Clinical Biochemistry News

ACBI

ACB

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Newsletter of the Association of Clinical Biochemists in Ireland

and the Association for Clinical Biochemistry and Laboratory Medicine (Republic of Ireland Region)

Contents

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Message from the President of the Association of Clinical Biochemists in Ireland

Dr. Jennifer Brady

It's hard to believe we are nearing the end of another busy year! Our conference was a great success and it was wonderful to see so many of you there. Don't forget to record it in your CPD portfolio on the website.

The EFLM postgraduate course entitled 'how to write a good scientific and professional article' is taking place on Friday 2nd February. This will be a really exciting and important opportunity to hear from the experts what it takes to get your paper published, whether you are a novice or a seasoned author. Publishing our research adds to the knowledge base on a topic and provides evidence and data that others can use in their laboratory practice, and of course it also is a great addition to your CV. The course will cover choosing where to submit a manuscript, what data to include and how to present it, how to critique the data, and how to write the cover letter. You can register now on the website. Due to the interactive nature of the course, places are limited to 35 on a first come first served basis. Don't forget that if you want some support with publishing or any other aspect of your career development, you can also apply to our mentoring programme.

As we reflect on the year at the ACBI, I want to thank everyone who gives their time voluntarily to support the organisation. Our Council members are Dr Seán Costelloe, Dr Paula O'Shea (vice-president), Dr Graham Lee, Karen Heverin (treasurer), Kelly Foley (secretary), Micheál Ryan and Bríd Holohan who was recently co-opted onto Council. Each of them, and in particular the officers, give a lot of time behind the scenes to ensure the ACBI is running smoothly. Alison Bransfield ensures the website is up to date, and Peadar McGing and Martin Healy continue to produce this newsletter which I'm sure you'll agree is a valuable resource. I am very grateful to all of them for their support and willingness to give up their time for the ACBI.

Members of Council recently attended a briefing by the HSE on the review to inform the strategic direction of laboratory services. The report is the culmination of 18 months' work to which the ACBI contributed and is due to be published in December. The ACBI welcomes the appointment of Professor Martin Cormican to the role of Clinical Lead for the National Clinical Programme for Pathology. His remit includes laboratory services reform and we look forward to working with him to develop the report content into a strategic plan.

The ACBI continues to advocate for Clinical Biochemists with the HSE and other stakeholders within our health services. We are also in discussions with Fórsa about working more collaboratively for our members. I would like to remind any Clinical Biochemist who is not yet a member of Fórsa to give serious consideration to joining. Benefits of union membership include support for workplace issues and financial benefits, however perhaps the most important albeit unseen benefit is the mandate Fórsa has to advocate for our entire profession with employers. This requires a critical mass of members to be successful.

The ACBI is a member of the Health and Social Care Professions Alliance (HSCPA) and we are represented by Dr Graham Lee and Dr Heloise Tarrant on this group. The HSCPA previously met with Bernard Gloster, the CEO of the HSE, to seek engagement on the challenges which face all HSCPs. Further meetings are planned.

It will soon be time to renew your membership. The ACBI Council have maintained membership fees at the same rate for 2024. When renewing, please ensure that you are registered for the correct category/grade of membership. There are many benefits to your membership, including the EFLM Academy which continues to produce a plentiful suite of webinars and learning material, and gives access to journals and CLSI guidelines, all of which can be accessed with your academy login. Keep an eye on the EFLM newsletters for new opportunities to get involved in EFLM activities.

Finally, I wish all our members a peaceful Christmas and good wishes for 2024!

Dr Jennifer Brady, ACBI President

ACB Republic of Ireland Region

Save the date for the ACB Republic of Ireland Region Annual Scientific Meeting – Friday 23rd February 2024

This will be a virtual meeting

The theme is 'Calculations in Laboratory Medicine' and the proposed topics include:

eGFR

KFRE (Kidney failure risk equation)

FIB-4

Adjusted calcium

There will also be a discussion of laboratory information system projects and accreditation requirements governing calculated tests.

The current committee composition of the ACB RoI Region is shown below. Carl Talbot's tenure as Regional Trainee Rep will be ending soon but no 'volunteers' have stepped forward to replace him yet ☺

ACB Republic of Ireland Region Committee

- **Ms Alison Bransfield – Chair, ACB Council Representative**
- **Dr. Janice Reeve – Secretary / Treasurer**
- **Dr. Janice Reeve – Regional Tutor**
- **Mr. Carl Talbot – Regional Trainee Representative**
- **Dr. Brendan Byrne – Regional Audit Lead**
- **Dr. Paula O'Shea – Association of Clinical Biochemists in Ireland (ACBI) Representative**
- **Dr. Roshaida Abdul Wahab – Ordinary Member**

IEQAS Conference, Dublin 2023

A Report by Dr. Barbara MacNamara

Senior Clinical Biochemist, St. James's Hospital Dublin

IEQAS Conference 2023.

In the October issue of *Clinical Biochemistry News* we carried an overview report on the IEQAS Annual Participants' Meeting held in Dublin in early October. In this issue Dr. Barbara MacNamara, Principal Clinical Biochemist in St. James's Hospital reports in more detail on three of the lectures from the morning's Plenary sessions.

Opening address by IEQAS Chair, Dr. Peadar McGing, retired Principal Clinical Biochemist, MMUH.

With the compliments of the ACBI, I attended IEQAS 2023 on the 5th October in the Aisling Hotel, a mere stone's throw away from my workplace at St. James Hospital, in Dublin 8.

It was a fantastic opportunity to re-engage with former colleagues and to network with medical scientists and clinical biochemists who were in attendance from various hospitals across Ireland.

There was a high calibre of presentations on pre-analytical EQA, validations and the recently revised ISO-15189 standard, while the clinical chemistry workshop consisted of an award winning clinical case on milk alkali syndrome by our colleague Micheál Ryan and a very interesting talk by Dr. Aidan Ryan on the diagnostic implications of hypertriglyceridemia.

