER Study)

Diagnosis and monitoring of almost all pediatric diseases require the measurement of a wide range of disease biomarkers. These biomarkers are commonly measured in clinical laboratories and the results interpreted based on established reference (or normal intervals) In children, physiological changes associated with growth and development may require separate reference intervals for different ages. In addition, physiological changes of growth and development may be different for male and female children. Biomarkers may also be affected by ethnicity. As a result, age, sex and ethnic group-specific reference intervals may be necessary for different biomarkers. This allows comparison of individual results with the correct reference interval, i.e. the interval derived from correct reference group. (Http://www.caliperdatabase.com/Cdb/contrOller?op=menu_about_refer). IACC has been reached eliminary agreement with Indonesian Association of Pediatric (IDAI) to conduct Project of Indonesian Pediatric Reference Interval (PIPER study) to set biomarkers reference range for children as follow: Routine hematology, TSHs, FT4, G6PD, Bilirubin Direct, Bilirubin Total, AST, ALT, GGT, Glucose, Albumin, Fe, TIBC, Ferritin, Tchol, HDL-C, LDL-C, TG, PT/APTT, Ureum, Creatinine, Na, K, Cl, Ca++, Mg, Phospate, hsCRP and Uric Acid. Research proposal has been sent to IDAI and we are waiting their respond.

IACC & IDAI members with Prof. K. Adeli after workshop on CALIPER and PIPER Study in Jakarta

2. LABORATORY MANAGEMENT & QUALITY CONTROL

Improving Pre analytical Practice in Indonesia by "May I Help Campaign" (MIHC).

The Indonesian Association of Clinical Chemistry (IACC) and Becton Dickinson (BD) share a common goal of improving pre analytical specimen collection, handling practices with an intention of improving overall patient care in the country. The current processes used for specimen collection throughout the country vary considerably and may be responsible for a large number of pre analytical specimen quality compromises leading to errors in laboratory results and hence sub-optimal patient care. Also, use of improper practices in the pre analytical phase could pose risks to the healthcare workers via exposure to infectious body fluids through potential needle stick injury or through other routes. Both organizations recognize the need to strengthen pre analytical practices in Indonesia and would like to promote awareness for safer and improved specimen collection and handling practices. The partnership aims at improving pre analytical practices and will be referred to as the "May I Help You Campaign".

33 institutions were registered to participate in May I Help You Campaign program me comprising 6 Government Hospitals, 3 Government Laboratories, 15 Private Hospitals and 9 Private Laboratories. We have already assessed 26 government, private laboratories and hospital laboratories and we got good response from the managements and laboratories. They get the benefits from the program. Reassessment done on 11 labs have shown significant improvement on awareness, pre analytical process, sample quality. We decide to continue this program to a wider area so more labs in Indonesia can get the benefits. By improving pre analytical phase we'll not only get good sample quality but also improved patient and healthcare worker safety. During The Annual Scientific Meeting of Indonesian Association of Clinical Pathology, IACC and BD conducted mini presentation to promote this program me.

KOREAN SOCIETY OF CLINICAL CHEMISTRY
KSCC 2014 ANNUAL REPORT

National Meetings		
Name of the Meeting	Date	Topic
Annual Meeting of KSCC (i)	2014. 5. 16	Plenary Lecture; Quality management of point-of-care testing
		Symposium 1; Document management and laboratory inspection
		Symposium 2; Current trends in biomarkers for the cardiac diseases
		Symposium 3; Practical approach in laboratory management
		Symposium 4; Integrating mass spectrometry (MS) in the clinical lab: what you need to know
		Symposium 5; Updated information for clinical chemists
Quality Assurance Workshop	2014. 11. 6	Quality Assurance Workshop for Neonatal Screening Tests
Annual Meeting of KSCC (ii)	2014. 11. 6	Plenary Lecture; Burnout syndrome and compassion focused stress management
		Symposium 1; Implementation and management of reagents in clinical chemistry laboratory
		Symposium 2; Understanding and clinical application of hormone testing
		Symposium 3; Current trends in vitamin D testing: What is the choice of your laboratory?

Education

1. Document management
2. Biomarkers for the cardiac diseases
3. Mass spectrometry
4. Implementation and management of reagents
5. Hormone testing
6. Vitamin D

International Relations

1. Attended IFCC WorldLab Istanbul 2014
2. KSCC was determined to host the 'IFCC WorldLab 2020' in Seoul, Korea by IFCC C-CC
3. APFCB committee members (2014-2016)

Pf. Yong Hwa Lee for the Education and laboratory management committee
Pf. Hwan Sub Lim for the Communications committee

Additional Information

IFCC Network Laboratory for HbA1c in Korea (2012-present)

Current Officer Bearer of KSCC (2013-2014)

President : Professor Gye Cheol Kwon (Chungnam National University College of Medicine

Secretary General : Professor Yeo Min Yun (Konkuk University College of Medicine)

Treasurer : Professor Hwan Sub Lim (Catholic Kwandong University College of Medicine)

THAILAND ASSOCIATION OF CLINICAL BIOCHEMISTS (TACB) 2014

Each fiscal year is an exciting year for the Thailand Association of Clinical Biochemists (TACB). Many different activities take place where the majority of the activities are centered around the voices and requests from the members of the association as well as from various medical laboratories situated around the Kingdom of Thailand.

3 meetings were held within the year which lead to the empowerment of knowledge for the Thai medical technologists of our field.

The concept of the seminar and workshops focused around Laboratory Administration For Quality Improvement and Problem Solving Via Root Cause Analysis Technique (RCA).

The RCA workshops focused on answering the technologists requirement in obtaining additional knowledge and tools for implementing quality in the clinical laboratory and the usage of control materials to enhance laboratory efficiency.

Thus, the 2014 TACB objective aims to focus on enhancing the quality and improvement of the clinical laboratory and gearing the laboratory in obtaining ISO 15189 accreditation.

On December 18-19, 2014 - we kick off by organizing a combined conference-workshop event titled Quality Can Be Touched. The event was supported by the Double S Diagnostic Company at Anantara Krungthep Hotel. A total of 70 attendees from various government and private hospitals participated. The conference covered various topics, such as:

1. Management of the 5 phases of the laboratory process with quality
2. The Hierarchy of Quality - Definition & Application
3. Quality of Control Material : IQC, EQA, Third-party, and commutability index
4. Case studies that relates to the collection of specimen such as low glucose, hemolysis, and Lipaemia

The conference was ongoing for 2 full days with active participation and experience sharing between the speakers and participants.

The workshop itself focused on Quality Index Setting and Applications and was held in parallel with the ISO 15189 workshop.

The event feedback was positive full of acknowledgement of satisfaction and recommendation for future topics of interest (ie. Quality of the result of batch analysis, management of health checkup and consultation for starters).

Our 2nd activity for 2014 comprised of having joined with various external organizations in order to discuss the possibility of management of HbA1C proficiency testing (PT) here in Thailand:

1. Faculty of Medical Technology, Mahidol University

2. Siriraj Hospital Department of Pathology
3. General hospitals from both the public and private sectors
4. The Association of Medical Technology of Thailand
5. Ministry of Public Health Social Security Office
6. Roche Diagnostic (Thailand) Ltd.

This project concentrated on three objectives:

1. Aim to set up a high quality proficiency testing (PT) center for HbA1C in Thailand.
2. Call for collaboration and experience sharing of Thai PT working group.
3. To establish the HbA1C PT program

However, on November 19-20, 2014 at the Fairmont Hotel in Singapore - APAC HbA1C Day - we had the chance to meet up with Dr Erna Lenters (HbA1C Research Coordinator) to discuss the PT possibility.

The meeting was a success where information obtained was extremely valuable to us all as well as cooperation from the IFCC network for HbA1C reference laboratory.

VIETNAM ASSOCIATION OF CLINICAL BIOCHEMISTS

Annual Report The activities of the Vietnam Association Clinical Biochemists (VACB): in 2014

1. The 19th Hanoi and Northern Provinces Association of Clinical Biochemists Congress, (part of the Vietnam Association Clinical Biochemists -VACB) for clinical biochemistry and molecular biology in medicine, August, 22 - 23, 2014 at Dong A Plaza Hotel in Thainguyen City

2. Scientific activities and clinical training for Clinical Biochemistry and Medicine techniques was supported by Roch Vietnam Co. Ltd, June,10 , 2014 in Hanoi City

3. Scientific activities and clinical training for Clinical Biochemistry and Medicine techniques was supported by Roch Vietnam Co. Ltd, June, 14, 2014 in Ho Chi Minh City

4. Training Course for Clinical Biochemistry doctor , June 20, 2014 at the Bach Mai Hospital , Hanoi city

5. The 60th anniversary of the Clinical Chemistry department, the Bach Mai hospital : Scientific Conference of the clinical biochemistry November 28 - 2014 at the Bach Mai Hospital, Hanoi city

6. Scientific Conference on updating technology in biochemical and immunological tests, November, 07 - 2014 at the Nikko hotel in Hanoi, was supported by Ortho Clinical Diagnostics (part of the Johnson & Johnson family of companies)

7. Annual Scientific Meeting of the Association of biochemistry Ho Chi Minh City (part of the Viet Nam Association Clinical Biochemists -VACB), November, 29 - 2014 at the Nikko Saigon hotel, Ho Cho Minh city

February, 27, 2015
Hoang Thi Bich Ngoc
President of VACB

A BALANCED AND FULFILLING LIFE

Dr. Tan It Koon National University of Singapore Alumni

Prof. Tan It koon, the founding President of APFCB was felicitated on the 27th Februray 2015 by the Alumni of National University of Singapore (NUS). Prof. Tan has been a renowned alumni of NUS. He has studied at the faculty of Science, taught in Science and Medical Faculties and examined PhD/MD candidates from both faculties.

Prof. Tan is exemplary multi-dimensional personality. He is a seasoned pianist and has been giving been giving Piano performances from time to time since undergraduate days. He had performed piano concertos by Bach, Beethoven and Hayden with an orchestra as well as George Gershwin's "Rhapsody in Blue" and "Cuban Dance" with another pianist on two pianos while studying at the university.

Another dimension of Prof. Tan's personality is as a fine painter and calligraphy artist. He has had various exhibitions of his paintings and has graciously contributed some of his finest art works for the APFCB news editions from 2010 till 2014.

