APFCB News

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

2024

Issue 1

Publication Team, 2024 Issue 1

Chief Editor	Prof. Pradeep Kumar Dabla, INDIA
Past Chief Editors	Dr. Raja Elina Raja Aziddin, MALAYSIA
	Prof. Praveen Sharma, INDIA
	Dr. Joseph B Lopez, MALAYSIA
Editorial Members	Dr. Leslie Lai, Kuala lumpur, MALAYSIA
	Prof. Ryunosuke Ohkawa, JAPAN
	Prof. Deepak Parchwani, INDIA
	Dr. Vivek Pant, NEPAL

APFCB Membership

Council Members

Australasian Association of Clinical Biochemists (AACB)
Association of Clinical Biochemists of India (ACBI)
Association for Clinical Biochemistry, Sri Lanka (ACBSL)
Chinese Society of Laboratory Medicine (CSLM)
Chinese Association for Clinical Biochemistry, Taiwan (CACB)
Hong Kong Society of Clinical Chemistry (HKSCC)
Indonesian Association for Clinical Chemistry (IACC)
Iranian Association of Clinical Laboratory Doctors (IACLD)
Japan Society of Clinical Chemistry (JSCC)
Korean Society of Clinical Chemistry (KSCC)
Malaysian Association of Clinical Biochemistry (MACB)
Mongolian Association of Health Laboratories (MAHL)
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)
Thailand Association of Clinical Biochemists (TACB)
Vietnamese Association of Clinical Biochemistry (VACB)

Affiliate Members

Chinese Association of Clinical Laboratory Management (CACLM)
Association of Medical Biochemists of India (AMBI)
Macao Laboratory Medicine Association (MLMA)
Nepalese Association for Clinical Chemistry (NACC)
College of Chemical Pathologists of Sri Lanka (CCPSL)
Philippine Council for Quality Assurance in Clinical Laboratories (PCQACL)

Corporate Members

Abbott Laboratories (Singapore) Pte Ltd.
Beckman Coulter Hong Kong Ltd.
Becton Dickinson Holdings Pte. Ltd.
Bio-Rad Laboratories (Singapore) Pte Ltd.
DiaSys Diagnostic Systems GmbH
Roche Diagnostics Asia Pacific Pte Ltd.
Siemens Healthcare Pte Ltd.
Snibe Diagnostics Pte Ltd.
Roche Diagnostics Pte Ltd.
Waters Pacific Pte Ltd.
Sukraa Software Solution Pvt Ltd
sysmex Pte Ltd. Singapore
RCPA QAP Pvt Ltd Sydney, Australia
Thermo Fisher Scientific
Greiner Bio-One Singapore Pte. Ltd.
QuidelOrtho Pvt Ltd

APFCB Executive Board and Chairmen of Committees, Elected 2024

Executive Board

President	Dr. Tony Badrick CEO, RCPAQAP Faculty of Health Sciences and Medicine, Bond University, Australia
Immediate Past President	Dr. Endang Hoyaranda Prodia Group, Jakarta, Indonesia
Vice-President	Dr. Samuel Vasikaran Consultant Chemical Pathologist, PathWest-Laboratory Medicine, Western Australia
Secretary	Prof. Praveen Sharma Former Professor and Head, Dean Research Biochemistry at AIIMS, Jodhpur, India Editor-in-chief, Indian Journal of Clinical Biochemistry
Treasurer	Dr. Raja Elina Raja Aziddin Senior Biochemist and Head of the Drug and Research Laboratory, Kuala Lumpur, Malaysia
Corporate Representative	Dr. Douglas W. Chung Area Marketing Manager Asia Pacific, Core Diagnostics at Abbott Laboratories

Chairman of Committees

Communications and Publications	Prof. Pradeep Kumar Dabla, INDIA
Education	Dr. Cui Wei, CHINA
Laboratory Management	Dr. Tjan Sian Hwa, INDONESIA
Scientific	Dr. Tze Ping Loh, SINGAPORE
Congress and Conference	Dr. Woei-horng Fang, 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.

Contact email: c-cp@apfcb.org

Cover page: Three Friends of Winter in a Chinese Garden

by Dr. Tan It Koo,
Founding and Past President APFCB

Address

The registered address of APFCB is as follows:
APFCB, c/o Solid Track Management Pte Ltd. 150 Cecil Street, #10-06, Singapore 069543

Contents

APFCB Auspices

Clinical Case

(APFCB Laboratory Medicine Case Contest)

Painting Story

From the desk of Chief Editor, APFCB eNews

Prof. Pradeep Kumar Dabla
Chief Editor, APFCB eNews

Dear Friends,

With the rise of the New Year 2024, the Team APFCB Committee of Communication and Publications (C-CP) presents you with the 1st issue of APFCB News, 2024. The New Year came with new hopes while facing different challenges to deliver the responsibility of development, overseeing, reviewing, and addressing system-wide policies as well as issues pertaining to the organization's website and its online operations along with APFCB news publications. After assuming the role by current C-CP, the APFCB is not only officially available but is actively disseminating the relevant information under the purview of APFCB on official Facebook, Twitter, LinkedIn, Instagram and YouTube.

In this issue, we bring you information and news from various APFCB member countries, with a wide spectrum ranging from annual reports of the year 2023 to the academic activities performed at both National and International levels. With the letter of “Chief Editor & APFCB President”, we also welcome the address by “IFCC President, Prof. Tomris Ozben” for the APFCB community while beginning her term of office on January 1st, 2024.

Expert’s opinion in this issue is focused into the field of cardiovascular science, highlighting the triglyceride associated residual atherosclerotic cardiovascular disease risk to the challenges involved while measuring Lp(a) levels. Special report from APFCB – APAC CVD Alliance to mention the ongoing collaborative work to elevate the public and policy awareness about CVD at the regional and domestic forums in Asia. Industry partners have shown great enthusiasm with the report on Green Revolution in Laboratories.

Since the C-CP resumed the office, Young Scientist column has become the integral part of APFCB news showcasing excellent report of activities by IFCC-TFYS extending to the interesting conversation with young scientist from Japan and Nepal. Future Leaders!

APFCB auspices events and activities calendar presented indicating commitment to promote scientific events under APFCB umbrella. One of important reader's attractions is "Case Series" from APFCB lab medicine case contest contributed by APFCB Education committee.

Don't forget to login to APFCB social media for receiving constant updating news about the APFCB Congress 2024, Sydney Australia. Join us at the Congress!

This time, Dr. Tan It Koon is taking us to visit "Three Friends of Winter in a Chinese Garden" through his lively painting strokes and its mesmerizing description.

As members of the Committee on communication and publication, we continue to take pride in APFCB system and its continuing improvement. C-CP Team is keen to extend the invitation to the member societies for corresponding members and young scientists positions open in committee. Join us!

Happy New Year 2024!

Happy Reading!!

Best Wishes

Team APFCB C-CP

From the desk of APFCB President

Dr. Tony Badrick

President, APFCB

Greetings

At this time of the year, we often reflect on the year that has been and consider what we have learnt from the experience to carry into next year. At the beginning of 2023, many countries were still coming out of lockdown. The impact of COVID-19 on the world cannot be understated, yet strangely, we have moved on. It was a tragic time for many. We learned the importance of so many people in keeping our societies functioning: healthcare professionals, shops, manufacturers, logistics, and those involved with waste disposal. Laboratories were recognized for the key role they play in a pandemic, in fact without laboratories, the pandemic would have been far worse. The scientific response to the pandemic was incredible.

But we realized how fragile our systems, and sometimes people, were. Sustaining the pressure of providing critical results in the face of a workforce that was susceptible to the infection over those covid years was an enormous challenge. The risk has not disappeared, but we have more tools now to deal with another emerging pandemic.

We need not forget the important lessons of well-trained and competent staff and internal processes. Our quality systems and quality people held the worst impacts of the virus at bay. The ability of laboratories to develop and/or implement new tests and procedures rapidly provided the health system with the ability to identify the risks accurately and respond appropriately.

Organizations such as the APFCB allow us to learn from others who faced the same challenges. The professional networks that we form and maintain are a critical, if not always recognized, part of the sustainability and resilience of our healthcare systems.

I wish you all a prosperous 2024 filled with new opportunities professionally and personally.

Best Wishes

President, APFCB

Dr. Tony Badrick

Greetings from IFCC President

Prof. Dr. Tomris Ozben

IFCC President

It is both an honor and a privilege for me to commence my role as the President of the IFCC Executive Board, beginning my term of office on January 1st, 2024. I extend my heartfelt gratitude to the IFCC member societies within the 6 IFCC Regional Federations for their kind support and trust. I sincerely appreciate their confidence and assure them that I will exert my utmost effort to merit their trust. My commitment involves dedicating my time and energy to enhance the functions and activities of IFCC.

Taking on a leadership position, with other dedicated members of the IFCC Executive Board, IFCC officers, Regional Federations, National Societies, and Corporate members, our primary objective is to fortify the robust foundations on which the Federation stands. Our efforts will be centered on identifying new opportunities and devising new strategies that empower Laboratory Medicine to play a pivotal role in patient care. Our goal is to ensure that theIFCC continues to stand as the foremost global organization representing Laboratory Medicineworldwide.

IFCC demands a dedicated and proficient management team. The President, along with the members of the new IFCC Executive Board and officers of the IFCC Functional Units, will devote both commitment and time. Our aim is not just to sustain, but to enhance IFCC functionsand activities, making significant contributions to the advancement of Laboratory Medicine andthe growth of its professionals. We are set to carry the IFCC flag even higher, maintaining past initiatives and developing new projects. The expertise, knowledge, and fresh ideas from the Executive Board members and IFCC officers, working with enthusiasm across different functional units, will drive this progress. We emphasize close collaboration with IFCC Regional Federations, IFCC Member Societies, and Corporate Members, encouraging their active participation in all IFCC activities.

We extend our heartfelt gratitude to the former IFCC Presidents, outgoing members of the IFCC Executive Boards, and officers of the Functional Units for their exceptional contributions, voluntary services, knowledge, and enthusiasm throughout the years.

Their dedication has played a crucial role in building a robust and continually advancing Federation, establishing it as a leading organization in laboratory medicine worldwide, providing high-quality healthcare services to its members. We will always remember and deeply appreciate their significant contributions. While they may no longer hold active roles, we are confident that their interests and contributions to the IFCC will persist. We look forward to working closely with them, drawing upon their extensive experience and knowledge for the benefit of IFCC.

In recent years, IFCC's activities have experienced steady growth. The substantial services and contributions of IFCC to the enhancement of Laboratory Medicine are widely acknowledged. This remarkable success is attributed to the voluntary service, dedication, and time invested by over 300 laboratory scientists from Member Societies and Corporate Members, serving across various IFCC Functional Units. Our gratitude extends to the IFCC officers representing Member Societies and Corporate Members for their unwavering support over the years. Their ongoing commitment and loyalty have played a pivotal role in the successful execution of numerous IFCC tasks and projects.

I firmly believe that advancing healthcare through Laboratory Medicine hinges on the active engagement and dedicated involvement of IFCC Member Societies, Corporate Members, and IFCC officers of the Functional Units. Their collective efforts play a pivotal role in guiding our profession toward the objectives and direction which will be outlined in the new IFCC Strategic Action Plans, set to be implemented in the coming years. These plans will be crafted in collaboration with the IFCC Executive Board, IFCC Functional Units, IFCC National Societies, and Corporate Members, incorporating their suggestions, ideas, and comments in formulating the IFCC Strategic Action Plans.

Success in this evolving landscape requires collaborations between industry, public, private, and academic drivers of innovation. The IFCC Executive Board welcomes the input of ideas, comments, suggestions, and sharing of challenges and concerns from National Societies and IVD Industry Partners. We invite them to actively participate in IFCC's endeavors, encouraging collaboration to fortify IFCC's leadership role in advancing laboratory medicine and enhancing the quality of healthcare and medical laboratories worldwide. Their engagement and contributions are vital as we work together towards

these shared goals. Their feedback, participation, and engagement will be integral to steering laboratory medicine forward and shaping the future of our profession.

Achieving our shared objectives requires collaborative action and effort. To facilitate this, an interactive global platform will be established for IFCC members in laboratory medicine, colleagues from the in vitro diagnostic industry, digital health, and medical devices.

This platform will provide opportunities to interact, share, and learn through networking discussions on trends, opportunities, and challenges. It aims to deliver the latest innovations and cutting-edge technologies in laboratory medicine, establish partnership models for efficient integration and adoption of emerging technologies, prepare for new in vitro diagnostic regulations in Europe and beyond, transition to green and sustainable medical laboratories, harmonize and standardize laboratory tests, and enhance collaborations in education and research.

I am looking forward to fostering productive collaborations and establishing efficient bridges with the IFCC Member Societies and Corporate Members in the ongoing and future activities of IFCC.

With my best regards.

Prof. Dr Tomris Ozben, EuSpLM, Ph.D., D.Sci.
Specialist in Clinical Biochemistry

IFCC President

Full Professor of Biochemistry and Clinical Chemistry
Akdeniz University, Medical Faculty, Dept. of Clinical Biochemistry, Antalya Turkiye
University of Modena and Reggio Emilia, Medical Faculty, Clinical and Experimental Medicine, Ph.D. Program, Modena, Italy

Report APFCB - Communication and Publication Committee (C-CP)

Prof (Dr.) Pradeep Kumar Dabla

Chair, APFCB C-CP

The APFCB Committee of Communication and Publications (C-CP) has the responsibility of developing, overseeing, reviewing, and addressing system-wide policies as well as issues pertaining to the organization's website and its online operations.

The committee is also responsible for the online publication of APFCB news and collaborates with member associations and corporate members to promote participation and wider dissemination of relevant online activities, educational material and resources for laboratory medicine personals. Through this mode C-CP directly supports novel ideas, encouragement and promotes member associations to develop policy and strategy that assist with broad goalsfor patient care. The new Chair of the Communication and Publications Committee for the term 2023-2025 was appointed in March 2023 by the APFCB-EB.

Members of the APFCB C-CP for this term were:

- Dr. Pradeep Kumar Dabla (Chair), INDIA
- Dr. Deepak Parchwani (Web Editor), INDIA
- Dr. Ryunosuke Ohkawa, JAPAN
- Dr. Mingma Lhamu Sherpa, INDIA
- Dr. Alireza Lotfi Kian , IRAN
- Dr. Tze Wei Poh (Corporate – Beckman Coulter) (member till Dec2023)
- Dr. Mayank Upadhyay, Corporate Member
- Dr. Vivek Pant, Young Scientist Member

Following their appointment, through the APFCB e-newsletter, social media, and official website, the newly C-CP team has strengthened the organization's online presence. Over the course of the previous year, the C-CP maintained active communication and used electronic methods to promote the APFCB's operations to both its member societies in the Asia Pacific area and to nations under the umbrella of IFCC.

In summary, the following heads outline the committee's operation in the preceding year:

1. **APFCB Website - Maintenance & Management:**

The C-CP is in charge of creation, upkeep, and administration of the APFCB website. Since the present committee began its term, a new and dynamic APFCB website has been developed. The most recent details about webinars, online courses, and virtual conferences hosted by the

APFCB, its member societies, and international professional bodies are regularly updated on the federation's website. Scientific publications, guidelines, and webinars (live & recorded) on avariety of interesting topics are also made available.

A substantial transformation has occurred since the previous version, including improved webinar exposure with ongoing updates; the creation of a quick link tab emphasizing APFCB Auspices on the home page, social media, and news; upgrading of the announcement section,social media, visitors' stats and a designated space has been created for corporate partners.

APFCB auspices calendar organized:

As APFCB is committed to maintain and promote an exchange of information in the field for patient care by creating the links of communication between the involved parties. APFCB auspices granted for scientific conferences and meetings symbolize that the scientific conference or meeting is of a high scientific and/or educational level. Granting of APFCB auspices has been methodically set up and organized since the federation views it as a crucialarea for its outreach.

2. **Stewardship of APFCB Social Media Platform**

Social media has become an indispensable part of our lives. In fact, it is a great online teaching-learning and publicizing platform for the federation. Everyone has at least one account in any one of the social media sites. This allows the federation to meet the target population who browse and connect with friends and colleagues via these social media platforms on a daily basis. This creates an opportunity for our federation to be even more user-centric information across the world.

The current C-CP set up newer social media profiles and revived the passive handles for the APFCB in an attempt to effectively communicate and distribute news, publications, nominations, awards, congress and updates on the federation's activities with national societiesand clinical laboratory experts.

Under the current C-CP, the APFCB is not only officially readily available, but is actively disseminating the relevant information under the purview of APFCB on Facebook, Twitter, LinkedIn, Instagram and YouTube.

Links to the APFCB social media pages are as follows:

(https://www.apfcb.org/networking)

Facebook Page: https://www.facebook.com/APFCB/

Twitter: https://twitter.com/APFCB_LM

Instagram: https://www.instagram.com/apfcb_lm/

LinkedIn https://www.linkedin.com/company/apfcb/

YouTube: https://www.youtube.com/channel/UCoiicTsnVX-COjklgZHQ54Q

3. Publication of online activities, educational material and resources

In the era of digital connectivity, the publication of online activities, educational materials, and resources plays a pivotal role in fostering accessible learning environments. Through diverse platforms, educators can share engaging content, interactive exercises, and valuable resources, transcending geographical boundaries. This dissemination facilitates the democratization of education, empowering learners globally.

Amidst the ongoing surge in digital connectivity demand, the publication of online activities, educational materials, and resources is significantly enhanced through the continuous efforts of C-CP. We have provided diverse platforms to share dynamic content, interactive exercises, and valuable resources, creating a vibrant and accessible learning ecosystem.
(visit: https://www.apfcb.org/continuing_education).

4. Practices to promote education and relevant activities of the federation

The homepage of the APFCB website and social media platforms are used to publicize all forthcoming events. The C-CP also notifies members of impending events and extends blast email invitations to them. The C-CP is relentlessly working to meticulously update and expand the list of members in its database.

5. Publication of APFCB eNews

C-CP takes charge of the online publication of APFCB eNews (https://www.apfcb.org/#enewsletter). The chair of the C-CP who was appointed in March 2023has been given the responsibility of being the Chief Editor of the APFCB eNews.

The newsletter is published twice a year and can be found on the APFCB website as an e-book. It can also be accessed as a PDF version. As per convention of the newsletter's biannual publication schedule, two editions were released in the year 2023:

APFCB News 2023 Issue 1

E BOOK PDF

APFCB News 2023 Issue 2

E BOOK PDF

In keeping with convention, **paintings of Dr. Tan It Koon**, the organization's founder and former president, was used as the front cover of both issues **(Issue 1**: A Bunch of Ripening Bananas with Flower Bud Still Attached and **Issue 2**: A Beautiful View of the Three Gorges in China).

The published APFCB News (Volume 1 and 2) includes myriads of information, ranging from delineating annual reports from member's societies showcasing their efforts in adding scientific knowledge to laboratory medicine, expert opinion in laboratory quality management & artificial intelligence, special reports from IFCC Global Medical Lab Week celebrations 2023 & sustainable green labs.

A feature piece on Tony Badrick (APFCB President), authored by Dr. Pradeep Kumar Dabla (Chief editor of APFCB eNews), was published in APFCB eNews 2023 Issue 2 in recognition of the honor he received by his appointment as "Member of the Order of Australia" for his services and immense contribution towards the community and science.

Industry partners have shown great enthusiasm while sharing reports for industry voice whether triage testing or non-invasive prenatal testing (NIPT). Their active engagement underscores a commitment to advancing cutting-edge technologies and practices, fostering innovation, and collectively shaping the future landscape of diagnostic and prenatal healthcare.

An additional fascinating feature of the APFCB eNews 2023 is the increased visibility of young scientists and it is always thrilling to share efforts by young scientists. The full report on the 2nd IFCC Young Scientists' Forum organized in conjunction with IFCC World Lab Euro Med Lab2023 in Rome was made available in the second issue.

To standardize article submissions to the APFCB news, the C-CP team drew up a guideline for the submission of reports, articles and corporate advertisements. These guidelines are accessible on the APFCB website homepage via this link:

https://www.apfcb.org/Submission%20Guidelines%20APFCB%20News%20050721.pdf.

A key new feature added to APFCB eNews is the clinical case discussion due to its inevitable importance in clinical medicine and practice as an instructive example to people who might encounter similar problems.

The APFCB eNews features compelling quiz and expert papers, offering a rich source of knowledge in the field of clinical chemistry and laboratory medicine. The quiz engages readersin testing their understanding of crucial topics, while expert papers delve into the latest advancements and insights. This combination ensures a comprehensive learning experience, keeping professionals abreast of developments in laboratory medicine and promoting continuous education within the APFCB community. It serves as a valuable platform for sharingexpertise and fostering collaborative growth.

Recommendations for the upcoming year:

The committee will further explore under the following headings in 2023-2024 to expand the APFCB network:

- **APFCB Webinar platform**

Marshall McLuhan in 1964 quoted that through digital communication the world is becoming aglobal village. It is a concept that says that communication has become instantaneous due to technological evolution. The same notion has now come into existence as learning/re-learningalso shifted to the digital arena. With this concept and considering the increased activities/requirements and best marketing techniques, we propose to organize a series of webinars to reach our target audience.

XA webinar permits many virtual functionalities in a sense that a fully-managed webinar platformprovides the organizers with numerous sets of interactive features that not only make learningeasy, but also networking. Another characteristic that makes webinars an exceptional choice is that they can reach a wider audience without any limitations. Some of

the most eminentadvantages of webinars include simpler way to gather wider audience, aasy availability of high-profile guests, cost-effective learning method, encourages interaction, great flexibility & convenience for all, excellent way to grow network and not to exclude branding & customization.

Social media expansion

By connecting on social media handles that the target population uses on a daily/regular basis, it enables us to meet them where they are and gives our federation the chance to disseminate the information worldwide. Major benefits of social media for our system includes, but not limited to, a communication channel for networking, for creative demonstration, connecting with experts, as a marketing tool, access to information and to publish news and update. Because of this, it is necessary to use these social media channels aggressively for outreach.

E-Mail Marketing

E-mail marketing is a type of direct digital marketing method that uses emails to engage with a target audience. It involves sending promotional or informational content. APFCB can use e-mail marketing typically to create brand awareness and generate leads and presence at an international forum cost effectively.

To utilize the Apace News as a platform for APFCB activities:

In the forthcoming issues of APFCB News 2024, C-CP intends and purposes to publish the APFCB Clinical Cases in batches of 2 to 4, considering that case studies are one of the cornerstones of medical progress and may provide novel ideas in the field.

As members of the Committee on communication and publications, we continue to take pride in APFCB and its strive for continuing

Report by:

Team APFCB C-CP

Chair: Prof (Dr.) Pradeep Kumar Dabla

Report APFCB Education Committee (C-E) – APFCB Laboratory Medicine Contest

Dr. Wei Cui

Chair, APFCB Committee-Education (C-E)

To show the clinical significance of laboratory medicine and encourage all the laboratory professionals in the Asia-Pacific region to pay more attention to special cases in routine work, APFCB, in collaboration with Shenzhen Mindray Bio-Medical Electronics company, organized the APFCB Laboratory Medicine Case Contest. This event was themed 'Value of Laboratory Medicine: Resolve Clinical Challenges' and all the laboratory professionals in the AP region were welcome to participate.

The overall process of the contest was composed of three rounds. In the first round, the participant was required to submit an unpublished clinical case report that described an atypical, misdiagnosed, special or rare case that received a definitive diagnosis or successful treatment. For these cases, the participant had to explain and analyze in detail how the laboratory played an important role in various facets of patient management. The participant could share the experience he/she had obtained during daily work which could be helpful to improve the work efficiency of laboratory professionals and to improve the total laboratory quality. The winners of the first round then continued to the second round. The second round was a video case presentation. The top 10 winners were then entered into the third and final round. The third round was an online presentation followed by Q&A.

10 winners were awarded first prize, second prize or third prize based on the quality of their case reports and presentations

The contest was launched on August 28. In the first round, a total of 68 case reports from Indonesia, Sri Lanka, India, Pakistan, Malaysia, and Japan were received. 50 reports were enrolled in the second round. 47 qualified video presentations were admitted. After assessment of their topic, content, academic value, and originality, 10 winners were selected who participated in the finals on December 15. We invited six distinguished professors to be the judges of the finals. They were Dr. Tony Badrick, Dr. Leslie Lai, Dr. Tjan Sian Hwa, Dr. Helen Martin, and Dr. Goce Dimeski and Drv Wei Cui According to the total of the six scores awarded by each of the six judges for each participant, the 10 contestants were awarded first prizes, second prizes or third prizes. Here are the winners' names and their topics.