My more detailed accounts of a number of excellent presentations are as follows;

Prof. Donal O'Shea, consultant endocrinologist, brought the audience though his 30 years of experience as a transgender medicine specialist by presenting a "*series of firsts*"; namely his *"first transgender patient"* as a young newly appointed consultant in Charing Cross in 1996, his *"first case upon return to Ireland" in 1999*, his*" first encounter with regret"* and his *"first thank you letter".*

As each series unfolded, the encaptivated audience gained a better insight into the world of transgender medicine not only from an endocrinology point of view, from also from a social, psychological, emotional and legal perspective.

Prof. Donal O'Shea.

Question time following Prof. O'Shea's talk.

One key message that Prof. O'Shea reiterated throughout his talk was the role of the healthcare profession to ensure the best possible outcome for transgender patients. While family support and good family relations are crucial in obtaining the best possible outcome**,** Prof. O'Shea's MDT endeavour to provide careful holistic support to achieve the best outcome possible in the form of psychological evaluations, assessment of social needs and very careful discussions with the patient on the need or not for surgical interventions.

Whilst considering Prof. O'Shea's very own words of "an ex-

plosion" of referrals to his transgender clinic since 2010, one aspect of this change that I find particularly interesting is that Prof. O'Shea's typical patient at the Charing Cross Centre for Gender Reassignment was a 50-year-old very flamboyantly dressed trans woman whereas now 30 years later his typical trans patient is a 19-year-old female at birth transitioning to the male gender. Thus, not only is this a journey of individual patients but also a journey of transgender medicine as a whole.

At the end of Prof O'Shea's thought-provoking presentation, members of the audience addressed the many challenges that laboratory medicine is currently experiencing in its role to provide the best service possible to transgender patients. Specific mention was made to the need of clarification of transgender terminology, the lack of functionality of current laboratory information systems to record both "Sex at Birth" and "Gender Identity", the lack of information on request forms for report interpretations, and the need for guidance in relation to appropriate reference intervals for the transgender population.

Transgender medicine has evolved and grown. Our journey as scientists to overcome the laboratory challenges is just beginning……

[Note from editors: In the week prior to publication of this newsletter RTE's Primetime addressed this topic in a programme in which Prof. O'Shea featured strongly. The programme is available on RTE Player].

Dr. Ann Leonard very enthusiastically presented the "**C**omprehensive & **E**ffective **L**aboratory **T**est Intervals for **I**rish **C**hildren" project (CELTIC Reference Interval Project) which was recently completed at Tallaght University Hospital under the management of Dr. Ann Leonard, Professor Gerard Boran, Professor Eleanor Molloy and Dr. Turlough Bolger.

The CELTIC project had a clear aim to produce a comprehensive set of paediatric reference ranges in the Irish population for commonly ordered clinical chemistry and haematology laboratory tests. This project also had a simple working hypothesis, namely that locally derived reference intervals would be better suited to the Irish population than the currently used reference ranges supplied by Roche.

Dr. Ann Leonard

Dr. Leonard referred to other such paediatric reference interval projects as KIGGS in Germany, HAPPI KIDS in Australia, PRINCE in China, the Nordic Reference Ranges project in Scandinavia and of course the well-documented CALIPER of Canada.

The project team obtained ethical approval for a simple study design to recruit patients between the age of 0 to 21 years for the analysis of RLB profile, lipid profile, TFT's, CK, magnesium, vitamin D and HbA1C on residual blood samples along with an extra spare blood sample for bio-banking purposes.

Dr. Leonard recruited patients between the years 2019 to 2022 at the GP phlebotomy clinic at Tallaght University Hospital, with a final number of 1015 participants comprising of 530 females and 485 males, noting a greater number of children in the 8,9 & 10-year-old age groups. The recruitment process involved the taking of consent, review of medical history to check for exclusion criteria and a very detailed questionnaire comprising of questions such as the number of hours' screen time per day and number of hours playing sport per week, of which an incidental finding of GAA being the most popular sporting activity emerged! Weight, height and arm span information was also recorded as part of the process.

The weekly joint scientific and clinical review of results to ensure accuracy of results and secondly for the appropriate follow-up of any abnormal results were a key part of the project. All results were reported before anonymization and subsequent statistical analysis. Data was reviewed by scatterplots, outliers removed by the Tukey method and intervals were calculated between 2.5 & 97.5 percentiles, confidence intervals were also calculated.

Dr. Leonard briefly outlined some co-incidental findings such as a general low vitamin D status and also explained their rational to age partition creatinine.

Dr. Leonard finally paid complement to both the phlebotomy team and to the clinical chemistry laboratory team at Tallaght University Hospital who very efficiently and brilliantly attended to the laboratory analysis along with the bio-banking component of this study.

Great project and an equally great reference interval title!

Joanna Pelanti, R&D director for the Finnish EQA provider Labquality, introduced her company in terms of its many milestones since its founding in 1971.

Dr. Pelanti put the need for participation in pre-analytical EQA schemes into clear perspective as it is estimated that over 70 % of laboratory errors occur in the pre-analytical phase. Interestingly ISO I5189 states that laboratories should choose EQA schemes to cover the total testing process, however, in practice, many accreditation bodies may not assess a laboratory's provision of an EQA scheme to cover the pre-analytical phase.

Dr. Pelanti outlined the mission of the IFCC and EFLM pre-analytical working groups to recommend strategies and to publish consensus documents for the overall goal to reduce the number of pre-analytical errors.

Dr. Pelanti presented the different types of pre-analytical EQA schemes on offer by Labquality such as the integrated pre-analytical-traditional EQA schemes and also discussed feedback from laboratories participating in these schemes.

Interestingly with a greater emphasis of the newly revised ISO-15189 standard to demonstrate risk reduction in clinical laboratories, enrolment in such EQA pre-analytical schemes can form part of a laboratory's strategy to ensure quality of this phase of testing.

Dr. Joanna Pelanti

ACBI / EFLM News

ACBI Training Day / EFLM Postgraduate Course: The ACBI Training Day, originally scheduled for the 19th October 2023, has now been rescheduled to Friday 2nd February 2024. It will be hosted at the the Pillar Centre for Transformative Healthcare, Eccles St. Dublin 7. The Training Day is being held in collaboration with the EFLM and is a postgraduate course entitled *'A journey into mastering scientific article writing'*. Registration for the training day is now open on the ACBI website. Due to the interactive nature of this course it is limited to 35 places on a first come first served basis. If you registered for the earlier date and opted to retain your registration, you do not need to do anything further unless this new date is not suitable, in which case you may contact the ACBI treasurer for a full refund (treasurer@acbi.ie).