The alumini of NUS wanted Prof. Tan to share his experience, art work and music skills in a two hour show on the Chinese new year for the faculty and students of NUS. The objective of the suggested event were (1) to increase awareness in the importance of, and (2) stimulate interest in early or timely development of interest, knowledge, skills and/or hobbies other that require for a specific profession or desired work, in order to enjoy a more interesting and fulfilling life, particularly after retirement from formal work. Undergraduates are encouraged to prepare for retirement even as they are just preparing to enter a professional or working life.

The event was well attended and appreciated. It included a lecture of one and a half hours followed by a piano performance of one hour at the National University of Singapore Shaw Foundation Alumni House. The National University Museum will be holding an exhibition of his art works from March to August this year.

Prof.Tan Giving his presentation

Brochure of exhibition of paintings of Prof. Tan

OPINION PAPER

Shaping the Future of Laboratory Medicine

Graham H Beastall

Past President, International Federation of Clinical Chemistry & Laboratory Medicine, Glasgow, UK. Email: gbeastall@googlemail.com

Abstract

Laboratory medicine has a central role in healthcare, which will be maintained and enhanced by the changing shape and delivery of medicine. Twelve mega-trends in global healthcare have been identified and laboratory medicine will have a role in delivering each of these developments. The current drivers for change in laboratory medicine include globalisation; technological advance; smarter working; integrated diagnostics; patient centred care; and adding value to improve clinical outcomes. These driversoffer both opportunities and challenges for laboratory medicine specialists. As the experts in laboratory medicine it is our professional responsibility to overcome current divisions within the profession and to shape the future of laboratory medicine. Leadership from laboratory medicine specialists is required at local, national and international level.

Keywords: Global healthcare trends, drivers for change, professional leadership.

The Central Role of Laboratory Medicine in Healthcare

The context of this article is that laboratory medicine is currently central to healthcare and that it will be even more important in the future.[1]

Current Position

Results from laboratory medicine investigations inform a high percentage of clinical decisions in healthcare. The percentage is often quoted as being up to 70%,[2] although a more realistic assessment suggests that the impact of laboratory medicine varies with the clinical specialty and application.[3] What is beyond doubt is that laboratory medicine is currently an essential element of the healthcare system providing users with pivotal information for the prevention, diagnosis, treatment and management of health and disease.[4] The global laboratory medicine market is now exceeds USD 50 billion and although this is a large sum it represents <5% of total healthcare expenditure.[2, 5]

Future Position

Will the current central role of laboratory medicine will be maintained into the future with the substantial changes that are taking place to healthcare across the globel Laboratory medicine specialists will all have a view on this point but a more independent and pragmatic view of the major future trends in global healthcare may be obtained from the business community. Figure1 has been prepared from consideration of future mega-trends in global healthcare by the editors of the Harvard Business Review.[6] The report highlights twelve mega-trends and for the purposes of this article they have been set against a clock to illustrate that change will occur with time, almost certainly at different rates in different countries. The impact of laboratory medicine on these mega-trends is considered in brief.

Innovation and demand in emerging countries:
Spending on healthcare in countries such as China and India will continue to rise in line with their economic growth. Demand for laboratory medicine diagnostics, technology and treatments will increase as the central role of laboratory medicine becomes better developed.

Technological advance and personalized medicine:
Laboratory diagnostics and related technological advance underpin the rapidly developing field of personalized medicine with diagnosis and treatment being linked to individual genomic variability.

Aging populations overwhelm the system:
Aging populations will lead to increases in the number of people suffering from chronic, expensive-to-treat diseases and disabilities, straining health-care systems. The appropriate use of laboratory medicine investigations in clinical practice guidelines, including by patients who self-monitor their condition, can improve both clinical and cost effectiveness.

Rising costs:
Making health care affordable is a challenge for every nation. Demand management and adherence to clinical practice guidelines are just two ways in which laboratory medicine can contribute to moderating 'over-diagnosis' and excessive health expenditure.

Global pandemics:
The development of laboratory based diagnostics is an essential component of rapid diagnosis and prevention of the spread of new infectious diseases.

Environmental challenges:
Laboratory testing is at the heart of environmental monitoring both as a risk to human health and in patients exposed to environmental challenges such as the effects of poor water and air quality, pathogens in food supply, and urban sprawl and congestion.

Evidence-based medicine:
Knowledge about clinical outcomes will increasingly be used to develop standard protocols for treating many diseases. Laboratory medicine data will be integral to developing evidence-based knowledge.

Non-MDs providing care:
Shortages of medical doctors, rising costs, and the standardization of protocols and technology will bring about changes in who treats patients. Non-medical laboratory medicine specialists will contribute to the protocols

Payers' influence over treatment decisions:
Increasingly, the payer will influence treatment decisions. Well informed patients will be using evidence-based data to contribute to their healthcare. Laboratory medicine diagnostics will be a key component of decision trees.

The growing role of philanthropy:
Accurate and effective diagnosis is an essential pre-requisite of reducing the burden of diseases such as malaria, tuberculosis and HIV in developing countries.

Prevention is the next big business opportunity:
Prevention of disease will involve screening well people and persuading them to take personal responsibility for their health. Biomarkers will be important factors in this process.

Medical tourism:
The quality and cost of care will influence patients to decide whether to have treatment at home or in another country. Laboratory medicineis part of the picture that will help patients decide.
Whilst some commentators may not agree with all of the mega-trends in the Harvard Business Review few will argue with the general direction of travel in the report. It is clear from this brief consideration of mega-trends in healthcare that laboratory medicine is essential to their development and delivery and so continuing central role of laboratory medicine seems assured.

The Evolution of Laboratory Medicine

Having concluded that laboratory medicine will continue to be central to future of healthcare it is appropriate to look at the current drivers for change within the profession of laboratory medicine.

Mega-Trends in Healthcare: Influence on Laboratory Medicine?

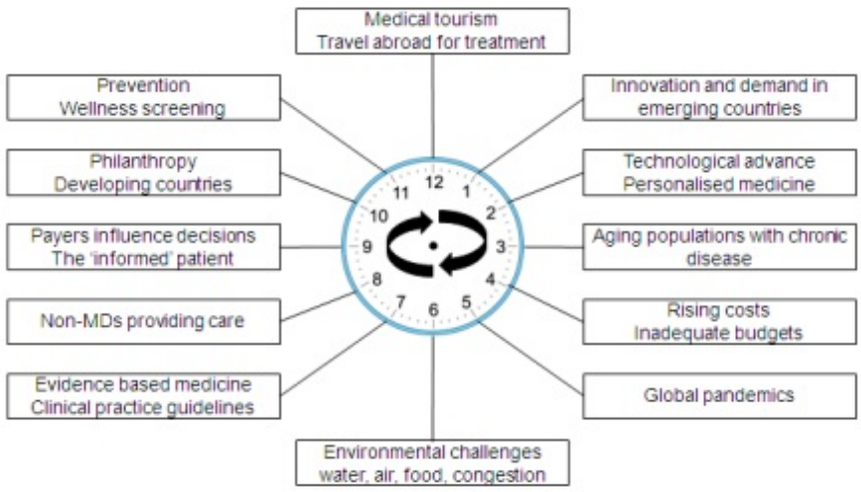

Figure 1. Twelve mega-trends in global healthcare as identified by the editors of the Harvard Business Review. The trends have been set against a clock to indicate that they will develop over time.[6]

Review of Laboratory Medicine Services
Laboratory medicine services are undergoing review in many countries in the world and in all of these reviews there are three central themes:

- Improving the quality of laboratory medicine services from internal quality control, external quality assessment, quality management and a drive towards laboratory accreditation against international standards.

- Improving clinical effectiveness of laboratory medicine results by reducing turna-round times, giving patients greater focus and auditing performance against clinical outcomes.

- Improving the cost effectiveness of laboratory medicine by rationalising the methods of delivery of laboratory medicine services, considering the appropriateness of testing and introducing ways of assessing value as well as cost.

Drivers for Change in Laboratory Medicine

There are many pressures and drivers for change in laboratory medicine. These are universal, although developed to differing degrees in different countries. One convenient classification is shown in Figure 2. Each driver for change is illustrated in brief below.

Globalisation:

Laboratory medicine now operates in an environment of instant global communication. Accordingly, it is easy and desirable to share and harmonise information on quality standards, laboratory practices and clinical applications.

Drivers for Change in Laboratory Medicine

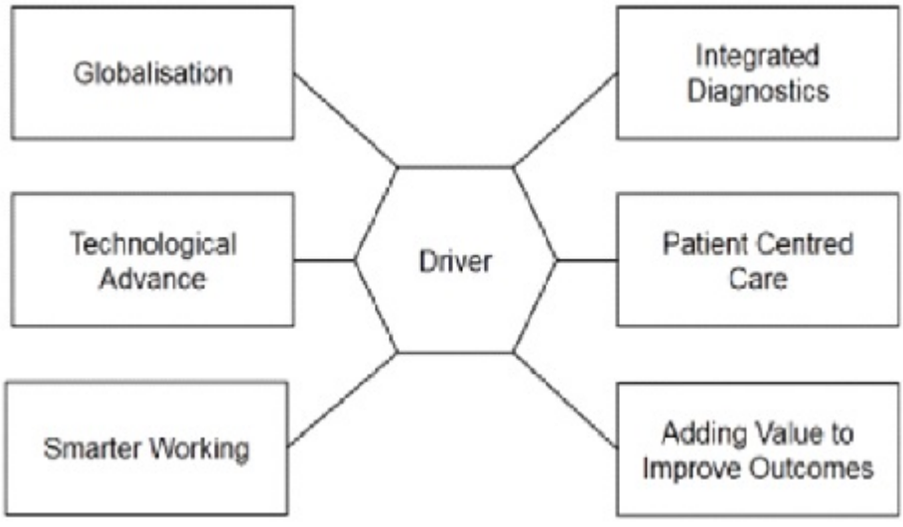

Figure 2. Current drivers for change in laboratory medicine.

Technological advance:

Laboratory medicine is currently undergoing a technological revolution with advances in a wide range of technologies including automation and robotics; micro-technology and nanotechnology; point of care testing technology; mass spectrometry; genomics, proteomics and metabolomics; and bioinformatics. In particular the molecular diagnostics revolution is rapidly gaining momentum.[7] There are implications for the training of staff to use the emerging technologies to best advantage.