First Prizes

1. Dr. Kadek, Indonesia, A Very Rare Case A Change in The Rhesus Blood Type in A Patient With Colorectal Cancer.

2. Dr. Sumita Sharma, India, Coexistence of Haemoglobin D Punjab with Beta Thalassaemia Traitand Gilbert Syndrome A Complex Case Analysis

Second Prizes

1. Dr. Yoji Uejma, Japan, A case of Ureaplasma meningitis in which rapid identification andquantitative bacterial count testing were effective

2. Dr. Siddiq Ozaal, Sri Lanka, A Diagnostic dilemma in a female who presented withhypercalcemia with a parathyroid and pancreatic tumor

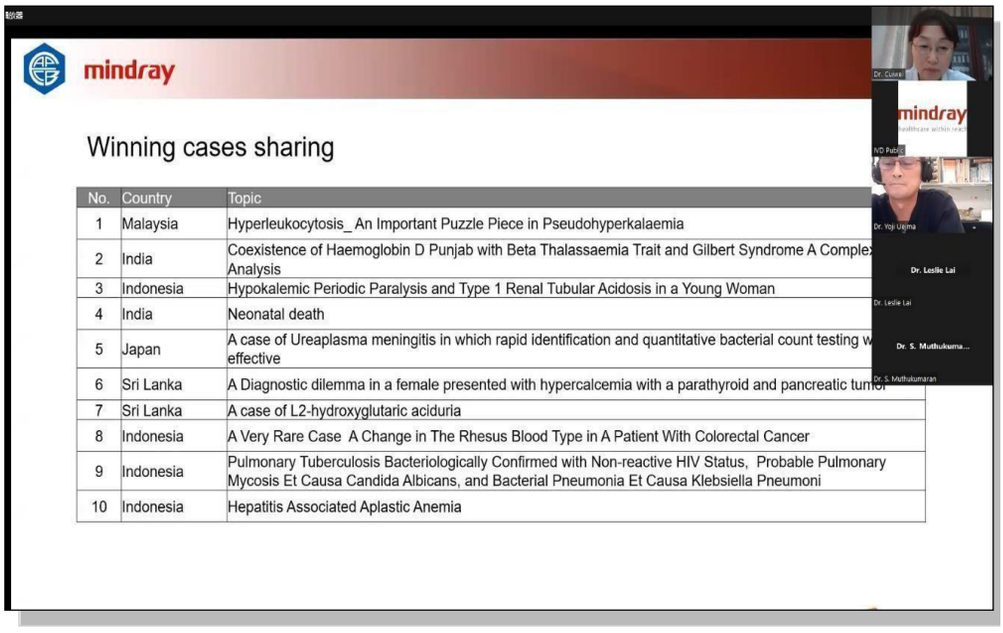
3. Dr. Ayu Mardewi, Indonesia, Hypokalemic Periodic Paralysis and Type 1 Renal TubularAcidosis in a Young Woman

Second Prizes

1. Dr. Yoji Uejma, Japan, A case of Ureaplasma meningitis in which rapid identification andquantitative bacterial count testing were effective

2. Dr. Siddiq Ozaal, Sri Lanka, A Diagnostic dilemma in a female who presented withhypercalcemia with a parathyroid and pancreatic tumor

3. Dr. Ayu Mardewi, Indonesia, Hypokalemic Periodic Paralysis and Type 1 Renal TubularAcidosis in a Young Woman



Screenshot of APFCB Laboratory Medicine Case Contest Finals

National Society Report- JSCC Japan

Japan Society of Clinical Chemistry (JSCC)

The 63rd Annual Meeting of the Japan Society of Clinical Chemistry (JSCC), chaired by Professor Hiroshi Yoshida (Director of Jikei University Kashiwa Hospital), was held at the Ochanomizu Sola City Conference Center in Tokyo from October 27 to 29, 2023. Although epidemics of infectious diseases, including COVID-19 and influenza, had not been completely stamped out in Japan, more than 800 paid participants joined the meeting on site. The theme of the meeting was "Development of clinical chemistry that contributes to sustainable and high-quality healthcare". We realized that the translation of basic science research from the bench to clinical implementation at the bedside has been steadily progressing in clinical chemistry and related areas. In addition to the Chairperson's lecture (Dr. Hiroshi Yoshida), there were 3 educational lectures by experts, 13 symposia, 11 co-sponsored seminars, and 106 general and student presentations, which were followed by active question-and-answer sessions. Special lectures were given by Dr. Yutaka Yatomi (Professor Emeritus, University of Tokyo and Dean, Graduate School of International University of Health and Welfare) on "Development and social implementation of clinical chemistry to ensure high-quality medical care" and by Dr. Masashi Yanagisawa (Professor, University of Tsukuba and Director, International Institute for Integrative Sleep Medicine) on "Trying to solve the mystery of sleep: Understanding the essence of sleepiness". Their fascinating lectures were also extremely informative, which covered a wide range of topics related to basic and clinical sciences. In the JSCC international session, Professor Nader Rifai of Harvard Medical School gave a presentation (pre-recorded) entitled "The use of the adaptive learning concept in laboratory medicine". He presented "Learning Lab for Laboratory Medicine", the AI-driven online program for adaptive e-learning, and its usefulness in education and training. In the evening of the second day, a reception was held for the participants, the first part of which featured a reading performance by Ms. Haruka Miyagishima of the Shizuoka Performing Arts Center. The participants enjoyed traditional Japanese culture and friendly interations with one another.

Finally, we would like to express our sincere gratitude to all the participants who came to the conference venue, to the sponsors, to the secretariat of the Japan Society of Clinical Chemistry, to the staff members of the Department of Laboratory Medicine, The Jikei University School of Medicine, and to the members of the clinical Laboratory departments at the four Jikei University Hospitals.

The next 64th meeting will be held by Dr. Toshiyuki Yamada (Professor, Jichi Medical University) in Utsunomiya, Tochigi, from August 30 to September 1, 2024.

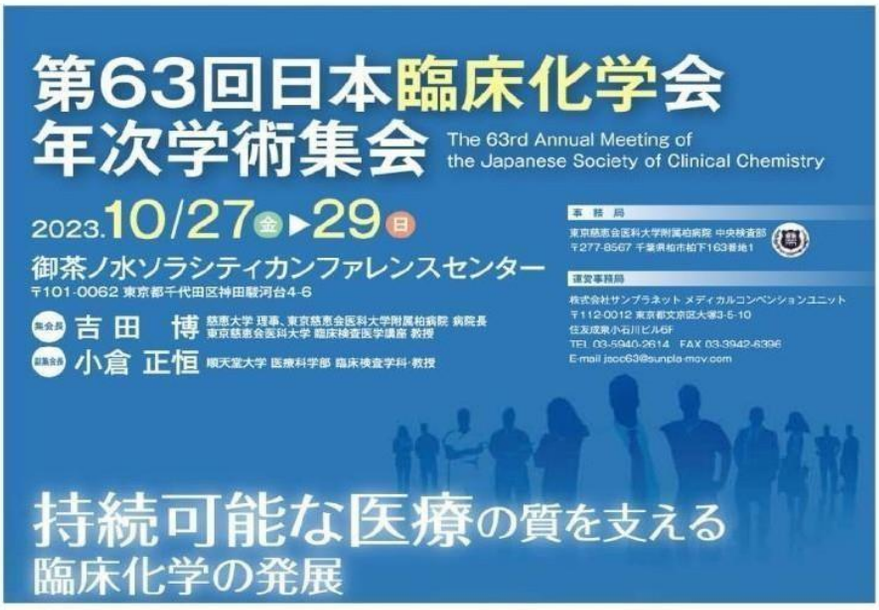
Photo 1: Poster for the 63rd annual Meeting of the Japan Society of Clinical Chemistry

Photo 2: Dr. Hiroshi Yoshida (Professor, The Jikei University School of Medicine and the Director of Jikei University Kashiwa Hospital) gave a special lecture (Chairperson's Lecture) entitled "Challenges for the promotion and clinical application of problem-oriented research that contributes to the development of clinical chemistry" on the first day of the meeting.

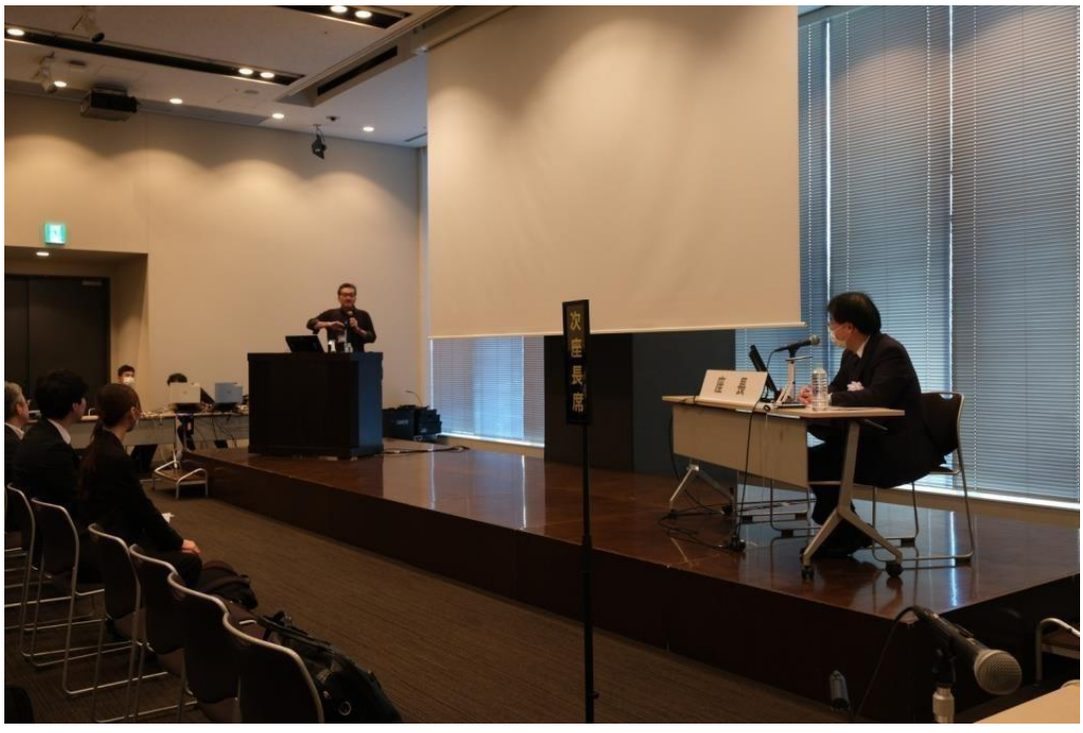
Photo 3: Dr. Yutaka Yatomi (Professor Emeritus, University of Tokyo and Dean, Graduate School of International University of Health and Welfare) gave a special lecture on the first dayof the meeting.

Photo 4: Dr. Masashi Yanagisawa (Professor, University of Tsukuba and Director, InternationalInstitute for Integrative Sleep Medicine) gave a special lecture on the second day of the meeting.

Dr. Masashi Yanagisawa (speaker, left) and Dr. Hiroshi Yoshida (session chair, right)




体液（臨床検体
分析 →臨床検査
の応用


次席長席

National Society Report- CACB Taiwan

NAME OF SOCIETY	Chinese Association for Clinical Biochemistry (CACB-Taiwan)
OFFICIAL SOCIETY EMAIL ADDRES	office@cacb.org.tw
NAME OF PRESIDENT & EMAIL ADDRESS	SandyHuey-Jen Hsu sandyhsu@ntu.edu.tw
NAME OF NATIONAL REPRESENTATIVE TO APFCB & EMAIL ADDRESS	Woei-horng Fang whfang@ntu.edu.tw

In a momentous convergence of expertise and innovation, CACB orchestrated the Symposium of Adaptive Learning and AACC Learning Lab at the 2023 Annual Meeting of the Taiwan Society of Laboratory Medicine at Chung Shan Medical University, Taichung on November 18th, 2023. CACB was honored to invite Dr. Nader Rifai, a distinguished figure in the field of laboratory medicine, to record a video presentation addressing the pivotal topic of "The Use of Adaptive Learning in Laboratory Medicine: Introduction of AACC Learning Lab." As an expert in clinical chemistry and a key contributor to the field, Dr. Rifai delved into the significance of adaptive learning methodologies within the context of laboratory medicine. His presentation explored the transformative impact of adaptive learning on medical education, emphasizing the AACC Learning Lab as an innovative platform. CACB Executive Director, Dr. Woei-Horng Fang, described his experience on leading the initiative of translating clinical biochemistry courses into Traditional Chinese as well as Simplified Chinese. CACB President, Dr. Sandy Huey-Jen Hsu shared her valuable experience of using both English and Chinese versions of Learning Lab. The audience provided positive feedback and expressed appreciation for this initiative. CACB encouraged the participants to spread the word and to join us for translating more courses in the Learning Lab. Our goal is to enhance the learning interest of students and medical laboratory professionals, fostering the sharing of new knowledge and innovative interactive learning experiences."

s(Photo 1) Dr. Nader Rifai delivered a pre-recorded speech at the Symposium of Adaptive Learning and AACC Learning Lab in Taichung, Taiwan on November 18th, 2023.

(Photo 2) CACB Executive Director, Dr. Woei-Horng Fang leads the AACC Learning Lab Chinese version initiative.

(Photo 3) CACB President, Dr. Sandy Huey-Jen Hsu shared her experience of using AACC Learning Lab.

(Photo 4) CACB Board Members and the distinguished guests at the Symposium of Adaptive Learning and AACC Learning Lab.

Upcoming events for 2024:

CACB annual conference and scientific symposium will be held in conjunction with the 38thJoint Annual Conference of Biomedical Science (JACBS). The main theme for JACBS 2024 is

"Biomedicine and Life". Dr. Man-Ho Choi, Principal Scientist at Korea Institute of Science and Technology, will deliver a keynote speech regarding steroidogenesis in adrenal diseases. A symposium of three speakers, Professor Cheng-Hsun Chiu, Dr. Wei-Kai Wu and Professor Hsinchu Lai are invited to share their expertise of microbiome in health and disease.

National Society Report- ACBI India

49th ACBICON 2023 KERALA 13th September 2023 to 16th September 2023

"Laboratory Medicine Path Ahead-Amalgamating Technology and Humanity"

CONFERENCE REPORT

The 49th ACBICON 2023 was organized in Kerala by the Association of Clinical Biochemists of India (ACBI) and the Believers Church Medical College. Themed "Laboratory Medicine Path Ahead -Amalgamating Technology and Humanity", it attracted around 1,000 biochemists and medical lab professionals nationwide. The conference, which offered sessions like keynotes, symposia, and workshops, aimed to provide an enriching platform for experts to share knowledge and advancements in clinical biochemistry. For the first time, ACBI opened its exhibition to the public. 49th ACBI also collaborated with global entities like the IFCC and APFCB to ensure international standards were maintained. The inaugural ceremony on 14 September 2023 was marked by addresses from key personalities. The ceremony commenced with a warm welcome address by the Organizing Secretary, 49th ACBICON 2023, Dr. Kannan Vaidyanathan. He extended gratitude to all the attendees and highlighted the importance of the event, followed by Dr. Seema Bhargava, the President of the Association of Clinical Biochemistry of India, who stressed the gathering's significance. The General Secretary, Association of Clinical Biochemistry of India, Dr. Rajiv Ranjan Sinha provided an annual report for the year 2022, detailing the association's accomplishments. The CEO and Director of Believers Church Medical College, Dr. George Chandy Matteethra, highlighted the growing collaboration between the institutions. The ceremony was further honored by the presence of the former Hon. Health Minister, Smt. K.K. Shailaja Teacher, as the Chief Guest. Her inspiring words underscored the importance of healthcare advancements and appreciated the efforts of the organizers. Dr. Riju Mathew, Associate Professor, Department of Biochemistry, closed the event by thanking everyone involved.


49th
ACBICON
2023 Kerala


DIRUI
Diamond


APPE


Believers Church
Medical College Hospital
ifcc
Snibe
Diagnostic
49th
ACBICON
2023 Kerala
DIRUI
BECKMAN
COULTER

The conference featured seven prominent orations aimed at advancing clinical biochemistry inIndia. The K.L. Gupta Memorial Oration was delivered by Dr. Alpana Sharma, Professor AIIMS, New Delhi, who discussed innovative strategies in cancer research, emphasizing the progression from diagnostics to therapeutics. The Dr. K.P Sinha Oration was delivered by Dr Tony Badrick, Chief Executive Officer, Royal College of Pathologists of Australasia Quality Assurance Programs, who highlighted the importance of patient-centered care, emphasizing the need to treat every patient as an individual in clinical decision-making. The Taranath Shetty Memorial Oration was delivered by Dr Chandrabhas Narayana from RGCB, Thiruvananthapuram. The Awadhesh Saran Memorial Oration was delivered by Dr. Shyam S Chauhan, Professor & Head Department of Biochemistry AIIMS New Delhi, who explored the role of Heterogeneous Nuclear Ribonucleoprotein D in oral cancer, emphasizing its significance in diagnosis and treatment. The Dr. T.N. Patabhiraman Oration was delivered by Dr. Seema Bhargava, President, ACBI, Chairperson and Senior Consultant, Department of Biochemistry & Professor, GRIPMER, who discussed the contributions of Nobel Laureates in Biochemistry and contrasted them with other impactful figures in the field who haven't received a Nobel Prize. The Dr. Praveen Sharma Oration was delivered by Dr. Poornima Manjrekar who highlighted the evolving landscape of type 2 diabetes, discussing contemporary trends and emerging challenges. The Mrs. & Dr. G.P.Talwar Oration was delivered by Dr. Medha Rajappa, Additional Professor of Biochemistry Department of Biochemistry Jawaharlal Institute of Postgraduate Medical Education & Research(JIPMER), Dhanvantari Nagar, Puducherry, who delved into biomarker signatures of inflammatory skin diseases, emphasizing their importance in refining treatment approaches.


TARANATH SHETTY MEMORIAL ORATION
Agappe Hall, Thursday Sep 14, 2023, 10.00 am - 10.30 am
Chairperson
K Goswami


"Laboratory Medicine Path Ahead -
49th


49th ACBICON 2023

Sessions

The 49th ACBICON 2023 Kerala meticulously organized 19 sessions, spread over three days, into four parallel segments in distinct halls. Day one comprised 11 parallel sessions, while day two had 5, and day three had 3 parallel sessions, each catering to specific themes. Renowned personalities chaired the sessions, enhancing the discussions with their expertise. Speakers, experts in their fields, presented on various topics, ensuring comprehensive learning for attendees regardless of their familiarity with the subject. Each talk was followed by a Q&A segment, promoting active engagement and in-depth understanding. A highlight was the symposium by the IFCC Committee on Clinical Laboratory Management (C-CLM). Prof. Sedef Yenice (VLP), Executive Member of IFCC Education and Management Division (EMD) spoke on the role of data analytics in clinical labs, and Prof. Praveen Sharma, Secretary, Asia- Pacific Federation for Clinical Biochemistry & Laboratory Medicine (APFCB), highlighted the importance of Emotional Intelligence in leadership. Additionally, embracing the digital age, ProfDr. Tomris Ozben, President of the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) and President Elect of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) presented virtually on the advancements in oncology diagnostics, emphasizing the shift from traditional tumor markers to liquid biopsies. Several parallel sessions highlighted international speakers. Dr Khosrow Adeli, President, International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), whose discourse on "emphasizing the cardiovascular risks associated with postprandial dyslipidemia in obesity and diabetes" was a standout contribution to the discussions. His deep dive into the complex interrelations between dietary patterns, metabolic responses, and cardiovascular health provided attendees with valuable insights. Dr Adeli's ability to elucidate the intricacies of this topic showcased not only his expertise but also highlighted the critical need for increased awareness and understanding of these cardiovascular risks in the context of modern health challenges. All through Parallel Session 5 at the 49th ACBICON 2023 Kerala, the focus was on the integration of cutting-edge AI into medical diagnostics, especially its role in promoting health equity. Led by Dr. Pradeep K Dabla (Chair, Communication and Publications Committee,Asia-Pacific Federation for Clinical Biochemistry & Laboratory Medicine (APFCB)) and Dr. BernardGouget, Chair IFCC C-MHBLM; Committee on Mobile Health and Bioengineering in Laboratory Medicine, President of the National Committee for the Selection of Reference Laboratories, Ministry of Health and Prevention, and Ex-President of the Healthcare Division Committee, painted a future where AI reshapes healthcare and laboratory diagnostics for more equitable outcomes. A standout talk was delivered by Dr. Bernard Gouget on "Unlocking the Potential of Chat GPT: Can it be our Virtual Assistant in Lab Medicine for Better Care?" where he emphasizedAI's transformative potential in enhancing lab operations and patient care. He envisioned AI asa pivotal tool in Lab Medicine, enhancing accuracy and accessibility. Parallel Session 6 at the 49th ACBICON 2023 Kerala delved into "Advances in Cancer Diagnostics: Current Indian Scenario" under the expert guidance of Chairperson Dr. Arnab Pal (Professor, Post Graduate Institute of Medical Education and Research, Chandigarh). The session highlighted the importance of cancer diagnostics, especially in India's diverse context. Dr. Maritha Kotze (Division of Chemical Pathology, NHLS and Stellenbosch University, Tygerberg Hospital, Bellville,Cape Town, S Africa) further enriched the discussions by detailing the progression of genetic testing in pathology. During the 49th ACBICON 2023 Kerala, Parallel Session 7, chaired by Dr. Dharamveer Yadav, Professor, All India Institute of Medical Sciences Jodhpur, delved into Molecular Diagnostics. The session spotlighted Dr Maritha Kotze's insights on integrating

point-of-care DNA screening with comprehensive genome sequencing, highlighting its potential to revolutionize pathology and patient care. Following Dr Kotze, the focus shifted to Dr Manogari Chetty's (Professor and HOD: Craniofacial Biology, Pathology & Radiology) discussion on dental and cranio-facial genetics in Africa. Dr. Helen Martin, (Past Secretary, Asia-Pacific Federation for Clinical Biochemistry & Laboratory Medicine (APFCB) an APFCB Traveling Lecturer, delved deep into Vitamin D's pivotal role in health. Her comprehensive overview touched upon its significance in bone health, immunity, and mood regulation. In a shift to a digital format, Parallel Session 12, under the AACC India Section and chaired by Dr. Jayashree Bhattacharjee, showcased Dr. Octavia M. Peck Palmer's (Division Director, Clinical Chemistry Medical Director, UPMC Presbyterian and Shadyside Automated Testing Laboratories) deep dive into the intersection of laboratory and emergency medicine. Her talk, "The Total Testing Process: Collaboration between Laboratory Medicine and Emergency Medicine to Ensure Quality Testing," highlighted the vital role of collaboration in ensuring accuracy and efficiency in emergency medical testing. Parallel Session 13 of the 49th ACBICON 2023 Kerala delved deep into a topic of pressing relevance, especially given the global surge in cases of diabetes mellitus. Titled "The Value and Evidence of Laboratory Tests Used in the Management of Diabetes Mellitus," this session, held under the auspices of IFCC/EBLM Evidence-based Laboratory Medicine, promised to impart essential insights into the role of lab tests in diabetes management. Presiding over the session as the Chairperson, Dr. Seema Bhargava (President, ACBI, Chairperson and Senior Consultant, Department of Biochemistry & Professor, Ganga Ram Institute for Postgraduate Medical Education & Research (GRIPMER) navigated attendees through a series of presentations and discussions that merged foundational knowledge with the latest advances in diabetes diagnostics and management. Dr. Emma English delivered an insightful analysis on "examining the pros and cons of HbA1c testing." Her balanced presentation highlighted both the strengths and limitations of the test, offering attendees a comprehensive understanding. Dr. Emma English's skill in presenting intricate details in a clear manner was especially commendable, enriching the audience's knowledge on HbA1c testing nuances. Parallel Session [16], chaired by Dr. Tony Badrick, (CEO, Royal College of Pathologists of Australasia Quality Assurance Programs) focused on "The Clinical Laboratory in Health & Disease." The session explored the vital role of laboratories in patient care, highlighting the latest advancements and challenges. Under Dr. Badrick's expert leadership, attendees were treated to a series of enlightening presentations and discussions. During this session, Dr. Tomris Ozben's online presentation on "transitioning labs to greener practices" was a standout. Addressing an increasingly important topic, Dr. Ozben highlighted the urgency and methods for making laboratories more environmentally friendly. The talk was not only timely but also forward-thinking, reflecting the need for sustainable practices in modern medical science. Dr. Ozben's approach to the subject, delivered with clarity and expertise, resonated with attendees and emphasized the imperative for eco-friendly transitions in lab operations. Meanwhile, Session 19, at the 49th ACBICON 2023 Kerala, titled "Miscellaneous - 2," ventured into innovative topics in clinical chemistry and laboratory medicine. Led by Chairpersons Dr. D Dash and Dr. SB Sharma, the session spotlighted unique areas of research. A highlight was Dr. John Anetor's (Head of Department, Chemical Pathology, University of Ibadan, Ibadan, Nigeria) presentation on the "Exposome-Nutriome Pathway," exploring the intricate relationship between lifetime exposures, nutrition, and their implications on health. Dr. Anetor emphasized the role of laboratory medicine in understanding these interactions and their health impacts.

