ACB News

The Association for Clinical Biochemistry & Laboratory Medicine | Issue 684 | August 2023

Trading places, the incoming and outgoing Presidents of the ACB

In this issue

Achieving Net Zero webinar: Part 2

UNIVANTS of Excellence Award Programme team recognition

Response to the NHS Long Term Workforce Plan

AI love you, but AI might kill you

UKMedLab23 and Regional Meeting Reports

Turbo Charge Your Faecal Testing

The BÜHLMANN fCAL® turbo and fPELA assays will revolutionise your faecal calprotectin and elastase testing with a streamlined workflow.

- ✓ **Same CALEX® extraction for both assays:**
  - One extraction two tests
  - 7 days ambient stability post extraction
- ✓ **CALEX® can be given to patients for sample collection**
  - Ambient, fridge and freezer stability for a flexible return to laboratory workflow
- ✓ **Wide assay range provides valuable clinical insight and keeps dilutions to a minimum**
  - Calprotectin: 20 – 2000µg/g (autodilute to 8000µg/g)
  - Elastase: 10 - 500µg/g
- ✓ **Time to first result is 10 minutes, with further results every few seconds**
- ✓ **Protocols available for most clinical chemistry analysers**
  - Including Abbott, Beckman, Roche, Siemens, as well as stand-alone options
- ✓ **Calibrators, controls and reagents are all in a stable, ready to use format and they don't need to be lot matched**

Turbo charge your faecal testing.
For more information visit
www.calprotectin.co.uk/calex

alpha laboratories
supplying quality to science

02380 483000 • sales@alphalabs.co.uk • www.alphalabs.co.uk

ACB News

The bi-monthly magazine for clinical science

Issue 684 • August 2023

Message from the President	page 4
General News	page 6
Future Perspectives	page 29
Deacon's Challenge Revisited	page 31
Microbiology News	page 32
Immunology News	page 37
Trainees News	page 39
UKMedLab23 Meeting Reports	page 42
Regional Meeting Reports	page 58
Crossword	page 64

The Association for Clinical Biochemistry & Laboratory Medicine 1953–2023

ISSN 2754-0863

Front cover: Incoming and outgoing Presidents Kath Hayden and Bernie Croal

Message from the President

It was a fantastic backdrop to take over the role as President in June at our National Scientific Meeting at The Royal Armouries in Leeds. UKMedLab23 was a celebration that befitted our platinum anniversary where, to celebrate the work and contribution of all members, each region had been invited to host a parallel session. All nine ACB regions enthusiastically responded to this task with the resulting excellent sessions spanning a huge variety of specialist areas, in addition to the ever-popular Clinical Cases and ACB Medal Award. The Trainees I spoke to who had attended the Biochemistry and Microbiology Training Days were hugely complimentary about the speakers and how the day had gone. My thanks go to Sarah Robinson, Tamsin Lawson, the ACB staff team and all of the UKMedLab and Training Day organising committees for delivering another excellent meeting. It was wonderful to see so many colleagues coming together to discuss science and build those all-important networks, and of course the sunshine helped!

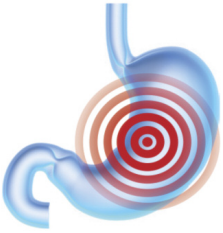
June 30 saw the release of the NHS Long Term Workforce Plan commissioned by the Government, with the plan for £2.4 billion over the next 15 years to fund additional training and education places to address projected shortfalls in the NHS workforce. Whilst proposals to increase the number of medical trainees and additional healthcare scientist training places are welcomed, we are developing a response to the Plan to highlight the need to consider the wider workforce requirements for Clinical Scientists and other groups of laboratory medicine staff including providing the infrastructure to support additional trainees and apprentices, and funding for the professional development and upskilling of our workforce.

We have seen some changes in the ACB staff team with our CEO Jane Pritchard leaving us at the end of June for pastures new, with the award to Jane of the President's Shield a fitting recognition of her outstanding contribution to the Association as our first CEO. We were also sorry to lose our Marketing and Communications Administrator, Ioana Andrei, who also moved on from the ACB in June.

Finally, we are delighted to announce the appointment of our new CEO, Victoria Logan, who joins us with a wealth of experience in other membership organisations and will be a great asset to the ACB. I look forward to working with Victoria over the coming months and I am sure you will join me in welcoming her to the Association when she starts with us in September. ■

Kath Hayden, ACB President

GastroPanel®

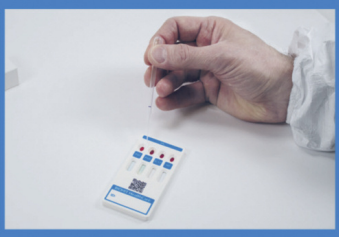


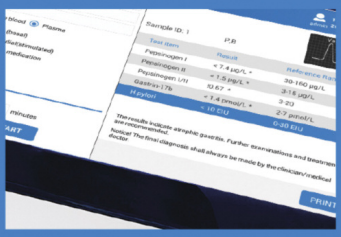
New Rapid test to triage gastroscopy referrals

Atrophic gastritis is chronic stomach condition that is a priority for gastroscopy referral and endoscopic surveillance based on the risk of gastric adenocarcinoma. It is also associated with iron deficiency anaemia (IDA), pernicious anaemia (PA), and nutrient deficiencies.

GastroPanel Quick Test NT identifies atrophic gastritis before endoscopy, enabling patients awaiting referral to be triaged based on risk. Testing dyspeptic patients using GastroPanel® can help to identify or rule-out atrophic gastritis to alleviate patient concerns and waiting list pressures associated with gastroscopy referrals, by aligning clinical resources with patients' needs.

- Select cases for gastroscopy according to risk
- Aid diagnosis of atrophic gastritis, *H. pylori*, and acid dysregulation
- Investigate the cause of IDA, PA, and nutrient deficiencies
- Ease the burden on overstretched gastroscopy services
- Finger-prick whole blood sample (POCT) or EDTA plasma (Lab)





Learn more at www.biohithealthcare.co.uk/gastropanelQT

BIOHIT HealthCare
Innovating for Health

Phone +44 151 550 4 550
info@biohithealthcare.co.uk
www.biohithealthcare.co.uk

View the UKMedLab23 posters online

The digital versions of the UKMedLab23 posters are now available to view on the ACB website.

These posters offer a wealth of interesting and informative information. Additionally, by reading these resources, it also helps support the work of your peers. If a poster catches your eye, you can always look up the author's details on your 'My ACB > Member directory' page.

In addition, if you booked a ticket for a UKMedLab23 event, you can also check out the speakers' presentations on this page.

If you have any questions, feel free to email us at enquiries@acb.org.uk. ■

Like the Reviews in the *Annals*?

Do you like reading the reviews in the *Annals*? Do you want a say in what is included? Would you like to get an introduction to the publication process and earn CPD college points for reviewing articles?

The Clinical Sciences Reviews Committee (CSRC) is currently seeking new membership from enthusiastic ACB Members. Previous publication experience is desirable but not essential. We would also welcome interest from members specialising in Haematology, Medical Microbiology/Virology and Immunology.

The CSRC commissions reviews from leading national and international experts from all disciplines of Laboratory Medicine. The Committee works with the authors to define the scope and style of the article, peer review drafts and format the manuscript ready for submission.

This friendly Committee meets three times a year either at Tooley Street, or online, as a hybrid approach to allow those to join who cannot easily get to London. If you are interested in applying, or require further information, please email the CSRC Chair, Dr David Gaze (d.gaze@westminster.ac.uk) or CSRC Secretary Dr Katharine Bates (katharine.bates@nhs.net). ■

Save the date

The West Midlands Region AGM and Scientific Meeting will be held on 27 September in Birmingham (venue tbc). The Robert Gaddie Prize, awarded for the best poster and oral presentation, will be awarded at the meeting. Abstract submission is now open and the competition is open to all West Midlands ACB Members. The prize will be awarded to the entrant who, in the opinion of the judges, produces scientific work which best exemplifies the professional aims and aspirations of the ACB. The competition will require both a poster and a 15 minute oral presentation (to be presented at the meeting) and will be judged on scientific merit, presentation and content.

To enter, please contact Tamsin Lawson for an application form. The closing date for entry is Monday 7 August 2023. ■

NHS
Black Country Pathology Services

Enhanced liver fibrosis markers

ELF & PIIINP

- NPEX result reporting
- Rapid automated immunoassay service
- Clinical interpretation service

0121 507 5348
rajvindergarcha@nhs.net
www.bcpathology.org.uk
Clinical Biochemistry, City Hospital, Dudley Road, Birmingham B18 7QH
@BCPathology BCPathology YouTube Black Country Pathology TV News

BCPS

NHS Pathology Serving the Black Country

Provided by Sandwell and West Birmingham NHS Trust, The Dudley Group NHS Foundation Trust, The Royal Wolverhampton NHS Trust and Walsall Healthcare NHS Trust.

ACB Annual General Meeting

A time for reflection and to look forward to exciting things ahead

Dr Sarah Glover, Company Secretary

Annual Report 2022 and the President's Report

May I first echo the President's foreword in the Annual Report by saying what a challenging year 2022 was and in many aspects 2023 continues to be with the war in the Ukraine, economic turmoil and inflationary pressures, and for healthcare, while post-pandemic challenges remain, recovery has been inhibited by the emerging economic downturn, supply chain issues and the impact of industrial action. It is within this context that laboratory services are now even more important in ensuring appropriate and efficient patient pathways are allowed to develop and operate.

As we celebrate our 70th Anniversary the ACB has been reacting to these challenges and developing its priorities and work plans to match. We are taking great strides forward with Lab Tests Online-UK which, with direct patient access to test results and an increasing presence of direct-to-consumer testing, the demand from patients for knowledge about their own results is growing rapidly.

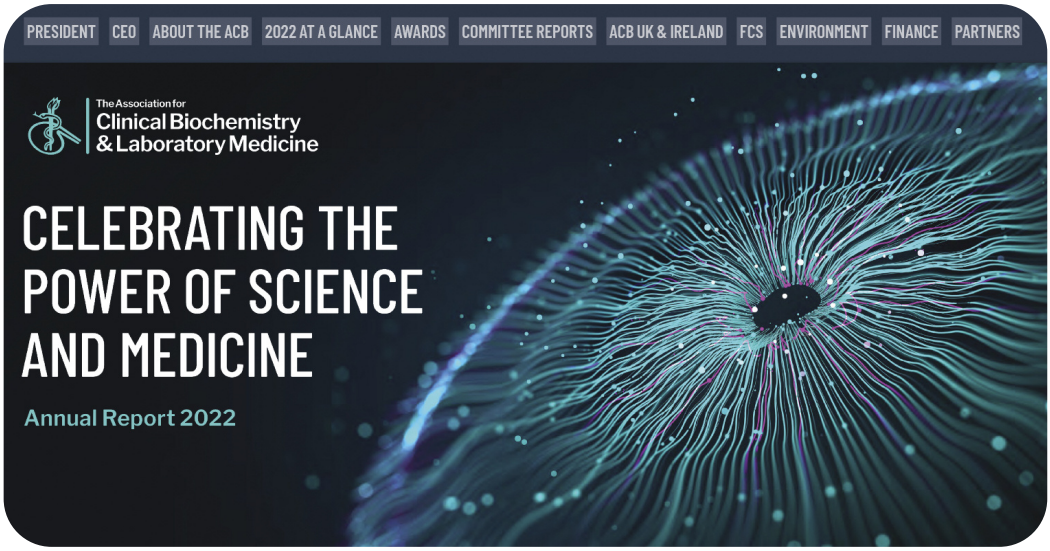
Professional collaboration and knowledge sharing is vital. We have strived to increase post-pandemic re-engagement with members and regional activity. Our first face-to-face UKMedLab meeting, which took place in November 2022 in London, facilitated training day activities, scientific presentations and professional networking to re-establish. We have also been delighted to see UKMedLab23 return to Leeds in June, resulting in us hosting two first class national scientific meetings in quick succession.

We continue to work with partner organisations, especially the Royal College of Pathologists and Institute of Biomedical Science, on shared challenges around workforce planning, results to patients, direct-to-consumer testing and point-of-care testing.