ACBI Membership renewal 2024: From the 1st of January 2024 members will be prompted on the ACBI website to renew their membership. Cost of membership remains the same as last year. Make sure you review your status and adjust accordingly. Benefits of membership include reduced rates for ACBI conferences and events, automatic registration for EFLM Academy, which includes access to CCLM (Clinical Chemistry and Laboratory Medicine) and CLSI guidelines, access to bursaries and maintenance of your CPD on the website.

HPRA Consultation Document: The Health Products Regulatory Authority (HPRA) have announced consultation on the draft guide for in house IVD's. Further information is available on the consultation page. All formal comments on the draft guidance can be submitted to devicesconsultation@hpra.ie by 26th January 2024.

eGFR Guidance: The National Clinical Programme for Pathology have issued an advice note on recommendations for calculation and reporting eGFR results in the laboratory. A link to the document can be found here.

EuroLabNews: A new edition of the EFLM Newsletter, EuroLabNews (November/December 2023), is available here.

CCLM: A new issue of Clinical Chemistry and Laboratory (CCLM—January 2024) is available. It can be accessed here. Members of the ACBI in good standing receive free access to the journal through membership of the EFLM Academy.

A Selection of Members' Recent Publications

Matvienko-Sikar K, Butler E, Keeffe LO, Dijk WV, Hayes CB, Huizink AC, Kearney PM, **Costelloe SJ**, Curtin S, Foley K, McCarthy FP, Mahony SO, Khashan A, Murray DM Prenatal maternal cortisol, stress and anxiety, and childhood obesity at 5 years: a nested case-control study. J Reprod Infant Psychol. 2023 Nov 29:1-15. doi: 10.1080/02646838.2023.2288298.

Green AD, **Lee GR** An appraisal of the practice of duplicate testing for the detection of irregular analytical errors. Clin Chem Lab Med. 2023 Nov 10. doi: 10.1515/cclm-2022-0605.

O'Sullivan M, Moran C, Griffin TP, Doheny H, McCartney DM**, O'Shea PM**. Impact of the COVID-19 lockdown on the vitamin D status of people in the West of Ireland. Ir J Med Sci. 2023 Oct 21. doi: 10.1007/s11845-023-03543-y.

Curneen JMG, Rabbitt L, Browne D, O'Donoghue DF, Alansari Y, Harhen B, Ní Ghríofa A, Ferguson J, McEvoy JW, Lappin D, Finn DP, **O'Shea PM**, Dennedy MC. Major disparities in patient-reported adherence compared to objective assessment of adherence using mass spectrometry: A prospective study in a tertiary-referral hypertension clinic. Br J Clin Pharmacol. 2023 Jul;89 (7):1948-1955. doi: 10.1111/bcp.15292.

Khan AI, Pratumvinit B, Jacobs E, Kost GJ, Kary H, Balla J, Shaw J, Milevoj Kopcinovic L, Vaubourdolle M, Oliver P, Jarvis PRE, Pamidi P, Erasmus RT, **O'Kelly R**, Musaad S, Sandberg S. Point-of-care testing performed by healthcare professionals outside the hospital setting: consensus based recommendations from the IFCC Committee on Point-of-Care Testing (IFCC C-POCT). Clin Chem Lab Med. 2023 Jun 2;61(9):1572-1579. doi: 10.1515/cclm-2023-0502.

Yelverton CA, O'Keeffe LM, Bartels HC, McDonnell C, Geraghty AA, O'Brien EC, Killeen SL, Twomey P, **Kilbane M**, Crowley RK, McKenna M, McAuliffe FM. Association between maternal blood lipids during pregnancy and offspring growth trajectories in a predominantly macrosomic cohort: findings from the ROLO longitudinal birth cohort study. Eur J Pediatr. 2023 Oct 11. doi: 10.1007/s00431-023-05251-2.

Bartosch C, Nadal A, Braga AC, Salerno A, Rougemont AL, Van Rompuy AS, Fitzgerald B, **Joyce C**, Allias F, Maher GJ, Turowski G, Tille JC, Alsibai KD, Van de Vijver K et al. Practical guidelines of the EOTTD for pathological and genetic diagnosis of hydatidiform moles. Virchows Arch. 2023 Oct 19. doi: 10.1007/s00428-023-03658-8.

AI and the Laboratory

The impact of AI on clinical chemistry laboratories is a live issue. Many professional organisations are examining the role of AI programs in clinical laboratory settings, including the EFLM. The paper below assesses ChatGPT.

Cadamuro J, Cabitza F, Debeljak Z, De Bruyne S, Frans G, Perez SM, Ozdemir H, Tolios A, Carobene A, Padoan A. **Potentials and pitfalls of ChatGPT and natural language artificial intelligence artificial models for the understanding of laboratory medicine test results. An assessment by the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) Working Group on Artificial Intelligence (WG-AI).** Clin Chem Lab Med. 2023 Apr 24;61(7):1158-1166. doi: 10.1515/cclm-2023-035.

Diabetes Guideline Updates

About 530 million people worldwide are living with diabetes with the number expected to rise to 1.3 billion in the next 30 years. Approximately 300,000 people in Ireland are diabetic at present, around 6% of the population. Not surprisingly, guidelines on diagnosis, management and therapy are regularly being published. See some examples below from a lab perspective:

Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus. Sacks DB, Arnold M, Bakris GL, Bruns DE, Horvath AR, Lernmark Å, Metzger BE, Nathan DM, Kirkman MS. Diabetes Care. 2023 Oct 1;46(10):e151-e199. doi: 10.2337/dci23-0036.

For a condensed version see: **Executive Summary: Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus.**

For the important interplay between clinical and laboratory medicine see: **New Laboratory Guidelines for Diabetes: Continuing the Collaboration between Clinical and Laboratory Medicine.** Kilpatrick ES. Clin Chem. 2023 Aug 2;69(8):785-787. doi: 10.1093/clinchem/hvad092.

Report on the 45th ACBI Annual Conference
October 20th/21st, 2023

The ACBI 45th Annual Conference was held in the Pillar Centre for Transformative Healthcare at the Mater Misericordiae University Hospital (MMUH), Dublin on the 20th and 21st October, 2023. The conference was a huge success with many praising the diverse scientific programme delivered by both national and international speakers.