Prelude to the 49th ACBICON 2023 Kerala: Insightful Pre-Conference

Workshops: Before diving into the deep waters of the 49th ACBICON 2023 Kerala, attendees were treated to a series of enlightening pre-conference workshops. Designed to provide in-depth understanding on specialized topics, these sessions were helmed by distinguished facultyand hosted across eminent venues in Thiruvananthapuram. At the renowned Rajiv Gandhi Centre for Biotechnology (RGCB), a session on 'Proteomics and Medical Applications' was conducted, shedding light on the dynamic world of proteins and their implications in medicine.The insightful discourse was further enhanced by Dr. Abdul Jaleel's workshop on "Genomics in Infectious Diseases," where attendees delved into the genomic intricacies underlying infectiouspathogens and their interactions with the host. Not too far, at the RGCB's Kinfra Campus, another enlightening session was in progress. Dr. Radhakrishnan Nair, a prominent figure in the domain, presided over two critical workshops. The first covered the intricate topic of "Inborn Metabolic Disorders and Amino Acid Analysis," providing an understanding of genetic metabolicdefects and the methods to diagnose them. The second was an essential session for budding and seasoned researchers alike, titled "From Conceiving a Research Topic to its Publication." Dr.Sucheta Dandekar, Professor of Biochemistry Era's Lucknow Medical College, Lucknow Memberof the Quality Assurance Committee and Global Consultant by FAIMER, Philadelphia and Dr. Thomas Chacko, Dean Medical Education & Professor Community Medicine, Believers Church Medical College, Thiruvalla, elucidated the research process's nuances, from ideation to the pivotal moment of publication, providing attendees with a roadmap to academic success. Further, the Al Saj Convention Center in Kazhakkoottam was buzzing with activity. A timely workshop on the "Transition from ISO15189 2012 to 2022 – Learning Opportunities" was hostedhere, guiding laboratories on the transition journey between these standards. Dr. Pradeep Kumar Dabla, Chair, Communication and Publications Committee, Asia-Pacific Federation for Clinical Biochemistry & Laboratory Medicine (APFCB), with his vast expertise, illuminated the updates, the implications, and the strategies to ensure compliance and quality.


BICON

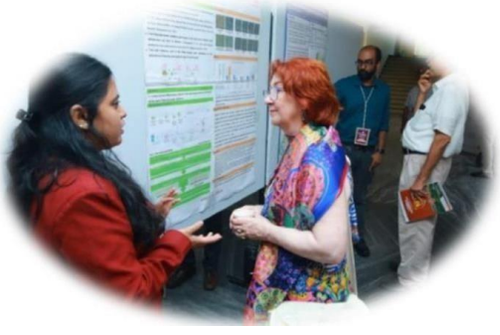

49th ACBICON 202


ata Science and
Analytics
Fundamentals
Big Data

Poster and Oral Presentation: The national conference featured competitions in poster and oral presentations, allowing scholars to showcase their research. Participants displayed theirfindings in posters, promoting individual interactions, while the oral presentations allowed adeeper exploration of their topics. Both formats were assessed by expert panels for clarity, depth, and relevance. Winners received cash prizes and achievement certificates, acknowledging their valuable contributions and efforts in the field.

Quiz competition Organized by Department of Biochemistry AFMC (Armed Forces Medical College, Pune): The quiz competition added a dynamic and engaging facet to the conference,allowing attendees to actively participate, challenge themselves, and interact with the contentin a fun and competitive manner.





Corporate Innovation & R&D Highlights: The 49th ACBICON 2023 in Kerala served as both an academic and corporate hub, highlighting advancements in clinical biochemistry and laboratory medicine. Industry leaders showcased innovations, emphasizing the synergy between academic research and industry application to produce tangible healthcare solutions. The event fostered interactions between corporate entities and the academic community, ensuring R&D efforts met practical healthcare needs. Attendees gained insights into the latest industry technologies and trends, underlining the industry's commitment to advancing the field.

A Banquet to Remember: The 49th ACBICON 2023, Kerala featured a memorable evening at Uday Samudra Leisure Beach Hotel, Kovalam, Thiruvananthapuram, where guests were treated to an elegant banquet dinner set to the soothing tones of water music. The serene ambiance was enlivened by a DJ, making attendees of all ages dance and enjoy. The highlight for many was the diverse culinary spread, ranging from traditional Kerala dishes to international cuisines, all accentuated by expertly crafted cocktails. Beyond just a dinner, the banquet was a blend offine dining, lively music, and spirited camaraderie, underscoring the conference's balance of intellectual and social enjoyment.

Showcasing Kerala's Cultural Heritage at the Conference: One of the most memorable aspects of the conference was the vibrant showcase of Kerala's rich cultural heritage through its iconic art forms. For those unfamiliar with these traditional dances, brief introductions were provided, ensuring participants understood the significance and stories behind each performance. The inclusion of these cultural events was met with overwhelming positivity. Attendees expressed their joy and appreciation for the opportunity to witness such authentic performances, with many considering it a highlight of their visit.

National Society Report- KSCC Korea

KSCC Spring Meeting, May 11, 2023

Korean Society of Clinical Chemistry (KSCC) held its spring meeting in Seoul on May 11, 2023. A total of 363 people attended the event, including 148 clinical pathologists, 51 resident doctors, and 57 certified laboratory technologies. The number of attendees increased compared to the previous fall meeting in 2022 (which had 310 attendees), possibly due to reduced concerns about COVID-19. During the meeting, we provided information on the latest laboratory tests and instruments in the field of clinical chemistry, covering analytical performance specifications, tumor markers, urine analysis, etc. The meeting comprised five symposium sessions and two review courses. The review courses were available online for a month.

Here are the details of the program and the event photos:

◎ **Symposium (Part 1)**

Time	Session	Description	Speaker
09:00~09:10		**Opening**	
		Opening address	Yong Wha Lee (President, KSCC)
		Congratulatory address	Jin-Yeong Han (President, Korean Society for Laboratory Medicine)
		Recognition of appreciation and Awards	
09:10~10:40	S1	**Utilization of Analytical Performance Specifications in Laboratory Quality Management**	**Chair: Jehoon Lee (Catholic University of Korea, College of Medicine), Hwan Sub Lim (Seoul Clinical Laboratories)**
		Review of analytical performance specification	Haeil Park (The Catholic University of Korea, College of Medicine)
		Data search strategies for the analytical performance specification establishment	John Hoon Rim (Yonsei University, College of Medicine)
		Utilization of Analytical Performance Specifications in Practice	Minje Han (Hallym University, College of Medicine)
10:40~11:00		Exhibition	
11:00~12:00	PL	**Plenary Lecture (all members welcome)**	**Chair: Yong-Wha Lee (Soonchunhyang University Bucheon Hospital)**
		Laboratory Test Utilization Management and Renal Function Test	Jeong-Ho Kim (Yonsei University, College of Medicine)
12:00~13:00	EW	**Education Workshop**	
13:00~13:30		Exhibition	
13:30~15:00	S2	**Current Status and Clinical Use of Tumor Markers**	**Chair: Hi Jeong Kwon(Catholic University of Korea, College of Medicine), Kyung Eun Song(Kyungpook National University, College of Medicine)**
		Metrological Aspects of Tumor Markers	Woochang Lee (University of Ulsan, College of Medicine)

12:00~13:00	EW	**Education Workshop**	
13:00~13:30		Exhibition	
13:30~15:00	S2	**Current Status and Clinical Use of Tumor Markers**	**Chair: Hi Jeong Kwon(Catholic University of Korea, College of Medicine), Kyung Eun Song(Kyungpook National University, College of Medicine)**
		Metrological Aspects of Tumor Markers	Woochang Lee (University of Ulsan, College of Medicine)
		Clinical application of tumor markers	Seungman Park (National Cancer Center)
		Trends and direction of tumor marker development	Yongjung Park (Yonsei University, College of Medicine)
15:00~15:20		Exhibition	
15:20~16:50	S3	**Rediscovery of Urine Analysis**	**Chair: Gye Cheol Kwon (Chungnam National University, College of Medicine), Min-Jeong Park (Hallym University, College of Medicine)**
		New test items and method comparisons in urine chemistry	Chul Min Park (Dongnam Institute of Radiological and Medical Sciences)
		Performance and test items of automated urine sediment analyzers	Eun-Jung Cho (Hallym University, College of Medicine)
		Performance of urinalysis and the use of artificial intelligence to diagnose urinary tract infection	Min Hyuk Choi (Yonsei University, College of Medicine)
16:50~17:20		**General Assembly and Closing Address**	

⊖ Symposium (Part 2)

Time	Session	Description	Speaker
13:30~ 15:00	S4	**Real Clinical Chemistry Data Analysis**	**Chair: Ile Kyu Park(Hanyang University, College of Medicine), PilWhan Park (Gachon University, College of Medicine),**
		Data analysis and Laboratory Medicine	Kyu Tae Choi (Chungnam National University, College of Medicine)
		Data Analysis based on Cloud Computing	Jun Hyung Lee (Green Cross Laboratories)
		Introduction to data analysis with R	Sunghwan Shin (Inje University, College of Medicine)
15:00~ 15:20		Exhibition	
15:20~ 16:50	S5	**Immunosuppressive Drug Therapy and TDM**	**Chair: Soo-Youn Lee (Sungkyunkwan University, School of Medicine), Sail Chun (University of Ulsan College of Medicine)**
		Consideration in immunosuppressant prescription among kidney transplant recipients	Jong Cheol Jeong (Seoul National University, College of Medicine)
		Immunosuppressive Drugs: Measurement and Standardization	Joon Hee Lee (Seoul National University, College of Medicine)
		Consultation on therapeutic drug monitoring for immunosuppressants	Hyun-Ki Kim (University of Ulsan, College of Medicine)

⊖ Review Course (Online)

Screening date	Session	Description	Speaker
12th -25th May 2023	RC1	**General Clinical chemistry**	
		Laboratory Service Planning - Clinical chemistry	Sun Min Lee (Pusan National University, College of Medicine)
		Laboratory Test Utilization Management	Jooyoung Cho (Yonsei University, Wonju College of Medicine)
		Function and Application of Laboratory Information System	Shinae Yu (Inje University, College of Medicine)
	RC2	**Special Clinical chemistry**	
		Basic Principles of Protein and Enzyme Testing	DongwonYoo (Pusan National University, College of Medicine)
		Principle and Interpretation of Electrolytes and Arterial Blood Gas Analysis	Jong Do Seo (Konkuk University School of Medicine)
		Measurement and Interpretation of Trace Elements	Park Hyun-Kyung (Seoul Clinical Laboratories)
		Inherited Metabolic Diseases and Newborn Screening	Ahram Yi (Green Cross Laboratories)

Professor Yong Wha Lee (President of KSCC) delivering the opening address

Executive board members and advisors of KSCC

The organizing committee of the 2023 KSCC spring meeting

KSCC Fall Meeting Plan

KSCC will hold the fall meeting in Seoul on November 1–2, 2023.

National Society Report- KSCC Korea

KSCC Fall Meeting, November 1–2, 2023

Korean Society of Clinical Chemistry (KSCC) held its fall meeting in Seoul on November1–2, 2023. A total of 366 people attended the event, including 144 clinical pathologists, 34 resident doctors, 43 certified laboratory technologies, etc. The number of attendees increased comparedto the previous fall meeting in 2022 (which had 310 attendees). The meeting comprised five symposium sessions, two workshops, and review course as video on demand format.

During the symposium, we provided information on the latest laboratory tests and instrumentsin the field of clinical chemistry, covering pre-analytical phase management, medical informatics, heart failure diagnosis, genetic testing, etc. Furthermore, this fall meeting also placed emphasis on educational programs. Among them, two workshops focused on data analysis using the R programming language and assay performance evaluation. Additionally, an online education program (Review Course) was delivered through Video On Demand (VOD) format.

Here are the details of the programs and the event photos:

Time	Description	Speaker
09:00–09:10	Opening address	Yong Wha Lee (President, Korean Society of Clinical Chemistry, KSCC)
	Congratulatory address	Sail Chun (CEO, Korean Society for Laboratory Medicine, KSLM)
	Recognition of appreciation and Awards announcement	
09:10–10:40	**Pre-Analytical Phase Management in Clinical Chemistry: Sample Collection and Transportation**	**Chair: Hi Jeong Kwon (Catholic University of Korea, College of Medicine), Jehoon Lee (Catholic University of Korea, College of Medicine)**
	Serum or plasma? Selection of blood-collection tubes	Sun Min Lee (Pusan National University Yangsan Hospital)
	Management of 24-hour urine specimens and use of preservatives	Hyun-Kyung Park (Seoul Clinical Laboratories)
	Experience building a sample transportation system in a clinical laboratory	Hyung-Doo Park (Sungkyunkwan University School of Medicine)
10:40–11:00	**Exhibition and Poster Sessions**	
	New Formats and Challenges of Medical Informatics	**Chair: Gye Cheol Kwon (Chungnam National University, College of Medicine), Yeo-Min Yun (Konkuk University School of Medicine)**

11:00–12:00	The necessity of standardizing medical data and government trends	Soo-Yong Shin (Kakao Healthcare)
	Standardization efforts for health information exchange in laboratory medicine	Sollip Kim (University of Ulsan College of Medicine, Asan Medical Center)
	Standardization of terminology in clinical chemistry	Kuenyoul Park (Inje University College of Medicine)
12:00–13:00	**Education Workshop**	**Chair: Kyoung Ho Roh (National Health Insurance Service Ilsan Hospital), Sung Eun Cho (Green Cross Laboratories)**
	The clinical utility of PIVKA-II in HCC	YeonJi Kim (Roche Diagnostics Korea)
	Standardziation of Cardiac high-sensitive troponin and Risk-stratification	Youngwon Nam (Abbott)
	Management efficiency of STAT tests with Atellica CI 1900 Analyzer: chemistry and immunoassay integrated system	Jin Cheon (Siemens Healthineers)
13:00–13:30	**Exhibition and Poster Sessions**	
13:30–15:00	**Current Guidelines and Practices in Heart Failure Diagnosis**	**Chair: Jeong-Ho Kim (Yonsei University, College of Medicine), Min-Jeong Park (Hallym University, College of Medicine)**
	2023 Update on heart failure guidelines	Jong-Chan Youn (Seoul St. Mary's Hospital, The Catholic University of Korea)
	BNP and NT-proBNP tests	Sang Hoon Song (Seoul National University College of Medicine)
	Novel biomarkers for diagnosis and monitoring of heart failure	Jong Do Seo (Konkuk University School of Medicine)
15:00–15:20	**Exhibition and Poster Sessions**	
15:20–16:50	**Genetic Testing in Clinical Chemistry II**	**Chair: Sail Chun (University of Ulsan College of Medicine), Soo-Youn Lee (Sungkyunkwan University School of Medicine)**
	Pharmacogenetic test results interpretation and application by clinical laboratories	John Hoon Rim (Yonsei University College of Medicine)
	Diagnosis of rare genetic metabolic disorders	Man Jin Kim (Seoul National University Hospital)
	Diagnosis of inherited metabolic disorders	Seungman Park (National Cancer Center)
16:50–17:00	**Awards and Closing Address**	

⊖ Symposium (Part 2)

Time	Description	Speaker
15:00-15:20	Exhibition and Poster Sessions	
15:20-16:50	**Pregnancy-Related Laboratory Tests**	**Chair: Eun-Hee Lee (Green Cross Laboratories) Hwan Sub Lim (Seoul Clinical Laboratories)**
	Interpreting laboratory test results during pregnancy	Shinae Yu (Inje University)
	Diagnostic test for gestational diabetes mellitus and preeclampsia	Sunkyung Jung (Seegenemedical Foundation)
	Prenatal screening for fetal aneuploidies from maternal blood	Sae-Mi Lee (GC Genome)

⊖ Workshop A (Assay Performance Evaluation)

Time	Description	Speaker
09:00-12:00	Introduction	Hae-Il Park (Catholic University of Korea, College of Medicine)
	Basics underlying performance evaluation	Woochang Lee (University of Ulsan College of Medicine and Asan Medical Center)
	Evaluation and User Verification of Precision	Eun-Jung Cho (Hallym University College of Medicine)
	Evaluating and Establishing the Linearity Interval and Extended Measuring Interval	Jooyoung Cho (Yonsei University Wonju College of Medicine)

⊖ Workshop B (Data Analysis)

Time	Description	Speaker
13:10-15:00	**Clinical Chemistry Data Analysis Using R (Establishing a reference interval)**	**Chair: PilWhan Park (Gachon University, College of Medicine)**
	Introduction to R (installation of packages, data types)	Zehwan Kim (Yeungnam University College of Medicine)
	Data analysis with R (input/preprocessing/manipulation)	Sunghwan Shin (Inje University Ilsan Paik Hospital)
	Understanding R packages and data visualization using ggplot2	BryungRyul Jeon (Soonchunhyang University College of Medicine)

⊖ Review Course (VOD)

Screening date	Description	Speaker
November 3, 2023- November 16, 2023	**General Clinical Chemistry**	
	Management of hazardous chemicals in laboratories	Ji Won In (Seoul Medical Center)
	Clinical chemistry laboratory safety	Kim Hyun-Ki (University of Ulsan College of Medicine, Ulsan University Hospital)
	Preanalytical variations and laboratory errors	Hyeyoung Lee (Catholic Kwandong University)
	Special Clinical Chemistry	
	Laboratory tests for thyroid disease	Yonggeun Cho (Hallym University Sacred Heart Hospital)
	Lipid and lipoprotein metabolism and measurement methods	Youngwon Nam (Abbott)
	Dyslipidemia and biomarkers of cardiovascular disease	Joon Hee Lee (Seoul National University Bundang Hospital)
	Basic concepts and practice of therapeutic drug monitoring	Misuk Ji (VHS Medical Center)
	Tumor marker tests: lung cancer biomarkers	Ji Yeon Sung (Roche Diagnostics Korea)

Professor Yong Wha Lee (President of KSCC) delivering the opening address

Executive board members and advisors of KSCC

The organizing committee of the 2023 KSCC fall meeting

KSCC 2024 Spring Meeting Plan

KSCC will hold the spring meeting in Seoul on April 11–12, 2024.

National Society Report- IACC Indonesia

PERKUMPULAN KESEMINATAN KIMIA KLINIK DAN LABORATORIUM INDONESIA
INDONESIAN ASSOCIATION FOR CLINICAL CHEMISTRY

Indonesian Association of Clinical Chemistry Report

ArwinPrasasto, DarmastantiWidi-secretariat@iacc.web.id

Green Laboratory Webinar: Make Your Effort Be Measured

Sustainability development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Indonesia Sustainable Development Goals Summit 2023 committed to successfully implementing the development agenda to achieve 17 goals before 2030.

Hospitals, health practitioners & laboratory medicine community face a great challenge becauseof the useof more energy & water than offices and generate huge amounts of hazardous & non-hazardous waste. At the same time, it is a great opportunity to contribute to improving the sustainability performance of laboratories & healthcare systems.
All laboratories, including laboratories, should do their part to reduce the harm they do to theenvironment and also to improve patients' comfort and safety. At this stage the awareness of the environmental impact of clinical laboratories is limited. Therefore, there is a need to sensitize labs about the importance of adopting good environmental practices.

One of the ways to achieve this, IACC in cooperation with APFCB presents an online seminar that aims to engage laboratories in Indonesia and other countries to contribute to developing sustainable laboratories and having a culture behavior to support green environment laboratories. The goals of this webinar are for the participants to understand the sustainability and the impact of doing sustainable activities, understand how laboratories can participate in sustainability efforts, and understand how to measure the impact of our green activity.

There were 649 registered participants and during the webinar, there were 266 participants from Indonesia and abroad (Malaysia, India, Singapore, South Korea, etc.).
The webinar ran well. The speakers of the webinar were Dr. Lia Partakusuma, MM, SpPK(K), Dr.Tony Badrick (APFCB), and Jay Nam. The participants were enthusiastic and asked questions tothe speakers during the 30-minute discussion session.

Instagram Reels Competition for Green Laboratory

29 participants from Indonesia joined the Green Award Instagram reels competition. The content and quality of the video, engagement, and creativity were the criteria of the winner. Allof the participants of this competition were being awarded and also one participant who wrotean article on the past seminar in early 2023 was being awarded in this event.

The list of the participants:

@apfcb.july	@vymayka	@kristinafnynt
@ritani.manurung	@ppdspatologiklinikfkuns	@patklinudayana
@wendy_dalimunthe	@patklin.ua	@katrintimorensa
@labrskb	@rspertaminatarakan	@avirigas
@laboratorium_rspb	@awyusufs	@krist_ryrin
@yulistianingsihwiwik	@auliasofiarahma	@ikeindriyani
@susipurwanti	@rsudbumiayu_brebes	@arwin.prasasto
@dr.diane.sppk	@tamidantoni	@allam.medica
@alknbl	@ilhksiam	@henimokasari94

Social Services for Anak Dalam Tribes

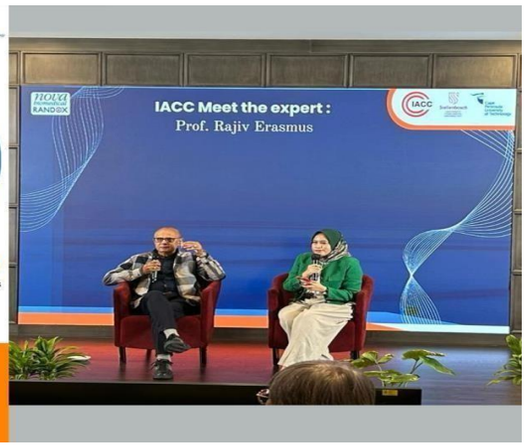
The Anak Dalam tribe or Orang Rimba is one of the minority ethnic groups living in Jambi Province. This tribe is still categorized as an "isolated community" because of their nomadic lifein the forest. They live in groups with a tribal leader and live by hunting.
IACC conducted this event from the 4th to the 6th of August 2023. The main agenda is to givemass treatment to the tribe and also give a blood test for them

May I Help You Campaign (Pre-analytical Survey)

Preanalytical errors occur most frequently (70% of the total testing process) and can have seriousimpacts on patients. Therefore, correct preanalytical activities are needed to be able to providegood laboratory results. Improvements in pre-analytical quality need to be carried out continuously. Since 2012, IACC has carried out the May I Help You Campaign pre-analytical survey activities to improve pre-analytical quality in Indonesia.
In 2023, collaboration was carried out with the Jakarta Health Service to conduct a survey of 10laboratories, including 6 Type A and B Regional Hospitals in Jakarta. Surveys were conducted for these six hospitals in January – June 2023 and an evaluation/follow-up survey was carried out in July – December 2023, namely Pasar Minggu Hospital, Koja Regional Hospital, Cengkareng Regional Hospital, Pasar Rebo Regional Hospital, Budi Asih Hospital, Adhyaksa Hospital. Several materials were found that needed attention for improvement in each hospital.