As the Association enters its eighth decade, the healthcare landscape in the UK is dramatically changing. The value, importance and contribution of our members continues to grow, with the Association flexing and changing to match the new demands and challenges we are all facing. The 70th Anniversary has been a great opportunity to celebrate the past but also focus on the future and we are delighted members approved our change of name to the Association for Laboratory Medicine which we will be excited to implement next year.

Accounts and Balance Sheet for 2022

We have continued to keep close management control of our finances. The Director of Finance, Ben Nicholson, reported that the year-end position for 2022 appears abnormally high, due to the sale of the fourth floor of 130-132 Tooley Street. These funds have been invested with an impact investment fund which aligns with the Association's aims around sustainability and positive environmental impact. As well as financial performance we receive regular updates on the impact our investments are having,



against recognised measures, such as carbon matrix reporting.

We continue to diversify our income streams so spreading any risks and are successfully growing grant funding, industry sponsorship and engagement. We continue to improve our reporting and governance with the establishment of a Finance and Risk Committee and risk register.

The accounts have been audited and, based on the information provided, satisfied our auditors H W Fisher LLP.

Member benefits and subscription fees for 2024

As agreed at the AGM in June 2022, we introduced a new membership structure in 2023 and we have invested in member benefits such as the Mentoring Programme, EFLM Academy, Research and Innovation Grants, and educational activities, whilst maintaining a budgeted break-even position.

Moving forward, due to the new membership structure being introduced relatively recently and in recognition of the financial difficulties many members will be facing due to the current rate of inflation, it was the recommendation by the Director of Finance, and the Association Council, that we **hold the 2024 fees at the 2023 rate** which was agreed by the members present.

Election of Officers and a National Member

All our Honorary Officers remain in post for at least the coming year, with the exception of Dr Elizabeth Bateman who remains Chair of the Immunology Professional Committee for the time being but shall demit office during the course of this year. In accordance with Byelaw 6.5, Council shall seek to fill this vacancy, after which the appointee shall stand down, to be reappointed at the next Annual General Meeting.

We received two nominations for the one National Member vacancy. A ballot of voting members was held in May and we are delighted to welcome Alison Jones to the role of National Member, replacing Sophie Hepburn.

We thank Bernie Croal for his dedication and leadership of the Association over the past two years and are now delighted to welcome Katharine Hayden as President following her appointment last year.

Equality, Diversity & Inclusion Champions

Following a call for expressions of interest, we received two applications for Equality, Diversity and Inclusion Champion. The Nominations Committee reviewed the applications and felt that both candidates would be suitable to the role, bringing different but complementary skills and experiences. We are delighted to report that members Divine Azange and Alan Courtney now share this important role.

A huge thanks to Rachel Wilmot, who was the Association's first EDI Champion, performing the duties of the role admirably over the past six years.

Membership Awards and President's Shield

We are delighted to announce the following Awards agreed at the AGM and UKMedLab23 closing ceremony:

- **Emeritus Member of the Association** Dr Rachel Wilmot and Dr Gwyn McCreanor, both nominated by the Trent, Northern and Yorkshire Region
- **Honorary Member of the Association** Professor David Holt, nominated by the Southern Region
- **President's Shield** Jane Pritchard for outstanding leadership as the first CEO of the Association.

Congratulations to all for this well-earned recognition of their hard work!

Thank you

Thanks to all our members who make the Association what it is today. We look forward to exciting times ahead as we continue on our journey and usher in a new era as the Association for Laboratory Medicine!

Outgoing CEO, Jane Pritchard received the President's Shield

VISIT US AT IBMS STAND 301 & 302

RANDOX

Complete QC Solutions
For Results You Can Trust

INTRODUCING THE NEW
ACUSERA TRUE THIRD PARTY CONTROLS

ACTIVE B12

ANTI MÜLLERIAN HORMONE (AMH)

BRAIN NATRIURETIC PEPTIDE (BNP)

BONE MARKERS (SERUM)

PRE-ECLAMPSIA

SERUM INDICES

ULTRA-LOW PSA

XANTHOCHROMIA

randox.com marketing@randox.com
Visit store.randox.com to buy directly from Randox today

Product availability may vary from country to country. Some products may be for Research use Only. For more information on product application and availability, please contact your local Randox Representative.

The ACB and Abbott: achieving Net Zero webinar – Part 2

In May, the ACB partnered with Abbott to deliver an interactive webinar focussing on achieving Net Zero. This session was facilitated by Lisa Harrison, Marketing Director, Core Diagnostics, Abbott.

We heard from the following panel of speakers:

- **Joanne Hall** – Sustainability and Green Champion in Blood Sciences, Newcastle upon Tyne NHS Foundation Trust
- **Sheri Scott** – IBMS Sustainability Lead and Council Member, EFLM Green Taskforce core member, Nottingham Trent University
- **Rob Shorten** – ACB Green Champion, Lancashire Teaching Hospitals NHS Foundation Trust
- **Janet Smith** – Head of Sustainability for Royal Wolverhampton NHS Hospitals

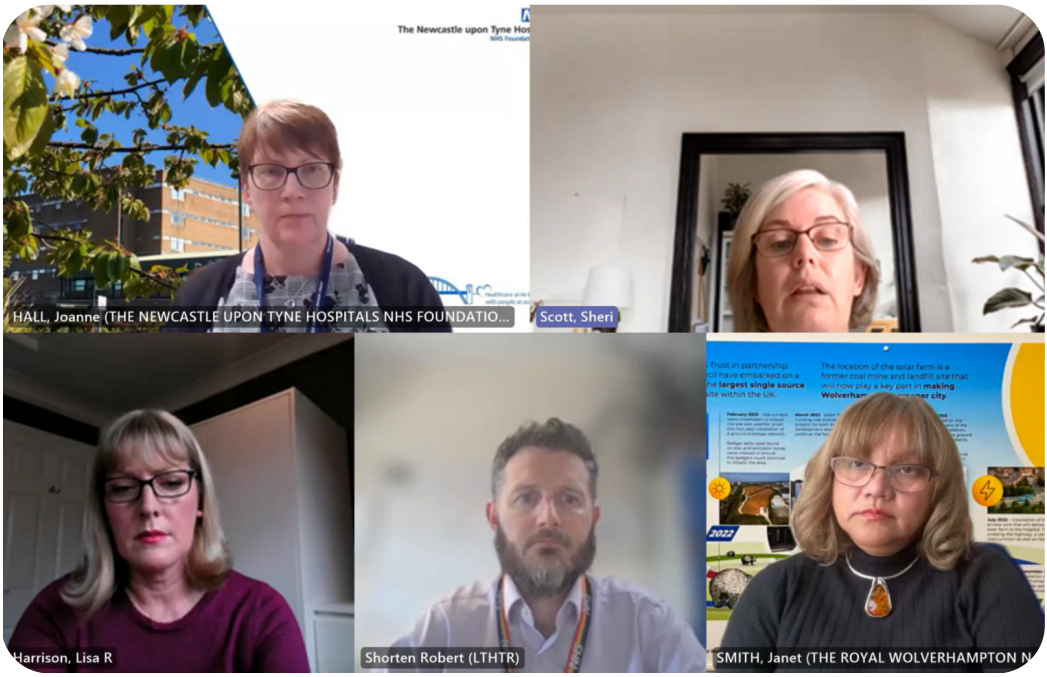
Quick-fire webinar summary

Learning outcomes

- Understand the relationship between the climate emergency and public health
- Understand sustainability and the concepts of sustainability in relation to Healthcare Science, the clinical laboratory and the patient pathway
- Gain knowledge of case examples of embedding sustainability into laboratory practice

Speaker insights

- Some of the main contributors to labs' carbon footprint are water, gas, energy consumption, waste, consumables and procurement practices
- Inappropriate testing also contributes towards the carbon footprint by



creating unnecessary waste and logistics (such as transportation)
- Increases in extreme weather events are raising risks to health, including heat-related deaths, malnutrition from draughts, increased disease from low water quality and seasonal variation in disease susceptibility
- The NHS is responsible for 5% of the total carbon emissions in the UK
- Pathology underpins the whole of healthcare by touching most patient journeys
- At the Royal Wolverhampton NHS Trust, over 70% of the carbon footprint is in Scope 3 (all indirect emissions excluding energy: procurement, waste, catering, business travel and others), it's total footprint is currently 65,000 tonnes CO_2
- Carbon reduction initiatives should be embedded in the Trust's processes for maximum impact, this includes service delivery, governance, business decisions and investments

How to get started – quick wins
- Create a culture where people are not afraid to suggest new ideas to reduce carbon footprint, for example, install a suggestions board in the laboratory
- Turn off lights and computer monitors and shut down analysers when not in use
- Make sure your fridges and freezers are filled up and set to the right temperature, discard samples that are not needed to increase available space
- Reduce frequency of lab deliveries (e.g. from daily to twice-weekly)
- Increase the use of digital tools to minimise printing
- Limit email use and use online file storage instead of sending attachments, emails can contribute between 3-17 g of carbon, or up to 50 g when including attachments
- Use a sustainability certification programme like My Green Lab, or the upcoming LEAF or EFLM Green Lab, to get specialised help and frameworks toward achieving Net Zero

Recommended resources and further reading
- ACB Green Champions home page
- Greener NHS
- Centre for Sustainable Healthcare
- My Green Lab
- EFLM Green Lab
- LEAF
- Envetec
- GP Liaison
- Green Health Wales
- BIVDA
- IEMA
- SusQI ■

ACB Research and Innovation Grants

Each year the Scientific Affairs and Clinical Practice (SACP) Committee award ACB Research and Innovation Grants. These grants are open to all full Members of the ACB. There is still time to apply for a Grant. The deadline has been extended to noon on 11 August 2023. The application will then be considered during the September 2023 meeting of the SACP Committee.

Further information and how to apply can be found here. ■

The Association for Clinical Biochemistry & Laboratory Medicine
1953–2023

Laboratory Medicine Leadership Summit

ICC Birmingham
28 September
2023

An essential strategic meeting for senior laboratory staff and managers, across all pathology disciplines, hosted at the Biomedical Science Congress.

Hosted at:

Institute of Biomedical Science
IBMS CONGRESS 2023
25-28 SEPTEMBER - BIRMINGHAM, UK
Linking learning to the laboratory

Join us at the Laboratory Medicine Leadership Summit

The IBMS Congress will be held from 25-28 September 2023 at The International Convention Centre (ICC), Birmingham and offers a unique opportunity to all attendees, whether attending the entire Congress including lectures and workshops, or just visiting the exhibition.

The Congress offers multidisciplinary sessions including Cellular Pathology, Cytopathology, Clinical Chemistry, Immunology, POCT, Laboratory Management, Medical Microbiology, Molecular Pathology, Quality Management, Transfusion Science, Virology, UKAS and more.

This year, the ACB is hosting the Laboratory Medicine Leadership Summit at the IBMS Congress on 28 September. This is an essential strategic meeting for senior laboratory staff and managers, across all pathology disciplines.

ACB Members can book the event at IBMS Member rates to attend both the Congress as a whole and the Laboratory Medicine Leadership Summit. Find out more by **visiting the IBMS Congress website.**

Ticket prices

ACB/IBMS Member rates are:

1 day	£220
2 days	£420
3 days	£575
Monday PM + 1 day	£330
Monday PM + 2 days	£530
Monday PM + 3 days	£685
Monday PM only	£130
Laboratory Support Staff – 1/2 day	£110

Book your discounted ACB Member tickets here.