Smarter working:

The combination of an aging population, medical advances and rising workloads is putting increasing pressure on healthcare budgets. Laboratory medicine is responding with a number of 'smarter working' initiatives that include new models of laboratory service delivery, shared facilities between sub-specialties and active workload management (laboratory utilisation). A recent systematic review demonstrates the benefits of education, audit and feedback in managing the laboratory workload.[8]

Integrated diagnostics:

The traditional silo approach to patient investigation and management is being replaced by evidence-based clinical pathways or patient journeys in which a systematic approach is used to increase efficiency and reduce the time that a patient must wait before diagnosis or treatment. Diagnostic testing is central to clinical pathways and it is common for laboratory testing, imaging and endoscopy to be involved in a single pathway. The integration of diagnostic services can facilitate knowledge management and deliver improvements in both clinical effectiveness and cost effectiveness.

Patient centred care:

Patients are increasingly well informed and are taking more responsibility for their healthcare. Patient focused care mobilises this interest and commitment by making the patient an active partner in his/her own health. Accordingly, patients want to know and own their laboratory results, especially when they are self-monitoring a chronic disease. Personalised medicine is a new direction in healthcare moving from a system that is population, symptom and therapy based, with a passive patient to 'P4 medicine' that is personalised, predictive, preventive and participatory.[9] The delivery of P4 medicine will rely on high quality diagnostics linked to individual genomic variability.

Adding value to improve outcomes:

Adding value to a quality laboratory medicine service is not a new concept but it is one that is gaining wider acceptance. The addition of value to laboratory medicine services is the responsibility of leadership in the speciality.

It comprises working with users of the service and those responsible for defining and commissioning clinical services to ensure that the available high quality laboratory medicine services:

- Develop in line with contemporary knowledge and modern technology
- Are evidence-based
- Are cost-effective in the context of the patient journey and local targets
- Facilitate improved clinical outcomes
- Contribute to increasing patient safety
- Are better understood by users, patients, the media and the wider public.[10]

Two simple tools have been described to help describe and exemplify added value.[10] and to assess the likely value of a development in laboratory medicine.[1]

Predicting the Future of Laboratory Medicine

An authoritative recent review [11] considers the evolution of laboratory medicine and offers opinions on emerging technologies, economic factors and social developments

that may play a role in shaping the future of the profession. Predictions are categorised as follows:

- Laboratories, laboratory organisation and staffing
- Automation and robotics
- Computing and information technology
- Analytical techniques and technologies
- Point-of-care testing
- Telemedicine
- Micro-technology
- Nanotechnology
- Genomics
- Proteomics
- Evidence-based medicine
- Microscopy and histopathology

Shaping the Future of Laboratory Medicine': Professional Leadership

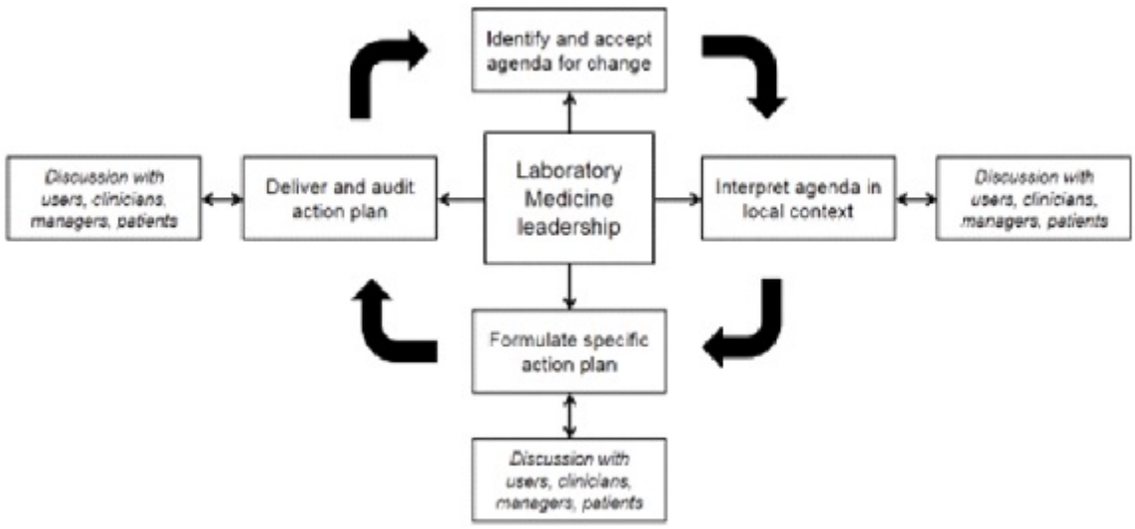

Figure 3. The importance of professional leadership in shaping the future of laboratory

Predicting the future is not easy and it will be fascinating to see how many predictions in this review are delivered. One factor in that delivery rate will be the extent to which the profession of laboratory specialists can embrace change, unite and take a leading role in shaping the future of laboratory medicine.

Overcoming Divisions in Laboratory Medicine

Organisation and Delivery

Laboratory medicine is a clinical profession that encompasses a number of sub-specialties, including clinical chemistry, haematology, transfusion medicine; immunology; transplantation; genetics; microbiology and reproductive science. The extent to which these sub-specialties are integrated or separate varies from country to country.[12] Consequently, there is no universal definition of laboratory medicine. Furthermore, the sub-specialties often have different names between and within countries. It is hardly surprising, therefore, that laboratory medicine has an 'identity crisis' within the profession and especially with healthcare managers, service users, patients and the public.

Professional Rivalry

Within the profession of laboratory medicine there are a number of professional groups, including medical specialists, clinical scientists, technologists and assistants. Each of these has an important role in the laboratory medicine team. However, each group tends to have its own professional body, which champions the role of its members without always considering the impact on the wider team. Consequently, professional rivalries are common based on differing perceptions of the roles, responsibilities and competences of the professional groups. These rivalries and differences may transcend the importance of the service to the patient and deflect from a willingness to recognise and embrace change.

Academic Erosion

Developed countries have seen a gradual erosion of the academic base of laboratory medicine as research and teaching are 'squeezed' in the interests of greater service commitments and efficiency.[13] It is an irony that this erosion of academic laboratory medicine is occurring at the same time as the explosion in knowledge about the pathophysiology of disease. The result is a growing need for translational research to evaluate new basic research findings, develop and validate new biomarkers and technology and work with commercial partners to put them into service.

Education and Training

One consequence of this diversity within laboratory medicine is that the standards, content and delivery of training is variable. There is a gradual move towards graduate level education for technologists and general acceptance of the need for specialist postgraduate education and training for medical doctors and specialists in laboratory medicine. However, curriculum content differs significantly both for specialty training and for the associated skills of professionalism, leadership and research. The need for greater international harmonisation in the education and training of laboratory medicine specialists has been recognised.[14]

The first step in overcoming any 'division' is to recognise that it exists. The next step is to bring together all partners for a structured discussion to define priorities and an action plan for the future. In the case of laboratory medicine the action plan must involve putting aside differences in the interests of identifying and delivering a harmonised approach in the interests of the patient. These structured discussions are required within each country and at international level. Examples of good practice are emerging based on integrated education and training and the merger of professional societies.

Professional Leadership

The previous sections of this article have set out the case for laboratory medicine at the centre of future healthcare; considered the current drivers for change in laboratory medicine; pointed towards predictions for the future of laboratory medicine; and indicated the divisions that must be overcome in laboratory medicine. Taken together these sections form the agenda for 'shaping the future of laboratory medicine'.

The next step is for leadership at all levels within laboratory medicine to embrace the

agenda and to be active in adapting it to local circumstances so that relevant and deliverable plans can be agreed put into place and audited. In this context leadership must include the director of local laboratory medicine services and also those in learned professional societies and other specialist laboratory medicine organisations at national and international level. As Figure 3 indicates this process should involve at each stage discussion with users of the services, clinicians, managers and patients. Therefore, laboratory medicine leadership should be active outside the laboratory as part of the multidisciplinary clinical team.[10]

Two simple tools have been described to help describe and exemplify added value[10] and to assess the likely value of a development in laboratory medicine.[1]

Conclusions

The central role of laboratory medicine in healthcare will be consolidated into the future as global trends in healthcare and drivers for change in laboratory medicine are delivered. Leaders in laboratory medicine at all levels have a professional responsibility to recognise and support that central role. The first consideration is the provision of a high quality service culminating in laboratory accreditation against an international standard. Thereafter, laboratory medicine specialists should be increasingly active outside the laboratory as part of the multidisciplinary team that seeks to optimise clinical outcomes and patient experiences in an efficient and cost effective way. This is a large and daunting task for the profession but it is also a great opportunity to embrace change, unite and take the leading role in shaping the future of laboratory medicine.

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PHARMACOGENETICS OF STATIN RESPONSIVENESS

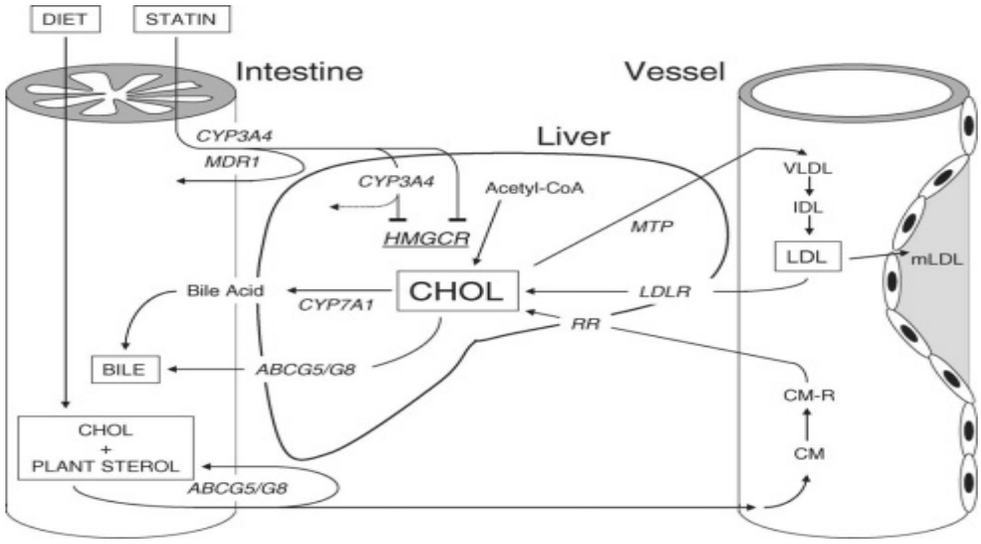
Prajakta Kadam [1], Chandrashekhar K. Ponde [3], Rajesh M. Rajani 3, T.F.Ashavaid [1, 2,1]Research Laboratories, [2] Department of Lab Medicine, [3] Department of Cardiology: P.D. Hinduja National Hospital and Medical Research Centre