Meet the Expert

Ethics are the principles that guide us to make a positive impact through our decisions and actions. In the laboratory we often face technical, medical and ethical problems. When problemsoccur, laboratory managers must be able to resolve the problem properly. This is where leadership is really needed, especially ethical leadership.
This hybrid seminar was conducted (offline and online) on 18th December 2023. The speaker was Prof. Rajiv Erasmus from South Africa. Prof Rajiv Erasmus also represented the APFCB. Therewere 142 participants in total offline and online.

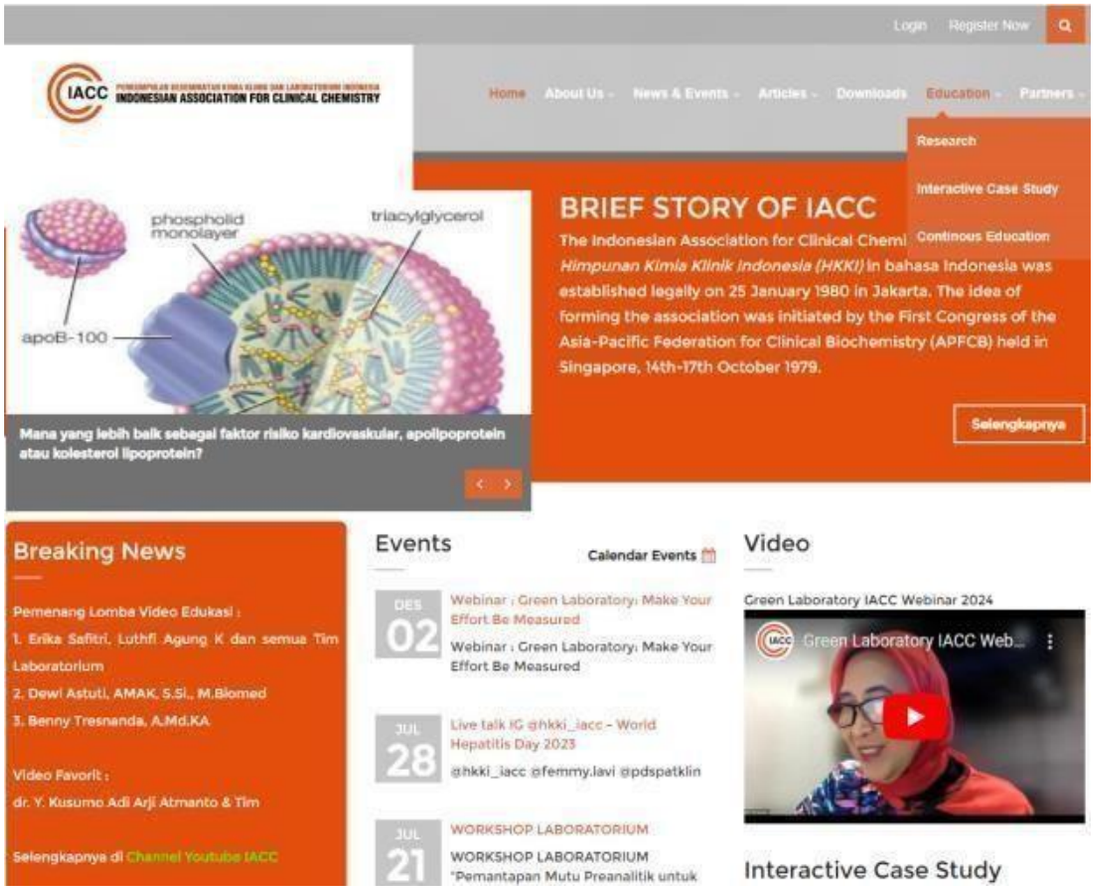


IACC Instagram Live!

IACC conducted Instagram Live several times during the second semester of 2023. The topics were on in vitro fertilization, hepatitis, upper respiratory tract infection, childhood cancer awareness, thrombosis, and Pediatric Reference Value & IFCC Program for Developing Countries. The target audience were the public and laboratory workers. The notable speakers were Prof. Koshrow Adeli, PhD., Prof. Dr. Rahajuningsih
D. Setiabudi, Sp.PK(K), Dr. ThyrzaDarmadi, Sp.PK, Dr. Dr. Nuri DyahIndrasari, Sp.PK(K), Dr. Dennis Jacobus, Sp.PK, and many more.

IACC Website Refresh!

The IACC website has been around since 2015 and has helped many of its members. Member registration, activity news and seminar materials can be obtained on the website. Since 2019, the name IACC has been used to replace HKKI. However, the website and email address still use the HKKI name. In 2024, we will use the name IACC as the name of our website and become iacc.web.id. The secretariat's email address has also been changed to secretariat@iacc.web.id. In the future, the new IACC website will use new features to make it easier to register and pay membership fees, make it easier to register for IACC activities, makeit easier to get seminar materials and certificates, and monitor IACC activities through the activity calendar. We



National Society Report- MACB Malaysia

MALAYSIAN ASSOCIATION OF CLINICAL BIOCHEMISTS (MACB)

1. HbA1C User Meeting

Everlife-Chemopharm Group organized a hybrid HbA1c User Meeting at Vida Bukit Ceylon, Level 22, KLon 19th September 2023 under the MACB auspices. The meeting featured lectures from three esteemedspeakers: Dr. Marco Flamini, Bio-Rad Global Product Manager; Dr. Adlin Zafrulan Bin Zakaria, Senior Chemical Pathologist at Hospital Raja Perempuan Zainab II; and Associate Professor Dr. Busadee, ClinicalPathologist at Mahidol University in Thailand.

In the meeting, Dr Marco Flamini shared on "Diabetes and Hemoglobinopathy Testing, A Synergic Strategy for A Common Goal: A Healthier Community."; Dr Adlin on "Streamlining Laboratory Reporting: Overcoming Challenges with Bio-Rad HPLC Method"; and Dr BusadeeProtumvinit on "Update on DiabetesSituation in Thailand & Potential Effect of Analytic and Clinical Factors of HbA1c". The meeting ended after Dr Hanisah Abdul Hamid's topic on "Correlation of HbA1c value between Variant II Turbo HbA1c Analyzer and D100 HbA1c Analyzer among patients with P3 > 5%"

Pic 1: Event flyer

Pic2: Opening remarks by MACB President

Overall, it was a fruitful meeting with 33 physical attendees and 134 virtual attendees who joined on Microsoft Teams.

Pic 3: Lecture and Q&A session with Dr Marco Flemini

Pic4: Participants at HbA1C User Meeting

2.0 THE 7th CONGRESS OF ASIA ASSOCIATION OF MEDICAL LABORATORY SCIENTISTS(AAMLS 2023)

The Malaysian Association of Clinical Biochemists (MACB) signed a Memorandum of Understanding withMalaysian Institute of Medical Laboratory Sciences (MIMLS) to support the Asia Association of Medical Laboratory Scientists (AAMLS) Congress which was hosted by MIMLS at World Trade Centre Kuala Lumpurfrom 9th to 12th October 2023. The aim of this collaboration between MIMLS and MACB was to showcasethe best of Malaysia medical laboratory industry to delegates from across Asia, fostering a sense of hope and appreciation for the advancements in medical laboratory sciences in the country. The MACB supported the congress in 2 programmers:

Pre-Congress Workshops (Day 1):

MACB conducted pre-congress workshop on 9th October from 1.30pm to 5.30pm on "Impact of Iso 15189:2022 On Laboratory Quality Management". A lecture on 'Introduction to ISO 15189:2002: Requirements for Quality and Competence' was given by Ms Fariza Wan Abdullah Department of Standards Malaysia, Ministry of International Trade and Industry Malaysia, 'Risk Based Approach in ISO 15189:2022' by Dr Raja Elina Raja Aziddin, President of MACB and 'Managing Quality in the Context ofISO 15189:2022' by Ms Rozita Abdullah, Clinical Biochemist, Hospital Sungai Buloh.

Symposium 12 – Immunology and Clinical Chemistry (Day 2)

MACB assisted MIMLS in inviting 2 speakers for this symposium. The lecture on 'Vitamin D & EndocrineDisorders' was delivered by Dr Sharifah Faradila Wan Muhammad Hatta, Consultant Internal Medicine Physician and Endocrinologist, KPJ Damansara Specialist Hospital 2 and 'Interference in Immunoassays'by Ms Joanne Lee Mee Yin, Senior Manager, Quality Assurance and Technical Excellence, Parkway Laboratories, IHH Singapore.

3.0 MALAYSIA BUSINESS EVENTS WEEK (MBEW)

The MACB participated in the MBEW which was organized by Malaysia Convention & Exhibition Bureau (MyCEB) on 22nd-23rd August, 2023 at Kuala Lumpur Convention Centre.

Pic 5: MACB President at MBEW

The program, themed "Riding the Waves" aims to create a series of ripples and impact towards financialand socio-economy for the country through Business Events. The event showcased knowledge sharing and case studies with a focus on sustainability and resilience. This event was attended by more than
300 local and international delegates consisting of business event industry players, association executives and students. The MACB was represented by the President.

4.0 Hosting of APFCB Webinar

On 4th October 2023, the MACB hosted the APFCB Webinar on "All you ever wanted to know about Patient Based Real Time Quality Control". The purpose of this webinar is to registrants the opportunity to ask any questions they may have about this form of QC.

Pic 6: Webinar flyer

5.0 MACB SYMPOSIUM ON POINT OF CARE TESTING

A MACB Symposia on Point of Care Testing (POCT) was held in conjunction with the 33rd MACB AGM 2023. The symposium discussed the impact of the recently adopted ISO 15189:2022 on POCT requirements and the process of preparing POCT facilities in Malaysia for accreditation.

Pic 7: Flyer for MACB Symposium on POCT

Lectures for the symposium were delivered by speakers from Malaysia, Thailand and Singapore.

6.0 MACB ANNUAL GENERAL MEETING

The hybrid 33rd MACB Annual General Meeting (AGM) was held on Saturday, 25th November 2023 at Triune Centre, Bangsar, KL Eco City.

Pic 8: MACB AGM Announcement

Pic 9: MACB members at the AGM 2023

7.0 PARTICIPATION IN INTERNATIONAL MEETINGS IN 2023

a) IFCC WORLDLAB - EUROMEDLAB CONGRESS 2023 IN ROME, ITALY FROM 21st-25th MAY 2023

The MACB sent 9 of its members to attend the IFCC WorldLab-EuroMedLab Congress 2023. This was made possible with the support from MACB-SNIBE Travel Grant. The Congress was well run and receiveda record attendance. Members who attended found this event as an exceptional platform for learning, exchanging knowledge and fostering social networking. Overall, members who attended gained a valuable experience to better help them in providing a better service and plan the future direction of thelaboratory services in their respective organizations.

Pic 10: MACB members with APFCB President at the IFCC WorldLab EuroMedLab Congress2023

Pic 11: MACB member's t at the IFCC WorldLab EuroMedLab Congress 2023

Pic 12: MACB member's t at the IFCC WorldLab EuroMedLab Congress 2023tradeexhibition

The Malaysian team was headed by the MACB president who attended the Congress in her capacity as amember of the IFCC Clinical Lab Management Committee, and was supported by the IFCC.

b) SNIBE INTERNATIONAL SYMPOSIUM ON IMMUNOASSAY

The International Immunoassay Symposium which was jointly organized by SNIBE, IFCC, APFCB, EFLM and Colabiocli was held in Shenzhen China from 24th-28th August 2023. The symposium was attended by 9 MACB members who received the MACB-SNIBE travel grants. The symposium highlighted issues which include biomarkers in cancer and liver fibrosis, value-based medicine, sustainability as well as Environmental, Social and Governance (ESG) for medical laboratories. Lectures were delivered by international experts.

Pic 13: MACB members at the International Immunoassay Symposium in Shenzhen China

MACB members who attended found that the symposium provided a platform for sharing knowledge, insights and advancements in the field of immunoassay. The symposium was very well received with representatives from 55 countries.

The IFCC Task Force – Young Scientists (IFCC TF-YS): Perspectives for Young Scientists in 2024

Santiago Fares Taie, Argentina YS (CUBRA), IFCC-TF-YS chair
Marie Lenski, French YS (Société Française de BiologieCliniques SFBC), IFCC-TF-YS member

The aim of the IFCC task Force – Young Scientists (IFCC TF-YS) is to ensure that young scientists(< 40 years old) make a significant and growing contribution to the activities of IFCC and to the promotion of laboratory medicine at the Centre of healthcare. 2023has been a busy year for young scientists participating in IFCC TF-YS (young scientist) activities, and new opportunities will be proposed for 2024.

IFCC TF-YS led two live webinars in 2023, moderated by YS members. The duration of each webinar was 90 minutes to include presentations from three YS speakers, a panel discussion, andfinal take-away messages. All these free eLearning programs provided a certificate of attendance.The webinars presented until now had close to 800 attendees each from countries around the world. In 2024, new webinars will be leaded by YS, and several others will include YS as renownedspeakers.

During 2023 IFCC TF-YS developed a **clinical case study project** where YS from IFCC communitycould present their experience with interesting real life case studies. A first session was done in November 2023 with 3 Young scientists' presentations of the structured case reports followed by a panel discussion. This project will continue in 2024 with the presentations of newselected clinical cases from various topics as endocrinology, hematology, clinical chemistry, etc. New abstract call will arrive soon. The TF-YS is structured with 6 core members, and 44 corresponding members nominated by IFCC Full Members and Corporate Members. Corresponding members have a central role in 1) the dissemination and promotion of TF-YS activities, 2) the dynamic of the TF-YS and the success of future or launched programs 3) the identification of young scientists that could have a growing contribution to the activities of theTF-YS. The **capillary program** launched in 2020 by the TF-YS intended to map National YS- WGs and to increase the participation of TF-YS corresponding members during national meetings. Major progresses were done in 2023, mostly by using zoom meetings. In 2024, the IFCC TF-YS will continue assisting its corresponding members to motivate them to create YS groups in their country and region. Moreover, we are permanently trying to get more committedwith our activities by doing surveys and seeking other points of view for our programs.

In a continuing evolving Laboratory Medicine profession with new technologies and methods every year, YS find exchange programs and communication essential to widen their horizonsand sharpen the laboratory skills. Lab-surfing (www.lab- surfing.com) is a Laboratory professional social media designed and created to fulfil these objectives. More than 800 YS registered from all around the world and could easily communicate.

The mentorship program interviews is intended to educate Young Scientist members on anycurrent mentorship program in the laboratory research area. The program focuses on "how, when, what and why" about the existing mentor and mentee relationship and tips on how others can learn from their relationship. In 2024, new inspiring feedbacks on mentorships will be available.

In 2023 Live My Lab project was launched, which consists in a virtual/remoted visit of a real lab, driven by young scientists. Thanks to this program, it is possible to visit other laboratories and how they treat the samples (pre-analytics, analytics and post-analytics) from the seat of your office. During 2023, IFCC TF-YS worked together with the CPD to call for videos and develop material used during the Global Med Lab Week (globalmedlabweek.org). In 2024, the IFCC TF-YS will continue to encourage young scientists to participate in the IFCC Global MedLab Week, to increase the visibility the work of Medical Laboratory Professionals worldwide.

Young Scientists are future leaders, and need to be trained and encouraged to succeed in theirrole, ideally with the support of experienced/senior leaders. In this objective, the third edition of the **IFCCYS FORUM** will take place during the IFCC **World Lab Dubai 2024**. The participationto the forum is supported by +50 IFCC-ROCHE scholarships, offering a unique possibility of training and improve communication and networking.

In 2024, young scientists will be able to participate in many other activities proposed by IFCC TF-YS. Information on all mentioned activities, objectives and projects of the TF-YS are available on IFCC website https://ifcc.org/task-force-young-scientists-tf-ys/, or follow us on Instagram(/ifcc_tfys), Facebook (/ifccYOUNG), LinkedIn (/groups/3049837/)

For more info, visit us at: **https://ifcc.org/task-force-young-scientists-tf-ys**

Young Scientist Interview

Dr. Chao Lien Liu, Ph.D.

Faculty Positions:

- Associate professor at the School of Medical Laboratory Science and Biotechnology, College of Medical Science and Technology, Taipei Medical University, Taipei, Taiwan
- Associate professor at Ph.D. Program in Medical Biotechnology, College of Medical Science and Technology, Taipei Medical University, Taipei, Taiwan

Special Local Responsibilities:

- Member of the Taiwan Society of Laboratory Medicine
- Member of the Taiwan Society on Thrombosis & Hemostasis (TSTH)

Special National Responsibilities:

- Member of the International Society of Transgenic Technology (ISTT)
- Member of the American Society of Gene & Cell Therapy (ASGCT)
- Member of the International Society on Thrombosis & Hemostasis (ISTH)
- Member of the European Association for Cancer Research (EACR)
- Member of the American Association for Cancer Research (AACR)
- Member of the American Association of Immunologists (AAI)
- Editor Board member for Frontiers in Bioscience-Scholar
- Guest Editor for Frontiers in Cell and Developmental Biology

1. Please introduce yourself

My name is Chao Lien Liu. I came from a stable, comfortable, middle-class family. My parents held a small garment factory and raised six children, making them almost overwhelmed. As the middle child in the family, I was naturally trained in independent thinking and learning, which directed me to education/research in medical science and biotechnology according to my interests.

I received my bachelor's degree in medical technology as the Valedictorian from the Departmentof Medical Laboratory Science and Biotechnology, China Medical University (CMU), Taiwan, andobtained a master's degree and a Ph.D. degree in Pathology from the Department of Pathology,College of Medicine, National Taiwan University (NTU), Taiwan. After finishing my Ph.D.program, I worked with Dr. Miao as a post-doctoral fellow at the Department of Immunology &Immunotherapies at Seattle Children's Research Institute (SCRI), Seattle, WA, USA, and then came back to Taiwan to join the School of Medical Laboratory Science and Biotechnology at Taipei Medical University, as a full-time faculty in 2013.

I am now an Associate Professor in the School of Medical Laboratory Science and Biotechnology (SMLSB) at Taipei Medical University (TMU), Taiwan. I am also serving as an Associate Professor in the Ph.D. Program in Medical Biotechnology (PPMB) at Taipei Medical University (TMU), Taiwan. To develop precision medicine, I also attended the OXCEP Academic Medicine Course at St Edmund Hall, University of Oxford, UK, in 2022 to promote the medical technology profession and life-long learning in biomedical science.

2. What is your main focus?

I have been an independent faculty since 2013 and am responsible for teaching (Immunology-related courses), academic research, and administrative services at the SMLSB/PPMB, TMU. Currently, my research areas are focused on two different parts of Immunology-related studies,including (i) Immunotherapy strategies by using CAR-T cells, CAR-NK cells, γδ-T cells, and the irderived exosomes to attack solid tumors, including ovarian cancer (OC), pancreatic cancer (PaC), and prostate cancer (PC); and (ii) Immunosenescence and Senotherapeutics in aging andage-associated diseases. Both have great potential for clinical application and are among the most actively studied topics in translational medicine. Our research team involves different expertise with our national/international collaborative networks, including National Taiwan University, Chang Gung Memory Hospital, Taoyuan General Hospital, Ministry of Health and Welfare, and Seattle Children's Researcsh Institute.

3. What else is important to you?

In addition to academic research, I have been actively engaged and responsible for developing English-medium instruction (EMI) teaching in medical technology and promoting international collaboration and activities for faculties and students, respectively, in both SMLSB and PPMB programs at TMU. To bring our students in line with international practice, especially the School of Medical Laboratory Science and Biotechnology (SMLSB) and the Ph.D. Program in Medical Biotechnology (PPMB) programs at Taipei Medical University recruit students from all over the world, and most of the subjects need to be organized as EMI courses. Therefore, I have been trained as an EMI lecturer by the Oxford Emi training courses, and I am also promoting the quality of medical technology education by utilizing EMI teaching.

Furthermore, international collaborations are needed for the sustained development of innovative research, education, and an international vision for faculties, students, and medical technologists/laboratory scientists in Taiwan. I have worked with many colleagues worldwide to create international exchange activities for students and faculty members. Specifically, I am actively involved in two international student exchange activities, including (i) the Tokyo Medical and Dental University-Taipei Medical University exchange program and (ii) the Hokkaido University-Taipei Medical University exchange program for students and faculty members, which have been organized annually for many years. Recently, we also aimed to create a similar student exchange program and a memorandum of understanding (MOU) contract between Chulalongkorn University (Thailand) and Taipei Medical University.

4. What are your interests in biomedical laboratory medicine?

Biomedical laboratory medicine is an interdisciplinary field that brings together knowledge in medicine, science, statistics, and technology, which plays a vital role in detecting, diagnosing, and treating disease and are rapidly progressing in the healthcare era. As mentioned above, my teaching and research correlate to the Immunology field. In line with the global megatrends, I am actively focused on immunotherapy (e.g., Abs or immune cells therapy), personalized medicine with a new perspective on healthcare, targeting diseases, such as cancers, autoimmune diseases, aging, and age-related diseases as the emerging therapeutics for clinical immune knowledge, high-throughput technologies, health informatics, and bioinformatics. The immunotherapy field is a good opportunity to train competitive medical technologists or biomedical laboratory scientists in this personalized healthcare era, and they will need to have life-long learning and investigating.

5. What are your future goals?

As a faculty member in biomedical laboratory medicine at the university, I dedicated my life to promoting education in medical biotechnology and laboratory science (e.g., EMI teaching and course optimization) and accelerated international collaborations that gear students to international conventions. Moreover, I also devoted myself to advancing the Taiwan Society of Laboratory Medicine (TSLM) to improve the environment and provide benefits for clinical staff in Taiwan, such as promoting a bill amended for medical technologists.

To develop the best clinically feasible therapeutic strategy, I am devoted to developing immunotherapy for immediate clinical translation. I assembled a research team at the beginningof 2013 at SMLSB, TMU, and am focused on cellular therapy (both engineered and non- engineered) targeting solid tumors, aging, and age-related dysfunction and assessing their fundamental immunotherapeutic mechanisms. Given my background in Medical Biotechnology/Immunotherapy, my ultimate goals in research are (i) to train graduate students and post-doctoral fellows to become scientists with essential competencies for afterwardacademic research, (ii) to facilitate our immunotherapeutic strategies used in the clinic for precision medicine, as well as for future manufacturing.

Interviewer:

Dr. Ryunosuke Ohkawa, Ph.D.

Professor of Analytical Laboratory Chemistry,

Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University.

Member, APFCB Committee-Communication & Publications (C-CP)

Young Scientist Interview

Dr. Vivek Pant, MD

Current Position:

Consultant Biochemist, Samyak Diagnostic Pvt. Ltd, Kathmandu, Nepal

Special Responsibilities:

- Corresponding member, Task Force Young Scientist, IFCC
- Corresponding member, Task Force on Outcome Studies in Laboratory Medicine, IFCC Corresponding member, Task Group Young Scientist, EFLM
- Young Scientist member, Communication and Publication division, APFCB

1. Please introduce yourself

I am Dr. Vivek Pant. I got my medical degree (MBBS) from Kathmandu University in 2012. Then,I worked as a medical officer in the Emergency department of the Institute of Medicine, Tribhuvan University Teaching Hospital. While working as a medical officer, I was more interested in the biomarkers rather than the subjective symptoms of diseases. What fascinated me more was that the symptoms of the same disease would vary between patients, but the impact of the disease on the body's functional equilibrium was almost the same. I was more inclined towards understanding the objective versus subjective realm of the diseases. Pursuing this dream of working with biomarkers, I studied MD Clinical Chemistry at the Institute of Medicine, Tribhuvan University, under a Nepal Government Scholarship.

s

Currently, I am working as a consultant biochemist at Samyak Diagnostic, a referral laboratoryin Kathmandu. My responsibility in the clinical laboratory includes verifying laboratory results,evaluating them on the grounds of the patient's clinical history, and providing interpretative comments to the clinicians. I also work as a research director at the same institution.

Apart from this, I am a member of working groups such as Task Force Young Scientist and TaskForce on Outcome Studies in Laboratory Medicine for the International Federation for Clinical Chemistry and Laboratory Medicine (IFCC). I also work as a corresponding member of Task Group Young Scientist for the European Federation for Clinical Chemistry and Laboratory Medicine (EFLM) and a corresponding member in the Communication and Publication division of the Asia Pacific Federation for Clinical Biochemistry and Laboratory Medicine (APFCB).