We hope to see you there. ■

Laboratory Medicine Leadership Summit Programme

09:00 **Welcome from the ACB President**
Kath Hayden, ACB President, Consultant Clinical Biochemist and Honorary Senior Lecturer, University of Manchester

09:10 **Blood Sciences: not AI yet but evolving**
Ellie Dow, Consultant in Biochemical Medicine, NHS Tayside

09:30 **NPIC's unique scanning facility for AI testing and development**
Matthew Humphries, NPIC Research Operations Manager, Leeds Teaching Hospitals

10.30 **The Future of Laboratory Services**
Professor Mike Osborn, President, Royal College of Pathologists

11:00 **Networks and Diagnostic Hubs**
Joanne Martin CBE, NHS National Specialty Advisor for Pathology, Professor of Pathology and Deputy Vice Principal Health, Queen Mary University London

11:30 **Consumer Driven Testing – Help or Hindrance**
Bernie Croal, Past President ACB, Consultant Chemical Pathologist, Aberdeen Royal Infirmary

14:00 **Importance of Laboratory Informatics**
Jonathan Kay, Nuffield Division of Clinical Laboratory Services, University of Oxford

14:30 **Results direct to patients – getting the language right**
Lindsay Brown, Manchester Academy for Healthcare Scientist Education (MAHSE) Lead Lay Representative, University of Manchester

15:00 **Tapping into the potential for Laboratory Information Management Systems to improve patient care**
Craig Webster, Director of Pathology, University Hospitals Birmingham

16:00 **Our NHS, Our Net Zero – how industry and laboratories can work together**
Helen Dent, Chief Operating Officer, BIVDA

16:30 **The first steps towards a sustainable laboratory: a great LEAF forward**
Rob Shorten, Consultant Clinical Scientist, Lancashire Teaching Hospitals

The Association for Clinical Biochemistry & Laboratory Medicine

IBMS

Some ACB resources are member-only, so you may be asked to log in.

UNIVANTS of Healthcare Excellence Award Programme recognises 11 new teams for transformational care

The UNIVANTS of Healthcare Excellence programme is proud to announce **11 new integrated clinical care teams** who are recognised for achieving measurably better health outcomes by 'UNIFYING' across disciplines to enable the development and implementation of 'AVANT-GARDE' processes. Among many applications from across the globe, the final outcomes for the 2022 UNIVANTS of Healthcare Excellence Awards reveal three top global winners, three teams of distinction and five teams of achievement (see table on page 21).

The top global winners of this prestigious Healthcare Excellence Award include Ipswich Hospital, East Suffolk and North Essex NHS Foundation Trust, the National Basketball Association (NBA) and The ROSE Foundation.

Improving the peri-operative pathway of people with diabetes undergoing elective surgery: the IP3D project

An integrated clinical care team from Ipswich Hospital, led by Professor Gerry Rayman and Emma Page, recognised that peri-operative pathways, while incredibly important, can often be challenging for patients, particularly for those with diabetes. Compounding these challenges for patients with diabetes are higher rates of post-operative complications, including mortality, longer length of stay and increased readmission rates. With this in mind, the IP3D initiative was born, which includes a handheld diabetes passport to enable patient empowerment and broader engagement of medical teams, including formation of a diabetes-surgery working group,

Ipswich (from left to right): Rachel Allen, Ruth Deroy, Gerry Rayman, Emma Page and Alison Czarnota

NBA (from left to right): Dave Weiss, Jim Weisberger, Christina Mack, Yonatan Grad and David Ho

recruitment of surgical diabetes champions and the roll-out of surgical diabetes study days. Further, a Perioperative Diabetes Specialist Nurse was created to help engage and educate others involved in the pathway while supporting patients with their diabetes care pre-surgery and on admission. The outcomes realised by this team include informed and more routine use of laboratory insights, such as HbA1c values, when planning surgical care, leading to an impressive reduction in length of stay for diabetic patients and reduction in post-operative complications.

The 'Bubble': safe and informed population health management based on strategic, novel laboratory testing to restart a global sports league, stimulate the economy and foster normalcy during the COVID-19 pandemic

The NBA and its associated partners sought to create a novel and bold occupational health programme during the height of the COVID-19 pandemic in order to safely restart their sports league, while also focussing on health, wellness and the need to be united together. Through strategic use of laboratory testing and infection control methods, this expansive team successfully and safely completed their 2020 NBA playoffs with zero COVID-19 transmissions among NBA players and NBA team staff residing on campus in the 'Bubble'. Further, and in recognition that the 'Bubble' was about more than basketball, this programme created >6,500 jobs, with a local economic impact >$200 M. The data and new insights garnered from the occupational bubble contributed to medical/scientific literature, with over eight peer-reviewed articles that helped to guide public health policies in the USA, and globally, at the time of the 'Bubble' and beyond.

Program ROSE (Removing Obstacles to cervical ScrEening): empowering women to eliminate cervical cancer

Cervical cancer can be a devastating disease, however, if caught early and treated accordingly, outcomes can be substantially improved. Screening for cervical cancer is most often done using cell collection through the Pap Smear to enable cellular analysis. Unfortunately, pap smears can be painful, uncomfortable, and/or inconvenient for many women, thus reducing regular cadence of screening. Recognising these significant barriers in Malaysia, Program ROSE sought to enable improved screening through self-collection and human papillomavirus (HPV) screening. HPV causes 99% of all high-risk cervical cancers and is an alternative to pap smears, particularly for women in rural and remote areas. Through implementation of self-collection and facilitated linkage to care for women who test positive, Program ROSE has screened over 22,169 women. With a >90% linkage to care rate for women who screen positive for HPV, over 194 women have early cancer and precancers identified and subsequently treated.

These impressive and diverse care initiatives involve impactful and meaningful outcomes enabling recognition with the 2022 UNIVANTS of Healthcare Excellence Awards. Congratulations to all teams.

For more information on UNIVANTS, the 2022 winners, and/or to apply starting 1 August, please visit www.UnivantsHCE.com.

For information on educational sessions associated with UNIVANTS and more, please visit www.healthcareelx.com. ■

ROSE Foundation (from left to right): Yit Lee Choo, Mun Li Yam, Marion Saville, Yin Ling Woo and Adeeba Kamarulzaman

UNIVANTS OF HEALTHCARE EXCELLENCE **GLOBAL WINNERS**

Program ROSE (Removing Obstacles to cervical ScrEening) - Empowering Women to Eliminate Cervical Cancer
ROSE Foundation

Yin Ling Woo, Marion Saville, Yit Lee Choo, Adeeba Kamarulzaman, Mun Li Yam

The "Bubble": Safe and Informed Population Health Management Based on Strategic, Novel Laboratory Testing to Restart a Global Sports League, Stimulate the Economy and Foster Normalcy During the COVID-19 Pandemic
National Basketball Association

Christina Mack, Jim Weisberger, David Weiss, Yonatan Grad, David Ho

Improving the Peri-Operative Pathway of People with Diabetes Undergoing Elective Surgery: the IP3D Project
Ipswich Hospital, East Suffolk and North Essex NHS Foundation Trust

Gerry Rayman, Alison Czarnota, Emma Page, Rachel Allen, Ruth Deroy

UNIVANTS OF HEALTHCARE EXCELLENCE **RECOGNITION OF DISTINCTION**

Early Diagnosis of Maternal Cytomegalovirus for Improved Management and Reduced Risk of Fetal Transmission and Complications
National Reference Center for Herpesvirus, University Hospital Center

Sébastien Hantz, Perrine Coste-Mazeau, Sophie Alain, Elodie Ribot, Melissa Mayeras

Enhanced Resource Utilization, Reduced Waste, and Expedited Transplantation Through Real-Time Donor Screening for Infectious Disease
Mid America Transplant, St. Louis, Missouri

Amber Carriker, Linda Martin, Erica Hinterser, Lindsey Speir, Kevin Lee

Getting to Zero Harm in Controlled Substance Prescribing: Increasing the Accuracy of Prescription Compliance Monitoring Through Enhanced Drug Testing Support
University Hospitals Cleveland

Jaime Noguez, Christine Schmotzer, Sean Hoynes, Heidi DelVecchio, Jeanne Lackamp

UNIVANTS OF HEALTHCARE EXCELLENCE **RECOGNITION OF ACHIEVEMENT**

Enhancing Resource Utilization and Improving Patient Experience Through Strategic Laboratory Stewardship
Ain-Shams University - Emergency Hospital

Wessam EL Sayed Saad, Essam Fakhery Ebied, Rawan Mahmoud Mohamed, Ashraf Hassan Abdelmobdy, Nouran Mahmoud Bahig

Enhanced Staff Satisfaction and Resource Utilization During the COVID-19 Pandemic
Associação Fundo de Incentivo a Pesquisa - AFIP

Debora Ribeiro Ramadan, Tatiane Rodrigues dos Santos, Josué Augusto do Amaral Rocha, Cristiane Franca Ferreira, Paulo Eduardo de Andrade Souza

Improving Emergency Department Flow and Decreasing Risk Through Development and Implementation of Molecular Diagnostics Guided Triage
Clinical Hospital Center Rijeka

Martina Pavletic, Vanda Juranic Lisnic, Mate Lerga, Mario Franic, Jennifer Babic

Improved and Accelerated Diagnostic Pathway for Patients That Present to the Emergency Department with Suspected Mild Traumatic Brain Injury
Hospital Universitario Virgen de las Nieves

Gemma Álverez Corral, Maria Molina Zayas, Francisco Ruiz-Cabello Osuna, Maria Isabel Romero Manjon, Eva Gutierrez Pérez

A Noninvasive Serologic Model Using an Intelligent Informatic Solution to Enhance Clinical Decision-Making and Improve Patient Safety
The Second Norman Bethune Hospital of Jilin University

Yinlong Zhao, Zhenjing Jin, Yongsheng Yang, Chunmei Hu, Yan Zhao

ADD-144293-GBL-EN 04/23

The Association for Clinical Biochemistry and Laboratory Medicine response to the NHS Long Term Workforce Plan (30 June 2023)

Kath Hayden, ACB President
Hazel Borthwick, ACB Director of Education, Training & Workforce
Jonathan Scargill, ACB Deputy National Workforce Lead
Dr Charles van Heyningen, ACB National Workforce Lead

The NHS Long Term Workforce Plan, published in June this year, sets out a co-ordinated model to address the shortfall in the NHS workforce over the next 15 years over all areas of the NHS workforce, including Healthcare Scientists.

As the major body for Clinical Biochemistry, Immunology and Microbiology in the United Kingdom, the Association for Clinical Biochemistry and Laboratory Medicine (ACB) is a leading professional membership organisation dedicated to the practice and promotion of clinical science and works nationally and internationally to promote the highest standards in laboratory testing and patient care. As such, we welcome the recognition in the NHS Long Term Workforce Plan of the crucial role healthcare scientists play in 80% of diagnoses, and the principles of 'train, retain, and reform' laid out in the plan for the NHS workforce.

The ACB welcomes proposals to increase training places for healthcare scientists by 13% by 2028/9 and 32% by 2031/32, and that PTP, STP and HSST training places are planned to increase by a similar proportion. The strategy details a commitment to a real numbers increase, however, there are some areas that require further consultation to define the granular detail of how this translates into the future NHS laboratory service that underpins many patient pathways.

Healthcare Scientists (HCS) are employed in the NHS in several different roles, not just in laboratory medicine where members of the ACB are typically employed as HCPC registered Clinical Scientists, Biomedical Scientists and medical staff. A breakdown of planned increases in numbers of healthcare scientists by specialty and discipline within life sciences would be welcomed and would assist the ACB and other organisations in assessing the adequacy of these proposed increases in the Healthcare Scientist workforce. This is also required to ensure that Trusts can support the training that is required to fill the current gaps and also make plans to increase training capacity to deliver the future vision.
It would also be helpful to understand further how the training numbers were

identified given there are issues with the current ESR codes to accurately assess the HCS workforce. It is important, given the strategy of this plan, that the workforce data feeding into such a project is robust and that we are assured that the evolving roles of Healthcare Scientists are also considered when projecting these figures.

Surveys have shown there are not enough pathologists in laboratory specialties in the NHS with significant variations between regions and specialties. Additionally, ACB membership data since 2016 demonstrates stable numbers and bandings of Clinical Scientists and medical staff despite an ever-increasing demand for services, estimated at about a 5% year on year increase in blood sciences. It is also noted that funding for professional development for Healthcare Scientists has again been overlooked. This needs to be challenged as every member of the NHS should have access to development funding to ensure services and people reach their full potential.