The conference was opened by Alan Sharp, CEO of the Hospital and by Dr Paula O'Shea, Consultant Clinical Biochemist at MMUH. The President's Address was delivered by Dr Jennifer Brady, Consultant Clinical Biochemist at Children's Health Ireland (CHI). The first session focussed on Toxicology and was chaired by Ms Siobhan Stokes, former Principal Clinical Biochemist at the National Drug Treatment Centre, Dublin.

Session 1: Toxicology:

The first talk of the session titled *'Trends in drug monitoring in Ireland: what festival pill testing and syringes can tell us'* was delivered by Sinéad McNamara, Senior Biochemist at the National Drug Treatment Centre, Dublin. Sinéad began her presentation by highlighting

the work undertaken as part of the ESCAPE Syringe Analysis Project, a fascinating project which aims to identify trends among intravenous drug-using populations in various regions around the world. The project involved collecting used syringes from two different locations in Ireland during 2021 and 2022, extraction of syringe contents and analysis of these contents for over 200 drugs and metabolites using LC-MS. Some of the findings of the study included the detection/identification of new substances, the re-emergence of particular drugs e.g. cocaine, and the variety in drug patterns between regions. This is the type of information that can provide unique insights into the ever-changing Irish drug market. Sinéad then took us through a 'back of house' drug checking service, currently utilised at national music festivals. Piloted in 2022, the service aimed to test and identify substances in the festival setting and to subsequently alert the public to any dangerous substances via social media and other available platforms. Sinéad outlined how impactful these alerts are and discussed how their findings led to notifications of new substances to the European Database on New Drugs. I think I speak on behalf of everyone in the audience when I say this talk was a real eye-opener and an excellent opening to the conference!

The second speaker of the morning was Professor Eamon Keenan, a Consultant Psychiatrist in sub-

stance misuse who has been working in the area of addiction since the late 1980s. Prof Keenan opened his presentation with a summary of the historic response to the Opioid Epidemic and HIV outbreak, which subsequently led to the establishment of various addiction services in Ireland. Prof Keenan went on to explain that although rates of HIV and hepatitis C have significantly dropped since development of these services, new drugs are continuing to rapidly emerge onto the market. The identification of the use of New Psychoactive Substances (NPS), particularly in young people, is of growing concern. Prof Keenan spoke of the ongoing challenges in monitoring this continually changing landscape, highlighting that existing services are required to adapt in order to provide appropriate responses and recommendations for those using these new drugs. Prof Keenan out-

lined the work currently being carried out to improve drug monitoring and knowledge in Ireland, touching upon the studies discussed in the first talk by Sinéad and on waste water analysis. The take-home message from this excellent presentation is that harm cannot be reduced without effective drug monitoring and drug analysis to inform responsiveness to emerging drug trends.

The third talk of the session was presented by Dr John Bradley, Forensic Toxicologist at the Medical Bureau of Road Safety (MBRS). Dr Bradley gave a comprehensive overview of the MBRS, discussing the toxicology workflow of blood and urine within the MBRS and mass spectrometry based method-

ologies used for detection and quantitation of drugs of abuse. Dr Bradley outlined the analytical challenges of drug detection using LC-MS and provided some ingenious tips and tricks to troubleshoot and overcome these challenges. Dr Bradley then shared an interesting case study of ion suppression in urine due to the presence of Pregabalin and he reiterated the importance of careful interpretation of mass spectrometry results. Dr Bradley concluded his talk outlining the future work of the MBRS.

After a short coffee break and a round of excellent poster viewing, Mairéad Webster of the State Laboratory presented her talk titled *'An agile and modern approach to post-mortem toxicology screening in the State Laboratory'*. The talk began with a fascinating overview of the State Laboratory, with Mairéad explaining that the Human Toxicology section of the Laboratory is responsible for providing a forensic toxicology service to assist the Coroner's service in establishing cause of death. Post-mortem samples are analyzed to confirm the presence or absence of ethanol and various other substances, with quantification of the substances that are detected. Mairéad went on to discuss the emergence of NPS onto the drug market and how NPS pose an analytical challenge; they often have similar chemical structures and are 'invisible' in traditional toxicology screens.

Mairéad took us through a novel analytical approach that was developed and implemented at the Laboratory; suspect samples to be screened for national and international NPS drug alerts. Notably, this approach also allows for retrospective analysis of data in suspected toxicology cases. Mairéad presented three case studies, each of which outlined the advantage of running a general and unknown screen rather than a targeted multiple reaction monitoring (MRM) approach,

emphasising that adding emerging drug trends to the general screen identifies analytes that would not have been detected in previous mass spectrometry screens. The State Laboratory is constantly optimising and improving, with plans to further develop and expand the general and unknown screen.

The final talk of the session was delivered by Dr. Adrian Moughty, Consultant in Emergency Medicine at MMUH. Dr. Moughty began his presentation by explaining the speciality of emergency medicine with an emphasis on patients presenting

with recreational drug use. Such recreational drug use related presentations to ED are common, and Dr. Moughty commented that these cases are frequently challenging to care for and often present to ED at resource depleted times. Dr. Moughty went on to present some of the data collected as part of the European Drug Emergencies Network (Euro-DEN) project. This project involves collecting data on ED recreational drug presentations in participating countries in Europe. Some of the findings to date include; most presentations were among males, polypharmacy is common, and prescription and OTC medicines were a significant proportion of drugs involved in these presentations. Dr. Moughty spoke of his own experience at MMUH, noting an increase in the use of all drugs classes in recent years. In conclusion, Dr. Moughty highlighted the need for more real-time information on drug use trends, as this data can provide valuable information on patterns of harm associated with emerging recreational drugs.

Session 2

After lunch the meeting resumed under the chairmanship of Micheál Ryan, Senior Clinical Biochemist in Limerick University Hospital. Professor Fidelma Dunne, a distinguished Consultant Endocrinologist at Galway University Hospital Group, and a prominent figure in diabetes research, shared valuable insights into the evolving landscape of Gestational Diabetes Mellitus (GDM). Her presentation covered critical aspects of screening methods, treatment strategies, and diagnostic criteria, bringing to light advancements that have the potential to significantly impact maternal and foetal health.