2. What is your main focus?

More often than not, physicians are reluctant to collaborate with laboratory professionals whilefacing a diagnostic challenge. I think a good physician identifies opportunities for laboratory professionals to become a more integral part of the clinical care team. To that end, I have beenwriting original articles and case reports that highlight the indispensable role of laboratory physicians in the effective management of diseases. For example, I published a case where an artifact of measurement led to false reporting of triglyceride in the case of glycerol kinase deficiency. As a consequence, the patient was not diagnosed accurately, and doctors kept increasing his drugs for hypertriglyceridemia. Eventually, after 13 years of being in treatment, the patient came to consult a laboratory physician by himself. Clinicians did not bother to communicate with laboratory physicians during the entire course of treatment. Therefore, I circulated my published case report among clinicians to champion the need to integrate laboratory professionals into the clinical care team.

Diabetes being omnipresent mainly in the South Asian context, I also strive to work on biomarkers related to it. Multiple studies have reported discordance between HbA1c and glucose levels. The discrepancy is attributed to the high prevalence of hemoglobinopathies, chronic kidney disease, iron deficiency anemia, and the use of drugs such as dapsone. I advocated the use of alternate marker such as fructosamine, and published article on false HbA1c results in various conditions. I also published reports on troubleshooting false Hba1c result and recommended to provide interpretative comments in such cases. I disseminated these reports in various laboratories and among clinical societies.

Now, I am happy that I have managed to have professional relationships with many clinicians throughout the country. I have championed that Laboratory physicians could be valuable resources whenever clinicians need assistance in selecting appropriate tests, interpreting test results, disentangling complicated diagnoses, and being acquainted with laboratory updates. This has been partly achieved through scientific writing and its dissemination as a research paper in journals and international conferences.

I have disseminated my research findings at the annual conference of IFCC, APFCB, Association for Diagnostics and Laboratory Medicine (ADLM), Australian Association of Clinical Biochemists(AACB), European Society of Endocrinology (ESE), American Association for ClinicalEndocrinology (AACE), Japan Association of Clinical Laboratory Science (JCLS) and Nepalese Association for Clinical Chemistry (NACC).

3. What else is important to you?

Especially in a resource-limited setting like ours, a laboratory quality management system is very important to me. Being a consultant biochemist in the first accredited (ISO 15189:2012) clinical laboratory in Nepal, I have to keep myself updated. I am a certified internal auditor andrecently completed an International Lead Assessor course as per the requirements of the ISO 15189:2022 conducted and organized by the Foundation for Quality (India) and the Accreditation Education Research & Scientific Services Center (AERSSC), Nepal. I train other laboratory professionals in my country on how to implement a quality management system for improving patient safety and meeting accreditation requirements. The training program is accredited by the Nepal Medical Council. I am also involved in various lectures, audio conferences, and workshops on topics about laboratory quality and laboratory statistics.

4. What are your interests in biomedical lab medicine?

I am interested in the clinical and laboratory aspects of hormones. As is known that the endocrine system is dynamic whereby one hormone influences the production of another hormone with a cascade effect. Pitfalls hormonal assays are commonly seen in clinical practiceand may lead to erroneous clinical impressions and treatments. I am interested in knowing themechanisms of such laboratory pitfalls, reviewing clinical scenarios in which they might occur,and exploring the ways to resolve these phenomena.

I have a strong interest in medical writing as well.

5. What are your future goals?

The scientific and technological advances occurring in medical research laboratories are not being translated into care for patients in our country. I have a great interest in advanced diagnostic techniques such as Mass Spectrometry and its use in clinical practice. Being involvedin IFCC is one of my best experiences so far. I am happy that I got the opportunity to learn newmethodologies and acquire new skills in a new environment. I was awarded a Professional Scientific Exchange program scholarship by the IFCC to visit the hormone laboratory at Oslo University Hospital in 2022 and learn the basics of the liquid chromatography–mass spectrometry technique. I am looking forward to performing collaborative studies and transferring the technology to Nepal.

Interviewer

Dr. Kohki Okada

Junior Associate Professor

Department of Medical Technology and Sciences, Faculty of Health Sciences, Kyoto Tachibana University, Kyoto, Japan

Symphony of Science and Sustainability: A Green Revolution in Laboratories

Author:

Dr. Shailaja Alapaty

Vydehi Institute of Medical Sciences

HOD, Prof Dept. of Biochemistry, Head of PurchaseEmail - headpurchase@vimsmail.com

The fluorescent hum of laboratories, once a triumphant melody of scientific progress, now facesa counterpoint: the rising crescendo of a green revolution. A transformative movement is brewing, envisioning laboratories bathed in the golden glow of solar panels, where water is revered, not recklessly squandered, and robots glide among sleek, energy-efficient equipment,minimizing waste and errors. In this digital symphony, data swirls seamlessly in the cloud, replacing mountains of paper and plastic with elegant efficiency.

Ignoring the environmental impact of laboratories is no longer an option. They guzzle water, generate mountains of hazardous waste, and rely heavily on fossil fuels, casting a long shadow on the planet's health. But amidst this disharmony, a new melody rises - the symphony of greenlabs. This vision is not a futuristic fantasy, but a clarion call to action, demanding immediate attention.

The challenges are stark, yet solutions bloom within reach. Dry chemistry, with its clever alchemy, replaces water-intensive processes. Automated systems minimize human error and waste, while green chemistry envisions a future where reagents dance with eco-friendly elegance. Digitalization orchestrates a paperless waltz, saving trees and streamlining workflows. But for this symphony to play, an orchestra must form. Leadership sets the tempo,allocating resources and crafting clear goals. The staff becomes the virtuosos, trained and empowered to perform the green movements with skill and dedication. Collaboration, acting as the conductor, brings together technology providers, green champions, and policymakers to harmonize efforts and amplify the impact.

The transition to green labs is not merely a trend; it is a moral imperative. It is about safeguarding the environment while propelling scientific progress forward. It is about leaving alegacy not just of groundbreaking discoveries, but of a world where scientific advancement andenvironmental responsibility coexist in harmonious co-existence.

Imagine a global network of green labs, where reduced water consumption could rejuvenate parched rivers, minimized waste could transform landfills into verdant gardens, and the lowered energy footprint could dim the ominous glow of climate change. This vision is not a pipe dream, but a symphony waiting to be played.

Leading the Green Revolution: VITROS® Systems and Technologies

Amidst this paradigm shift, exploring alternatives to traditional wet chemistry becomes imperative. Dry technology, exemplified by VITROS® Systems and VITROS® Technologies, presents a sustainable solution. These instruments eliminate the need for external water, treatment plants, plumbing, and drainage, contributing significantly to environmental sustainability.

One notable advantage of dry chemistry is the dramatic reduction in water consumption. Laboratories performing 15,000-18,000 tests daily can save an estimated 2500 liters of water,aligning with global conservation efforts. This translates into not only cost savings but also improved operational efficiency. Eliminating water-related maintenance time and costs enhances overall lab productivity, allowing for more streamlined diagnostic processes.

But the green symphony extends beyond water conservation. Dry chemistry addresses challenges associated with variable water quality, ensuring more reliable and consistent diagnostic outcomes. Laboratories embracing dry chemistry report improved accuracy in results, reducing the margin of error in diagnostic assays. This shift towards greener practicesis not a dismissal of wet chemistry, but rather a recognition of the strengths each methodologybrings to the table.

Balancing the Scales: Financial Considerations

However, in the pursuit of greener labs, acknowledging the additional expenses laboratories incur in maintaining water quality fit for analysis is crucial. Traditional wet chemistry auto analyzers necessitate extensive measures such as water softening, reverse osmosis, and de-ionization. Costs associated with water quality management, including the maintenance of treatment systems, validation, and quality control tests, and collaborations with water treatment experts, contribute to the overall financial burden.

As laboratories grapple with these financial challenges, the green lab movement becomes even more vital. It advocates for a holistic approach where leadership sets the tempo, allocating resources and crafting clear goals. The staff becomes the virtuosos, trained and empowered toperform the green movements with skill and dedication. Collaboration, acting as the conductor,brings together technology providers, green champions, and policymakers to harmonize effortsand amplify the impact.

From Green Labs to a Greener Future

Implementing green labs is not just a trend; it's a moral imperative. It's about safeguarding the environment while propelling scientific progress forward. It's about leaving a legacy not only of groundbreaking discoveries but of a world where scientific advancement and environmental responsibility coexist harmoniously.

Envisioning a global network of green labs holds immense potential. The reduced water consumption could rejuvenate parched rivers, minimized waste could transform landfills into verdant gardens, and the lowered energy footprint could contribute to dimming the ominous glow of climate change. This vision is not a pipe dream, but a symphony waiting to be played, with laboratories at the forefront of this transformative movement.

A Hopeful Overture in Arid Lands: Dry Chemistry for Water-Scarce Regions

Amidst the global symphony of green labs, a poignant melody takes center stage: the application of dry chemistry in regions struggling with water scarcity. For laboratories in parched lands, where every drop is precious, the traditional reliance on wet chemistry poses an untenable challenge. Here, dry technology rises as a conductor of hope, orchestrating a future where vital medical testing can thrive despite the constraints of a desert landscape.

Imagine a small clinic nestled in the heart of a sunbaked village. Imagine the despair if a life-saving blood test cannot be conducted because water, the very essence of life, is simply too scarce. This is the harsh reality for millions across the globe. But with dry chemistry, this melody of despair shifts to a hopeful serenade.

Gone are the days of bulky water treatment systems and miles of plumbing snaking through arid landscapes. Dry chemistry instruments, like those offered by VITROS® Technologies, require no external water. Their tests rely on pre-measured, sealed reagents, eliminating the need for water purification and disposal. This not only conserves precious resources but also reduces logistical burdens, making diagnostic testing accessible even in the remotest regions.

The benefits extend beyond water conservation. Dry chemistry offers greater stability and shelf life for reagents, making them ideal for areas with limited infrastructure and unreliable transportation. Additionally, their compact size and minimal maintenance requirements make them perfect for resource-constrained settings.

The melody of hope extends beyond immediate medical benefits. By reducing water consumption and waste generation, dry chemistry labs contribute to environmental sustainability in water-scarce regions. This creates a ripple effect, improving public health, promoting economic development, and fostering a sense of environmental stewardship.

Harmonizing the Global Stage: Collaboration and Innovation

The green lab movement transcends national borders, demanding a global orchestra to amplify its impact. Organizations like My Green Lab champion sustainable practices across continents, inspiring laboratories worldwide to join the eco-conscious chorus. Countries like Sweden and Austria lead the charge with ambitious policies and innovative initiatives, showcasing diverse pathways to green lab implementation. Sharing best practices and fostering international collaboration becomes crucial in amplifying the symphony's impact.

The Ethical Imperative: Beyond Technology, Responsibility

The green lab movement transcends mere environmental benefits, weaving itself into the tapestry of ethical responsibility. By minimizing their environmental footprint, laboratories contribute to safeguarding human health, animal welfare, and social justice. Reduced water consumption benefits communities facing water scarcity, while responsible waste disposal protects ecosystems and human health. By embracing green practices, laboratories become stewards of a sustainable future, ensuring long-term prosperity for generations to come.

The Future Beckons: A Tapestry of Possibilities As the green lab movement gains momentum, the future holds a tapestry of exciting possibilities. Artificial intelligence promises to revolutionize diagnostics, minimizing waste and energy consumption through targeted testing and optimized workflows. Bioprinting could lead to sustainable lab consumables, replacing plastic with biocompatible materials grown from living cells. Renewable energy sources like solar and wind power offer laboratories independence from fossil fuels, further reducing their environmental footprint.

However, challenges remain. Ensuring equitable access to green technologies for laboratoriesin developing countries requires dedicated efforts and international collaboration. Addressingpotential job displacement associated with automation demands proactive reskilling and workforce development programs. The future symphony of green labs requires both technological innovation and social responsibility to ensure a harmonious crescendo for all.

From Harmony to Action: The Final Crescendo

The orchestra of green labs stands poised, instruments tuned, ready to play their part in a transformative environmental revolution. Leaders must set the tempo, staff must practice theirparts with dedication, and collaborative efforts must harmonize to amplify the impact. The choice is clear: continue the discordant hum of unsustainable practices, or join the symphony of science and sustainability, composing a future where laboratory advancements and environmental responsibility resonate in perfect harmony.

As the final notes of the green lab symphony fade, a powerful echo resonates with the promiseof a future where scientific progress and environmental responsibility dance in perfect harmony. This is not merely a vision, but a call to action for every laboratory across the globe. By embracing the orchestra of green technologies, nurturing the dedication of the scientific virtuosos, and amplifying the melody of collaboration, we can transform the disharmony of unsustainable practices into a symphony of hope. Let us begin, then, not with hesitant whispers, but with a resounding crescendo, rewriting the narrative of science with every green innovation,every drop of water saved, and every laboratory transformed into a beacon of environmental consciousness. Together, we can orchestrate a world where scientific breakthroughs heal the planet, and the chorus of a sustainable future sings for generations to come. Let the green revolution in laboratories begin. Now, it's time to raise the curtain and play the music.

Cardiovascular Disease Epidemic in India and Triglyceride-Associated Residual Atherosclerotic Cardiovascular Disease Risk

Pratishtha Mehra[1], Vimal Mehta[1], Jamal Yusuf[1], Safal[1], Pradeep Kumar Dabla[2]

[1]Department of Cardiology, G. B. Pant Institute of Postgraduate Medical Education and Research, New Delhi, India

[2]Department of Biochemistry, G. B. Pant Institute of Postgraduate Medical Education and Research, New Delhi, India

Corresponding Author:

Dr. Vimal Mehta, Director-Professor, Department of Cardiology
G. B. Pant Institute of Postgraduate Medical Education and Research (GIPMER),
New Delhi, INDIA
E-mail ID: drvimalmehta@yahoo.co.in

ABSTRACT

Cardiovascular disease (CVD) is the leading global cause of mortality, with a significant rise in low- and middle-income countries. India faces a substantial burden of CVD, with alarming prevalence rates and an increase in associated deaths over the years. Despite a comparable cardiovascular death rate to Western populations, Indians developed atherosclerotic cardiovascular disease (ASCVD) a decade earlier. Lifestyle factors, genetic predisposition, and various risk factors contribute to this high prevalence. The management of ASCVD risk in India lifestyle measures, addressing risk factors such as sedentary lifestyle, unhealthy diet, obesity, metabolic syndrome, smoking, dyslipidemia, prediabetes, diabetes, and hypertension. Specifically, focusing on lipid management guidelines, low-density lipoprotein cholesterol (LDL-C) lowering is considered a crucial global need for additional interventions.

This expert paper highlights the role of hypertriglyceridemia, its association with ASCVD, and the importance of managing triglyceride levels. Non-high-density lipoprotein cholesterol (non-HDL-C) and apolipoprotein B (Apo B) are highlighted as valuable indicators for assessing residual risk beyond LDL-C levels. The Lipid Association of India proposes non-HDL-C as a co-primary target, emphasizing the need for a comprehensive lipid management strategy, particularly in high-risk populations.

EPIDEMIOLOGY

Cardiovascular (CV) disease is the leading cause of death in the world causing nearly one-third of all deaths. It has reached epidemic proportions in low- and middle-income countries with over three-quarters of total CV deaths occurring in these countries.1 India has one of the highest burdens of cardiovascular disease (CVD) with coronary heart disease prevalence rates in India ranging from 2% to 7% in rural populations and from 7% to 13% in urban populations.2,3CV disease was responsible for 26.6% of total deaths in India in 2017, compared with 15.2% in 1990. The Global Burden of Disease (GBD) study group reported a 2.3-fold increase in the prevalence of both ischemic heart disease (IHD) and stroke in the country between 1990 and 2016. Also, there was a two-fold increase in the number of prevalent cases of CV disease, from 25.7 million in 1990 to 54.5 million in 2016.4,5

Although the cardiovascular death rate in India is similar to Western populations, alarmingly Indians develop atherosclerotic cardiovascular disease (ASCVD) about a decade earlier than the Western populations, despite having lower levels of low-density lipoprotein cholesterol (LDL-C).[6] It has been reported that more than 50% of coronary artery disease (CAD)-associated deaths in India occur before the age of 50 years and 25% of myocardial infarctions (MI) occur before the age of 40 years.[7]In the INTERHEART study, the median age of MI among Indians was 53.0 years compared to 58.1 years in other countries.[8]

The high prevalence of CV disease can be attributed to the increased frequency of risk factors in the Indian population like sedentary lifestyle, unhealthy diet, obesity, metabolic syndrome, smoking, dyslipidemia, prediabetes, diabetes, and hypertension. Further, genetic predisposition, low-grade inflammation, and other known and unknown risk factors contribute to the increased prevalence.

According to International Diabetes Federation Atlas estimates, age-adjusted comparative prevalence of diabetes in India was 9.6% as of 2021.[9]The prevalence of hypertension was 25.3% in the fourth District-Level Household Survey conducted in India from the year 2012-2014, with hypertension being common even among younger age groups (18-25 years).[10]Dyslipidemia is also highly prevalent in India with the ICMR-INDIAB study reporting that 79% of Indian subjects have at least one lipid abnormality. The decreased high-density lipoprotein-cholesterol (HDL-C) levels were found in 72.3% of subjects, hypertriglyceridemia in 29.5% and elevated LDL-C levels were identified in 11.8% of subjects.[11]

MANAGEMENT OF ATHEROSCLEROTIC CARDIOVASCULAR DISEASE RISK

The institution of lifestyle measures is key to decreasing the risk of ASCVD including avoiding smoking and alcohol, regular exercise, preventing obesity, heart a healthy diet, and optimal management of hypertension and diabetes. Since the incidence of diabetes is increasing and the incidence of prediabetes is 2–3 times that of diabetes, patients with prediabetes must be managed appropriately to circumvent the onset of diabetes and ultimately reduce the risk of developing ASCVD.

Low-density lipoprotein cholesterol (LDL-C) lowering to reduce CV risk

LDL-C has both a causal and a cumulative effect on the risk of atherosclerotic cardiovascular disease. In all the major guidelines across the globe for dyslipidemia management, LDL-C is the primary target for ASCVD risk reduction. The LDL-C goals have been a moving target with the recent American College of Cardiology (ACC) and European guidelines recommending LDL-C goals of <55 mg/dL in very high-risk patients.[12,13]

The Lipid Association of India was the first organization in the world to recommend the LDL-C goal of <50 mg/dL in very high-risk patients in the year 2016 considering the increased risk of ASCVD in South Asian individuals. The statin therapy is the first-line therapy for management of dyslipidemia. The LDL-C levels are lowered by 30% with moderate-intensity statin therapy; high-intensity statins (HIS) reduce LDL-C by 50%. The combination therapy with HIS + ezetimibe reduces LDL-C levels by about 65%. The addition of bile acid sequestrants or bempedoic acid results in an additional LDL-C reduction of 20%.The proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors reduce LDL-C by about 55%–60%.[14]

Residual risk

Multiple randomized trials with statins have shown that statins reduce adverse CV events both in primary and secondary prevention. However, there is a huge residual risk despite the use of statins as approximately 75% of CV events cannot be prevented despite statin therapy.[15]Although newer non-statin therapies like ezetimibe, bempedoic acid, and PCSK9 inhibitors have been shown to reduce LDL-C levels beyond the 50–60% reduction seen with statins with additional CV benefit, still there remains a significant residual risk.

Although part of this residual risk may be attributable to many conventional, non-conventional, and genetic risk factors as listed above, the lipid-associated risk is of extreme importance because it is the lipids that accumulate in the arterial wall to initiate atherogenesis. The lipid-related risk is ascribed to several factors including non-attainment of LDL-C goals, hypertriglyceridemia, atherogenic dyslipidemia, small, dense LDL particles, remnant cholesterol (cholesterol in triglyceride-rich lipoproteins) and lipoprotein (a).

Triglycerides and cardiovascular disease

The triglycerides (TG) are transported in the blood by TG-rich lipoproteins. The TG-rich lipoproteins are chylomicrons (CMs) (~90% TG), very-low-density lipoproteins (VLDL) (~70% TG), intermediate-density lipoproteins (IDL) (~30% TG), chylomicron remnants and VLDL remnants (Figure 1). The remnants are derived from CMs secreted from the intestine and VLDL particles secreted from the liver as TGs are partially degraded by lipoprotein lipase (LPL) in the bloodstream. TGs are also present in small amounts (<10%) in low-density lipoprotein (LDL) and high-density lipoprotein (HDL) particles.

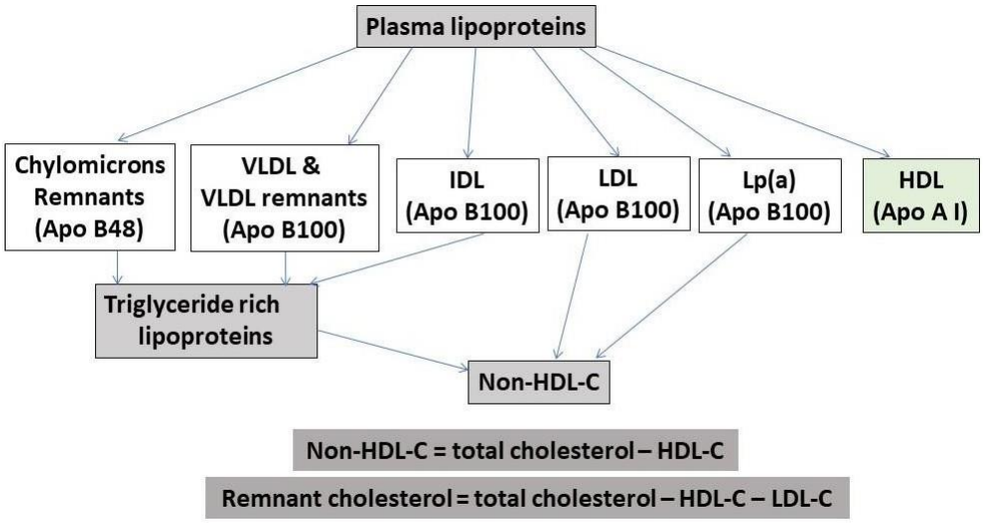


Figure 1. Triglyceride-rich apo B containing plasma lipoproteins

The normal plasma triglyceride levels are <150 mg/dL with optimal levels being ≤100 mg/dL, levels beyond 150 mg/dL are associated with ASCVD risk. This CV risk is typically present when triglycerides are moderately elevated (up to 500 mg/dL). The TG elevations ≥500 mg/dL are more of a concern about the risk of pancreatitis than ASCVD risk. The increased TG levels are often due to factors like increased fat intake, sedentary lifestyle, obesity, metabolic syndrome, insulin resistance, diabetes (especially uncontrolled), alcohol consumption, etc.; likewise, they also show a marked decrease in response to control of the above, making lifestyle interventions key to management of hypertriglyceridemia.[16]

Hypertriglyceridemia is a risk factor for atherosclerotic cardiovascular disease either directly or indirectly. It can be a manifestation of underlying atherogenic risk factors and diseases listed above or may be directly responsible as cholesterol in triglyceride-rich lipoproteins can get deposited in the arterial wall. As lipoprotein particles ≤70 nm in size can

enter the arterial wall, VLDL, VLDL remnants, intermediate-density lipoproteins, and chylomicron remnants can infiltrate the arterial wall. Chylomicrons being very large and having a very short half-life are not atherogenic.

The triglyceride content of triglyceride-rich lipoproteins (TGLPs) gets hydrolyzed by the action of lipoprotein lipase, an enzyme present on the vascular endothelial surface to provide free fatty acids to peripheral tissues like muscle, adipose tissue, etc. for energy and storage. The cholesterol component of TGLPs is directly atherogenic. Moreover, the TG-rich lipoproteins can indirectly potentiate atherogenesis by potentiating inflammatory response by upregulating pro-inflammatory cytokine production and promoting thrombin generation. The pooled data from secondary prevention trials: the Cholesterol and Recurrent Events trial (CARE) and the Long-term Intervention with Pravastatin in Ischemic Disease study (LIPID) showed that TG levels remain a CV disease risk factor in patients treated with statins, with patients in the statin arms having increased event rates if TG levels were high.[17] This suggests that control of both LDL-C and TGs may be important to achieve CV risk reduction. Since TG levels directly correlate with the remnant cholesterol (cholesterol content of TGLPs) levels, TG levels must be lowered therapeutically to reduce the CV risk.