NHS laboratory services have expanded enormously over the last 75 years. Changes to population demographics, a shift to prevention, and continued developments in research and technology – as referred to in the NHS Long Term Workforce Plan – will continue to require a well-trained and growing laboratory medicine workforce. The ACB is looking forward to engaging in discussions regarding implementation of the Plan and to understand what information our members will require to support the development of the future NHS workforce. ■

UKMedLab meeting reports

UKMedlab23 was held at the Royal Armouries in Leeds on 10-12 June and was a true celebration of 70 years of the ACB. As part of this celebration, each of our regions was invited to host a parallel session at the conference. It was with great enthusiasm that all nine regions stepped up to this challenge and organised a diverse range of interesting topics showcasing the varied specialisms across the UK and the Republic of Ireland.

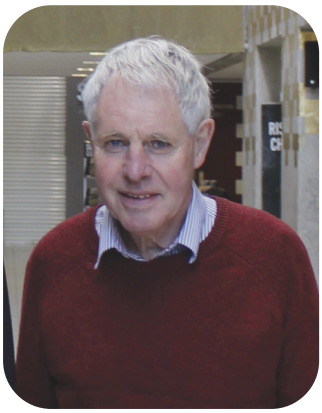
The sun shone and the conversation flowed, with an increased number of delegates both during the main conference and at the training days, there was a real buzz about the venue. It was also lovely to see so many of our Past Presidents who came along to celebrate with us. The President's address, given by Bernie Croal and Kath Hayden, looked back on those who had gone before and reminded us of the impact that they had on science and services that we see today, before focussing on the future work of the ACB with regards education, training, EDI and sustainability.

This edition of *ACB News* highlights some of the sessions that were given at the Biochemistry and Microbiology Training days and day one of the conference.

In the next edition of *ACB News* we will cover some of the highlights from day two of UKMedLab23 and will also give you a sneak peek into UKMedLab24, to be held at the Brighton Metropole on 10-12 June 2024. ■

I remember when . . .

by William Marshall



Thanks to the work of Bill Richmond, Consultant Biochemist at St Mary's Hospital, London, Scot, salmon fisherman, composer and connoisseur of single malts, cholesterol is now widely measured by an enzymatic method, with which readers will be familiar. Cholesteryl esters are hydrolysed by a hydrolase, the released free cholesterol is converted to cholest-4-en-3-one by cholesterol oxidase, and the hydrogen peroxide generated reacted with 4-aminopyrine in the presence of peroxidase to produce a coloured quinoneimine dye.

But it was not always thus. Prior to the introduction of Richmond's method, the most widely used method was a fearsome affair involving the use of concentrated sulfuric acid – the Liebermann-Burchard method. This would surely be banned under the Health and Safety legislation that binds us today. It relied on the oxidation of cholesterol in an anhydrous solvent. The solvent was acetic anhydride, which also contributed oxidising capacity. The concentrated sulfuric acid provided dehydrating and additional oxidising capacity. The products were bis 3,5 cholestdienyl sulfonic acids, the initial reddish-purple colour changing to a deep green, which was measured using simple colorimetry. This fearsome mix of chemicals risked the analyst's shoes and skirt or trousers if not handled with extreme caution. A lab coat provided no protection, but not quite to the extent of the Mattingley method for the measurement of cortisol and related substances, of which more in another historic note. Sadly, I have not been able to determine who either Liebermann or Burchard were.

A paragraph in the 1968 Whittington Hospital Handbook shows how our view of the importance of cholesterol has changed over the years: *'As a guide to wholesome living and as an omen of longevity, this test will rank as one of the more bizarre manifestations of 20th Century pop science. The facts fit easily into a nutshell'.*

It goes on to enumerate these, acknowledging the correlation between serum cholesterol concentrations and the incidence of myocardial infarction but stressing that this was a statistical relationship and not applicable to specific individuals (of course still true today). It emphasises the lack of any evidence of a causal relationship (certainly true at the time of writing) and states that: *'…the uncritical demand for this kind of test (from both lay public and doctors) has made private laboratories prosperous and hospital laboratories bankrupt'.*

The handbook also suggests that cholesterol is useful in the diagnosis of myxoedema and cretinism, but this of course was before the development of assays for TSH (1975) although this had been described much earlier in the 20th Century, and measurement of protein-bound iodine was the best measure of thyroid hormones.

How easy it is to wield a retrospectoscope, but researching this article has only strengthened my admiration for our predecessors and emphasised the huge advances that have been made in our discipline during my lifetime. ■

ACB welcomes new members

The ACB is proud to introduce the following new members who have joined us since the last edition of *ACB News*. Please extend a warm welcome to:

Mohamed Abulfadl, Student, University of Bristol, Translational Health Sciences
Iman Al Hathi, Doctor, OMSN, Muscat, Oman
Dana Al-Nasiri, Clinical Biochemistry Specialist, Ministry of Health, Kuwait
Aminat Alimi, Student, School of Health and Life Sciences, Teesside University
Baffo Anita Yeboah, Student, Kwame Nkrumah University of Science & Technology, Ghana
Ross Bacchetti, Trainee Clinical Scientist, NHS Greater Glasgow & Clyde, Scottish Microbiology Reference Laboratories
Thomas Bancroft, Trainee Clinical Biochemist (STP), Bradford Teaching Hospitals NHS Foundation Trust
Lorenz Konstantin Becker, Senior Clinical Scientist, University Hospitals of North Midlands
Kelly Bicknell, Virology Specialist Clinical Scientist, Portsmouth Hospital NHS Trust
Jacob Cassar, Basic Specialist Trainee, Mater Dei Hospital, Malta
Jian Yuan Cheng, Medical Officer, Sibu Hospital, Malaysia
Matthew Curley, Trainee Clinical Scientist, Wirral University Teaching Hospital NHS Foundation Trust
Nikita Delgaty, Specialist Biomedical Scientist, Guy's and St Thomas' NHS Foundation Trust
Maria Dragan-Carciuc, Biomedical Scientist, University of Brighton
Omaima Elsayed, Biomedical Scientist, Khartoum Teaching Hospital, Sudan
Niels Fogh-Andersen, MD, Herlev Hospital, Denmark
Terry Gbaa, Student, Manchester Metropolitan University
Georgia Hackney, Trainee Clinical Scientist, East Kent Hospitals University NHS Foundation Trust
Eloise Haynes, Trainee Clinical Biochemist, Leeds Teaching Hospitals NHS Foundation Trust
Tetsuya Hirano, Founding Director, Hirano Clinic, Japan
Danielle Ifeama, Student, London Metropolitan University
Agnieszka Jakubowska, Chemical Pathology Trainee, East and North Hertfordshire NHS Trust
Jumana Jawat, Senior Clinical Biochemist, Sabah laboratory, Kuwait
Benjamin Johns, Clinical Scientist, Public Health Wales
Imogen Johnston-Menzies, Trainee Clinical Scientist, NHS Greater Glasgow Clyde, West of Scotland Specialist Virology Centre
Zepur Kazezian, FRCPath Part 1 Trainee, London
Rachel Kettles, Trainee Clinical Scientist – Microbiology, University Hospitals Birmingham NHS Foundation Trust
May Oo Khin, Specialty Registrar in Chemical Pathology and Metabolic Medicine, St Helens and Knowsley Hospital NHS Trust
Angela Kremmyda, Principal Clinical Scientist, Princess Royal Hospital, Telford
Win Chyn Laguio, Trainee Clinical Biochemist, Brighton & Sussex University Hospitals NHS Foundation Trust
Gregory Lynch, Chemical Pathology Registrar, Salford Royal NHS Foundation Trust
Thivanka Manawadu, Clinical Fellow in Chemical Pathology, King's College Hospital Foundation Trust
Elaine Mitchell, Point-of-Care Healthcare Scientist, Norfolk & Norwich University Hospitals NHS Foundation Trust
Vedes Nair, Student, Cardiff University
Marc Niebel, Clinical Scientist, Regional Virus Laboratory, Belfast Health & Social Care Trust
Theoktisti Pasadaki, Laboratory Manager, CREATE Fertility Leeds
Ashleigh Rainey, Clinical Scientist, The Newcastle Upon Tyne Hospitals NHS Foundation Trust
James Reid, Trainee Clinical Scientist (Biochemistry), Belfast Health & Social Care Trust
Mohamed Saeed, Chemical Pathology Registrar, Leicester Royal Infirmary
Adam Senessie, Laboratory Director, London Medical Laboratory
Eleanor Senior, Trainee Clinical Scientist, Countess of Chester Hospital NHS Foundation Trust
Karen Stade, Point-of-Care Operational Lead, Barts Health
Aleksandra Stanisic, Student, University of Greenwich
Mark Tremaine, Trainee Clinical Scientist, County Durham and Darlington NHS Foundation Trust
Rebecca Wood, Trainee Clinical Scientist, Brighton and Sussex University Hospitals NHS Foundation Trust ■

National Audit Day

10 November 2023, 09:00-17:00

Royal College of Pathologists, London

Join us at the Royal College of Pathologists in London for an excellent opportunity to hear about both national and local audits carried out by Clinical Scientists and Medical staff working in Laboratory Medicine and forthcoming audits. The day will focus on troponin and acute chest pain, monoclonal gammopathy and myeloma.

09:30 **Welcome and Introduction**
W Wassif, National Audit Lead

09:35 **National Audit on Troponin Assay**
Helen Jerina, Principal Clinical Scientist, Gloucestershire Hospitals NHS Foundation Trust

10:05 **Accelerated diagnostic pathways for acute chest pain: guidelines into practice**
Nick Mills, Chair of Cardiology/Consultant Cardiologist, Royal Infirmary of Edinburgh

10:45 Tea break

11:00 **Accelerated diagnostic pathways for acute chest pain: what does the laboratory need to do (and what the guidelines don't tell you)**
Paul Collinson, St George's Hospital, London

11:40 Discussion

11:50 **Regional audit presentations**

12:20 **Lunch and poster session**

14:00 **Louise Ward**
National Audit Deputy Lead

14:05 **International audit of laboratory practice for the provision of monoclonal gammopathy service**
Ross Sadler, Consultant Scientist, Oxford University Hospitals NHS Foundation Trust

14:45 **Assessment of and management of patient with monoclonal gammopathies**
Fenella Willis, Consultant Haematologist, St George's Hospital, London

15:30 **Minimal residual disease on blood using targeted mass spectrometry**
Hans Jacobs, Consultant Immunologist, The Netherlands

16:00 **Myeloma: a life worth living**
Mairi Whiston, Myeloma UK

16:30 **Discussion**

16:40 **Feedback and closing remarks**
W Wassif, National Audit Lead

For further information and to book please ***click here***.

Clinical Interpretation and Implementation of Microbiological Sequencing Techniques Course

This free course has been launched on behalf of Health Education England (HEE) and is delivered by Great Ormond Street Hospital Learning Academy (GLA) and the Association for Clinical Biochemistry and Laboratory Medicine (ACB). The first two cohorts (April in London and June in a virtual setting) have successfully taken place and there are still some places remaining for the September 26-30 (virtual) and November 20-24 (London) cohorts for anyone in an NHS or associated research setting with clinical exposure to microbiological test results and sequencing data and interested in attending.

Click here for more information and to register your interest. ■

Publication Deadlines

To guarantee publication, please submit your article by the 1st of the preceding month (i.e. 1 September for October 2023 issue) to: **editor.acbnews@acb.org.uk**

We try to be as flexible as possible and will accept articles up to the 20th to be published if space allows. Otherwise they will be held over to the next issue. If we are aware that articles are imminent, this gives us more flexibility and we can reserve space in anticipation.

If in doubt, please contact Gina Frederick, Lead Editor, via the above e-mail. ■

Sudoku

This month's puzzle

			H	E	T			
	T						I	
			I		Y			
		Y	E		R	H		
		R	Y	C	I	E		
	R						H	
	C	M				I	E	
	I	T		R		C	M	

Solution for April

T	S	Y	M	R	I	C	H	E
E	R	C	H	Y	T	M	I	S
H	M	I	C	S	E	T	R	Y
M	R	C	T	H	Y	E	S	I
I	H	E	S	M	R	Y	T	C
Y	T	S	E	I	C	R	M	H
S	Y	M	R	E	H	I	C	T
R	E	T	I	C	S	H	Y	M
C	I	H	Y	T	M	S	E	R

LAB TESTS ONLINE UK

Your Trusted Guide

Peer Reviewed • Non-Commercial • Patient Centred

Produced by The Association for Clinical Biochemistry & Laboratory Medicine

With support from The Royal College of Pathologists — Pathology: the science behind the cure; IBMS

Lab Tests Online-UK is a non-commercial website written by practising laboratory medics and scientists with lay editorial review of content to ensure its suitability. The aim of the website is to help patients and the public, including healthcare professionals, understand the many clinical laboratory tests that are used in diagnosis, monitoring and treatment of disease.