GDM remains a global health concern impacting approximately 2.93 million pregnancies annually, with a significant burden in low- and middle-income countries. The presentation highlighted the short-term and long-term complications associated with GDM for both mothers and infants. Maternal complications include hypertensive disorders, caesarean sections, and long-term risks such as recurrent GDM and cardiovascular diseases. Foetal complications encompass large for gestational age, neonatal hypoglycaemia, and long-term risks such as type 2 diabetes and obesity.

The presentation meticulously compared the traditional 2-step Carpenter & Coustan criteria (1982) with the 1-step IADPSG (WHO 2013) criteria for GDM screening. Professor Dunne navigated through the benefits and challenges of each approach, emphasizing the need to identify at-risk

mother-infant dyads and minimize missed cases through appropriate screening.

Drawing from the Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) Study, Professor Dunne highlighted the necessity for internationally agreed-upon diagnostic criteria. She presented the IADPSG recommendations, specifying three 75-gram, 2-hour Oral Glucose Tolerance Test (OGTT) thresholds for diagnosing GDM: Fasting 5.1 mmol/L, one hour 10 mmol/L, two hours 8.5 mmol/L.

Professor Dunne emphasized the importance of proper laboratory analysis in the diagnosis and management of diabetes mellitus. Citing the executive summary of guidelines and recommendations, she highlighted the need to minimize glycolysis during sample collection. A tube containing a rapidly effective glycolytic inhibitor, such as granulated citrate buffer, was recommended. If this was not feasible, the sample should be promptly placed in an ice-water slurry and subjected to centrifugation within 15-30 minutes to remove cells. The cautionary note was given that tubes with only enolase inhibitors, like sodium fluoride, should not be solely relied upon to prevent glycolysis.

The talk delved into the potential of metformin as an alternative therapeutic approach for GDM. She outlined the advantages of metformin, such as significant knowledge and safety data, oral administration, high compliance, affordability, no storage issues, and a global reach. She presented the outcomes of the EMERGE double-blind, placebo-controlled trial investigating the use of metformin in GDM. The study aimed to determine if early metformin administration could reduce the need for insulin, maternal weight gain, and improve maternal and neonatal outcomes. While not statistically superior in the primary outcome, metformin showed positive effects on glycaemic control, maternal weight gain, and infant size without increasing morbidities. Ongoing research is exploring its impact on the long-term health of mothers and offspring.

In conclusion, Professor Dunne's presentation provided a comprehensive understanding of the challenges, advancements, and potential solutions in GDM. The emphasis was on early identification and intervention in GDM to reduce complications and prevent future health risks for both mothers and infants. The scientific community faces an opportunity to revisit and refine diagnostic criteria based on evolving knowledge and research presented by Prof. Fidelma Dunne.

Dr. Graham Lee, an accomplished Consultant Clinical Biochemist at the Mater Misericordiae University Hospital in Dublin, illuminated the intricate landscape of Vitamin B12 and Folate testing. Drawing from his extensive expertise in clinical diagnostics, Dr. Lee provided his insight on the challenges surrounding these commonly requested tests and introduced key considerations for optimal diagnostic accuracy.

In his presentation, aptly titled *"B Wise with B12 (& Folate) Testing!"* Dr. Lee explored the absorption and transport mechanisms of folate, emphasizing the role of dietary sources and cellular release. His thorough examination underlined the fundamental connection between B12 and folate, stressing that these two vitamins are inseparable in both diagnosis and management. The presentation continued by addressing various causes of B12 and folate deficiency, expanding the discussion to include factors such as inadequate dietary intake, malabsorption issues, genetic considerations, and heightened utilization during pregnancy and lactation. Dr. Lee's comprehensive overview provided a holistic understanding of the multifaceted factors influencing B12 and folate levels across diverse patient populations.

The presentation delved into the interpretation of serum/plasma folate levels. Dr. Lee spotlighted a fascinating concept - folate trapping - elucidating scenarios where patients exhibit normal serum folate but low red cell folate. The Folate Trap occurs when Vitamin B12 deficiency renders folic acid inactive, disrupting essential biochemical reactions. Without B12, homocysteine accumulates, and the

active folate crucial for DNA synthesis is not produced, leading to "Megaloblastic Anaemia." This highlights the interdependence of B12 and folate in maintaining cellular functions.

A notable addition to Dr. Lee's insights was his exploration of controlled B12 testing in practice. By implementing local guidelines and advocating for appropriate B12 testing, Dr. Lee demonstrated a 70% decrease in the number of processed samples without compromising patient care. This strategic approach not only improved diagnostic accuracy but also showcased the efficacy of guideline-compliant testing.

The discussion extended to the comparison of Total B12 and Active B12 assays, with Dr. Lee shedding light on their diagnostic accuracy and relevance, particularly in the context of diabetes mellitus. Highlighting the potential impact of metformin on B12 levels, Dr. Lee underscored the importance of selecting the most appropriate test for accurate diagnosis.

In his closing remarks, Dr. Lee urged healthcare professionals to consider interventions that support judicious B12 and folate testing. He emphasized the imperative of viewing these vitamins as a dynamic duo for investigation and management, discouraging the practice of isolating one from the other. Dr. Lee also cautioned against inappropriate testing, encouraging exploration of alternative tests, such as Active B12, in specific patient populations.

Session 3:

Session 3 was chaired by Dr. Seán Costelloe, Consultant Clinical Biochemist at Cork University Hospital, and started with a talk about the benefits of adopting real time quality control measures, followed by a discussion on the opportunities and threats posed by disruptive technologies.

The opening talk for this session was titled *'If Internal Quality Control is inefficient or insufficient; consider patient-based real time QC'* and was presented by Dr Huub H Van Rossum, Laboratory Specialist at the Netherlands Cancer Institute in Amsterdam. In some circumstances the use of IQC alone is insufficient to assure appropriate analytical quality; reasons for this include absence of suitable QC materials, rapid-onset critical errors (between scheduled IQC measures); QC materials with non-commutability issues and, lastly, tests with a sigma value less than or equal to 4. Development in the field of moving average quality controls, alongside limit checks, delta checks and multivariate checks, have enabled the design of more efficient and powerful QC procedures. Patient-based real-time quality control (PBRTQC) is a generic term for the use of patient results for real time QC purposes.