Although statins lower TG levels by up to 35% based on baseline TG levels, certain drugs like fibrates, niacin, and omega-3 fatty acids decrease TG levels more significantly. However, earlier trials with fenofibrate, niacin, and a relatively low dose of omega-3 fatty acids (up to 1 gm/day) failed to show the significant benefit of these drugs in reducing the primary outcome in large randomized trials. However, in the REDUCE-IT (Reduction of Cardiovascular Events With Icosapent Ethyl- Intervention Trial) trial, 8179 high-risk patients (70% secondary prevention) with plasma triglyceride concentrations of 135-499 mg/dL were randomized to treatment with 4 g icosapent ethyl (a purified derivative of eicosapentaenoic acid (EPA)) daily or a mineral oil control and followed up for a median of 4.9 years. The high dose icosapent ethyl lowered the plasma triglyceride concentration by a median of 19.7% and reduced the risk of ASCVD events by 25% compared with the placebo, however, the reduction in ASCVD risk was unrelated to the change in plasma triglycerides.[18]In The EVAPORATE trial icosapent ethyl 4 gm daily demonstrated significant regression of low attenuation plaque volume on coronary computed tomographic angiography compared with placebo over 18 months. [19]

Omega-3 carboxylic acid (omega 3 CA) formulation of omega-3 fatty acids (EPA and docosahexaenoic acid (DHA)) does not require hydrolysis by pancreatic lipase during intestinal absorption, eliminating the need for consumption with a high-fat meal, resulting in greater bioavailability compared with standard omega 3 ethyl ester formulations. The administration of 4 gm/day of omega 3 CA produces similar increases in plasma EPA levels as doses of purified EPA approved for clinical use, and also increases DHA concentrations. In the STRENGTH trial,

13,078 statin-treated patients with high CV risk, hypertriglyceridemia, and low HDL-C were randomized to omega-3 CA in a dose of 4 gm per day. The median baseline triglyceride level was 240 mg/dL and 70% of participants had diabetes. Triglyceride levels were reduced by 18% which was similar to REDUCE IT trial. CRP levels significantly decreased with omega-3 CA use vs. corn oil (-20% vs -6.3%; P <0.001). However, no significant difference in the composite outcome of major adverse CV events was seen.[20]

Although both REDUCE-IT and STRENGTH trials randomized subjects with hypertriglyceridemia with approximately the same baseline triglyceride levels, the STRENGTH trial did not show the benefit of omega-3 CA. STRENGTH trial used a combination of EPA and DHA, whereas the REDUCE-IT trial used only purified EPA.[21]

The EPA and DHA decrease the production of triglyceride-rich VLDL particles from the liver resulting in a reduction of apoB100-containing VLDL particles and their remnants in the circulation and increase clearance of chylomicrons from the circulation. An increase in the EPA to arachidonic acid ratio generates anti-inflammatory mediators such as resolvins and they may have beneficial effects on endothelial dysfunction, and inflammation seen in the arterial wall. In the REDUCE-IT trial, there was a drop in the CRP levels with EPA, however, there was no interaction between baseline CRP and relative risk reduction, which could be expected if it was a strong anti-inflammatory action that drove the benefit. Therefore, other mechanisms responsible for the salutary CV benefits of purified EPA need to be explored. Omega-3 fatty acids are associated with increased bleeding times and reduced thrombogenic potential. Further, EPA stabilizes cholesterol within cell membranes, in a way that DHA does not because of their different physical structures.

In the PROMINENT trial, the treatment with fenofibrate, a selective peroxisome proliferator-activated receptor α modulator was studied in 10,497 patients with diabetes with triglycerides levels 200-499 mg/dL and HDL-C <40 mg/dL. Pemafibrate significantly reduced triglycerides by −26.2%, very low-density lipoprotein (VLDL) cholesterol by −25.8%, remnant cholesterol by −25.6%, and apolipoprotein C-III by −27.6%. Despite this, there was no reduction in the primary endpoint with pemafibrate compared with placebo at a mean follow-up of 3.4 years likely because apolipoprotein B levels did not decrease but rather increased by 4.8% in the pemafibrate group.[22]

Non-high-density lipoprotein cholesterol (non-HDL-C)

Non-high-density lipoprotein cholesterol (non-HDL-C) represents the total cholesterol carried by apoB-containing lipoprotein particles. It is calculated from the standard lipid profile as non-HDL-C =total cholesterol −HDL-C. Since non-HDL-C measures all the apo B-containing lipoproteins, it also correlates with the circulating levels of apo B. Although, non-HDL-C and

apo B correlate significantly, yet are only moderately concordant because the cholesterol content per apo B particle is variable. Non-HDL-C gives an estimate of total atherogenic cholesterol mass, whereas apo B is a better predictor of total atherogenic lipoprotein particles.

Nevertheless, the ability of non-HDL-C compared with apo B to predict ASCVD events continues to be a point of ongoing discussion.[23] Non-HDL-C measurement is more practical due to ease of calculation with no added cost. A meta-analysis of 25 trials including 1,31,134 participants on lipid-lowering therapy inferred that non-HDL-C outperforms apo B for the prediction of CVD.[24]

Apolipoprotein B (Apo B)

Each apo B-containing particle has a single apo B molecule, thus the levels of apo B in plasma are a measure of the number of apo B-containing lipoprotein particles in plasma. The standardized assays for apo B are available, while some measure only apo B 100, others measure both apo B100 and apo B48. Since apo B48 is present in small quantities even in non-fasting samples, both may be acceptable in routine practice.

In certain circumstances like subjects with elevated triglycerides, diabetes, obesity, or very low achieved LDL-C levels, the calculated LDL-C level may underestimate both the total concentration of cholesterol carried by LDL and the total concentration of apo B containing lipoproteins, thus underestimating the risk of ASCVD. About 20% of patients may have discordance between measured LDL-C and apo B levels.

Lipid goals to reduce CV risk

LDL-particle numbers, non-HDL-C, and apo B provide a better assessment of on-treatment residual risk than achieved LDL-C levels. Although statins which lower LDL-C also lower non-HDL-C and apoB, the statin therapy reduces LDL-C to a greater extent than LDL particle numbers, non-HDL-C, and apo B. While LDL-C lowering remains the primary focus of therapy, the Lipid Association of India guidelines propose non-HDL-C as a co-primary target (Table 1).[14]Besides LDL-C goals, the treatment goals for both non-HDL-C and apoB should be achieved especially in patients with diabetes, obesity, metabolic syndrome, and high triglycerides, in whom measurement of LDL-C levels alone tend to underestimate the risk.

Table 1: Lipid Association of India (LAI) treatment goals of LDL-C, non-HDL-C and Apo B

Risk Category	LDL-C goal (mg/dL)	Non-HDL-C goal (mg/dL)	Apo B goal (mg/dL)
High risk group	<70	<100	<80
Very high risk group	<50	<80	<65
Extreme risk group-Category A	<50	<80	<65
Extreme risk group-Category B	≤30	<60	<50

Whether the relative importance of apoB (particle numbers) and non-HDL-C (cholesterol carried by apoB lipoproteins) in atherogenesis differs especially over time and during different stages of plaque development needs further study. Till we have more answers, it is important to achieve LDL-C, non-HDL-C, and apo B goals for optimal reduction of lipid-associated CV risk (Figure 2).

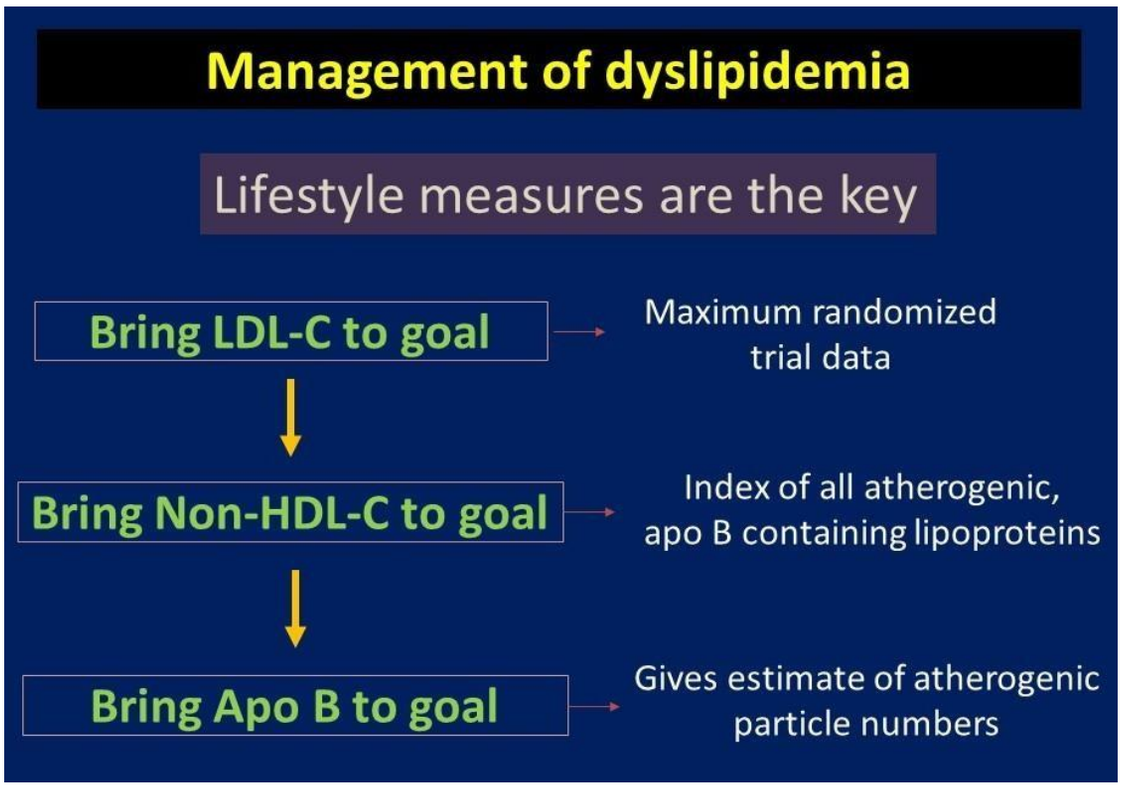


Figure 2. Algorithm for management of dyslipidemia

CONCLUSIONS

The higher the baseline LDL-C levels, the higher the CV risk. Patients with ASCVD and multiple risk factors and comorbidities have a higher risk of future adverse CV events. Hence, they need to be treated aggressively to achieve LDL-C goals. The risk stratification must be done in each patient and the LDL-C goal should be determined. High-intensity statins followed by ezetimibe and bempedoic acid are the way to go in most patients. Lifestyle measures including smoking cessation, alcohol restriction, low-fat diet, regular exercise, weight control in appropriate patients, and adequate control of blood sugar and blood pressure, are important for their desirable effect on lipid profile and reduction of CV risk. Elevated non-fasting plasma triglycerides are a marker of elevated remnant cholesterol. Non-high-density lipoprotein cholesterol (non-HDL-C) represents the total of cholesterol carried by apo B-containing lipoprotein particles. Apo B levels reflect the number of all atherogenic particles. Statin therapy reduces the LDL-C more than apo B by about 15%. On-treatment apo B is a more reliable index of the residual risk. In patients who have achieved LDL goals, non-HDL and apo B goals may be pursued to further reduce the CV risk.

References

1. Amini M, Zayeri F, Salehi M. Trend analysis of cardiovascular disease mortality, incidence, and mortality-to-incidence ratio: results from global burden of disease study 2017. BMC Public Health 2021;21:401.
2. Krishnan MN. Coronary heart disease and risk factors in India- on the brink of an epidemic? Indian Heart J 2012;64(4):364-7.
3. Huffman MD, Prabhakaran D, Osmond C, et al. Incidence of cardiovascular risk factors in an Indian urban cohort results from the New Delhi birth cohort. J Am Coll Cardiol2011;57:1765-74.
4. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the global burden of disease study 1990-2016. Lancet Glob Health 2018;6:e1339-e1351.
5. Kalra A, Jose AP, Prabhakaran P. The burgeoning cardiovascular disease epidemic in Indians- perspectives on contextual factors and potential solutions. Lancet Reg Health Southeast Asia 2023:12:100156.
6. Mehta V, Iyengar SS, Yusuf J, Mukhopadhyay S, Sattur GB, Puri R. Fighting the atherosclerotic cardiovascular disease epidemic: Declaring war on lipids by Lipid Association of India. J Assoc Physicians India 2020;68(11[Special]):6-7.
7. Ardeshna DR, Bob-Manuel T, Nanda A, Sharma A, Skelton WP 4th, Skelton M, Khouzam RN. Asian-Indians: a review of coronary artery disease in this understudied cohort in the United States. Ann Transl Med 2018;6(1):12.
8. Yusuf S, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet 2004;364:937-52.
9. IDF Diabetes Atlas. 10th edition, 2021. https://diabetesatlas.org/data/en/country/93/in.html

10. Geldsetzer P, Manne-Goehler J, Theilmann M, et al. Diabetes and hypertension in India: a nationally representative study of 1.3 million adults. JAMA Intern Med 2018;178:363-72.
11. Joshi SR, Anjana RM, Deepa M, et al. Prevalence of dyslipidemia in urban and rural India: the ICMR-INDIAB Study. PLoS One 2014;9(5):e96808.
12. Lloyd-Jones DM, Morris PB, Ballantyne CM, et al. 2022 ACC Expert Consensus Decision Pathway on the role of nonstatin therapies for LDL-cholesterol lowering in the management of atherosclerotic cardiovascular disease risk: A report of the American College of Cardiology solution set oversight committee. J Am Coll Cardiol 2022;80(14):1366-1418.
13. Mach F, Baigent C, Catapano AL, Koskinas KC, et al; ESC Scientific Document Group. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. Eur Heart J 2020;41(1):111-188.
14. Puri R, Mehta V, Duell PB, et al. Proposed low-density lipoprotein cholesterol goals for secondary prevention and familial hypercholesterolemia in India with focus on PCSK9 inhibitor monoclonal antibodies: Expert consensus statement from Lipid Association of India. J Clin Lipidol 2020;14(2):e1-e13.
15. Heart Protection Study Collaborative Group. MRC/BHF Heart Protection Study of cholesterol-lowering with simvastatin in 20,536 high-risk individuals: a randomized placebo-controlled trial. Lancet 2002;360(9326):7-22.
16. Puri R, Mehta V, Iyengar SS, et al. Triglycerides and atherosclerotic cardiovascular disease. J Assoc Physicians India. 2020 Nov;68(11[Special]):35-41.
17. Sacks FM, Tonkin AM, Shepherd J, et al. Effect of pravastatin on coronary disease events in subgroups defined by coronary risk factors: the Prospective Pravastatin Pooling Project. Circulation 2000;102(16):1893-900.
18. Bhatt DL, Steg PG, Miller M, et al. Cardiovascular risk reduction with icosapent ethyl for hypertriglyceridemia. N Engl J Med 2019;380:11-22.
19. Budoff MJ, Bhatt DL, Kinninger A, et al. Effect of icosapent ethyl on the progression of coronary atherosclerosis in patients with elevated triglycerides on statin therapy: final results of the EVAPORATE trial. Eur Heart J 2020;41(40):3925-32.
20. Nicholls SJ, Lincoff AM, Garcia M, et al. Effect of high-dose omega-3 fatty acids vs corn oil on major adverse cardiovascular events in patients at high cardiovascular risk: The STRENGTH randomized clinical trial. JAMA 2020;324(22):2268-80.
21. Oscarsson J, Hurt-Camejo E. Omega-3 fatty acids eicosapentaenoic acid and docosahexaenoic acid and their mechanisms of action on apolipoprotein B-containing lipoproteins in humans: a review. Lipids Health Dis 2017;16:149.
22. Das Pradhan A, Glynn RJ, Fruchart JC, et al. Triglyceride lowering with fenofibrate to reduce cardiovascular risk. N Engl J Med 2022;387:1923-34.
23. Puri R, Mehta V, Iyengar SS, et al. Non-HDL cholesterol and atherosclerotic cardiovascular disease. J Assoc Physicians India 2020;68(11[Special]):54-58.
24. Robinson JG, Wang S, Jacobson TA. Meta-analysis of comparison of the effectiveness of lowering apolipoprotein B versus low-density lipoprotein cholesterol and non-high-density lipoprotein cholesterol for cardiovascular risk reduction in randomized trials. Am J Cardiol2012;110:1468-76.

Navigating Lp(a) Measurement Challenges: From Guidelines to Laboratory Perspectives

Dr. Deepak N Parchwani[1], Dr. Ragini D. Singh[1], Prof Dr (Col) CDS Katoch[2]

[1]Department of Biochemistry; All India Institute of Medical Sciences Rajkot, Gujarat, India

[2]Executive Director; All India Institute of Medical Sciences Rajkot, Gujarat, India

Corresponding Author:

Dr. Deepak N Parchwani
Additional Professor
Department of Biochemistry
All India Institute of Medical Sciences Rajkot, Gujarat, INDIA
E-mail: drdeepakparchwani@yahoo.com

Abstract:

This comprehensive review delves into the evolving landscape of Lp(a) measurement standardsand examines the discordance and challenges in cardiovascular risk assessment in the contextof Lp(a). Acknowledging the shifting trends towards universal screening for Lp(a) endorsed by international societies working on risk assessment, management, and prevention of cardiovascular diseases, this review highlights the divergence in recommendations and the lackof consensus on Lp(a) risk thresholds. Ethnic variations in Lp(a) levels and ongoing clinical trial stargeting Lp(a) underscore the urgency of a unified and standardized approach to Lp(a) measurement. This article explores the intricacies of Lp(a) isoform size heterogeneity, availablemeasurement approaches, and the reporting unit challenge for the molecule. Emphasis is placed on collaborative efforts, transparent calibration, and the pivotal role of laboratories in ensuring the precision and reliability of Lp(a) measurements. The discussion encompasses thecall for unified calibration standards, highlighting the need for continuous external quality assessment and transparent reporting in clinical laboratories until a standardized Lp(a) measurement system is established.

Harmonizing Lp(a) Measurement Standards: Bridging Guidelines and Clinical Realities

Updated clinical guidelines and consensus statements/recommendations from various notable international societies working for the prevention, management, and risk assessment of atherosclerotic cardiovascular diseases (ASCVD) have emphasized the significance of evaluating Lp(a) levels in both primary and secondary prevention groups. The European Atherosclerotic Society (EAS)/ European Society of Cardiology (ESC) (2019) and Canadian Cardiovascular Society (CCS) (2021) have advocated universal screening for adults [1]. The landscape of Lp(a) testing has seen a shift towards universal screening, with ongoing debates regarding its benefits and potential implications for cardiovascular disease (CVD) risk assessment and management. The rationale for this approach is based upon, the high epidemiology burden of elevated Lp(a) and accumulating "evidence-based" data from randomized control trials linking Lp(a) to ASCVD. Universal screening is believed to enhance ASCVD risk assessment. Divergent views on universal screening have been reported by the National Lipid Association (NLA) scientific statement. They caution against testing in the general population because of the lack of currently targeted Lp(a)--lowering therapies. Intriguingly, apart from the discordance related to screening of the general population, the professional societal guidelines also lack a generalized consensus on Lp(a) risk thresholds [1].

Given the evidence-based role of Lp(a) as a causal independent CVD risk factor [2], the observed ethnic variations in Lp(a) levels combined with the divergence in recommendations by international societies for screening the population for Lp(a) levels, there is an urgent need fora unified approach to Lp(a) measurement standardization and establishing universally applicable standards for Lp(a) measurement and subsequent generation of Lp(a) risk thresholdsacross geographies.

With multiple ongoing clinical trials exploring Lp(a)-targeting therapies with a ray of hope [3], defining Lp(a) risk thresholds based on a unified standardized approach for Lp(a) measurementwill be of paramount importance for effective risk and clinical management. In this direction, the concerted efforts by the International Federation of Clinical Chemistry (IFCC) and laboratories shall play a crucial role in standardizing and harmonizing Lp(a) measurements, thereby ensuring consistency across diverse populations. Addressing Lp(a) measurementissues, transparent calibration, and adopting reliable methodologies are imperative for an accurate risk assessment. Furthermore, collaborative efforts among laboratories, clinicians, and researchers are essential for establishing comprehensive guidelines that account for ethnic variations, advancing precision in Lp(a) risk evaluation, and therapeutic interventions.

The following discussion aims to provide insights into the challenges, advancements, and Collaborative strategies that can contribute to the harmonization of Lp(a) measurement standards, enhance clinical interpretation, and facilitate comprehensive insights into its role incardiovascular health.

Navigating challenges in Lp(a) measurement

As the landscape of cardiovascular risk assessment evolves, the identification of Lp(a) as a distinct contributor to cardiovascular health and its incorporation into the risk prediction framework highlights the critical role of accurate measurements in assessing and guiding therapeutic interventions, signifying a paradigm shift in the nuanced comprehension and management of CVD risk [2].

Peculiarities of Lp(a) structure: Implications for Isoform Heterogeneity and Challenges in Measurement"

While navigating the challenges associated with Lp(a) measurement, it was observed that this enigmatic molecule has inherent structural peculiarities that cause 'isoform heterogeneity' and that leads to a major analytical challenge. Lp(a) has a unique apolipoprotein structure consisting of 11 types of Kringle sequences (Kringle IV type 1 to type 10; Kringle V) and a protease domain. Kringle IV type 2 shows sequence polymorphism with a variable number of repeated copies (ranging from 3 to >40) [4], which creates diverse apo(a) isoform landscapes and leads to molecular weights ranging from approximately 250 to 800 kDa [5]. Notably, there is an inverse relationship between the isoform size of Lp(a) and its plasma concentration. The repetitive Kringle IV2 (KIV2) structure and the high homology between these repetitive units pose a substantial hurdle for the precise measurement of the encoded protein. This isoform heterogeneity introduces 'measurement bias' that complicates the precise quantification [6,7] and this potential 'measurement bias' further influences the measurement outcomes.

Precise Quantification of Lp(a): What are the available approaches to measuring Lp(a)?

We have different analytical assays available to measure Lp(a) concentration in serum: isoform-sensitive, isoform-insensitive, and newer assays based on mass spectrometry. The widely available, commercially utilized, immunoturbidometric or immunonephelometric assays use antibodies raised in animals that are polyclonal in nature and cross-react with variable epitopes of apo(a). This polyclonality raises concerns about potential "measurement bias" with consequences.

The bias manifests as smaller isoforms that are linked to elevated levels being underestimated, whereas large isoforms with numerous KIV repeats associated with lower levelsare overestimated [8]. Furthermore, this bias affects theassociation between Lp(a) and ASCVD risk [9] and the misclassification of patients with Lp(a) levels close to predefined cut-off points [9].

An alternative approach for Lp(a) measurement available is ELISA, using a monoclonal antibody directed against the apoB of Lp(a). This assay is insensitive to the apo(a) isoform size heterogeneity [6]. The limited adoption of this method may be attributed to overlooking the LDL-unbound-'free' apo(a) (approx. 5%) [10,11], with uncertain implications for apo(a) atherogenicity [10].

A newer approach that is well-suited for high-throughput applications, marking a significant stride in precision and efficiency in Lp(a) analysis, is a mass spectrometry-based approach [12]. Unlike traditional immunochemical assays, this method identified unique peptide fragments of apo(a) that were absent in the KIV2 domain, mitigating issues of isoform size bias. However, cost concerns currently limit its application in routine clinical practice.

Prevalence of assays reporting Lp(a) values as mass concentration (mg/dl) vs. particle concentration (nmol/L): The reporting unit challenge

Recently, the discontinuation of the use of mg/dl units for Lp(a) reporting has been recommended [13], and it has been observed that the measurement of Lp(a) in particle concentration units (nmol/L) is being increasingly adopted. Numerous high-throughput platforms employing methods such as immunoturbidimetry or immunonephelometry now report Lp(a) measurements in nmol/L.

The primary question here is why we need Lp(a) concentration to be reported as nmol/L, and secondly, can mg/dl be converted to nmol/l and vice versa for Lp(a)?