LTO-UK fact of the month

Do you know we're always looking for people to help keep the content of the site up-to-date? If you have a particular special interest in an area of Laboratory Medicine and the right level of expertise, you could be involved in writing and maintaining the material we have on that topic. We also like to keep users of the site up-to-date with stories in the news related to lab tests so we also accept short articles for the front page on topics that are being reported about in the media at the moment.

NICE approve genetic test in neonates

There's a piece on our front page on a story that a new genetic test has become available at the point-of-care to test for babies who have a gene variant that makes them susceptible to deafness if they are given the aminoglycoside antibiotic, gentamycin.

The test uses a mouth swab and produces a result within 30 minutes. Preclinical assessment of the instrument has shown 100% sensitivity and specificity for the variant. A trial across the North West of England found that of 751 neonates, 424 needed antibiotics. Using the test, three were found to have the gene variant indicating that other antibiotics should be used in these babies. NICE have recommended that the test can be used, but a full assessment will be released when sufficient evidence has been gathered.

The test has been welcomed by The National Deaf Children's Society.

Meet the Lab Tests Online-UK Board

This edition we have your new ACB President, Kath Hayden. Kath is a Consultant Clinical Biochemist at Manchester University NHS Foundation Trust (MFT) and Honorary Senior Lecturer at the University of Manchester and took up the role of ACB President at the AGM during UKMedLab23 in June. Following training in South Manchester, Kath has held posts in hospitals in Manchester and Liverpool over the last 30 years, overseeing implementation of new analytical technologies, point-of-care testing in hospital and community settings and harmonisation of laboratories. With specialist interests in endocrinology, quality and training, she has held previous roles as Clinical Director and then Clinical Head of Division for Laboratory Medicine at MFT and continues to teach STP students on the MSc in Clinical Sciences (Blood Sciences).

Kath has been involved in ACB activities since being appointed initially as the junior rep on the Regulating Committee (later the FCS) in 1990 which involved attending ACB Council, before moving to Chair of the Trainees Committee and a number of roles on the North West Regional Committee including Regional Tutor, and on Focus organising committees (now UKMedLab).

She has long been a supporter and advocate of LabTestsOnline as the source of reliable information for the public and health professionals.

Outside of work, Kath likes reading, aerobics, walking and travelling and fulfilled a lifetime wish to visit Canada and the Rockies last year.

How to get involved

Join the editorial team

If you are interested in contributing to the vital work of the editorial team to keep the website up-to-date and to introduce new material please contact us for more information.

Become a Lab Tests Online-UK champion

Join our army of Champions and promote LTO-UK locally and nationally. Champion packs provide a great starting point with ideas and marketing material. For more information or to join our champions please contact us.

Email: **labtestsonlineuk@acb.org.uk** Website: **labtestsonline.org.uk** Follow us:

AI love you, but AI might kill you

Devon Buchanan, Senior Clinical Scientist, Blood Sciences, King's College Hospital; Lorenz Becker, Senior Clinical Scientist, University Hospitals of North Midlands NHS Trust; and Jessica Johnson, ST3 Chemical Pathology Sheffield Teaching Hospitals

A 56-year-old man receives his blood test results using the GP practice's new app. He sees that he has a high HbA1c of 57 mmol/mol and fasting glucose of 8.6 mmol/L. His GP practice doesn't have any appointments until next week, so he enters his results into ChatGPT and asks what they mean. Despite never being designed to answer medical questions, ChatGPT gives an accurate response: "This individual has elevated glucose and HbA1c levels, suggesting a diagnosis of diabetes".

This was a scenario created by Janne Cadamuro and colleagues (2023) to test ChatGPT's understanding of laboratory results. ChatGPT is part of an explosion of new machine learning systems, dubbed 'artificial intelligence' (AI). Popular ML systems include chatbots like Google Bard and image synthesis systems like DALL-E and Stable Diffusion. These systems are referred to as generative AI, foundation models, or large language models (LLMs), which is the term we will use. What excites people is the system's ability to write, draw and answer questions to a standard similar to that of a human. Numerous companies are developing commercial products using LLMs, and the NHS Long Term Workforce Plan states NHS England will investigate how they can be used to support NHS staff. Given this, and the likelihood patients will use LLMs to assist them, it is important laboratorians understand the basics of how LLMs work, their potential and their shortcomings.

LLMs are a type of statistical learning model, a topic laboratorians are already familiar with because we use it all the time. In our labs, corrected calcium, eGFR, KFRE, risk scores like QRISK and even the humble calibration curve are all applications of statistical learning. Take calibration curves for example: statistical learning requires a model (a linear relationship shown as a straight line) with an input (absorption) and an output (concentration), training data (measurements of calibrators) and a computer. The model can be 'trained' by comparing the output of the model to the outputs in the training data and changing the model so that its outputs are more similar to the training data. The model can then be used to make predictions for new data where the output is not known (a patient sample).

LLMs have the same components: they take text as input and predict what the next word is likely to be, like the auto-complete feature of mobile phones. A straight line isn't flexible enough to describe patterns in text, so current LLMs

use models called transformers, which are made of simulated neurons – a neural network. The training data was a huge amount of text from the internet, with words removed to create a 'fill-in-the-blanks' game. The model guessed which word should appear in the blanks, and after each guess this was adjusted so that it produced words that were more similar to the correct answer. This process was extremely computationally intensive; training GPT-3, which ChatGPT is based on, cost £3.5 million according to Lambda Labs. LLMs generate text and have conversations by repeatedly guessing the next word.

LLMs have two exciting properties. First, LLMs can carry out tasks that they have not been specifically programmed for, which is termed emergent behaviour. For example, ChatGPT can often (but not always) answer arithmetic questions correctly. Interpreting blood test results is another emergent behaviour that it was not specifically trained to do. These behaviours suggest LLMs could be capable of performing more complicated tasks. LLMs are also universal – they can accept, produce or convert between any sequence of word-like things including English, other languages, images, computer code, DNA and proteins. For example, services like DALL-E can convert text descriptions into images and GitHub Copilot can convert prose instructions into computer code.

LLMs also face several challenges. The first and most fundamental is their unpredictability. As they guess which word is likely to come next, they have no notion of an answer being right or wrong, so their output may look factual, but actually be completely made up. These are referred to as "hallucinations" or "confabulations" and they are only identifiable by human checking. For example, when some lawyers used ChatGPT to find cases to support their arguments, they got into serious trouble when most of them turned out to be fictitious.

Another challenge is poor alignment between what we want the model to do and how we actually train it. In healthcare we would like LLMs and other models to be safe, effective and equitable, but the only data that is available to train them with is data generated by humans, who themselves are often biased and unreliable. Machine learning models may unintentionally learn to reproduce any bias inherent in their training data. Their powerful pattern recognition can exacerbate this issue, as they identify and reproduce subtle biases. For example, some image recognition models can identify a person's race from CT scans, opening up the possibility that these models may learn racial discrimination even when they are trained on data that doesn't include information about ethnicity. "Laundering" human bias through machine learning models, which are assumed to be coldly logical, is a serious concern.

So how could LLMs be used for good in laboratory medicine? The emergent behaviour and universality of LLMs has made them popular in fields where creativity is important, such as copywriting, visual art and programming. However, in healthcare, we have to validate the behaviour of our tools, meaning the unpredictability of LLMs is a major barrier to their use. It is also unclear how easy it will be to update LLMs with changing guidelines, i.e. to forget old information and only use the new information going forward as medical practice changes. Until LLMs are better understood, more established statistical learning techniques will remain a better choice for laboratorians hoping to improve healthcare. ■

Deacon's Challenge Revisited

No 26 - Answer

An assay mixture for the measurement of lactate dehydrogenase constituted 2.7 mL of buffered NADH and 100 µL of serum. The reaction was started by adding 100 µL of sodium pyruvate. The absorbance change over 5 minutes was 0.150 when measured in a 0.5 cm light path at 340 nm. Assuming the molar absorptivity of NADH at 340 nm is 6.30×10^3 $Lmol^{-1}cm^{-1}$, calculate the enzyme activity.

LDH activity = µmol substrate consumed/min/L plasma

The reaction is monitored by following the fall in absorbance at 340 nm due to the oxidation of NADH as pyruvate is consumed:

$$CH3CO.COO^- + NADH + H^+ \rightarrow CH_3CH(OH)COO^- + NAD^+$$

First calculate the amount of NADH oxidised over the reaction period of 5 min:

$$\Delta \text{ Absorbance} = \Delta[NADH] \text{ mol/L} \times \varepsilon \text{ NADH } (Lmol^{-1}cm^{-1}) \times \text{Cell path (cm)}$$

$$0.150 = \Delta[NADH] \times 6.30 \times 10^3 \times 0.5$$

$$\Delta [NADH] = \frac{0.150}{6.30 \times 10^3 \times 0.5} \text{ mol/L/5 min}$$

To convert from mol to µmol, multiply by 1,000,000 and from 5 min to 1 min, divide by 5:

$$\Delta [NADH] = \frac{0.150 \times 1{,}000{,}000}{6.30 \times 103 \times 0.5 \times 5} \text{ µmol/L/min}$$

This is the LDH activity per litre of reaction mixture not plasma.

Since 100 µL of plasma was diluted to a final volume of 2.9 mL (i.e 100 µL plasma + 2.7 mL NADH/buffer + 100 µL of substrate) the activity (µmol/min/L plasma) is obtained by multiplying this result by 2.9 and dividing by 0.1:

$$\text{LDH activity} = \frac{0.150 \times 1{,}000{,}000 \times 2.9}{6.30 \times 103 \times 0.5 \times 5 \times 0.1} = \textbf{276 µmol/min/L}$$

Question 27

A 60 mg dose of a drug is given to a male experimental subject who weighs 80 kg. Assuming that the drug is completely absorbed and distributed evenly throughout the total body water, estimate the potential peak plasma level. If the drug were distributed only within the extracellular compartment, what would the plasma level be?

The Diggle Microbiology Challenge

These multiple-choice questions, set by Dr Mathew Diggle, are designed with Trainees in mind and will help with preparation for the Microbiology Part 1 FRCPath exam.

Question 36 from April's ACB News

The following are true or false statements regarding viral infection of the central nervous system (CNS):

A. Meningitis may occur together with encephalitis.
B. Enteroviruses are one of the commonest causes of CNS infections in childhood.
C. Electron microscopy of the cerebrospinal fluid (CSF) is a useful diagnostic test.
D. PCR has no role in the diagnosis of CNS infections.
E. The detection of antibody in the CSF is a useful diagnostic marker.

Answers

A. True – This condition is called meningoencephalitis. This happens when the thin layers of tissue that surround your brain and spinal cord become inflamed in addition to swelling and inflammation in your brain itself.
B. True – Enteroviruses are very common. The viruses mostly cause illness in babies, children and teens. This is because most adults have already been exposed to many enteroviruses and have built up immunity. The viruses often don't cause symptoms or cause only mild symptoms.
C. False – although can provide useful information, electron microscopy is not considered a time or cost-effective tool as a diagnostic test.
D. False – Polymerase chain reaction (PCR) is a broadly applied laboratory test for the diagnosis of a wide variety of central nervous system (CNS) infections.
E. True – Significant levels of antibody in the CSF may mean you have an infection or an inflammatory or autoimmune disease that involves your central nervous system.

Question 37

The following are true or false statements regarding Rubella infection:

A. It can be asymptomatic.
B. It may be indistinguishable from parvovirus B19.
C. It can have the most serious side effects when occurring in a woman in the third trimester of pregnancy.
D. It is usually preventable by vaccination.
E. It may be acquired by having close contact with an infant with congenital rubella syndrome.