Statins are the most prescribed drugs in the world. Atorvastatin became the world's best-selling drug of all time, with more than $125 billion sales in approximately 14.5 years. According to 2014-Health Affair report of statins in India, atorvastatin accounts for 80% of all statin products and a more than 90% of prescriptions sold in India. [(1)] Statin responsiveness is an area of high research interest given the success of drug class in the treatment of hypercholesterolemia and in primary and secondary prevention of cardiovascular disease. [(2)] Despite the clinical efficacy of statins in a wide range of patients, inter-individual variability exists with regard to low density lipoprotein cholesterol (LDL-C) lowering response as well as efficacy in reducing major cardiovascular events. [(3)] Only one third of patients treated with statins reach their targeted plasma LDL-C levels. These differences have been attributed to genetic and environmental influences. Genetic variations in genes involved in statin and lipid metabolism have been proposed as important determinants of statin response. [(4-6)]

The most serious adverse effect associated with statin therapy is myopathy, which may progress to rhabdomyolysis, and that, in turn, can lead to renal failure and death. [(6-7)] Since statin-induced myopathy is a concentration-dependent adverse drug reaction, researchers argue that when statins are especially used in high daily doses, the SLCO1B1 c.521>C SNP increases the risk of myopathy.[(7)] Study of the Effectiveness of Additional Reductions in Cholesterol and Homocysteine trial (SEARCH) Collaborative Group confirmed this risk for simvastatin.[(8)] The study recruited 12,064 patients which were allocated to receive either 20 mg or 80 mg of simvastatin. After a follow up of 6 years, myopathy was identified in 85 patients of the high simvastatin (80 mg) group. When the 85 patients with myopathy were compared to a control group of 90 patients it was shown that a non-coding SNP in the SLCO1B1 gene (rs4363657) which is in strong linkage disequilibrium with the c.521T>C SNP was strongly associated with simvastatin induced myopathy. Adverse effects to statins including discontinuation of treatment were reported by Donelly et al. [(9)] in over 4,000 type 2 diabetic patients treated with statins. Among these patients carriers of the SLCO1B1 variants had 2- fold increase in statin intolerance. All these results strongly indicate that the c.521T>C SNP is a highly predictive marker for the statin-induced myopathy.

Polymorphisms in several genes (Figure 1) such as those encoding 3-hydroxy 3-methylglutaryl coenzyme A reductase (HMGCR: rate-limiting enzyme involved in cholesterol metabolism), ATP-binding cassette protein B1/multidrug resistance protein 1 (ABCB1/MDR1: drug transporter), solute carrier organic anion transporter family, member 1B1 (SLCO1B1: drug transporter) and cholesterol-7-alpha-hydroxylase (CYP7A1: involved in lipid metabolism) have shown the association with variable effect of statins in lipid-lowering abilities. [(4-5,7)]

Figure 1: Metabolic Pathways Of The Genes Involved In The Pharmacogenetics Of Statin Responsiveness. [4]



Key: CHOL-cholesterol; CM-chylomicron; CM-R,-chylomicron-remnant; IDL-intermediate-density lipoprotein; LDL-low-density lipoprotein; mLDL-modified low-density lipoprotein; VLDL-very low-density lipoprotein; ABCG5/G8: ATP-binding cassette transporter G5/G8; CYP3A4-cytochrome P450, subfamily IIIA, polypeptide 4; LDLR-low-density lipoprotein receptor; MTP- microsomal trigly ceride transfer protein; RR-remnant receptor.

The goal of identifying the genes modulating statin response is challenging. Since multiple genes have role in statin pharmacogenetics. Results of two studies, the Pravastatin Inflammation/CRP Evaluation study [10] and the Atorvastatin Comparative Cholesterol Efficacy and Safety Study (ACCESS) [11], suggest that compound effects of multiple genetic variants may be better predictors of statin response than any single gene variant.

HMGCR is the rate-limiting enzyme in cholesterol synthesis. Statins are competitive inhibitors of HMGCR and therefore this gene is an interesting target for pharmacogenetic studies.[4,12] In the Pravastatin Inflammation/CRPEvaluation (PRINCE) trial of 1536 individuals treated with 40 mg/day pravastatin for 24 weeks, Chasman et al. [10], reported a significant association between two common and tightly linked intronic single nucleotide polymorphisms (SNPs 12 A/Tand 29 T/G) and reduced pravastatin efficacy as measured by smaller total cholesterol (TC) and LDL-cholesterol reductions. These two SNPs define haplotype 7 (H7). In addition to the original observation in the PRINCE population, the association between H7 and statin response has also been described in two additional independent populations, The Cholesterol and Pharmacogenomics (CAP) and the Genetics of Diabetes Audit and Research in Tayside Scotland Database (GoDARTS). However, this association failed to replicate in the Atorvastatin Comparative Cholesterol Efficacy and Safety Study (ACCESS), Assessment of Lescol in Renal Transplantation (ALERT) and Treatment to New Targets (TNT) study cohort. [11-12]

The effects of ABCB1 transporter variants (which encodes P- glycoprotein, an efflux transporter), on the variability in pharmacokinetics of statins have been affirmed in several studies. [4-5] The 2677G>T and 1236C>T polymorphisms within the ABCB1 gene, are the most commonly investigated variants. [4, 7]

ABCB1 1236T allele leads to impairment of efflux function and enhance intestinal absorption of statins.[7] Fiegenbaum et al. [13] reported, that in Brazilian population carriers of the ABCB1 1236T variant allele had a greater reduction in TC and LDL-C with simvastatin treatment compared with the with the wild type allele. Similar results were observed for the 2677G>T polymorphism.

Bile-acid biosynthesis is a key determinant of intracellular cholesterol and, in turn, cholesterol synthesis rate in hepatocytes. This suggests that variation in the CYP7A1 gene, a key enzyme in bile-acid biosynthesis, may influence the statin response. [5-6] In 324 hypercholesterolemic patients treated with atorvastatin (10mg), Kajinami et al. [14] described a significant association between promoter polymorphism of CYP7A1 (A-204C) and reduced atorvastatin efficacy in Caucasian population. Statins are transported into hepatocytes by the organic anion transporting polypeptide C (OATP1B1), which is encoded by the SLCO1B1 gene.[4] Several studies in Caucasian, Chinese and Brazilian populations have confirmed the association between SLCO1B1 polymorphisms (c.388A>G and c.521T>C) and statin efficacy. [5-7, 15-17]

In North Indian population, Poduri et al. [18] found a significant association between variant alleles of ABCB1 (-41A/G), HMGCR (SNP29 G/T, rs5908A/G, rs12916C/T), CYP7A1 (A-204C) and atorvastatin efficacy in terms of LDL-C lowering. We too observed, that polymorphisms of CYP7A1 (A-204C) and SLOC1B1 (c.388A>G and c.521T>C) significantly modulates the LDL-C lowering efficacy of atorvastatin in Indian patients with CAD (Ashavaid et al.; yet to be published).

Kinesin family member 6 (KIF6) is a member of the molecular motor superfamily involved in intracellular transport of several important molecules, encoded by the KIF6 gene in humans. Several studies have shown an association between the Trp719Arg (rs20455) SNP in the KIF6 gene and coronary heart disease.[6] Furthermore, analysis in four large clinical trials have shown a substantially increased benefit of statin therapy in carriers of this SNP compared with noncarriers.[6, 19-21] In The West of Scotland Coronary Prevention Study (WOSCOPS), a primary prevention statin trial, the absolute risk reduction of coronary heart disease by statin therapy was 5.5% in carriers of the SNP compared with 0.1% in noncarriers [21] In the secondary prevention trials PROSPER, CARE and PROVE ITTIMI 22, the absolute risk reduction by statin therapy ranged from 5 to 10% in carriers of the SNP compared with 0.41.2% in noncarriers. The end points of interest in all studies were, respectively: coronary events, myocardial infarction and death or major cardiovascular events [20-22]. SNPs in the APOE gene have also been assessed in relation to progression of coronary heart disease during statin therapy. Gerdes et al. analyzed data of 5.5 years of follow-up from 966 Danish and Finnish myocardial infarction survivors enrolled in the Scandinavian Simvastatin Survival Study.[23] Carriers of the APOE å4 allele had nearly twofold higher mortality compared with noncarriers of the å4 allele during simvastatin therapy.

Over previous years, substantive effort has been made in investigating the pharmacogenetics of the variable response to statin treatment. Ongoing genetic inquiry into response variability indicates probable multigenic determinants for statin efficacy and safety. Therefore, it is the vision that knowledge of patient's genetic status for a number of common variants will soon guide hyperlipidemic intervention.

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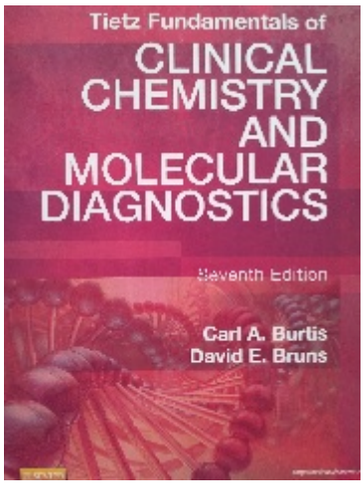

BOOK REVIEW

Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics, 7th Edition; edited by Carl A. Burtis and David E. Bruns; 1075 pages, published by Elsevier. ISBN: 978-1-4557-4165-6.

What a joy it is to see yet another edition of Tietz's book! The latest version of this well established textbook of clinical chemistry has been significantly revised to contain updated information. Its scope has been expanded to include molecular diagnostics. As a result, there are new chapters on the field and updated chapters on the related areas of genetic testing and the genetic basis of diseases. New topics and chapters such as "Pharma cogenetics" and "Genomes and Nucleic Acid Alterations" make an appearance.

Forty-seven new authors and 53 others from the 6th edition have collaborated to produce this edition. They read like the Who's Who of clinical chemistry. The book has a total of 50 chapters that are grouped into 6 sections entitled Principles of Laboratory Medicine, Analytical Techniques and Instrumentation, Analyzes, Pathophysiology, Molecular Diagnostics and Reference Information.The last section should be of great value to the practicing clinical chemist. As with previous editions of Tietz's books, it contains detailed reference intervals and values based on gender, age groups, different conditions and ethnicity, together with the critical values of many analytes and the therapeutic and toxic levels of drugs.