PBRTQC can be used for quality assurance for all phases of the laboratory process (i.e. preanalytical, analytical and postanalytical). One of the major developments that have allowed for widespread implementation of PBRTQC has been the online availability of advanced simulation techniques to set up and validate laboratory-specific PBRTQC procedures. Difficulties preventing the implementation of PBRTQC include the production of a manageable number of PBRTQC alarms and issues around specific patient populations or at specific times of the day or week. Dr Van Rossum used the example of the weekend patient population showing a lower average albumin concentration due to increased percentage of inpatient to outpatient samples. In conclusion, Dr Van Rossum highlighted how recent insights in the field of PBRTQC have made it possible to design more powerful and efficient QC plans by incorporating these techniques. Furthermore, the availability of the necessary optimization and validation tools has paved the way for a more general application of PBRTQC in medical laboratories.

The second presentation *'Disruption versus Evolution in Laboratory Medicine'* was given by Professor Janne Cadamuro from the Department of Clinical Chemistry, University Hospital Salzburg. Prof Cadamuro began by warning of the dangers posed to Medical Laboratory Professionals should we not adapt to emerging disruptive technologies, citing

the previous downfall of different market leaders who failed to adapt to the introduction of new technology such as Xerox, Kodak, Nokia and Blockbuster. He described how the traditional 'Evolution' of our role within the Hospital often remains concentrated on the analytical phase of testing with a focus on doing current tasks better, faster or cheaper through the use of new technologies, meaning faster instruments, lower sample volume, new software for documentation etc. 'Disruption', on the other hand, is an event or technology that results in the review of existing processes or the development of completely new strategies in laboratory medicine.

Prof. Cadamuro asks why laboratory specialists leave test selection and interpretation to the Clinicians. When new parameters emerge why do we wait until clinical teams have heard of them before looking at their implementation. Laboratory specialists, as experts in their field, know best which tests are appropriate to diagnose the patient and taking a larger role in the decision to introduce new tests would be beneficial to the profession and more importantly the patient. Other disruptive changes that he points to within diagnostic laboratories include the use of artificial intelligence and the introduction of a more integrated approach to healthcare that moves away from the traditional medical discipline model of healthcare. With the role of Laboratory specialists in flux, we must be aware of disruptive technologies and we need develop strategies to adapt to these changes.

The day closed with two oral presentations selected from abstracts, after which Dr Paula O'Shea, Chair of the Conference Organising Committee formally closed the day.

Session 4:

On Saturday morning the conference resumed under the chairmanship of Dr. Martin Healy, retired Principal Biochemist in St. James's Hospital. The morning began with three more oral presentations selected from abstracts, before a session on aspects of Vitamin D.

Dr Helena Scully (Children's Health Ireland) brought us through the findings of her PhD regarding Vitamin D in an Irish Population: Status, Determinants and Testing. Irelands' northerly latitude and our weather, leaves our population unable to synthesise adequate Vitamin D, therefore it is necessary to have good sources of vitamin D in our diet. If not present in the diet, then supplementation is required.

Dr. Scully published a number of papers during her PhD research, looking at: geo-mapping of Vitamin deficiency in Dublin; Vitamin D re-testing; Vitamin D deficiency in children and the effects of other determinants on Vit D status (Biophysical, skin type, sunscreen use, diet etc.). Of interest to us in the lab, she found that inappropriate retesting is common (too soon after treatment and too frequently in replete adults).

Dr Daniel McCartney (Human Nutrition & Dietetics at TU Dublin and Trinity College Dublin) discussed the importance of Vitamin D in the population and its seeming protective effect in respiratory illnesses including Covid19. Dr McCartney is making the case for mandatory supplementation of foods with Vitamin D, given the lack in the modern Irish diet, our northerly latitude, use of sunscreen etc.

Session 5:

After a relaxing coffee break, and last looks at the posters, we headed back to the lecture room for the final session, chaired by Dr. Jennifer Brady.

Shared Care Pathology

Helen Sneddon, a Clinical Scientist at the Royal Derby Hospital, discussed the creation in 2011 of the Derbyshire Shared Care Pathology guidelines, which were developed by a team of both primary and secondary care clinicians, along with laboratory scientists.

The guidelines help GPs to better understand requesting and interpreting laboratory results, for better management of their patients.

Guidelines are published on the Shared Care Pathology website with free access to all: https://www.uhdb.nhs.uk/shared-care-pathology-guidelines/ and their availability has resulted in reduced phone calls from GPs to the Duty Biochemist in Derbyshire requesting assistance with the interpretation of results. An impact has also been observed with regard to an increased appropriateness of requests coming in from GPs. Consultants have reported an increased quality of incoming referrals from Primary Care practice.

Challenges were discussed, including difficulties encountered with expanding the guidelines outside of the local Trust because of the differences in practice and care pathways provided by various regions/hospitals, making it difficult to apply the same guidelines across all Trusts. These challenges have been used constructively to start discussions about harmonizing processes.

Feedback from GPs indicate that the guidelines are simple, informative and easy to follow and have become an important part of the daily work of a GP. Since 2018, the guidelines have been incorporated into the national GP update, Red Whale and now reach a wide audience throughout the UK.

In his presentation *Diabetes and Technology, What's in a number?* Dr. Tomás Griffin discussed the role that advancing technology has to play in easing the burden faced by people living with Type I Diabetes (TID). It is a lifelong disorder, with no current cure. Management involves close monitoring, treatment and risk reduction techniques.

Dr. Griffin discussed how it is now possible to replace traditional methods with new and more convenient technologies such as continuous glucose monitors (CGM) and insulin pump technologies. The benefits of this include real time monitoring, which allows better glycaemic management. It is

now possible to record insulin dose administration electronically, and dosing can be automatically adjusted to meet closely monitored blood levels. Alarms can be set when blood glucose breaches a set upper or lower limit.

CGM is a more useful technique for measuring a patient's "time in range" than more traditional methods such as HbA1c monitoring or finger prick capillary glucose monitoring. Time in range is a dynamic measurement in comparison to HbA1c, with changes in therapy being reflected within a day as opposed to months for HbA1c monitoring. Being able to monitor time in range in real time and react immediately to changes in blood glucose levels has been demonstrated to be associated with a decrease in acute diabetes complications associated with TID.