The answer to Question 37 will appear in the next issue of ACB News – enjoy! ■

Different routes of entry to the Scientist Training Programme

Benjamin Chadwick and Alexander Lennon, Trainee Clinical Scientists, Great Ormond Street Hospital, London

An advantage of the current Scientist Training Programme (STP) is that applicants need not have followed the 'traditional' entry route that was required pre-STP. In this report, Benjamin Chadwick and Alex Lennon talk about their different experiences and routes of entry into the STP, one coming from a work-based experience background and the other coming in from an academic route post PhD.

Transition from academia to STP

Benjamin Chadwick

I'm eight months into the Scientist Training Programme (STP) after having spent the last six years in academic research. I started off in Liverpool where I studied for my undergraduate degree and then Masters in Microbiology. After that, I fancied a change of scenery and subject and so moved to Leeds to start a PhD imaging viral life cycles with electron microscopes. One consistent theme throughout all of this was my dislike of research, and so after six years I decided to jump-ship and try out the clinical side of Microbiology. I applied and was accepted onto the STP, where I've been ever since. After being on the STP for eight months, I've found that there are a few similarities and differences between academia and clinical work.

One of the things I enjoy about working in Great Ormond Street's microbiology department is the sheer range of people I work with, ranging from nurses and consultants to laboratory staff and researchers, all with their own areas of knowledge and expertise.

In research, specialties can be quite niche and everyone is typically a postgraduate researcher. Additionally, it has been wonderful working on Microbiology as a broad subject rather than one specific area. In research, I was primarily working on viral life cycles, whereas now I get to work in areas covering bacteriology, parasitology and mycology. Another example of a difference between academia and clinical work is the work-life balance. Don't get me wrong, the STP is extremely full on, and I often find myself catching-up on said work in my own time (I say as I write this on my annual leave). However, working during my own time feels like my own choice, whereas in academia I found that there was often an unhealthy assumption that you should be working on science during every minute of the day. The final big change for me was motivation. As the

number of failed experiments during my PhD began to increase, I found my motivation dropped. In clinical work, things rarely don't work (at least so far, touch wood) as you're running diagnostic tests which have been heavily optimised and validated. Yes, it can be a bit monotonous working on the routine diagnostics, but it works, and it's efficient. Most importantly, every test performed gives a patient more information on their ailment, allowing the doctors to make a more informed decision on their treatment.

Although I'm glad to be done with my PhD, the lessons I learned in the last six years are invaluable and I can't wait to see what the rest of the STP has in store for me!

Switching roles within a diagnostic laboratory to become a Clinical Scientist

Alexander Lennon

I began working for the NHS in a microbiology and virology diagnostic laboratory almost three years ago as an Associate Practitioner. I was originally brought in to supervise our COVID-19 and respiratory virus testing service during the pandemic. I have always wanted to become a Clinical Scientist since I completed university and my previous role as an Associate Practitioner was an important stepping stone in my life towards building the skills I needed to become one. Getting the opportunity to work in a diagnostic microbiology laboratory alongside other Clinical Scientists reinforced that I had made the correct decision that this was the career path I wanted to pursue.

Last year I discovered that there was funding available for an in-service post on the STP within my department and I was very fortunate to be awarded the position. My previous role came with a lot of duties and responsibilities so when my new role commenced, I needed to have a transition period, which included training my replacement. I have thoroughly enjoyed having the opportunity to train as a Clinical Scientist within the same department because I have been able to maintain the relationships I have built with my team and continue to support them when required.

The most significant difference I have experienced since transitioning to a Trainee Clinical Scientist is the level of autonomy I have been given. As an Associate Practitioner, I was always supervised by one of our senior scientists, whereas as a Trainee Clinical Scientist I have been allowed to work more independently. My first rotation was based in the laboratory within my department, where it has been very refreshing to design my own training plan and complete my competencies in the order I choose. This new level of independence has had its challenges but has been a valuable opportunity to gain new experience and develop new skills. ■

Highlights of the Microbiology Training Day at UKMedLab23

Azul Zorzoli, Trainee Clinical Scientist - Microbiology, Royal Infirmary of Edinburgh

The Microbiology Training Day was hosted in Leeds on 12 June 2023 in the context of the UKMedLab23 annual meeting. National leaders in Clinical Microbiology discussed antimicrobial drugs and infection control scenarios, including interactive case discussions and a preparation session for the Royal College of Pathologists examination. The morning session brought together attendees from Biochemistry and Microbiology, featuring sessions on procurement options from Abbott Diagnostics, common challenges in the procurement process and interactive management discussions.

During the afternoon, **Dr Andy Stone,** an infection pharmacist and antimicrobial specialist from Greater Manchester, presented 'Properties of antimicrobial drugs' for the Microbiology session. His talk emphasised the importance of understanding pharmacokinetics (PK) and pharmacodynamics (PD), drug interactions and toxicities of essential antimicrobials. Dr Stone discussed drug contraindications (i.e. the risks of using aminoglycosides in patients with myasthenia gravis) and drug interactions (i.e. rifampicin impact on doxycycline bioavailability). Dr Stone also highlighted drug interactions involving rifampicin and anticoagulants, diazepam, mirtazapine and omeprazole. The presentation concluded with a discussion on drug toxicities, contraindications, side effects and engaging audience interactions concerning penicillin allergies and patient de-labelling.

Dr Jessica Martin, Consultant Microbiologist and medical lead for the Infection, Prevention and Control (IPC) team at Leeds Teaching Hospitals Trust, delivered a presentation on 'Understanding *Clostridioides difficile* transmission and IPC'. She discussed the multidisciplinary approach employed during *C. difficile* ward rounds, where pharmacists and consultants from the infection and IPC teams address different aspects of individual cases. The group discussed a clinical case involving a 93-year-old male who developed a *C. difficile* infection (CDI) after receiving broad-spectrum antibiotics, highlighting the impact this disease has on patients and the healthcare system. Dr Martin's talk provided insights into the history, trends and impact of hospital-acquired CDI, covering pathogenesis, clinical presentation, epidemiology and diagnosis methods.

Dr Anna Hartley, a Genitourinary Medicine Consultant from Leeds, presented two clinical cases on the epidemiology, diagnosis and treatment of Sexually Transmitted Diseases (STIs). The first case focussed on a 22-year-old female with abnormal vaginal discharge. The audience discussed the patient's sexual history, diagnostic tests and appropriate treatment for *Neisseria gonorrhoeae*. The second case involved a

44-year-old male with a perianal ulcer. Differential diagnosis was considered, including Herpes simplex virus, *Neisseria gonorrhoeae* and *Treponema pallidum.* The presentation covered the intricacies of syphilis serology, the evolution of the disease, available resources for patient support, contact tracing and HIV treatment.

Dr Penny Lewthwaite, a Consultant and Lead Clinician in Infectious Diseases in Leeds, presented on 'HIV-associated tuberculosis'. The talk highlighted the challenges in managing TB/HIV co-infection, including atypical case presentations, higher pulmonary and disseminated TB rates and low CD4 counts. The sensitivity of the diagnostic methods, such as smears and chest X-rays, were discussed alongside advances like GeneXpert Cepheid PCR and TBcID. Two clinical cases emphasised the importance of early antiretroviral initiation and the occurrence of immune reconstitution inflammatory syndrome. The rates of multidrug resistance TB and drug interactions were also addressed.

Dr Naomi Gadsby, a Consultant Clinical Scientist from Edinburgh, concluded the Microbiology Training Day with a study session for Trainees preparing for the Royal College of Pathologists examination. Scenarios covering infection prevention and control practices for viral and bacterial infections were presented, along with discussions on treatment options, considering drug interactions, contraindications, patient demographics and comorbidities. Specific cases included *Bordetella pertussis* infection in a baby, *Varicella Zoster Virus* in a pregnant woman, *Trichophyton rubrum* mycosis and *Strongyloides stercoralis* infection.

The Microbiology Training Day was a remarkable success, providing a comprehensive and engaging programme that covered important clinical microbiology topics. Attendees gained valuable knowledge on antimicrobial drugs, infection control strategies, diagnosing and treating sexually transmitted diseases, HIV-associated tuberculosis and other infectious conditions. The event was truly informative and helped enhance the attendees' skills and understanding. ■

Clinical Immunology – STP Networking Day

Ellie Gerred, 2nd year STP Trainee, Immunology Laboratory, Barts Health NHS Trust

The Clinical Immunology Scientist Training Programme (STP) Networking Day is a highly anticipated event that brings together Trainees from all three years, training officers and Clinical Immunologists. This annual gathering serves as a platform for individuals to share their knowledge, exchange innovative ideas and collaborate.
The Networking Day encompasses a range of activities, including a keynote speech by a renowned Immunologist, interactive presentations showcasing intriguing patient cases, elective placements and dissertation projects. Participants have the opportunity to engage in meaningful discussions, forge valuable connections and expand their professional networks. The event fosters a collaborative atmosphere, inspiring participants with ideas for their own elective placements. Through presenting cases, electives and research, this event allows the enhancement and dissemination of knowledge across Immunology laboratories country wide, which can enhance the service and patient care provided.

After a welcome talk from **Alison Whitelegg**, Consultant Clinical Scientist, the second year STPs performed their presentations. Eleanor Hickman, from Oxford University Hospitals, first presented an interesting paediatric fungal infection case. This case described a 13-year-old patient who presented with ulcers and white, creamy lesions in the mouth due to candida infection. The patient was found to have very few of a certain type of T helper cells (Th17), and a gain-of-function mutation in a particular signalling molecule called STAT1 was later discovered.

Peter Stannard, from Ashford and St Peter's Hospitals, presented several short cases investigating serum free light chains in patients with normal serum electrophoresis. The presentation offered valuable insights into these rare cases, emphasising that the absence of a monoclonal gammopathy on protein electrophoresis should not be considered a definitive exclusion for the diagnosis of multiple myeloma.

Daniel Vipond, from University Hospitals Birmingham, presented a stimulating case about a 41-year-old patient with a complex history of inflammation from early childhood. In an assay of neutrophil function (dihydrorhodamine, DHR) their neutrophils showed abnormal activity when stimulated with one stimulus (paramethoxyamphetamine, PMA), but a normal response was seen with *E. coli* stimulation. PMA passively diffuses across cell membranes to activate protein kinase C (PKC), which subsequently allows the generation of reactive oxygen species to kill intracellular bacteria and fungi.
The patient was later diagnosed with PKC deficiency, explaining the unusual DHR results.

Following on from this, **Hansraj Dhayan**, from King's College Hospital, presented a case of immune dysregulation. This case was a 13-year-old male with a variant in a gene (neutrophil cytosolic factor 4 (NCF4)) associated with chronic granulomatous disease (CGD). On PMA and fungal particle stimulation, this form of CGD showed a

conserved oxidative burst whereas pathogen stimuli did not. This form of CGD (p40 deficient-CGD) differs from classical forms and has a better prognosis. Subsequently, I performed a presentation on my elective placement at the Royal Children's Hospital, Melbourne. I compared the differences in testing between their lab and my own as well as the short project I performed on investigating the use of a live/dead stain in their T cell proliferation assay.

Our first guest presentation was given by **Tony Taylor** from Launch Diagnostics. His presentation covered the topic, In Vitro Diagnostic Regulations (IVDR), which explained the current requirements for IVD in the UK. Launch Diagnostics kindly sponsored the event and provided the lovely refreshments and lunch.

Following lunch, the third year STPs then performed their presentations. **Kavindi Gunaratne**, from University Hospitals Plymouth, presented an incidental finding on liver function tests. In this presentation, she discussed a patient who had a massive paraprotein that was cold-precipitating leading to conflicting biochemistry results. Kavindi highlighted abnormal and discrepant results that indicated the presence of a cryoprotein early in testing. Understanding this can result in a speedier diagnosis for patients with these unusual antibodies.

Melanie Hunt, from Cambridge University Hospitals, presented on her elective placement at The Binding Site. During this placement, she observed how specialist diagnostic products are developed and tested. Additionally, she was able to observe the testing performed by the novel analyser EXENT, which uses quantitative immunoprecipitation mass spectrophotometry to identify low-level monoclonal proteins.