Expressing Lp(a) as a mass concentration (mg/dL) introduces inherent bias because a given mass represents fewer particles for large isoforms and more particles for small isoforms. Furthermore, because Lp(a) isoforms have different molecular weights, direct conversion is not possible, unlike that of other lipids and lipoproteins [9]. Furthermore, commercial assays that incorporate five isoform sizes as calibrators are standardized against the WHO/IFCC reference material, which is reported in nmol/L units to effectively minimize isoform size bias [7].

From a technical standpoint, most assays in clinical practice utilize polyclonal antibodies against Lp(a) and are inherently isoform-sensitive [7,14,15]. However, some assay manufacturers have claimed that their assays demonstrate isoform insensitivity by making direct comparisons with isoform-insensitive assays [12]. This approach is good, but its limitations include inadequate representation of certain apo(a) isoform groups (smaller ones) owing to the limited sample pool. Additionally, some assay manufacturers are claiming a conversion factor between 2.0 and 2.5 from mg/dl to nmol/l without providing reasons behind [16]. This conversion with a fixed factor of 2.5 leads to overestimation for larger isoforms and underestimation for smaller isoforms. Furthermore, some assay manufacturers offer both mass and molar assays for Lp(a), despite using similar types of polyclonal antibodies, the same calibrator, and the same measurement system. Given the structural heterogeneity of Lp(a), thisis highly unlikely.

Enhancing Lp(a) Measurement Accuracy: Multipoint Calibrators, Transparencyin Calibration, and Certification Processes

Overcoming the above-mentioned challenges is pivotal for refining Lp(a) measurement methodologies and ensuring alignment with their true physiological significance. Researchers and laboratories are actively pursuing strategies to address this complexity, ultimately helpingto enhance the reliability and clinical relevance of Lp(a) measurements in cardiovascular healthassessments.

To optimally minimize the major obstacle for Lp(a) measurement i.e., isoform size bias, the useof multipoint calibrators (5- 5-point calibrator) is suggested. The multipoint calibrator should cover the measured concentration range and each calibrator should be independent and containa suitable distribution of apo(a) isoforms traceable to the WHO/IFCC reference material [7]. Additionally, the assay manufacturers must transparently disclose crucial information regardingthe apo(a) isoform size associated with each calibration and specify that the multipoint calibrator is a dilution of a single calibrator or consists of various calibrators with different apo(a) isoform sizes. A clear and comprehensive disclosure of these aspects will ensure the integrity and reliability of the Lp(a) measurements across diverse calibration points [16]. Furthermore, the Northwest Lipid Metabolism and Diabetes Research Laboratory (NLMDRL) at the University of Washington, Seattle, offers a certification process for assessing the performance of various assays. This involved comparing the Lp(a) values obtained through thecertification process with those derived from the monoclonal antibody-based ELISA method [7].

Laboratory Perspectives on Lp(a): Investigating the Enigma and Advancing Clinical Understanding

Given the role of Lp(a) as an independent causal risk factor for CVD, Lp (a) measurements needto be standardized. This involves addressing the technical challenges, implementing unified calibration standards, and ensuring continuous External Quality Assessment Schemes (EQAS). Concerted efforts by laboratories and researchers should aim to enhance measurement accuracy, resolve technical intricacies, and promote uniform reporting practices. Such initiativeswill strengthen the reliability of Lp(a) assessments, offering a foundation for precise clinical interpretation and facilitating comprehensive insights into their role in cardiovascular health.

Call for Unified Calibration Standards

The demand for Lp(a) measurement is expected to surge, particularly if ongoing trials of Lp(a)-lowering drugs yield positive results. High-throughput methods, often based on immunoturbidimetric and immunonephelometric techniques, are essential to meet this demand. A recent study compared the performance of six widely utilized commercially available assays that use five-point calibrators provided by manufacturers on a sample size of 144 serumsamples to an assay that claims to be isoform-insensitive (Denka Reagents). The overall bias between the assays ranged from −5 to +15 mg/dl. This suggests that all assay manufacturers should use a particular set of calibrators [17].

Furthermore, along with other scientific contributors [12], the IFCC Working Group for Standardization of Apo lipoproteins by Mass Spectrometry [18] is diligently involved in crafting advanced reference materials using contemporary methodologies. These materials are universally available and can serve as calibration standards for assay manufacturers. Leveragingthe inherent robustness of mass spectrometry technology facilitates the precise and reproducible quantification of proteins at the molecular level. This positions mass spectrometry as the benchmark reference method for clinical assay comparisons, particularly in molar units.The anticipated accessibility of these newly calibrated reference materials will present an opportunity for assay manufacturers to enhance the calibration precision of their methods.

The Crucial Role of Continuous External Quality Assessment in Lp(a) measurement

Clinical laboratories must systematically undergo external quality assessment to promptly identify and address disruptions introduced throughout the chain, from assay production to clinical application.

This ongoing evaluation is indispensable for upholding the integrity and reliability of laboratory processes, facilitating the early detection and effective mitigation of potential disturbances. Continuous participation in external quality assessment programs serves as a robust mechanism to ensure the precision and consistency of laboratory procedures,thus contributing significantly to the overall reliability of clinical practice. External quality assurance programs should distribute samples with known apo(a) isoform compositions and Lp(a) values assigned by a validated method independent of apo(a) size polymorphism and withcalibration traceable to the WHO/IFCC SRM-2B reference material [7].

Furthermore, external quality assurance samples should encompass a clinically relevant range, particularly within the management threshold range of 90-200 nmol/L. This comprehensive approach ensures thorough assessment and validation of laboratory performance across key parameters [7,16].

Transparent Reporting in Clinical Laboratories

Until a unified standardized system for Lp(a) measurements has been generated, clinical laboratories must transparently report not only the measured Lp(a) concentration but also specify the assay and calibrators employed. This is crucial for accurate clinical interpretation, particularly for serial measurements conducted across different laboratories in some cases. The laboratory must indicate the reported unit, as confusion often arises from unit discrepancies, impacting daily clinical counseling. This straightforward disclosure ensures consistency, eliminates ambiguity, and enhances the reliability of the Lp(a) concentration data in clinical settings [16].

Conclusion

The complex landscape of Lp(a) measurement requires a concerted effort to standardize and harmonize practices for precise clinical interpretation. The divergence in recommendations from international societies underscores the critical need for a unified approach to Lp(a) measurement standardization. As clinical guidelines advocate universal screening and ongoingtrials exploring Lp(a)-targeting therapies, establishing universally applicable standards and defining risk thresholds are paramount.

Laboratories play a pivotal role in this endeavor by addressing challenges, such as isoform heterogeneity and reporting units. Multipoint calibrators, transparent calibration, and certification processes are crucial for accurate quantifications. Collaboration among laboratories, clinicians, and researchers is essential for comprehensive guidelines that consider ethnic variations and advance precision in Lp(a) risk evaluation. Continuous external quality assessment further ensured the reliability of laboratory procedures.

As we navigate the complexities of Lp(a) measurement, transparent reporting practices have become a temporary solution, enhancing consistency across diverse laboratories. Until a unifiedstandard is established, these initiatives collectively contribute to bridging guidelines with clinical realities, ultimately advancing our understanding of Lp(a) in cardiovascular health.

References

1. Alebna P L, Mehta A. An Update on Lipoprotein(a): The Latest on Testing, Treatment, and Guideline Recommendations. Expert Analysis, Sep 19, 2023
2. Virani SS, Koschinsky ML, Maher L, et al. Global think tank on the clinical considerationsand management of lipoprotein(a): The top questions and answers regarding what clinicians need to know. Prog Cardiovasc Dis. 2022;73:32-40. doi:10.1016/j.pcad.2022.01.002
3. Wei, Trent; Cho, Leslie. Recent lipoprotein(a) trials. Current Opinion in Lipidology 33(6):p 301-308, December 2022. | DOI: 10.1097/MOL.0000000000000856
4. Kronenberg F, Utermann G. Lipoprotein(a): resurrected by genetics. J Intern Med 2013;273(1):6-30. https://doi.org/10.1111/j.1365-2796.2012.02592.x.

5. Utermann G, Menzel HJ, Kraft HG, Duba HC, Kemmler HG, Seitz C. Lp(a) glycoprotein phenotypes. Inheritance and relation to Lp(a)-lipoprotein concentrations in plasma. J Clin Invest. 1987;80(2):458-465. doi:10.1172/JCI113093
6. Marcovina SM, Albers JJ, Gabel B, Koschinsky ML, Gaur VP. Effect of the number of apolipoprotein(a) kringle 4 domains on immunochemical measurements of lipoprotein(a). Clin Chem. 1995;41(2):246-255.
7. Cegla J, France M, Marcovina SM, Neely RDG. Lp(a): When and how to measure it. Ann Clin Biochem. 2021;58(1):16-21. doi:10.1177/0004563220968473
8. Kronenberg F, Tsimikas S. The challenges of measuring Lp(a): A fight against Hydra?. Atherosclerosis. 2019;289:181-183. doi:10.1016/j.atherosclerosis.2019.08.019
9. Wilson DP, Jacobson TA, Jones PH, et al. Use of Lipoprotein(a) in clinical practice: A biomarker whose time has come. A scientific statement from the National Lipid Association [published correction appears in J Clin Lipidol. 2022 Sep-Oct;16(5):e77- e95]. J Clin Lipidol. 2019;13(3):374-392. doi:10.1016/j.jacl.2019.04.010
10. Mooser V, Marcovina SM, White AL, Hobbs HH. Kringle-containing fragments of apolipoprotein(a) circulate in human plasma and are excreted into the urine. J Clin Invest. 1996;98(10):2414-2424. doi:10.1172/JCI119055.
11. Kostner KM, Maurer G, Huber K, et al. Urinary excretion of apo(a) fragments. Role in apo(a) catabolism. Arterioscler Thromb Vasc Biol. 1996;16(8):905-911. doi:10.1161/01.atv.16.8.905
12. Marcovina SM, Clouet-Foraison N, Koschinsky ML, et al. Development of an LC-MS/ MS proposed candidate reference method for the standardization of analytical methods to measure lipoprotein(a). Clin Chem 2021;67(3):490-499. https://doi. org/10.1093/clinchem/hvaa324
13. Benn M, Nordestgaard BG. From genome-wide association studies to Mendelian randomization: novel opportunities for understanding cardiovascular disease causality, pathogenesis, prevention, and treatment. Cardiovasc Res. 2018;114(9):1192-1208. doi:10.1093/cvr/cvy045

14. Marcovina SM, Albers JJ. Lipoprotein (a) measurements for clinical application. J Lipid Res. 2016;57(4):526-537. doi:10.1194/jlr.R061648

15. Tsimikas S, Fazio S, Viney NJ, Xia S, Witztum JL, Marcovina SM. Relationship of lipoprotein(a) molar concentrations and mass according to lipoprotein(a) thresholds and apolipoprotein(a) isoform size. J Clin Lipidol. 2018;12(5):1313-1323. doi:10.1016/j.jacl.2018.07.003

16. Kronenberg F. Lipoprotein(a) measurement issues: Are we making a mountain out of a molehill? Atherosclerosis. 2022;349:123-135. doi:10.1016/j.atherosclerosis.2022.04.008

17. Scharnagl H, Stojakovic T, Dieplinger B, et al. Comparison of lipoprotein (a) serum concentrations measured by six commercially available immunoassays. Atherosclerosis. 2019;289:206-213. doi:10.1016/j.atherosclerosis.2019.08.015

18. Cobbaert CM, Althaus H, Begcevic Brkovic I, et al. Towards an SI-Traceable Reference Measurement System for Seven Serum Apolipoproteins Using Bottom-Up Quantitative Proteomics: Conceptual Approach Enabled by Cross-Disciplinary/Cross-Sector Collaboration. Clin Chem. 2021;67(3):478-489. doi:10.1093/clinchem/hvaa239

Understanding and Addressing Healthcare Workforce Shortages

Damien Gruson[1,2,3]

[1]Department of Laboratory Medicine, Cliniques Universities' St-Luc and Université Catholique deLouvain, Brussels, Belgium.

[2]Pôle de recherche en Endocrinologie, Diabète et Nutrition, Institute de Recherche Experimental et Clinique, Cliniques Universities' St-Luc and Université Catholique de Louvain, Brussels,Belgium.

[3]IFCC Division on Emerging Technologies

Email: Damien.gruson@saintluc.uclouvain.be

Like many laboratory and health managers, I am concerned about the shortage affecting our health forces and I therefore wanted to write this short article to guide reflection on this subject.

Health systems worldwide rely fundamentally on the presence and performance of health workers. They are the pillars upon which the structure of health services is built, and their availability, accessibility, acceptability, and quality directly influence the attainment of the highest standards of healthcare. However, a looming crisis threatens this foundational aspect of healthcare systems: a shortage of healthcare workers.

Projections from the World Health Organization (WHO) indicate an estimated deficit of 10 millionhealth workers by 2030, predominantly affecting low- and lower-middle-income nations. But this scarcity is not confined to specific economic tiers; it extends across various nations, each grappling with distinct challenges in the education, employment, deployment, retention, and efficacy of their healthcare workforce.

The genesis of this enduring scarcity can be traced to chronic underinvestment in health worker education and training, resulting in a mismatch between educational strategies and population needs. Moreover, the intricate issue is compounded by the inability to deploy healthcare workersto rural, personnel might seem like a straightforward solution. However, healthcare, being a complex system, demands a nuanced approach.

healthcare workforce shortages, it's imperative to pivot from a problem-centered approach towards a solution-oriented perspective that accounts for multifaceted dimensions.

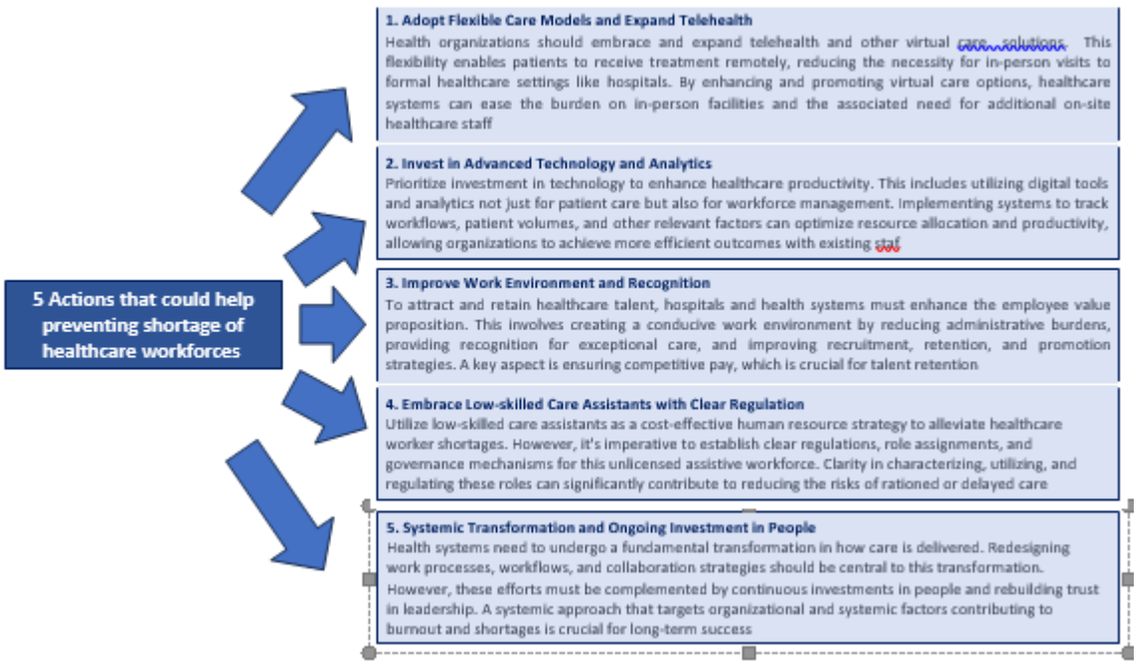
The dilemma of healthcare workforce scarcity is not limited to its impact on the health system alone; it also intertwines with societal disparities. A myopic focus on managing workforce shortages might inadvertently exacerbate inequalities and create further challenges for certain segments of society.

Furthermore, as healthcare organizations strive for enhanced efficiency and effectiveness, they often overlook the needs and well-being of healthcare professionals. Issues such as burnout, stress, and work-life balance are frequently sidelined, potentially impeding long-term workforceplanning and management.

The solution demands a holistic approach. Prioritizing quality primary care and ensuring equitable access to healthcare should be central to workforce policies. It necessitates a reevaluation of working conditions, rights, opportunities for advancement, and the creation of asustainable equilibrium between personal and professional life for healthcare workers.

Despite the recognition of these priorities in global policies, the execution of interventions still lacks the promise of substantial and enduring change. The persistent question prevails: Are we attempting to solve these problems with the same mindset that contributed to their creation?

We might have several options to prevent the shortage of such precious resources and the following figure highlights five of them:



In conclusion, the shortage of healthcare workers in laboratory medicine necessitates a paradigmshift in approach—one that transcends mere problem identification and delves into comprehensive, sustainable solutions that prioritize the needs of both citizens and healthcare professionals. Only by reshaping perspectives, policies, and practices can healthcare systems globally navigate this pressing challenge and secure a robust, resilient workforce for the future.

References

1. https://www.who.int/health-topics/health-workforce#tab=tab_1
2. https://www.myadlm.org/cln/articles/2023/june/laboratory-organizations-urge-congress-to-address-workforce-shortages
3. Džakula A, Relić D. Health workforce shortage - doing the right things or doing things right? Croat Med J. 2022 Apr 30;63(2):107-109. doi: 10.3325/cmj.2022.63.107. PMID: 35505643; PMCID: PMC9086817.
4. Kagonya VA, Onyango OO, Maina M, Gathara D, English M, Imam A. Characterising support and care assistants in formal hospital settings: a scoping review. Hum Resour Health. 2023 Nov 27;21(1):90. doi: 10.1186/s12960-023-00877-7. PMID: 38012737; PMCID: PMC10680191.
5. https://www.ft.com/partnercontent/j-and-j/what-is-the-cure-for-the-global-healthcare-worker-shortage.html
6. https://www.pwc.com/gx/en/issues/c-suite-insights/the-leadership-agenda/talent-required-for-healthcare-shortages.html

APFCB - APAC CVD Alliance (Asia-Pacific Cardiovascular Disease Alliance)

CVD is the leading cause of death in the Asia-Pacific, with the largest increase in premature deaths occurring in East Asia, South Asia, and Southeast Asia over the last 20 years. In 2019 alone, over 10 million people died of heart disease in Asia, making up 35% of all deaths in theregion.

The APAC CVD Alliance is a multisectoral, multistakeholder coalition dedicated to improving heart health for patients, societies, and economies by elevating public and policy awareness about CVD at regional and domestic forums in Asia.

Objectives:

- Patients, allied health professionals, academia, corporate partners, and a global health think-tank launch the Asia-Pacific Cardiovascular Disease Alliance (APAC CVDAlliance) to battle CVD across Asian health systems.
- The APAC CVD Alliance will engage policymakers, patients, professionals, academia,non-profits, and implementation partners to champion increased attention and innovations for CVD.
- The Alliance is keen to work with more patients in Asia – reach out at apaccvd.org/partner-with-us

The APAC CVD Alliance aims to: increase public and policy awareness of the importance of tackling CVD at regional and domestic forums in Asia; encourage the implementation of scalable and sustainable CVD innovations across all health systems, and emphasize that fighting CVD is a much-needed investment for healthy societies and productive economies.

The four strategic partners are,

- the Asia-Pacific Federation for Clinical Biochemistry and Laboratory Medicine (APFCB),
- Global Alliance for Patient Access (GAfPA),
- Global Heart Hub (GHH),
- Universiti Teknologi MARA (UiTM) Faculty of Medicine – and corporate partners Amgen, Novartis, and Roche Diagnostics

Dr Tony Badrick, President, APFCB said “Accurate and rapid diagnoses for people with CVD is fundamental to all health systems. As the largest clinical biochemistry and laboratory federationin Asia, we have seen that investing in capacity building and education of laboratory professionals is essential for the early detection and treatment of CVD and other non- communicable diseases. The APAC CVD Alliance’s mandate to elevate policy awareness dovetails with the APFCB’s goal of encouraging continual improvements to laboratory practicesin the region.”

ACCESS Health International (Asia) President Dr Krishna Reddy said, “The Allianceaims to harness the existing good work in tackling CVD in the Asia-Pacific. ACCESS Health is proud to be the secretariat for this regional initiative and we look forward to improving investment in CVD innovations in policies, care models, products, or services across all health systems.” Based in Singapore as its regional hub for Southeast Asia, global health think-tank ACCESS Health International is the secretariat for the APAC CVD Alliance.

Timothy Fang, APAC CVD Alliance Program Lead at ACCESS Health International

Source: apac.cvd.org/partner-with-us

Contact: timothy.fang@accessh.org

Report compiled by:

Prof. Pradeep K. Dabla

Chair APFCB C-Communication & Publication

APFCB Auspices Events Calendar Activity 2023

Dr. Woei-horng Fang, PhD
Chair, APFCB C-CC

APFCB Auspices

One of the functions of the APFCB C-CC is the award of auspices of the APFCB for various scientific events like conferences, congresses, and events organized by regional society members and corporate members. The provision of auspices is mutually beneficial: the APFCBlends its prestige to a meeting which should help it attract greater participation and in return the APFCB benefits from greater name recognition among the participating laboratory scientists. All applications for APFCB auspices are evaluated by the C-CC and treated on a case-by-case basis in an efficient and timely manner. The C-CC is careful to award auspices only toscientific meetings that are organized by learned bodies and vendors such as APFCB corporatemembers where the content is of scientific and educational value. In 2023, the committee members evaluated and granted APFCB auspices to the following scientific events.

	Conferences and Events:	Dates	City and Country	Organizer
1	IFCC Visiting Lecture 2023 : Prof. Khosrow Adeli (IFCC President)	23-25 Mar 2023	Jakarta, Indonesia	Indonesian Association for Clinical Chemistry
2	Snibe Academic Conference on Immunology	1 Apr 2023	Indore, India	Snibe Co., Ltd.
3	Maglumi X Series: The Global IVD Pioneer	19 Apr 2023	Hong Kong	Snibe Co., Ltd.
4	New Progress in Research and Application of International Laboratory Medicine	22 Apr 2023	Shenzhen, China	Snibe Co., Ltd.

5	14th International & 20th National Congress on Quality Improvement in Clinical Laboratories	16-19 May 2023	Tehran, Iran	Iranian Association of Clinical Laboratory Doctors
6	Snibe Academic Conference on Immunoassay	24 Jun 2023	Delhi, India	Snibe Co., Ltd.
7	International Conference on Immunology	9 Jul 2023	Dubai	Snibe Co., Ltd.
8	Annual Academic sessions CCPSL 2023	14-15 Jul 2023	Kandy, Sri Lanka	College of Chemical Pathologists of Sri Lanka
9	International Symposium on Laboratory Medicine	26-27Aug 2023	Shenzhen, China	Snibe Co., Ltd.
10	49th Annual Conference of Association of Clinical Biochemists of India	14-16 Sep 2023	Thiruvalla, Kerala, India	Association of Clinical Biochemists of India
11	International Symposium on Laboratory Medicine	16 Sep 2023	Negombo, Sri Lanka	Snibe Co., Ltd.
12	Re-imagining Mass Spectrometry – A Convergence of ideation, innovation and integration	5 Oct 2023	Yokohama, Japan	Roche Diagnostics Asia Pacific
13	International Symposium on Laboratory Medicine	29 Oct 2023	Shenzhen, China	Snibe Co., Ltd.
14	Roche Experience Days (RED) 2023 with virtual	8-9 Nov 2023	Seoul, South Korea	Roche Diagnostics Asia Pacific
15	International Symposium on Immunoassay	25 Nov 2023	Kathmandu, Nepal	Snibe Co., Ltd.
16	International Symposium on Immunoassay	9 Dec 2023	Colombo, Sri Lanka	Snibe Co., Ltd.
17	AMBICON 2023	13-16 Dec 2023	Navi Mumbai, India	Association of Medical Biochemists of India

CASE-1: Ni Kadek Mulyantari, Tania Wangunhardjo, I Made Mahayasa, Ngakan Putu Daksa Ganapati

Faculty of Medicine, Udayana University / Prof. Dr. I.G.N.G Ngoerah Hospital, Denpasar Bali-Indonesia

E-mail: kadek_mulyantari@unud.ac.id

Case History

The patient is a 51-year-old woman diagnosed with Wound dehiscence following a colon transverse colostomy and Adenocarcinoma of the Rectosigmoid. The Clinical Chemistry resultswere:

Analyte	Results	Biological Reference interval
Creatinine	0.62 mg/dL	0. 57-1.1
Bun	9.2 mg/dL	6.0-23.0
e-GFR	104.4	>90
AST	28 U/L	11.0-27.0
ALT	22 U/L	11.0-34.0
Albumin	2.60 g/dL	3.40-4.80
Blood glucose	120 mg/dL	70-140
Sodium	132 mmol/L	136-145
Potassium	3.71 mmol/L	3.50-5.10
Chloride	94.8 mmol/L	96-108

Questions:

1. What is the indication to check the analyte?
2. What is the interpretation of the clinical chemistry result?
3. Are there any other tests you might suggest to the patient?