This edition also contains learning tools that have either been added or expanded. Each chapter begins with a set of learning-objectives, which is followed by a listing of key words and their definitions before the content of the chapter begins. It ends with a set of multiple-choice review questions and references.

While the book is predictably strong on accepted mainstream topics, readers looking for insights on some newer concepts may feel a tinge of disappointment. They should remember that this is a textbook and newer concepts need to become accepted into the mainstream before they can appear in books. Furthermore, this is a book on "Fundamentals". Do not expect, therefore, to see in the index current buzzwords in such as "personalized medicine/diagnostics"or "companion diagnostics".

Discussions on the uncertainty concept, traceability and the Joint Committee for Traceability in Laboratory Medicine appear in two separate chapters (by different authors) when the topics may have been better together in the chapter on Quality Management. Accreditation should have received a more detailed treatment and the IFCC-recommended ISO 15189 standard rather than the ISO 9000 should have been discussed in this chapter. It has been common aspiration of clinical chemists that laboratory test results and reference intervals should be comparable and independent of the medical laboratory that produced them.

This is the Holy Grail of clinical chemistry.As such, the concept of harmonization, which has been around for sometime albeit somewhat in the background, should have received mention (1).

However, these shortcomings, if at all, are minorin what is otherwise an excellent and timely update of our rapidly changing field. Tietz's books are an indispensable and comprehensive resource for anyone associated with clinical chemistry.Though Edward Ashwood is no longer amongst the editors, he has, nonetheless, co-authored a chapter. It is inspiring to see these venerable leading lights of our profession still making contributions to education. Long may they continue to do so.

Joseph Lopez
Kuala Lumpur, Malaysia.

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(JL is Immediate Past President of the APFCB and a past member of the IFCC EB.)

SIEMENS

THE SIEMENS ADVIA CENTAUR ELF TEST: A BLOOD TEST AIDING THE ASSESSMENT OF LIVER FIBROSIS

by Katherine Soreng, PhD. Roma Levy, MS

Abstract

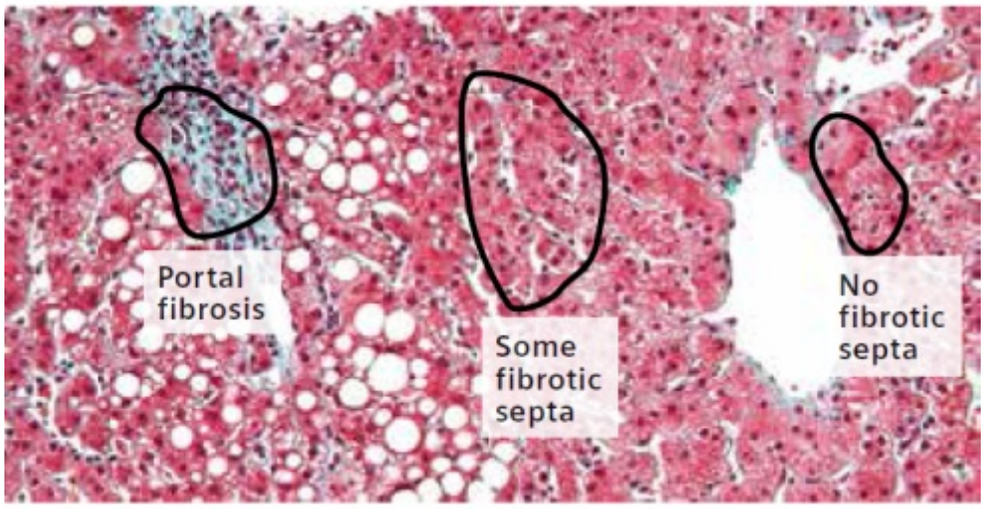
Chronic liver disease is a leading cause of morbidity and mortality worldwide. Recent advances in the treatment of hepatic disease have increased therapeutic options but remain challenged by limitations in current methodologies used for diagnosing and monitoring fibrotic disease. For decades, an invasive liver biopsy has been the primary means of diagnosing patients with fibrosis or cirrhosis, but biopsy incurs risk, cost, and challenges with accuracy. Non invasive alternatives to biopsy have recently become available, including both imaging modalities and blood tests. The Siemens ADVIA Centaur® Enhanced Liver Fibrosis (ELF™) test* is a novel blood test that measures levels of three direct markers of fibrosis and utilizes an algorithm to generate a numeric score. Application of this score to patients with chronic liver disease allows physicians to better assess fibrotic progression and can significantly reduce the number of patients requiring biopsy. This article provides an overview of the current published evidence on the clinical utility of the ELF test.

Introduction

Chronic liver disease (CLD) is a leading cause of death globally. Significant contributors include viral hepatitis B and C (HBV, HCV), alcoholic liver disease (ALD), and non-alcoholic fatty liver disease (NAFLD), although several other etiologies exist and some of these causes may co-exist. Management of patients with CLD requires assessment and staging of fibrosis to identify those most at risk and in need of treatment or lifestyle modification. Suppression or reversal of fibrosis, and possibly even early cirrhosis, can restore liver functionality and minimize complications such as the development of portal hypertension or hepatocellular carcinoma.[1,2] Diagnosis and prognosis are both important clinical parameters, and biopsy and scoring systems have been clinically utilized for cirrhosis prognostication (e.g., Child-Pugh [CP] score and the Model for End Stage Liver Disease [MELD]). Biopsy has long been considered the gold standard for diagnosis, but in recent years significant limitations have been acknowledged that compromise both sensitivity and diagnostic accuracy. Minor complications are relatively common, with up to 30% of patients reporting post procedure pain. Severe bleeding extensive enough to require transfusion has been reported to occur in up to 0.04% of patients, bleeding severe enough to cause pain occurs in 2% of patients, and bleeding detectable by ultrasound has been found in 18% to 20% of patients overall.[3] Additionally, there is a small but real risk of biopsy related mortality (reported between 0.01% and 0.09%).[3] In addition, biopsy is inherently invasive and contraindicated in some (such as patients on anticoagulation therapy and those with advanced cirrhosis). Patients are generally reluctant to undergo repeat biopsy, limiting its use in monitoring fibrotic changes and treatment efficacy.

* Not available for sale in the U.S. Product availability may vary from country to country and is subject to varying regulatory requirements

Figure 1. Fibrosis is not always homogeneous within a biopsy sample.Note the different conclusions that could be reached depending on the length of the biopsy sample and the placement of the collection needle.



Biopsy length	Correct diagnosis
15 mm	65%
25 mm	75%

Limitations of Biopsy

Biopsy-proven fibrosis or cirrhosis remains an important but imperfect method for identifying disease progression as it can provide direct histological evidence of fibrotic changes, necro-inflammatory activity, and other contributing factors such as iron overload or steatosis. If a quality tissue sample of sufficient size and number of portal tracts is obtained, it can show pathological evidence of disease. However, in routine practice, biopsies are often smaller than the optimal size. Furthermore, sampling error is common and can either over or under represent liver damage due to the heterogeneous nature of fibrosis, even if a sufficient specimen size is obtained and is preserved intact on the slide (AASLD recommends a 2–3 cm core using a 16 gauge needle, and the sample should contain at least 11 portal tracts).

Too small a sample size is one of the most common confounders to an accurate assessment, and data shows diagnostic accuracy is directly associated with the size of the biopsy specimen (Figure 1).[4]

Even "adequate" and non-degraded samples have been shown to mischaracterize the presence or degree of fibrosis in 25 to 30% of patients.[3,5,6] In addition, significant inter- and intra-observer variability has been well documented, and the subjective nature of histopathological interpretation contributes to differences in staging of disease and misinterpretation.[7-9]

Use of different histological scoring systems that utilize varying criteria can also lead to variability in the diagnosis.[7] Accurate identification of patients with severe fibrosis or cirrhosis is particularly important, as post-treatment prognosis depends on the stage of disease. Many physicians remain unaware of the diagnostic limitations of biopsy, which may contribute to reluctance in adopting newer alternatives.

Alternatives to Biopsy

Both imaging and serological methods have been developed as noninvasive and less invasive means of detecting and monitoring fibrosis. Both modalities have already been incorporated into HCV treatment guidelines as alternative methods to assess HCV-related liver fibrosis.[10]

Structural Imaging

In recent years, testing alternatives to biopsy have become available to aid in the assessment of fibrosis and cirrhosis. Imaging modalities include MRI, and ultrasonic and ultrasound elastographic technologies such as FibroScan® and Acoustic Radiation Force Index (ARFI) analysis, which detect changes in tissue stiffness resulting from progressive scarring. While imaging modalities have proven useful in identifying significant fibrosis or cirrhosis in many patients, they do not perform as well for accurate exclusion of disease or for detection of intermediate levels of fibrosis. Studies have suggested that FibroScan (which requires a trained operator and specialized, dedicated equipment) can have a relatively high failure rate ranging from 5–20% associated with factors such as obesity, small intercostal rib space, and patients with ascites or liver inflammation, indicated by highly elevated ALT.[11-16] In addition, variability in results interpretation among operators has been noted. Studies suggest ARFI (which has the advantage of using standard ultrasound equipment rather than a dedicated instrument) performs as well as or better than FibroScan, may have a lower failure rate, and may not be as impacted by obesity, inflammation, or elevated ALT.[17,18] However, both technologies involve significant capital investment, highly trained operators, take time to perform, and require patient access to the site performing the procedure (generally specialized liver centers). MRI-based methods of assessing liver elasticity have shown promise,[16] but also require expensive equipment and patient access.

Serologic Methods

Blood tests to assess fibrosis are appealing as they are minimally invasive and readily obtained in the majority of clinical settings. In contrast to biopsy, collection of serial samples over time is typically not a problem and rarely meets with patient resistance. Additionally, the analytical failure rate of blood sampling is low, whereas meaningful histology following biopsy may not be possible if the sample size or quality is poor.[3,4,8] Turn-around time for blood tests is generally rapid, and patients usually tolerate phlebotomy collections well. Blood tests offer access for patients in remote settings as samples can be collected locally then shipped for analysis to a regional reference lab;results are objectively determined based on an established cut point or cut points, rather than on the subjective determination of an individual. Finally, blood tests require fewer trained personnel and are less expensive to perform than biopsies.Blood tests for fibrosis vary in design but usually utilize a panel of markers associated with liver damage, dysfunction, or the fibrotic process itself.