Ashfaq Rahman, from Great Ormond Street Hospital, presented an interesting case about a young infant returning home from holiday with a fever. This case highlighted the importance of investigating all options in young children and not just assuming immunodeficiency. In this case, a hyperinflammatory disorder (Hemophagocytic Lymphohistiocytosis, HLH) was suspected initially, but a parasitic infection was proven to be the cause.

Finally, completing the Trainee presentations, **Ashleigh Hemmings** from Barts Health presented her verification of the Weislab Complement Function ELISA and testing of complement stability in samples. Her investigations have proved to be uniquely fascinating and may influence how patient samples for complement testing are stored in the future.

We then had the privilege of hosting **Professor Tracy Hussell** as a guest speaker, who delivered an insightful and engaging talk about her career, research and future events for us to get involved in such as the BSI-CIPN Congress 2023.

To conclude the day, all Trainees participated in individual mentoring sessions with experienced registered Clinical Scientists. These sessions served as a platform for us to reflect on our training progress and seek guidance or support if needed. Moreover, they presented an excellent networking opportunity, allowing us to connect with Clinical Scientists from different hospitals whom we hadn't had the chance to meet before. The Clinical Immunology STP Networking Day was a resounding success, promoting collaborations and inspiring discussions among all participants. The event surpassed expectations, leaving us excited for next year's event. ■

By Trainees, for Trainees

Barbara MacNamara, Clinical Biochemist, St James's Hospital, Dublin, Ireland

The opportunity for Trainees to participate in the creation of summaries of NICE best practice guidelines for the ACB website has returned.

This extra-curricular activity was previously co-ordinated by Dr Alana Burns who along with many (former) Trainees is credited for the wealth of guideline-summaries currently available on the **ACB website**.

When Alana took a sabbatical, two or so years ago, so too did the summaries! However, over the last few months great inroads have been made in re-initiating this very worthwhile educational activity.

Newly published NICE Guidelines with relevance to Clinical Biochemistry/Chemical Pathology have been compiled into a working list of guidelines for future summary, along with existing summaries whose parent guideline has been revised substantially since the last date of summary. This working list is very much a living document. Dr Alaa Abdelrazik (Chemical Pathologist in the Scientific Affairs and Clinical Affairs Section), approves this working list of guidelines on a regular basis before they are assigned to trainees for summary.

When a Trainee confirms an expression of interest in writing a guideline-summary, they are provided with detailed instructions including a summary template. Once assigned a guideline for summary, it is recommended that the summary should be ready within three to four weeks for follow-on review by a supervisor with full FRCPath status.

The ACB issues CPD points and a letter of acknowledgement to the Trainee upon receipt of the completed summary as approved by the supervisor.

As the ACB now encompasses other laboratory medicine disciplines such as Microbiology and Immunology, it is the understanding that more co-ordinators will be assigned to facilitate guidelines-summaries for all disciplines.

It is also anticipated that the improved functionality of the recently overhauled ACB website will better categorise and index the summaries resulting in easier searches.

Writing a guideline-summary is a fantastic way of enhancing one's own learning and also facilitating the learning of our fellow Trainees and colleagues. It is learning based on best practice.

Furthermore, this is quite a unique activity within the ACB, as it is exclusively 'trainee-led'; the Trainee writes the summary, which is reviewed by a supervisor whom the Trainee organises. There is no other scientific review involved in the process. All notable factors for creating a sense of ownership and engagement.

We are calling out for all Trainees to become involved in this exceptionally rewarding activity. Our participation today ensures its continuation for the future. Contact Barbara MacNamara **here**.

"By Trainees, for Trainees", that's our motto!

Biochemistry Training Day

Ciara Cunning, Clinical Biochemist, The Mater Misericordiae University Hospital, Dublin

The Biochemistry Training Day commenced with an informative session presented by **Jacob Stokes** of Abbott Diagnostics on the various procurement options available. The focus was on managed service contracts, reagent rental and capital purchase, discussing the advantages and disadvantages associated with each. Attendees gained valuable insights into the different approaches to procurement and the implications for laboratory operations.

The next presentation was by **Hazel Borthwick** and **Emma Walker** who delved into the practical aspects of procurement. Participants were enlightened about the challenges commonly encountered in real-world procurement scenarios and offered strategies to overcome them. This session aimed to equip professionals in the field with the necessary knowledge and skills to navigate procurement hurdles effectively.

Following a well-deserved break and a great networking opportunity, the day continued with an interactive session focussing on management scenarios hosted by **Allison Chipchase**. Participants were divided into groups and actively engaged in discussions and problem-solving activities, applying their knowledge to practical situations commonly encountered in laboratories. This session aimed to enhance decision-making skills and foster a collaborative learning environment.

Jacob Stokes

Following a delicious lunch, the afternoon sessions commenced with an in-depth exploration of real-world statistics by **Craig Webster**. Participants gained a comprehensive understanding of statistical analysis techniques commonly used in laboratory research and diagnostics. This session aimed to improve the attendees' ability to interpret and analyse data accurately, ultimately enhancing the quality of their work.

The penultimate session of the day by **Dr Katharine Bates** provided attendees with a comprehensive overview of liver metabolism. The presentation included clinical case studies, helping to enhance participants' knowledge of liver biochemistry and its relevance in clinical practice.

The final presentation of the day focussed on advancements in laboratory diagnosis techniques for liver disease by **Dr Stuart McPherson**. Attendees were updated on technologies and methodologies employed in diagnosing and monitoring of liver-related conditions and their implications for improving patient care.

The Biochemistry Training Day concluded with a sense of accomplishment and a wealth of new knowledge. The event served as a platform for professionals in the field to enhance their skills, exchange ideas and stay abreast of the latest developments in biochemistry.

I thoroughly enjoyed the Biochemistry Training Day and found it was a great learning experience for my on-going prep towards the FRCPath examinations. I am grateful and pleased to have been awarded the ACB Education Bursary which enabled me to travel to Leeds and attend such a fantastic event. ■

International Award

Ben Nicholson, Senior Clinical Scientist, Sheffield Childrens NHS Foundation Trust

On the first day of the UKMedLab23 Conference, I had the pleasure of attending the 'Lessons in Chemistry' International Award Plenary Lecture by Professor Maria Fitzgibbon, Consultant Clinical Biochemist at Mater Private Network (NPH) in Dublin and Cork. Professor Fitzgibbon gave an overview of inflammatory markers in both acute and chronic inflammation, with an insight into the current and upcoming combined markers of inflammation testing and novel studies into the potential use of these markers to assess cardiovascular (CV) residual risk.

The session started with an introduction to acute and chronic inflammation, discussing the pathway in which inflammation occurs through activation of immune and non-immune cells to protect the host from viruses, bacteria and infections through removal of pathogens and promoting tissue repair. The discussion led onto how systemic chronic inflammation (SCI) is implicated in cardiovascular risk, diabetes mellitus, chronic kidney disease and auto-immune diseases.

This progressed into a discussion of current markers. Did you know the C in C-Reactive Protein (CRP) stood for C-polysaccharide of *Streptococcus pneumoniae*? I didn't. In acute inflammation, there is release of CRP

Professor Maria Fitzgibbon receiving her Award from the ACB President, Dr Bernie Croal

by IL-6 stimulation (and to a lesser extent macrophages, lymphocytes etc), which has the greatest sensitivity for acute illness/inflammation, with its release being proportional to the intensity of the inflammatory process. In addition to CRP, there can be release of Prohormone of Calcitonin (PCT), which is a more useful marker in the differentiation of bacterial causes of inflammation from non-bacterial causes. The benefits of using PCT include early antimicrobial treatment which can reduce morbidity and mortality, reduction in the inappropriate use of antibiotics and improved differential diagnoses in cases where CRP may be high, but the PCT is low (?other acute inflammatory disorders e.g. vasculitis). Further to this, a study discussed the use of CRP and IL-6 in SARS-CoV-2 and found that there was evidence for worsening outcome in SARS-CoV-2 infection when CRP and IL-6 were elevated. Baseline IL-6 levels were positively correlated with organ failure severity (SOFA score) but did not correlate with CRP levels, and CRP (slower kinetics) cannot be used as a surrogate marker for IL-6 (rapid release kinetics).

The session then turned to a more specific summary of chronic inflammation and CV residual risk. Discussion was had regarding potential combination biomarkers: hs-CRP, IL-6 and non-HDL-cholesterol, combination therapies: statins, PCSK9 inhibition, IL-1b blocker (Canakinumab) and news that IL-6 inhibition is on the horizon with a drug named 'Ziltivekimab' which is being specifically developed for atherosclerosis.

Further studies discussed included the protective effect of aspirin on CV risk in apparently healthy men, the use of CRP as a predictive marker of CV disease in women, use of CRP and LDL-cholesterol in the prediction of first cardiovascular events, inflammation and cholesterol as a determinant of CV death among statin treated patients and the effectiveness of statin therapy in primary prevention when LDL is low but hsCRP is high (JUPITER Trial).

The session was rounded off with the European Society of Cardiology Guidelines on CV disease prevention in clinical practice, cases of hyper-inflammation and a summary discussion of the research required for fully understanding the role that systemic inflammatory processes play in disease risk, biological ageing and morbidity and mortality.

Finally, don't forget to eat healthily and exercise!

The Impact Award Lecture:

Development of a national home finger-prick blood laboratory testing service for clinicians of Paediatric Highly Specialist Services for complex conditions

Emma Tuddenham, Clinical Scientist, South West London Pathology

Professor Tim McDonald, Royal Devon and Exeter Hospital, gave a very interesting talk on the work of his team who developed home capillary blood sampling for specialist patient populations during the COVID-19 pandemic. Monitoring children with rare, long term conditions who are normally cared for by specialist tertiary referral centres (under the NHS Highly Specialised Services umbrella), was a challenge during this time, and home finger-prick capillary blood collection was proposed as a solution.

Professor McDonald's team developed a home capillary blood test service for these patients, collating test requests from clinicians around the country via a new web portal integrated into their LIMS systems. Clinicians were responsible for adding their patient's details, including address, to the portal. An admin team received the order and dispatched a capillary blood testing kit to the patient's home. The kit contained instructions on how to collect a good capillary blood sample – including keeping well hydrated,

Professor Tim McDonald receiving his Award from the ACB President, Dr Bernie Croal

warming hands and standing up to collect the blood. This trial was successful and was rolled out to 19 highly specialised service clinics in 2021.

Parallel to this work, the lab also ran the Valovote study, comparing levels of more than 50 analytes in paired capillary and venous samples and surveying patients enrolled in the trial on their experience of home capillary blood sampling. Three hundred and three already having venepuncture were enrolled in the study, with capillary and venous samples collected within 30 minutes of each other. CLSI EP35 guidance for the assessment of equivalence was followed, with the requirement that at least 40 samples for each analyte were measured in duplicate across a wide concentration range.

Electrolytes showed wide variation and scatter in results between venous and capillary samples, as did cortisol – the latter was attributed to stress of finger-prick testing! For the full blood count, haemoglobin, red blood cell and white blood cell counts all correlated well. Most patients were very positive about capillary blood collection, preferring it to a Phlebotomy visit. However, there was a high proportion of young IBD patients within the study group who perhaps might be more motivated to avoid unnecessary healthcare appointments and be more willing or able to collect their own capillary blood.

The pros and cons of capillary blood sampling were discussed – advantages included use of existing laboratory analysers for measurement of many analytes on a small volume of capillary blood, convenience for patients and reduced phlebotomy costs. However, variation between venous and capillary results meant certain analytes could not be reported on capillary samples, and sample quality was generally poorer, with increased haemolysis and lower volumes obtained. The capillary blood sampling kits are expensive at around £5 each, and the challenge of accrediting lab assays for capillary testing as an extension to scope also needs to be considered. ■

The Leeds experience

Eloise Haynes, STP, Leeds Teaching Hospitals NHS Trust

Kick starting 'The Leeds experience' was a fascinating talk on essential blood testing in patients abusing androgenic anabolic steroids by **Dr Stephen Gibbons**. This talk gave an excellent overview of the physiological and health impacts of anabolic androgenic steroid use and the incidence, habits and doses of the average steroid user. This was particularly fascinating as many people have little insight into the world of steroid abuse and just how common and accessible anabolic steroids are. For example, the average testosterone production in male non-users is 50 mg per week. However, advanced androgenic steroid abusers can use 3000 mg per week and autopsies have shown levels can reach a staggering 10-15,000 mg. This fact drove home the sheer quantity of anabolic steroids that are taken and thus the health implications that come with such a high quantity of testosterone in a user's system.