It is also useful by the fact that data generated can be uploaded and accessed remotely by a patient's clinician allowing for virtual management.

With 95% of patients reporting an improved quality of life and with evidence of reduction in both acute and chronic complications of diabetes, it is clear to see the benefits of these technologies for improved patient management and care.

Dr. Carla Moran presented an informative, interactive session discussing the drugs that cause thyroid dysfunction, as well as the various mechanisms through which they cause their effect, including:

- direct toxic effects
- suppression of TRH and TSH production
- changes in thyroid hormone metabolism
- measurement artefact

Some examples were discussed, including the following:

Many cancers respond well to immune check point inhibitors and as such, they are being increasingly used. However, they are associated with a 70% risk of adverse effects, including to the endocrine system. Surveillance protocols for thyroid dysfunction have been developed to monitor patients. Advice is also available for interpretation and management of results obtained.

Alemtuzumab is a drug that is used for multiple sclerosis and it very commonly causes thyroid disease, with 41% of patients having this side effect, with about 16% of these patients having a fluctuating course of hypo- to hyper-thyroidism due to the presence of both stimulating and blocking forms of Thyroid Receptor antibodies (TRAB). Guidelines have been developed which recommend a baseline TSH followed by regular 3 monthly monitoring and if the patient develops thyrotoxicosis or hypothyroidism, then TRAB should be measured and patient monitored for fluctuation. If a patient attends with both MS and thyroid disease, Alemtuzumab therapy should always be queried and TSH and TRAB checked.

Amioderone therapy causes thyroid function changes in all patients who go on it, but only a subset develop thyroid dysfunction. 6% develop hypothyroidism and 3% develop Amioderone induced thyrotoxicosis. Differentiation between type 1 Amioderone induced thyrotoxicosis (AIT) and type 2 induced AIT is important because of variations in treatment (AIT type 1 is antithyroid drugs, AIT type 2 is steroids); measurement of FT3 is useful here.

Dr Moran also described a case study which brought awareness to how the drug Heparin can cause a displacement effect where FT4 appears raised in the presence of a normal total T4 level. This may occur due to displacement of thyroid hormones from their binding sites by free fatty acids liberated in vitro and is an artefact of heparin therapy.

Posters

Informative insights derived from audits, method evaluations, and compelling case histories should be actively disseminated among colleagues via engaging posters. Throughout the two-day ACBI conference, attendees were treated to a showcase of high-quality posters covering a spectrum of key themes, audits, service reviews, pre-analytics, clinical cases, POCT, and method verifications. Additionally, four abstracts were chosen for oral presentation.

As participants took the opportunity to thoroughly review, appreciate, and assess the outstanding poster entries, the event culminated with the ACBI President, Dr. Jennifer Brady, conferring well-deserved medals. Notable recognitions included the Best Clinical Case Poster awarded to Ms. Ruth Cullen from Mater Misericordiae University Hospital, Dublin. Mr. Akoji Ameh of Children's Health Ireland at Crumlin, Dublin, earned the distinction of Best Research Poster Presentation. The coveted Geraldine Roberts medal for the Best Overall Poster was bestowed upon Mr. Micheál Ryan from University Hospital Limerick for his compelling presentation on Milk Alkali Syndrome titled *"Rennies to the Rescue – or Maybe Not."* As well as the poster prizes Dr. Graham Lee, Director of the MSc in Clinical and Diagnostic Biochemistry at UCD, presented a special medal to Niamh O'Connor. She was the recipient of a medal awarded by ACBI to students achieving the highest overall GPA (grade point average) in the MSc course. Niamh was from the 2021/2022 class and graduated in 2022 (after last year's conference).

The organisers, and all of us attendees, wish to pay special thanks to the sponsors who helped make this meeting such a great success.

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EFLM Webinar: Nutrition and Biochemistry 24th Oct 2023

Karen Heverin, Principal Clinical Biochemist, University Hospital Galway

Speaker: Dr. Ruth Ayling (London, UK)

Moderator: Dr. Anastasia Kanellou

I recently logged in to this interesting EFLM webinar in real time on the topic of Nutrition and Biochemistry on 24th October 2023.

Did you know, with your ACBI membership you can access this webinar along with a series of great webinars and CPD material which is recorded and available on the EFLM Academy? (EFLM Academy Site | On-demand Webinar (eflm-elearning.eu))

This webinar was focussed on Refeeding Syndrome (RFS) and the role of the laboratory in monitoring of nutrition support. RFS has been defined by the American Society for Parenteral and Enteral Nutrition (ASPEN) as a 'Measurable reduction in one or more of phosphate, potassium and magnesium, or the manifestation of thiamine deficiency, developing shortly after initiation of calorie provision to an individual who has been exposed to a substantial period of malnourishment'. (1) It is a spectrum disorder, with symptoms ranging from a minor biochemical abnormality to death with most cases occurring within 72hrs of the initiation of feeding via oral, enteral or parenteral routes.

The pathophysiology of RFS was explained in detail as a shift from catabolism to anabolism upon refeeding. At the onset of starvation insulin secretion falls, glucagon increases and glycogenolysis in the liver is stimulated. When glycogen reserves are depleted, gluconeogenesis is stimulated and the amino acids released from muscle breakdown are used. Increased lipolysis occurs in fat stores and an increase in the production of ketones which are preferentially used by the brain for energy. During prolonged fasting intracellular concentrations of the electrolytes are depleted. Upon refeeding, there is a shift from fat to carbohydrate metabolism. This glucose load stimulates insulin release, resulting in increased uptake of the electrolytes, increased protein synthesis, sodium and water retention and increased use of thiamine which leads to the electrolyte abnormalities that are characteristic of RFS.

As we know, the identification of patients at risk of the development of RFS is paramount. Dr Ayling outlined the various clinical guidelines detailing the risk factors for the development of RFS as well as the treatment strategies, noting the differences between each. The ASPEN criteria for the identification of patients at risk of developing RFS is shown below and very helpfully, it includes clinical syndromes associated with RFS as well as individual risk factors (1).