In contrast to biopsy, which only evaluates approximately 0.002% of the total liver mass on average, blood tests (especially those utilizing markers directly associated with fibrosis versus just liver damage) offer the possibility of measuring the extent of total liver fibrosis, and can supply clinically relevant information across the continuum of fibrogenic disease.[3,19] For this reason, blood tests can offer a more objective interpretation compared to biopsy. It is important to understand, however, that biomarker performance is currently linked to the limitations described for biopsy, because biopsy still serves as the reference standard for evaluating blood tests. An imperfect reference method will impact performance of surrogate markers of fibrosis: comparison to a flawed test inherently compromises accuracy. One elegant analysis showed that even a "perfect" marker of fibrosis would not achieve >90% area under the curve (AUC) in a receiver operating characteristic analysis because it was limited to the biopsy accuracy range as well as prevalence of fibrosis in the testing population.[20] This is critical to understand when reviewing performance of these markers and incorporating them into clinical practice, because superior performance could be under-recognized.

Indirect Serum Markers of Fibrosis

Two main approaches have been used for blood tests. Indirect markers evaluate a variety of biochemical components associated with hepatic damage or dysfunction, while direct markers measure proteins and enzymes integral to the biochemical processes of fibrogenesis and fibrolysis.[17] It is important to understand the differences between the two approaches, especially since multiple formats utilizing indirect markers exist, and no single test utilizing indirect markers offers an undisputed advantage. Generally, indirect markers combine routine lab tests along with other clinical or laboratory parameters in a formula or model. Various indirect markers have been utilized in several assay formats. Common indirect markers used include alanine aminotransferase (ALT), platelet count, bilirubin, and apolipoprotein A1. The AST to ALT ratio has also been used, though studies suggest diagnostic accuracy of fibrosis using this ratio is low.[21] The AST-to-platelet ratio index (APRI) is one of the most studied of the indirect markers, and is calculated using this equation:

$$\left[\frac{\left(\frac{\text{AST (IU/L)}}{\text{AST Upper limit of normal (IU/L)}}\right)}{\text{Platelet count (10}^9\text{/L)}}\right] \times 100$$

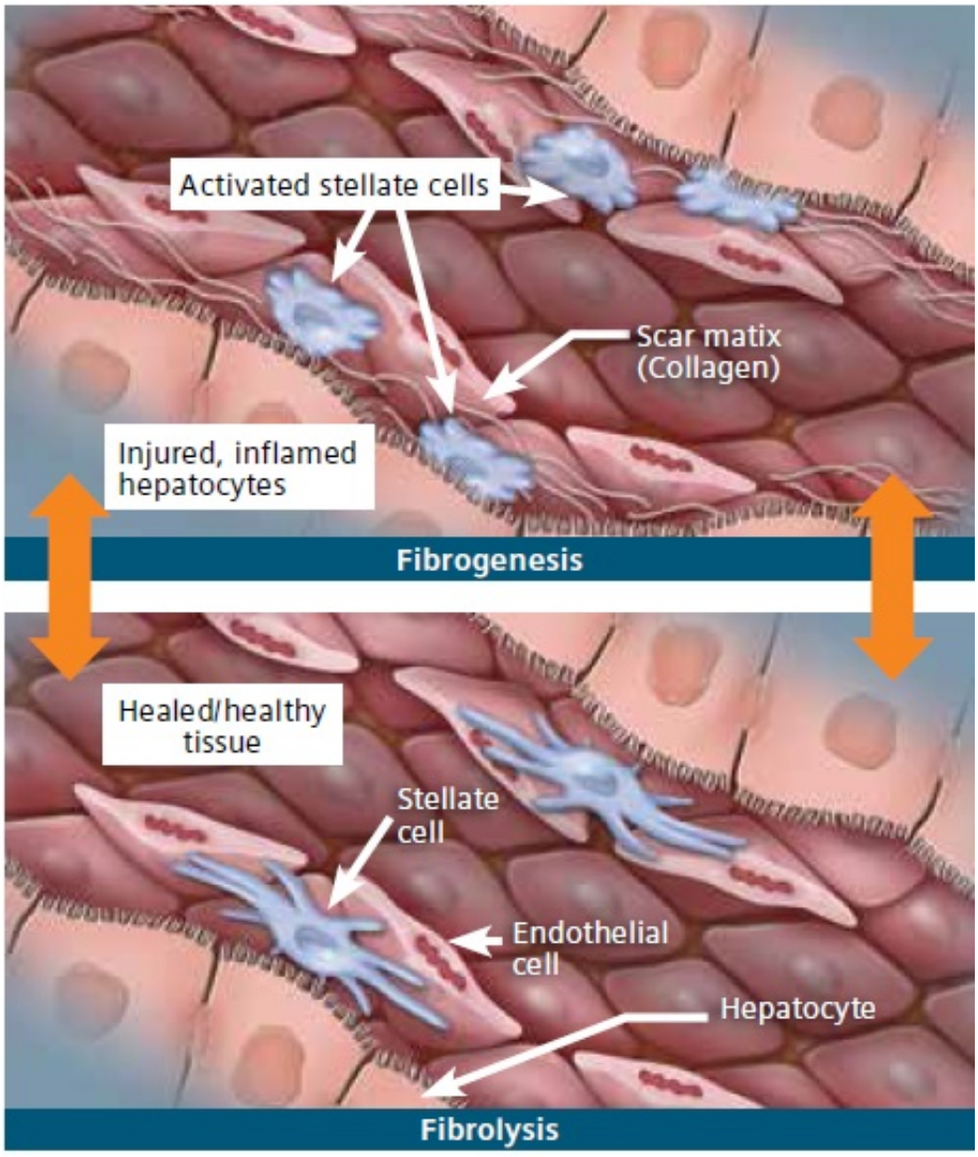
In principle, worsening fibrosis and portal hypertension are associated with reduced production of thrombopoietin by hepatocytes, increased platelet sequestration within the spleen, and reduced clearance of AST, thus APRI could serve as a surrogate marker of fibrotic progression. While APRI has demonstrated reasonable clinical performance in some studies, its sensitivity and accuracy have been challenged. A recent meta-analysis suggested only moderate performance for APRI in the detection of HCVrelated fibrosis.[22] FibroTest®, a commercially available algorithm that incorporates multiple indirect marker measurements in addition to age and sex, has been studied in a number of investigations and has shown reasonably good clinical performance.[23] However, FibroTest performed only marginally better than APRI in a systematic review.[24]

In addition, FibroTest requires that the multiple parameters be entered into a commercial website to produce the clinically relevant value. Since not all of the analytes used in the algorithm are completely harmonized across labs and vendors, individual analyte performance could Complicate comparisons and interpretation. In addition, hemolysis or Gilbert's syndrome (a common variant in which the liver processes bilirubin more slowly than usual) can lead to false-positive results with FibroTest.[25]

Direct Serum Markers of Fibrosis

In contrast, direct markers of fibrosis measure biochemical markers of the fibrotic biochemistry itself. Fibrosis is a complex process involving both fibrogenesis (scar tissue formation) and fibrolysis (tissue repair, Figure 2). Many of these proteins or their by-products are released into the blood and can be measured using immunoassay techniques. Increased presence of these analytes in the blood correlates with increased extra-cellular matrix (ECM) production of proteins within the liver itself. In liver disease, ongoing injury generates a wound healingresponse and scar formation in an attempt to encapsulate injury. ECM proteins produced by activated hepatic stellate cells are intimately involved in the direct formation of this collag en-rich scar tissue. Therefore, increased detection of these proteins (or other proteins involved in fibrogenesis or fibrolysis) in the blood is directly associated with fibrotic tissue. Due to its large size and activity, when damaged, the liver becomes a significant source of ECM protein production. Several of the many proteins involved in this process have been investigated as markers of fibrosis, both as single markers or as panels of multimarkers incorporated into an algorithm. The ELF test is a highly investigated assay that exclusively utilizes direct markers of fibrosis and generates a score that can be associated with biopsy-proven fibrosis in multiple forms of CLD.

Figure 2. Fibrosis is a complex process involving both fibrogenesis (scar tissue formation) and fibrolysis (tissue repair).



ELF Test: A Multimarker Algorithm that Generates a Single Score

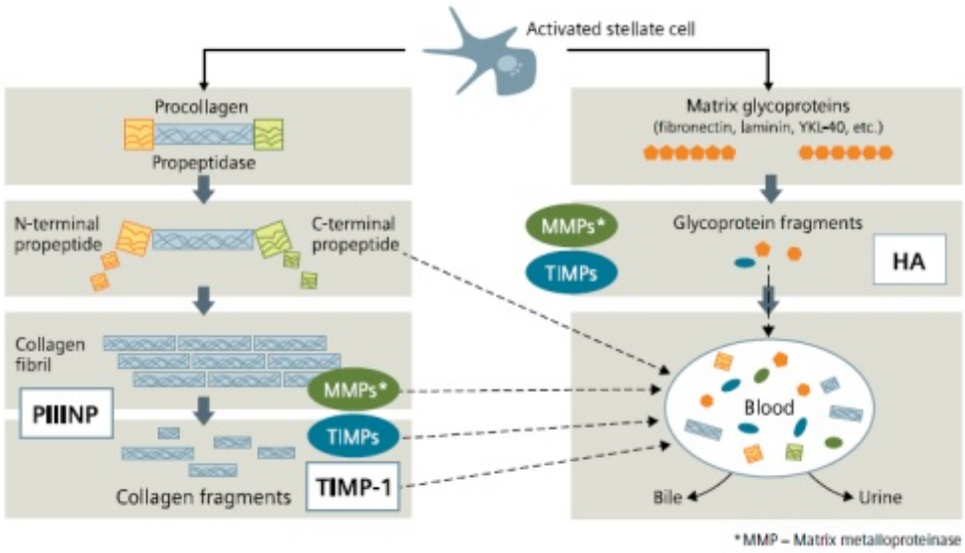
The ELF markers and algorithm were originally investigated and validated in a large study of over 1,000 patients with multiple forms of chronic liver disease, including HCV, ALD, and NAFLD, for the detection of fibrotic damage.[26] Blood samples were obtained from patients within 6 months of biopsy.Biopsy served as the reference standard, and biochemical values used in the algorithm were correlated back to staging assigned by histopathology. To minimize the impact of subjective interpretation, all samples were assessed by a single expert pathologist and using the consensus of three expert observers for staging and grading. The final markers and algorithm (which are now referred to as the ELF score) showed clinically useful performance as assessed by AUC values for ALD, NAFLD, and HCV(though performance varied somewhat, depending on the disease state). Subsequent work

has established additional positive clinical performance for ELF, both in these Common forms of liver disease and others, such as primary biliary cirrhosis (PBC), primary sclerosing cholangitis, hepatitis B (HBV), and autoimmune hepatitis.[19,27-38] Adult and pediatric populations have been studied with ELF, with the test performing well in both.[39,40]