Discussion

Question 1

The patient suffers from colorectal cancer and received chemotherapy drugs. Though chemotherapy is an effective way to treat cancer, it also carries a risk of side effects. The purpose of clinical chemistry tests in this patient is to predict the presence of side effects of chemotherapy and tumor metastases.

The patient plans to continue Folfox VI chemotherapy 3 series and radiotherapy. Other indications of laboratory examination in this patient are routine pre-chemotherapy blood tests and routine pre-operation procedures. The patient also plans to do wound debridement on the colostomy site. Routine pre-chemotherapy blood tests can be undertaken within 2-3 days of treatment.

Question 2

The interpretation of clinical chemistry results were normal liver function test, normal kidney function test, and normal electrolyte parameters. The patient suffers from hypoalbuminemia. Hypoalbuminemia in this patient can be caused by a hypermetabolism state and decreased nutritional intake.

Question 3

Complete blood count is one of the most important tests before and after chemotherapy. Chemotherapy-induced alterations in complete blood count may cause many significant problems in clinical practice. Anemia, neutropenia, and thrombocytopenia induced by chemotherapy regimens may cause life-threatening complications such as severe infections and hemorrhagic complications. Moreover, these side effects may also necessitate dose reduction and/or delay in schedules of chemotherapy treatment.

References

1. Chambers P, Weil L, Forster MD, Kipps E, Wong ICK, Jani Y. Evidence to guide the optimal timing for pre-chemotherapy blood tests for early breast, colorectal cancer and diffuse large B-cell lymphoma. Cancer Medicine. 2021;10:7996-8004.
2. Sökmen FC, Kasapoğlu B, Yozgat A, Engin H. Assessment of Hematological Parameters Before and After Adjuvant Chemotherapy in Patıents with Colorectal Cancer. 2019; 52(3):405-409.

CASE-2: Dr. Sumita Sharma, Dr. Kapil Sharma, Dr. Onjal K. Taywade, Dr Manish Kumarand Dr. Anurag Sankhyan

[1]Department of Biochemistry, All India Institute of Medical Sciences, Bilaspur, Himachal Pradesh,India

[2]Department of General Medicine, All India Institute of Medical Sciences, Bilaspur, Himachal Pradesh, India

Email:drsumita17@gmail.com

Case History

An 18-year-old female presented to General Medicine OPD for evaluation of jaundice. The patient had a history of intermittent jaundice for the last one year. At the time of presentation,there was no history of fever, anorexia, weight loss, dark urine, clay-coloured stool, pruritus, pain abdomen, abdominal distension or pedal swelling. She did not have a history of any chronicdisease or blood transfusion and her family history was not significant for any chronic disease.On physical examination, mild pallor and mild icterus were noticed. There was neither any lymphadenopathy nor hepatosplenomegaly. Cardiovascular and central nervous system examination was normal.

The results of the investigations conducted are summarized in Table 1.

Investigation	Result	Reference Interval
Haemoglobin	11.5	12.0–15.0 g/dl
Total Leucocyte Count	7,210	4,000–10,000/μl
Platelet count	3,76,000	1,50,000–4,00,000/μl
Red blood cell count	5.5	4.5–5.5 million/μl
Packed cell volume	37	38–48 %
Mean cell volume	68	83–101 fl
Mean cell haemoglobin	21	27–32 pg
Mean corpuscular haemoglobin concentration	31	30–35 g/dl
Red cell distribution width	20.3	10.0–16.0 %
Reticulocyte count	2.6	1.0–2.7 %
Total Bilirubin	4.7	0.3–1.2 mg/dL
Direct Bilirubin	0.1	0.0–0.3 mg/dL
Indirect Bilirubin	4.6	0.3–0.9 mg/dL
Aspartate transaminase	15	0–35 U/L
Alanine transaminase	14	0–45 U/L

Alkaline phosphatase	73	45-117 U/L
Total protein	6.8	6.0-8.0 g/dL
Albumin	4.9	3.2-4.5 g/dL
Globulin	1.9	2.5-3.5 g/dL
Albumin/Globulin ratio	2.6	1.5-2.5
Lactate dehydrogenase	154	<247 U/L
Iron	89	60-180 μg/dL
Total iron binding capacity	282	244-450 μg/dL
Ferritin	38	10-291ng/ml
Transferrin saturation	32	12.8-36.4 %
HBsAg	Non-reactive	--
Anti-HCV	Non-reactive	--
HAV-IgM Ab	Non-reactive	--
Anti-HEV-IgM	Non-reactive	--
G6PD screening	Normal	--
Haptoglobin	44	36-195 mg/dl
Direct Coombs' test	Negative	--
Peripheral blood smear examination	Predominantly microcytic hypochromic RBCs,anisocytosis, poikilocytosis, few pencil cells and target cells werenoted	--

The laboratory investigations of this patient showed that the patient had mild microcytic hypochromic anaemia. However, since the iron studies were found to be normal, the physician decided to order an Hb HPLC study. The biochemist discussed the Hb HPLC findings (Figure 1)with the treating physician and screening of both parents was considered for confirmation of the findings. The patient's father turned out to be a carrier of thalassaemia and the mother of Hb D-Punjab.Assessment of liver function showed mild unconjugated hyperbilirubinaemia withnormal serum proteins and liver enzymes. The workup for haemolysis was negative. Thus, a genetic analysis of the UGT1A1 polymorphism was conducted, revealing the patient's UGT1A1*28/*28 genotype, which is linked to a significant decrease in UGT enzyme activity.

Questions

1. What are the abnormal findings in Hb HPLC results in this patient?
2. What is the cause of hyperbilirubinemia in this patient?
3. What guidance ought to be provided to this patient?

Discussion

Question 1

Hb HPLC study revealed the presence of HbD, high HbF and normal HbA2 in this patient. HPLC findings are suggestive of compound heterozygous HbD-Punjab and beta thalassemia trait with a false normal HbA2. The screening of parents for

Question 2

The absence of evident hemolysis and underlying hepatic pathology indicates the possible presence of Gilbert syndrome. Genetic assessment of the UGT1A1 polymorphism confirms thatthe patient has the UGT1A1*28/*28 genotype that is associated with severely reduced UGT enzyme activity. This genetic profile strongly suggests that the primary factor contributing to unconjugated hyperbilirubinemia is most likely the reduced conjugation of bilirubin resulting from diminished activity of the UGT enzyme in this patient. Notably, a homozygous HbD state typically only results in sub-clinical jaundice, making Gilbert syndrome a major contributor to the observed hyperbilirubinemia.

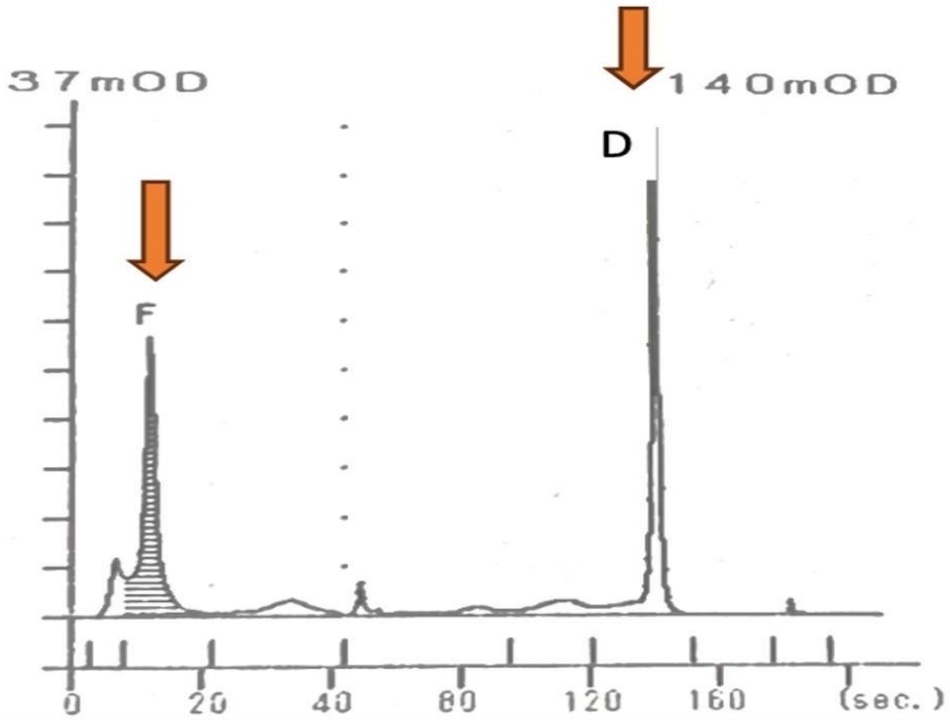
Question 3

The patient needs to be counseled and reassured regarding the benign course of the disease. She should be sensitized about various precipitating factors like fever, physical exertion, prolonged fasting, etc. that may increase her bilirubin levels. The patient should receive guidance to refrain from undergoing unnecessary laboratory investigations to avoid thepotential discomfort or inconvenience associated with repeated blood draws.

References

1. Torres L de S, Okumura JV, Silva DGH da, Bonini-Domingos CR. Hemoglobin D-Punjab: Origin, distribution and laboratory diagnosis. Rev Bras HematolHemoter. 2015;37(2):120–6.
2. Basmanj MT, Karimipoor M, Amirian A, Jafarinejad M, Katouzian L, Valaei A, et al. Co-inheritance of hemoglobin D and β-thalassemia traits in three Iranian families: Clinical relevance. Arch Iran Med. 2011;14(1):61–3.
3. Galanello R, Origa R. Beta-thalassemia. Orphanet J Rare Dis. 2010;5(1):1–15.
4. Vítek L, Tiribelli C. Gilbert´s syndrome revisited. J Hepatol. 2023;79(4):1049–55.
5. Petrenko AA, Pivnik A V, Kim PP, Demidova EY, Surin VL, Abdullaev AO, et al. Coinheritanceof HbD-Punjab/β+-thalassemia (IVSI+5 G-C) in a patient with Gilbert's syndrome. Ter Arkh. 2018;90(7):105–9.

Fig. 1 HPLC chromatogram of blood sample



Peak		Time (at second)	Peak Area Value	Percentage
P1		6	459	1.2
P2	F	12	2098	5.7
P3		33	555	1.5
P4		49	248	0.7
P5	A2	111	1264	3.4
P6	D	141	31766	85.9
P7		166	173	0.5
P8		182	426	1.2
Total Area Value			36989	

CASE-3: Dr. Hani Ajrina Zulkeflee, Dr Wan Nur Aimi Wan Mohd Zamri, Dr Siti Nadirah Ab Rahim, Dr Wan Nor Fazila Hafizan Wan Nik and Dr Razan Hayati Zulkeflee

1. Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia.

2. Pathology Department, Hospital Ampang, Jalan Mewah Utara, Pandan Mewah, 68000 Ampang,Selangor, Malaysia.

3. Pathology Department, Hospital Selayang, Lebuhraya Selayang – Kepong, 69100 Batu Caves,Selangor, Malaysia.

4. Pathology Unit, Faculty of Medicine and Defence Health, National Defence University of Malaysia, Kem Perdana Sungai Besi, 57000 Kuala Lumpur, Malaysia.

5. Department of Chemical Pathology, School of Medical Sciences, Universiti Sains Malaysia, 16150 Kota Bharu, Kelantan, Malaysia. 6Department of Haematology, School of MedicalSciences, Universiti Sains Malaysia, 16150 Kota Bharu, Kelantan, Malaysia.

E-mail: haniajrina@usim.edu.my

Case History

A 31-year-old lady presented with infected burn injuries. Her past medical history was unremarkable. During the admission, her laboratory results showed persistent hyperkalaemia while the patient remained asymptomatic. The serial laboratory results were:

Mode of sample transportation	Date	Type of sample	Haemolysis index	Potassium concentration	Lactate dehydrogenase	Total white cell count
	Hospital A (reference range)			3.4 – 4.5 mmol/L	< 247 U/L	4.0 – 10.00 X 10^9/L
Pneumatic tube system	14/1/2023	Plasma	NIL	13.6	-	1262
Manual transport by hand	15/1/2023		NIL	7.5	1709	-
	17/1/2023		1+	19.3	2430	-
	17/1/2023	Serum	NIL	6.6	-	-
	Hospital B (reference range)			3.4 – 4.5 mmol/L	120 – 246 U/L	4.078 – 11.37 K/uL
	20/1/2023	Plasma	NIL	8.6	1291	483.7
	11/4/2023		NIL	4.2	319	18.5
	19/6/2023		NIL	3.8	255	3.4

Questions

1. What possibilities could you offer to explain the potassium results?
2. How to investigate the results?
3. What further tests to confirm the patient's diagnosis and what is the underlying mechanism related to hyperkalaemia?
4. What is the best advice to clinicians when dealing with hyperkalaemia in this case?

Discussion

Question 1

Serial potassium results showed hyperkalaemia, which is diagnosed when the potassium concentration is above 5.0 mmol/L. It is particularly concerning when the level rises above 6.5mmol/L due to its potential cardiotoxicity risks.[1]

The patient showed no symptoms of hyperkalaemia such as palpitation, chest pain and muscle weakness. Her electrocardiography results showed no tall and tented T wave, shortened QT interval, widened QRS complex or absent T wave. Thus, pseudo-hyperkalaemia is suspected.

Pseudo-hyperkalaemia refers to an erroneous hyperkalaemia and it poses a significant challenge in the accurate determination of potassium concentration.[2] Upon receiving hyperkalaemic results, the attending physicians are warranted to decide promptly, and this may result in injudicious administration of potassium-lowering therapies.

The possible causes of pseudo-hyperkalaemia include:

- Haemolysis of red blood cells (e.g. difficult venepuncture, improper specimen handling)
- In vitro leakage from other blood cells (e.g. thrombocytosis, leucocytosis)
- Potassium contamination (e.g. EDTA tube sampling, sampling at the same side of intravenous fluid).[1]

Question 2

Timely identification of pseudo-hyperkalaemia is crucial to prevent the administration of inappropriate treatments. A combination of severely elevated potassium concentrations reaching levels incompatible with life and asymptomatic presentation raises the suspicion of pseudohyperkalaemia.[2] This shall be confirmed with a repeat sampling. Alternatively, utilizing a direct ion-selective electrode method through a blood gas analyser for the measurement of whole blood potassium offers a swift method to identify true hyperkalaemia, as it bypasses the technical processing of a patient's sample.[3]

Red blood cell haemolysis is the predominant preanalytical factor leading to pseudo-hyperkalaemia. Any reported potassium concentration surpassing the reference range necessitates an accompanying assessment of the haemolysis index (H-index).[4] Most of her results exhibited a negative haemolysis index, effectively ruling out haemolysis as the contributing factor.

Reflex testing with serum calcium, magnesium, and alkaline phosphatase (ALP) helps mitigate the risk of K^2-EDTA contamination. EDTA selectively chelates divalent cations, such as calcium and magnesium, leading to hypocalcaemia and hypomagnesaemia, respectively. Indirectly, depletion of these ions renders them inaccessible for various enzymatic reactions. For instance, ALP requires magnesium and zinc as the enzyme cofactors. Thus, this elucidates the observed low concentrations of ALP in samples contaminated with EDTA.[5]

Simultaneous measurement of serum and plasma potassium is beneficial for further investigation of its underlying cause. Reverse pseudo-hyperkalaemia refers to an elevated plasma potassium concentration compared to the serum levels observed in the presence of significant leucocytosis.[6] Conversely, thrombocytosis leads to an increased measured serum potassium due to the release of potassium by platelets during the clotting process.[7]

Figure 1 depicts the proposed stepwise laboratory approach to hyperkalaemia, aiming for the early detection of erroneous results.

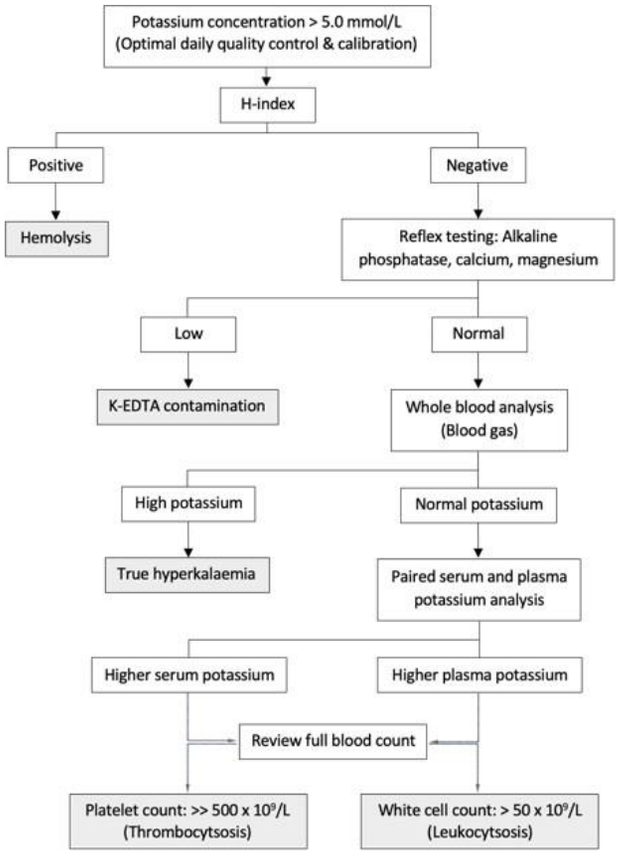


Figure 1: Diagnostic algorithm on approach to pseudohyperkalaemia

Question 3

Urgent blood film and bone marrow biopsy confirmed a diagnosis of Chronic Lymphocytic Leukaemia (CLL).

Dysplastic leukocytes in leukaemia are easily ruptured during sample centrifugation due to an increased in the membrane fragility. CLL for example, has cytoskeletal defects on its lymphocytes and this is manifested as smudge cells on peripheral blood film. In the presence of hyperleukocytosis, in vitro lysis of CLL lymphocytes can lead to the spurious hyperkalaemia. [2, 4]

Serum potassium measurement yields a lower result as the fibrin clot in the serum captures and stabilizes delicate tumour cells during sample centrifugation, consequently minimizing therelease of potassium from the cells.[7]

The pneumatic tube system is not an appropriate method for sample transport in this case dueto the additional mechanical force exerted on the fragile leukemic cells. This is evident in the higher reported potassium concentration compared to the specimens transported manually byhand.

Chemotherapy was commenced, and serial laboratory results showed reduction of white bloodcell count along with plasma potassium levels. This showed that the magnitude of potassium elevation is proportional to the white cell counts as we can see the normalization of plasma potassium is achieved when the white cell counts reduced.

	19/1/2023	15/2/2023	9/3/2023	11/4/2023	12/5/2023
WBC count (4.078 – 11.37 K/uL)	494.3	476.1	414.3	18.5	2.8
Plasma potassium (3.4 – 4.5 mmol/L)	7.7	5.7	4.9	4.2	3.9

Question 4

This case highlights the importance of recognizing pseudo-hyperkalaemia in patients with extreme hyperleukocytosis. This awareness is essential to prevent iatrogenic hypokalaemia and ensure prudent patient management. The significance of identifying pseudo-hyperkalaemia isparticularly emphasized in this patient, as accurate electrolyte monitoring is crucial to assess the risk of tumour lysis syndrome during her chemotherapy treatment.[2,4]

The most suitable method for monitoring the patient's potassium levels is through whole bloodpotassium analysis using a direct ion-selective electrode method through the blood gas analyser.[3,8] This approach aids in distinguishing between true and erroneous hyperkalaemia Additionally, it is imperative for clinicians to correlate blood test results with clinical findings. Effective communication between clinicians and laboratory personnel becomes essential whenreported results show discrepancies.

References

1. Lindner G, Burdmann EA, Clase CM, Hemmelgarn BR, Herzog CA, Małyszko J, Nagahama M, et al. Acute hyperkalemia in the emergency department: a summaryfrom a Kidney Disease: Improving Global Outcomes conference. Eur J Emerg Med 2020; 27(5):329-337.
2. Dewey J, Mastenbrook J, Bauler LD. Differentiating Pseudohyperkalemia From True Hyperkalemia in a Patient With Chronic Lymphocytic Leukemia and Diverticulitis. Cureus 2020 17;12(8):e9800.
3. Shrestha B, Rijal SS, Pokhrel A, Paudel A, Baral K, Poudel B, et al. Pseudohyperkalemia Associated With Leukemia. Cureus 2022; 14(4):e23978.
4. Haque MZ, Nasir A, Judge R. Pseudohyperkalemia in chronic lymphocytic leukemiaand diabetic ketoacidosis. Clin Case Rep. 2023 Aug 22;11(8):e7821.
5. Van Elslande J, Dominicus T, Toelen J, Frans G, Vermeersch P. A case of severe pseudohyperkalaemia due to muscle contraction. Biochem Med (Zagreb) 2020; 30(2):021004.
6. El Shamy O, Rein JL, Kattamanchi S, Uribarri J, Vassalotti JA. Reverse pseudohyperkalemia is more than leukocytosis: a retrospective study. Clin Kidney J2020; 14(5):1443-1449.
7. Merritt M, Kline H, Garimella S, Seigler R. Pseudohyperkalemia in a patient with T-cellacute lymphoblastic leukemia and hyperleukocytosis. J Pediatr Intensive Care 2018;7:166-168.
8. Massicotte-Azarniouch D, Canney M, Sood MM, Hundemer GL. Managing Hyperkalemia in the Modern Era: A Case-Based Approach. Kidney Int Rep 2023; 24;8(7):1290-1300.

"Three Friends of Winter in a Chinese Garden"

By
Dr Tan It Koon

In China's Suzhou city, about 200 private traditional-style gardens were created by top imperial government officials, scholars, and wealthy merchants as part of their family homes. The concept underlying the planning of such gardens was the creation of scenes of natural beauty surrounding the residence one lives in to give the impression of living in the mountains with scenic views of nature. Views at every nook and corner of the garden would appear like beautiful idyllic Chinese traditional landscape paintings by great masters in miniature 3-dimensional forms. Stones from the bottom of the Tai Lake were selected and assembled to appear like the well-known mountains and waterfalls and ponds were created to enhance the beauty of the gardens. Growing plants that bloom at different times of the year and whose foliage changes their colors depending on the seasons helps to provide changing views of the garden with change of season.

My large scrolled painting is an example of such a garden in winter when snow covers everything under the dark sky. This 《Three Friends of Winter in a Chinese Garden》 painting features plum trees in full bloom, snow-covered pine trees and bamboo plants, and unique beautiful rocks from Tai Lake in varied sizes, shapes, and states of water erosion. A couple of visitors are seen walking on a zig-zag walkway built over the manmade lake while 3 other visitors are admiring the snowy scene from the snow-capped pavilions in the distance.

When snow covers everything and the cold causes most plants to lose their foliage and wildlife go into hibernation, plum trees show their pride and nature of unyielding strength by beginning to bloom with pink and white blossoms. At the same time, pine trees and bamboo remain green and thrive with vigor in such harsh and adverse environments. It is not surprising that they have been regarded by learned scholars of ancient China as the 《Three Friends of Winter. They represent the most desirable virtues of righteous gentlemen and great scholars: righteousness, strength, and humility.98777[9]nmklm

With Best Wishes

Dr Tan It Koon

SACB Founding President
APFCB Founding President
IFCC Executive Committee Member
WHO Expert Committee Member