ASPEN consensus criteria

	Moderate Risk: 2 Risk Criteria Needed	Significant Risk: 1 Risk Criteria Needed
BMI	16–18.5 kg/m²	<16 kg/m²
Weight loss	5% in 1 month	7.5% in 3 months or >10% in 6 months
Caloric intake	None or negligible oral intake for 5–6 days **OR** <75% of estimated energy requirement for >7 days during an acute illness or injury **OR** <75% of estimated energy requirement for >1 month	None or negligible oral intake for >7 days **OR** <50% of estimated energy requirement for >5 days during an acute illness or injury **OR** <50% of estimated energy requirement for >1 month
Abnormal prefeeding potassium, phosphorus, or magnesium serum concentrations[a]	Minimally low levels or normal current levels and recent low levels necessitating minimal or single-dose supplementation	Moderately/significantly low levels or minimally low or normal levels and recent low levels necessitating significant or multiple-dose supplementation
Loss of subcutaneous fat	Evidence of moderate loss	Evidence of severe loss
Loss of muscle mass	Evidence of mild or moderate loss	Evidence of severe loss
Higher-risk comorbidities *	Moderate disease	Severe disease

*		
	Acquired immunodeficiency syndrome	Cancer
	Chronic alcohol or drug use disorder	Advanced neurological impairment
	Dysphagia and oesophageal motility disorder	Post bariatric surgery
	Eating disorders	Postoperative patients with complications
	Food insecurity and homelessness, refugees	Prolonged fasting
	Hyperemesis gravidarum or protracted vomiting	Protein malnourishment
	Major stressors without nutrition for prolonged period	Malabsorptive states

In the treatment strategy, the recommended initial calorie intake varies slightly between consensus criteria but the general consensus is that electrolytes abnormalities must be corrected before feeding takes place with thiamine supplementation considered for high risk patients or patients displaying clinical features of thiamine deficiency. Importantly for laboratory practice, thiamine monitoring is not recommended in these patients.

The biochemical monitoring of nutrition support has several roles in the management of the malnourished patient; initial assessment, monitoring and evaluation of the support provided and detection and management of the metabolic complications. There are numerous recommendations on the recommended repeat intervals for biochemical nutritional marker monitoring. These recommendations have been updated recently to increase the interval of testing

to consider the increasing number of patients undertaking home parenteral nutrition (HPN). This has a direct positive impact on a patient's quality of life, as some of these patients are well and leading normal lives and, as a result, want minimal hospital contact.

Dr Ayling discussed the impact of the acute phase response (APR) on the interpretation of biochemical parameters, in particular the interpretation of vitamin and trace element results. She explained how important it is that Clinical Biochemists understand the issues with the interpretation of these results should they be attending ward rounds or nutritional MDT. Dr Ayling outlined the importance of the concurrent measurement of CRP with these analytes as it is vital to correctly interpret trace element or vitamin results. Copper is an acute phase reactant, but it increases in response to acute inflammation, unlike other trace elements. Another interesting take home point was that it is important to take into consideration with female patients, particularly on HPN whether they are on oral contraceptives or if they are pregnant as this too can increase copper. Severe zinc deficiency causes acrodermatitis enteropathica which is an unusual finding, but acquired zinc deficiency is common. Plasma zinc is protein bound so caution is advised in its interpretation in hypoproteinaemia. The zinc albumin ratio has been suggested as a marker of zinc deficiency in the APR, but not quite enough evidence yet. In summary, a copper result <8 µmol/L, zinc result <5.5 µmol/L or selenium result of <0.4 µmol/L whatever the CRP result, is supportive of deficiency of these trace elements.

Vitamin E interpretation is difficult, as it is transported in LDL. When lipids are pathologically elevated or low, results may be misinterpreted. It has been suggested that results should be presented as a ratio of vitamin E to cholesterol but this may not be suitable in malnutrition, as it might give a falsely normal ratio when in fact the patient has deficient vitamin E with a concurrent low LDL.

Vitamin D is also an acute phase reactant. Parenteral nutrition (PN) patients are at particular risk of bone disease for a number of reasons, including; poor nutrition, immobilisation, reduced sun exposure, exposure to steroids and cytokine release. As a result, measurement of vitamin D in this population is important. Dr Ayling showed results of a study published by Duncan *et al* (2) which displayed that the reduction in vitamin D was significant when CRP was >20 mg/L. This highlighted the possibility of an incorrect interpretation of vitamin D results not only in PN patients but also in any acutely unwell patient.

The final aspect of this wonderful talk centred on the observed increase in vitamin B12 deficiency. The common causes that we are all familiar with include; patients who undertake vegan or vegetarian diets, patients with reduced gastric acid secretion (as they can't liberate vitamin B12 from food), patients prescribed PPI or H2 blockers, patients who produce autoantibodies to intrinsic factor, patients with small bowel disease, ileal resection and pancreatic insufficiency. However, a new cause of vitamin B12 deficiency has appeared as a result of the misuse of nitrous oxide (N_2O).

Nitrous oxide is used in the clinical environment as an anaesthetic agent but now has become popular as a drug of abuse. It causes a functional B12 deficiency as it interferes with B12 metabolism. N_2O causes irreversible oxidation of cobalt atom of B12, which leads to reduced S-adenosyl methionine, important for the methylation of myelin. Patients present with specific neurological symptoms as a result. The condition is termed subacute combined degeneration of the spinal cord with symptoms including tingling and numbness of limbs, reduced sensation pressure and paralysis. Dr Ayling discussed the role of methylmalonic acid (MMA) to assist in the evaluation of a functional deficiency. Due to the magnitude of the problem in London her trust has developed a pathway for the presentation of these patients whereby routine analysis of B12, folate and MMA is carried out immediately on presentation. Homocysteine can be used as an alternative to MMA, however it is labile and has to be taken on ice, which makes phlebotomy in the emergency department difficult.

This talk was quite timely as from 8th November 2023, the UK government have moved to make the possession of nitrous oxide illegal and they have also classified it as a Class C drug under the Misuse of Drugs Act 1971.

References:

1. ASPEN Consensus recommendations for refeeding syndrome da Silva *et al* Nutrition in Clinical Practice 2020;35:178-95
2. Duncan *et al* Am J Clin Nut 2012;95:64-71