The three markers incorporated into the ELF test are hyaluronic acid (HA), amino-terminal propeptide of type III collagen (PIIINP), and tissue inhibitor of matrix metalloproteinase 1 (TIMP-1, Figure 3). While both HA and PIIINP are involved in fibrogenesis, TIMP-1 is actually an inhibitor in the pathway controlling fibrotic degradation. Thus the three markers collectively capture both fibrogenic and fibrolytic-associated activities. The individual assays are run from a single serum sample on the fully automated ADVIA Centaur Immunoassay Systems. Software on the analyzer imports the individual analyte values and applies a weighted algorithm to produce a unit-less ELF score (Figure 4, following page). The score is then provided to the physician managing the CLD patient. Importantly, the ELF score predicts the likelihood of fibrosis in the patient, and numerous studies have associated ELF values with biopsy results using differing staging systems.[41]

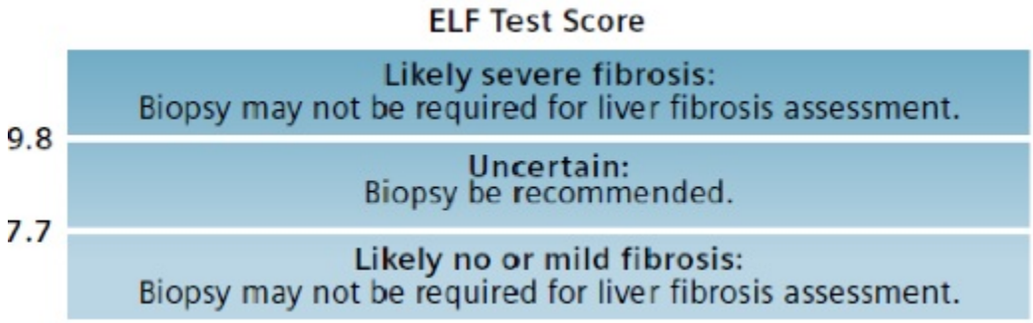
Since the algorithm incorporates a natural log calculation, a small numeric change in score represents a significant shift in concentration of the ELF markers. Changes in ELF score are associated with the changing clinical presentation.One study found an association of,decreased values of ELF markers in HCV patients who achieved a sustained virologic response (SVR) following successful therapy, as compared to patients who either failed to achieve a response or relapsed.[42,43] Another study in HCV liver transplant patients found that ELF could accurately identify patients whose transplanted organ had developed rapidly progressive fibrotic disease following reinfection by HCV.[44] An optimal time was identified for follow-up testing as 6 months after transplant. The same study demonstrated superior performance of ELF markers for the detection of fibrosis versus other markers such as APRI, and ELF was the single most strongly associated marker for detection of an increase in the hepatic venous pressure gradient (HVPG)—a measure of portal hypertension–related complications of cirrhosis.

Figure 3. Components of hepatic fibrosis.



The ELF score provides a valuable enhancement over biopsy staging in that it is a continuous rather than categorical variable, and is thus more sensitive to disease status and change. However, many physicians may be more used to thinking of liver fibrosis as a categorical state such as mild, moderate or severe. Since the physician only sees the numeric ELF score, interpretation is straight forward (Figure 5).

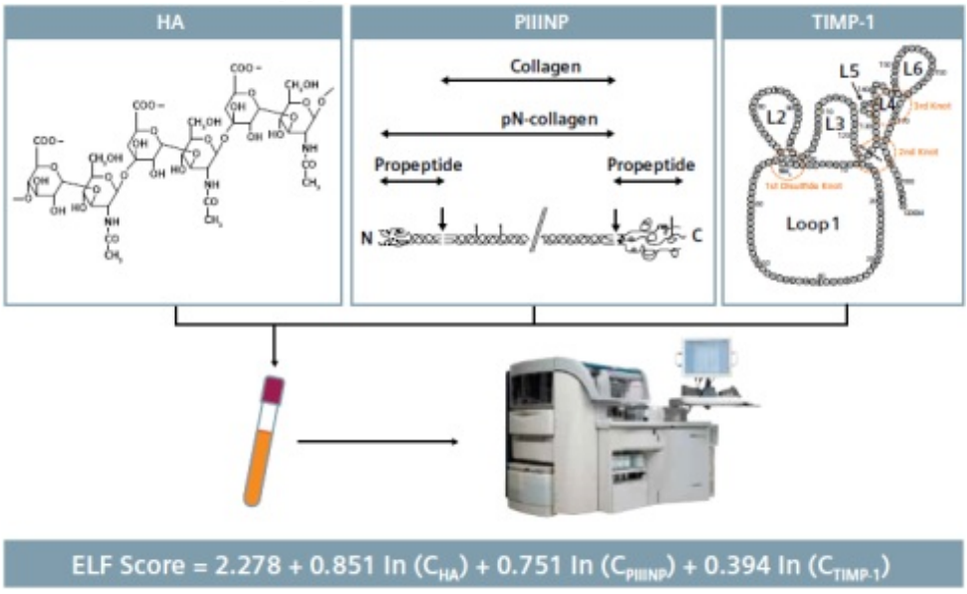
Figure 5. ELF score guidance



ELF score thresholds have been identified in populations of patients with known chronic liver disease to identify these commonly used categories of fibrosis. The low value of 7.7 was optimized for sensitivity, meaning any patient at or below that value has a low probability of any biopsy-proven significant fibrosis (none to mild). When used in a CLD population, a low ELF score can identify patients who could likely safely avoid biopsy (at least at the time of the ELF testing).[19] Studies have suggested that as many as 43% of CLD patients could be safely ruled out for biopsy using the ELF cut-off of 7.7 or less.[26] Patients could then be monitored for any change, as fibrosis is a dynamic process and can change with time.

The high cut-point of 9.8 was optimized for specificity, and is associated with biopsy-proven significant fibrosis. This means patients presenting with values greater than 9.8 are likely to have advanced fibrosis (to include cirrhosis) if they underwent biopsy. Although a liver biopsy is likely to be required for full assessment of the disease etiology and status, patients with high ELF scores could also likely avoid biopsy because the score indicates rule-in for significant fibrosis, and instead be managed according to the specific cause of their CLD (e.g., Antiviral therapy for HBV or HCV, alcohol abstinence for ALD, and treatment of non-alcoholic steatohepatitis [NASH]). The percentage of patients presenting with advanced disease varies by population, so the percentage ruled in or out will vary with the testing cohort. However, as concluded by multiple investigations, it is abundantly clear that application of ELF to a CLD population could dramatically reduce the need for biopsy. In a recent meta-analysis of ELF studies, the authors noted that overall, applying the ELF test to a diverse population of CLD patients showed considerable diagnostic performance for prediction of histological fibrosis stage.[38] In addition, the authors found that ELF testing could reasonably allow 74% of patients avoid biopsy. The impact of such a significant number of patients potentially avoiding biopsy cannot be understated, as it would reduce both cost and the morbidity associated with an invasive procedure. Even if a physician preferred to biopsy, availability of the ELF test could be useful for subsequent follow-up rather than attempting repeat biopsies.

Figure 4. The ELF test algorithm. (Algorithm shown here is for ELF run on the ADVIA Centaur XP Immunoassay system.)



Other investigations have specifically looked at a value of ELF specific for cirrhosis (excluding advanced fibrosis). In a recent study of HCV patients, the authors found that an ELF value of 11.3 discriminated cirrhosis from fibrosis with a sensitivity of 83% and a specificity of 97%.[34] Another study examining the original cohort of patients with multiple forms of CLD suggested that patients with an elevated ELF value above the upper cut point be considered for heightened monitoring.[19] The same study noted the excellent prognostic capacity of ELF. Compared to biopsy, ELF was able to identify the highest-risk patients at a median of 2 years, compared to 6 years for biopsy.

The ability to interpret ELF values both diagnostically and prognostically would be valuable for optimizing management of CLD patients, since identifying those with stable versus progressive disease remains challenging, and treatment is often predicated on perceived risk. In addition, a study looking at cirrhotic patients found that ELF prognostically outperformed both the MELD and the CP scoring systems.[45]

Limitations

Because the large size of the liver represents a significant source of ECM proteins associated with fibrotic damage, ELF test specificity is highest in patients with known CLD. Application of the 7.7 cut-point allows rule-out with a high degree of clinical confidence. But, while the test has been well-validated in various CLD populations, as with many tests, optimal performance is influenced significantly by the prevalence of disease in the testing population. Specifically, if the ELF test is applied to populations in which the prevalence of fibrosis is low (such as to screen healthy individuals) the thresholds derived in patients with known CLD will result in the generation of many false positive test results. Additionally, as with indirect tests and imaging modalities, patients who fall outside the rule-in and rule-out zones for ELF present more of a challenge. Although percentages can vary significantly depending on the study group, CLD populations will on average have a sizable portion of patients with intermediate ELF values (between 7.7 and 9.8). On biopsy, some of these patients will have no-to-minimal fibrosis, while in others fibrosis will be moderate, and in yet others it will be advanced. While some of these patients may have liver damage missed on biopsy, others may have extra-hepatic contributions to the ELF score. All alternatives to biopsy struggle with specificity in the moderate zone, and biopsy will often mischaracterize these patients.[3,46] Indirect tests using markers of damage or dysfunction typically perform better with advanced versus early-to-moderate disease.

Fibrosis is not unique to the liver, so extrahepatic sources of fibrosis arising from, for example, cardiac, pulmonary or kidney disease could theoretically contribute to an elevated score. For this reason, ELF (using the manufacturer's recommended cut points) should not be used in a general population in an attempt to identify undiagnosed hepatic-specific fibrosis. Elevations of ELF also have been documented in other fibrotic disease states such as systemic sclerosis (and a clinical utility for ELF specific to this disease state has been studied).[47] While diseases such as systemic sclerosis would be expected to contribute significant levels of fibrotic markers due to the mass of tissue involved, many other fibrotic activities would not be expected to produce high ELF scores. Values of ELF in apparently healthy populations are useful in supporting this interpretation.

ELF Values in a Healthy Population

Several studies have demonstrated that apparently healthy people can present with elevated levels of ELF (though typically the level will be below 9.8). Undiagnosed sources of fibrosis are likely contributors.[48] One investigation looked at ELF values in a blood donor population, and found that 47.8% were below 7.7 and 99.2% were below 9.8.[49] In a recent study looking at both normal subjects and patients with HCV, the authors noted that ELF was effective for the diagnosis of both fibrosis and cirrhosis in the HCV population, and that ELF values correlated well to biopsy staging.[27] However, while ELF values could be elevated in the normal population (ranging from below 7.7 to 8.4), the average levels were far lower than the CLD population with progressive disease. The authors also found that the ELF test outperformed APRI for both sensitivity and specificity (despite their observance that APRI performed well in their study as compared to many others). In a study of normal patients in Germany, ELF values were shown to correlate to both gender and age, with values slightly higher in men versus women.[34] While a similar influence of gender was found for healthy patients in Korea, the authors found no association with age or BMI.[48] The observation that men have slightly higher levels than women in a normal population is not unexpected, given the average increased body mass in men relative to women.

While age was originally included in the ELF score, it has subsequently been found that the algorithm performs equally well without this component when assessing CLD patients, so age has been eliminated from the current algorithm. The finding that some normal patients may have age-associated ELF elevations should not be surprising, however, given that advancing age can be associated with extrahepatic sources of fibrotic damage. In contrast, studies showing excellent performance of ELF in a pediatric population can be interpreted in the context that young patients are more likely to be free of co-morbidities, including sources of extra-hepatic fibrotic disease.[39,40]

Elevations of ELF in populations apparently free of known hepatic disease underscore the need to use the test with the established test thresholds in the proper patient population (i.e., CLD). For this reason, it is not appropriate to use ELF as a screening test to identify undiagnosed hepatic fibrosis. As is true for many tests, the judicious use of the test in the right population is key to its performance. Positive and negative predictive values are contingent on the prevalence of disease in the testing population. While future studies may validate a cut-point useful for a screening application

(for example to aid identification of NASH in an obese primary-care population), the current test must be used in conjunction with other clinicalinformation for patients with known CLD.

Sequential Testing: ELF plus Imaging

While ELF may support the rule-out or rule-in of a significant portion of patients, approximately 25% of patients will require additional assessment for liver fibrosis according to a recent meta-analysis. According to some studies, up to 50% of patients may require additional assessment.[38] Options include monitoring for progression of CLD patients with moderate ELF values, referral to biopsy, or secondary testing with an imaging modality. Studies have investigated possible synergy in using the ELF test in conjunction with an imaging modality and found this approach could further reduce the number of patients requiring biopsy.[18,37] Two approaches are possible: either utilize both technologies in the initial patient work-up or employ a sequential approach starting with ELF and then referring to imaging if ELF is insufficient for rule-out or rule-in. From the perspective of cost and testing logistics, a sequential approach may be the more reasonable of these two alternatives.

Conclusion

An accurate characterization of liver fibrosis is critical in the optimal management of CLD. Distinguishing patients with significant fibrosis from those with benign disease has historically required an invasive biopsy, which can still fail to accurately assess damage. In addition, biopsy is associated with pain, risk, and substantial cost. The number of CLD patients is expected to grow substantially in the coming years, driven by anticipated increases in undiagnosed HCV infected patients presenting with advanced disease as well as the growing burden of NAFLD in many countries. For this reason, a direct and reproducible blood test for fibrosis offers great clinical appeal. The ADVIA Centaur ELF test has been clinically validated in a range of chronic liver disease states and is automatically calculated from a single serum sample by the immunoassay system software. A numeric ELF result allows the likelihood of fibrosis to be classified with good probability as none-to-mild, moderate, or severe and so helps target patients to the appropriate clinical pathway. Routine adoption of the ELF test into clinical practice presents an appealing alternative to both biopsy and imaging modalities that require significant capital investment, a trained clinician, and limited patient access. As with all other current alternatives to biopsy, ELF can facilitate, but not completely replace, the need for biopsy referral.

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MULTI-ANALYTE, TRI-LEVEL LIQUID CONTROL MATERIAL FOR CARDIAC MARKERS COVERING CLINICALLY SIGNIFICANT LEVELS

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Abstract

Cardiac markers are blood chemicals used in conjunction with electrocardiogram (ECG) and other clinical investigations in the diagnosis and risk stratification of patients presenting chest pain and suspected acute coronary syndrome. The monitoring of the accuracy and precision of the biochemical tests for cardiac markers require quality control material; this is relevant to ensure the reliability of the results. Guidance and recommendations have been issued relating to the use of control material at different concentrations covering medical decision levels to ensure the validity of the decisions. Furthermore, the use of liquid stable control material containing multiple cardiac markers avoids the use of multiple separate controls, reduces the risk of errors associated with the reconstitution of the material and minimises the operator training requirements, which is of value for applications in clinical settings and in point of care systems.

Keywords: Multi-level control material, Liquid cardiac control, Decision levels, Cardiac markers

Introduction

Acute coronary syndromes (ACS) refer to a range of acute myocardial states, ranging from unstable angina pectoris to acute myocardial infarction (AMI) with or without ST-segment elevation. Diagnosis and risk stratification (from low risk to high risk) are closely linked in ACS. During the process of establishing the diagnosis of ACS and excluding differential diagnosis, the risk is repeatedly assessed and serves as a guide for the therapeutic management[1].

Cardiac biochemical markers are used as analytical tools for the diagnosis in conjunction with physical examination, clinical history, electrocardiogram or imaging investigations. Creatine kinase-MB (CK-MB) isoenzyme is found mainly in cardiac muscle, where it comprises 15-40% of the total CK activity.

The rapid return to normal values makes it suitable for confirmation of reinfarction[2]. C-reactive protein (hsCRP) is an acute phase reactant and its prognostic value after ACS as well as its association with the onset of cardiovascular events in patients with stable and unstable angina pectoris have been reported.[3] D-dimer is the primary degradation product of cross-linked fibrin and serves as a direct marker of ongoing coagulation with fibrinolysis.[4] Its level increases in patients with angina pectoris and acute myocardial infarction,[5] and is an early marker of coronary ischemia in patients with chest pain[6]. Digoxin (Digitalis) is used to treat patients with heart failure, serum digoxin concentrations should be monitored to guide therapy in patients at high risk for developing digoxin intoxication.[7] Myoglobin is a haem protein located in the cytoplasm of cardiac and skeletal muscle cells.

Its relatively low molecular weight and cytoplasmic location ensures its rapid release in the circulation; the plasma concentration is elevated 2-3 hours after myocardial injury[2]. Myoglobin has low cardiac specificity but high sensitivity, which makes it useful for ruling out myocardial infarction if the level is normal in the first 4-8 hours after the onset of symptoms. Myoglobin should be used with other serum markers because its level peaks and falls rapidly in patients with ischemia.[8] N-terminal pro-brain natriuretic peptide (NT-proBNP) is raised in both symptomatic and asymptomatic patients with left ventricular dysfunction.[9-11] Troponins (T, I C) are found in striated and cardiac muscle, troponins T and I are known as the "cardiac troponins" and are markers for the diagnosis of myocardial injury.[12] The cardiac troponins may remain elevated up to two weeks after symptom onset which make them useful as late markers of recent acute myocardial infarction.[1]

Analytical results from the testing laboratory provide critical information for the clinician to make timely decisions in critical situations and these results need to be correct.

The monitoring of the accuracy and precision of the entire analytical process require quality control material with appropriate concentrations. Guidance and recommendations have been issued related to the use of control material at different concentrations covering medical decision levels to ensure the validity of the decisions.[13,14] further more, the use of liquid stable control material containing multiple cardiac markers avoids the use of multiple separate controls, reduces the risk of errors associated with the reconstitution of the material and minimises the operator training requirements, which is of value for applications in clinical settings and in point of care systems.

This study reports a liquid stable control material containing the cardiac markers CK-MB (mass), D-dimer, high sensitive C-reactive protein (hsCRP), Myoglobin, NT-proBNP, Troponin I, Troponin T and Digoxin at three different levels covering clinically significant values for applications in clinical settings and point of care systems.

Materials and Methods

Three levels of liquid cardiac control were prepared at normal and clinically significant levels, containing the analytes: CK-MB (mass), D-dimer, hsCRP, Myoglobin, NT-proBNP, Troponin I, Troponin T and Digoxin, Each level was dispensed into 3ml glass vials and stored at +2 to +8°C. The control material used human serum.

Open vial stability was determined as the percentage recovery of each level of analyte opened and stored at +2 to +8°C over a period of 40 days related to day 0.

Shelf life was assessed as the percentage recovery of each level of analyte stored at +2 to +8°C compared to the same material stored at -70°Cover a 24 months period. Measurements were made on various automated systems.

Results

The typical concentration levels of the three level multi-analyte liquid control material for cardiac markers covered clinically significant ranges (Table 1).

The open vial stability after 40 days at +2-+8°C showed 92-104% recovery from day 0 for different concentration levels. The shelf life of stored controls at +2 to +8°C for a period of 24 months showed 92-105% recovery for different concentration levels.

Table: Liquid multi-analyte control material for cardiac parameters: typical ranges

LIQUID CARDIAC CONTROL			
ANALYTE	LEVEL 1	LEVEL 2	LEVEL 3
CK-MB (mass)	4.33 ng/ml	9.53 ng/ml	139 ng/ml
D-dimer[1]	1540 ng/ml	2312 ng/ml	5263 ng/ml
Digoxin	0.679 ng/ml	1.37 ng/ml	2.5 ng/ml
hs CRP	0.930 mg/L	1.84 mg/L	9.95 mg/L
Myoglobin	26.4 ng/ml	90.3 ng/ml	240 ng/ml
NT-ProBNP	76.2 pg/ml	299 pg/ml	1491 pg/ml
Troponin T	0.020 ng/ml	0.299 ng/ml	3.270 ng/ml
Troponin I[2]	0.035 ng/ml	0.234 ng/ml	15.4 ng/ml

[1,2] Typical values for Mitsubishi Chemical Pathfast

Conclusions

The human based liquid multi-analyte cardiac control material contained the parameters: CK-MB mass, D-dimer, hsCRP, Myoglobin, NT-proBNP, Troponin I, Troponin T and Digoxin at three levels covering normal and pathological ranges. This control material presented an open vial stability of 40 days (92%-104% recovery at 40 days) and 2 years of shelf life (92%-105% recovery at 24 months). Furthermore, the use of liquid stable control material containing multiple parameters avoids the use of multiple separate controls, reduces the risk of errors associated with the reconstitution of the material and minimises the operator training requirements. This control is of value as a convenient, ready to use material for clinical applications and point of care systems.

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