Dr Stephen Gibbons went on to explain the need for clinicians to inquire about and determine anabolic steroid use in patients presenting with hypogonadism to ensure the correct patient pathways are assigned. He highlighted how often anabolic steroid users are referred to endocrinology pathways unnecessarily due to symptoms often resolving following steroid cessation and recovery. Within his talk he explained how the Leeds team had developed an algorithm for clinicians to consider when faced with likely candidates for steroid abuse. Through this talk, Dr Gibbons highlighted an ever-growing 'steroidemic' of anabolic androgenic steroid use and established the common misconceptions and issues relating to patient handling as a result.

This engaging presentation provided a well-informed overview of the pathophysiology, incidence and the patient and NHS implications of androgenic anabolic steroid abuse. Dr Gibbons provided well presented evidence and suggestions to tackle the current issue that impacts not just Leeds ,but the NHS as a whole, which benefited and related to the entire audience.

The second talk of the Leeds experience covered the interesting topic of lead poisoning in children and was presented by **Dr Carys Lippiatt**. This talk gave an amazing perspective of the reality of modern-day lead poisoning in children which many assume is a thing of the past. It was both insightful and shocking to learn how often lead is still present in our environment and how common behaviours like pica can increase lead poisoning risk. This talk covered the common items containing lead, the impacts of blood lead concentrations and the individuals and scenarios that increase risk.

To further support the impacts of lead poisoning and need for early identification, Dr Lippiatt discussed a sad case involving a child who lost their life due to late identification and intervention of lead poisoning. The case highlighted the necessity to consider the risk of lead

poisoning in individuals with pica behaviour. Through investigating the case Dr Lippiatt and her team implemented a change so that when bloods were being requested for the investigation of iron deficiency in a child with pica, blood lead measurement was included. This has led to a significant increase in the detection of children in Leeds with high blood lead concentrations, allowing more timely intervention. Furthermore, this talk emphasised the importance of adjusted national guidelines to fit the severity of lead poisoning. Prior to 2021 the threshold for reporting lead poisoning was 0.48 µmol/L. However, after lobbying by people like Dr Lippiatt, the threshold was dropped to 0.24 µmol/L. This has ensured that the UK Health Security Agency are able to accurately map and track cases of paediatric lead poisoning and ensure appropriate follow up with local Health Protection teams.

The talk given by Dr Lippiatt brought an underestimated issue to our attention which was greatly appreciated not just as clinical staff but also as people with families and children. This talk increased vital awareness of the risks and consequences of lead poisoning which can aid our clinical judgement but also improve our awareness in our personal lives.

The final presentation of 'The Leeds experience' was from **Dr Robert Barski,** covering the very interesting topic of the metabolic impacts of nitrous oxide (NOS) abuse. The choice of topic was particularly relevant given the increase in recreational use of nitrous oxide. Although many are aware of the use of nitrous oxide, I was intrigued to learn the physiological impact of nitrous oxide abuse and the consequent impacts this has for the NHS and patient health. Dr Barski clearly explained the molecular consequences of NOS on the functionality of vitamin B12 and related this to common patient presentations, such as paraesthesia and peripheral numbness, following NOS abuse. This talk really emphasised that NOS abuse isn't a new trend and has prevailed in society as a party drug for over a century and that its rise is evident in the increase in admissions of patients with subacute combined degeneration of the spinal cord and paralysis requiring months of rehabilitation and physiotherapy. The information provided a good foundation for understanding why tests such as total plasma homocysteine are important when investigating NOS abuse.

In addition to the biochemistry and pathophysiology behind NOS abuse this talk provided an overview of the history and prevalence of NOS within our society. Like so many others I often underestimate the prevalence and increase in trend of NOS use. However, through this talk I gained a better understanding of how long-standing NOS abuse is and the ease of access through commercially bought cannisters. This talk highlighted the need for education for the general public about the risks and potential life-long debilitating consequences, and for clinicians about appropriate testing of functional vitamin B12 markers.

Overall, the Leeds experience presentations comprised of three fascinating talks focussed around drug and heavy metal toxicology. The subject choices addressed a common theme of an underestimated problem which has prevailing clinical consequences in our society. The information provided in all three talks was incredibly helpful both as clinical staff but also as members of the public who were previously unaware of these health issues. Lastly, I want to thank Leeds Hospitals Charity for providing funding for clinical scientists here at Leeds Hospitals NHS Trust to attend this brilliant conference and all of its amazing talks! ■

Neuroendocrine tumours

Amy Wothorspoon, Principal Clinical Scientist (Biochemistry), Kelvin Laboratories, Royal Victoria Hospital, Belfast

As of 2019, Belfast has been recognised as a Centre of Excellence in Neuroendocrine Tumours (NETs) and has considerable experience in diagnosis and management of patients with NETs. As part of the region specific session organised by Northern Ireland, three excellent talks surrounding NETs were presented.

A lifetime of experience in peptides and neuroendocrine tumours

The first speaker, **Dr Joy Ardill**, presented her experience in the field of NETs during her career, which spanned over 50 years. The first observation of a carcinoid tumour in the appendix was made by Merling in 1838, with the term carcinoma being coined by Oberndorfer in 1907. Various different names have been adopted over the years, with neuroendocrine neoplasia being the latest. Dr Ardill began by explaining the background of discovery of some of the regulatory peptides, which are still measured in current practice, for the diagnosis and management of patients with NETs. In the early 1900s, secretin was the first peptide to be discovered, which was quickly followed by other regulatory peptides, including gastrin, insulin, glucagon and cholecystokinin. Dr Ardill then went on to speak about the discovery of gastrin specifically – a 17 amino acid peptide involved in gastric acid secretion and gut motility. When Dr Ardill began work at the Royal Victoria Hospital in Belfast, she had the unenviable task of developing an assay to measure gastrin to aid the diagnosis of peptic ulcers in patients, which was otherwise difficult to diagnose other than through endoscopy. Gastrin was a notoriously difficult peptide to develop an assay for due to its size and very low blood concentrations.

Dr Joy Ardill

This became apparent when Joy reminded the audience of the size and concentration of albumin in blood in comparison to gastrin; 585 amino acids and grams per litre versus 17 amino acids and nanograms per litre respectively. She also explained the presence of different forms of gastrin of different amino acid lengths (eg gastrin 17, gastrin 34 and gastrin 71) and the importance of measuring the correct forms, given it was subsequently demonstrated that gastrin 34 is more prominent in NETs than gastrin 17, and where only gastrin 17 is measured, half of the patients with NETs would not be identified.

Dr Ardill then demonstrated the improvement in both detection and management of NETs. In 2017, Belfast had a total of 388 patients with NETs, whilst in 2021, this number had risen to 525 patients. One marker which plays an important role in the diagnosis and

monitoring of progression of carcinoid tumours is neurokinin A (NKA). Levels of NKA are associated with disease burden of liver metastasis in NETs, with the majority of patients having liver metastasis at diagnosis. A raised or rising NKA indicates progression of disease. A cut-off level of 50 ng/L is used to determine prognosis at diagnosis, with levels greater than 50 associated with a prognosis of 6-9 months, whilst those with levels less than 50 associated with a prognosis of approximately 6 years. Levels can also be used in disease monitoring, with a reduction in levels demonstrating good response to treatment.

Dr Ardill then finished her talk demonstrating the stark differences between both laboratory and clinical practice between when she started in 1970 and when she finally retired in 2022. Over that time, the number of peptides identified has increased 1000-fold, histopathology is now used as a diagnostic tool in NETs, many more NETs are now known about and have been well studied, with many treatments available which has significantly improved the prognosis of the disease.

Carcinoid syndrome

The next speaker, **Dr Una Graham**, gave a presentation on carcinoid syndrome; a paraneoplastic syndrome that is a result of gross secretion of serotonin which leads to the symptoms associated with the condition. These include flushing, diarrhoea, bronchospasm and heart disease. Generally, the condition only becomes evident with the development of hepatic metastases, meaning the liver is no longer capable of metabolising serotonin as efficiently, leading to the gross elevations observed. Urine 5-hydroxyindolacetic acid (5-HIAA), the main metabolite of serotonin, is the marker of choice for the diagnosis of carcinoid syndrome owning to its more favourable stability. Una then presented three cases to demonstrate the severity of symptoms associated with the condition and to also demonstrate the management of associated symptoms and complications.

The first case was of a patient who presented with profound symptoms of carcinoid syndrome, including extreme flushing. This patient was discovered to have extremely grossly elevated 5-HIAA, with imaging and histopathology subsequently confirming the presence of a NET. Una then demonstrated the various treatment modalities for carcinoid syndrome through the treatments employed in this patient. These include somatostatin analogues, telotristat, which interferes with tryptophan metabolism, steroids, ranitidine, ondansetron for side effect management and chemo-embolism. Peptide related radiotherapy (PRRT) and debulking surgery can also be considered but these were not appropriate in the current patient.

The second case examined the complications associated with carcinoid syndrome, specifically looking at niacin deficiency. Dr Graham described the case of a patient who had been previously diagnosed with a NET and had good control of the condition for seven years

Dr Una Graham

until they decompensated. They presented to the emergency department on several occasions, during one of which they were noted to be confused and have poor event recollection. Dr Graham went on to outline the role of tryptophan in both serotonin and niacin production.
In carcinoid syndrome, given the vastly increased production of serotonin, there is less availability for trypotophan to be used in the production of niacin, resulting in deficiency which leads to the development of pellagra. Once the patient was treated with B vitamins, their neurological symptoms resolved.

Dr Graham's final case explored the phenomenon of carcinoid heart disease, which develops due to continued bombardment of cardiac tissue with high serotonin levels. Patients develop fibrosis of their cardiac valves and tissue, leading to stenosis and regurgitation, which can ultimately require valve replacement.

MEN1

The final speaker of the session, **Dr Claire McHenry,** has recently been appointed as a Consultant Endocrinologist to the department and has set up a Multiple Endocrine Neoplasia 1 (MEN1) clinic. MEN1 is a condition that affects multiple endocrine glands, most commonly affecting the pituitary, parathyroid and pancreas. The genetic linkage to the MENIN gene was demonstrated in the 1990s, with children inheriting an inactivated MENIN allele from their parents alongside a somatic mutation which leads to disease development.
The MENIN gene is highly penetrant, meaning most individuals with the gene will be affected and can present phenotypically in childhood. Management can be challenging but generally includes surgical intervention and long term follow up.

Dr McHenry then discussed a case of a patient who presented with a history of

Dr Claire McHenry

hypoglycaemia episodes. She highlighted the importance of differentiating between hypoglycaemia with low/undetectable insulin levels, which is the expected response, and hypoglycaemia with high insulin levels which can indicate an underlying pathology. The patient underwent a 72 hour fasting procedure to determine their insulin levels during hypoglycaemia and this demonstrated a high insulin level. An insulinoma was suspected as part of the differential diagnosis, which was subsequently identified using imaging and histopathological staining. In order to localise the tumour, a selective arterial calcium stimulation test was performed, with calcium promoting secretion of insulin from pancreatic tumour cells but not from normal pancreatic cells.
The patient subsequently underwent a laparotomy and a radical distal pancreatectomy. Patients with MEN1 require regular follow up as part of their management as tumours can develop at any point. With further follow up, this patient was discovered to have developed a pituitary tumour, which ultimately required surgical intervention.

Special interest updates in heavy metals, drugs of abuse and bile acid malabsorption

Charlotte Evans, 2nd year STP (Clinical Biochemistry), Black Country Pathology Services

The fascinating and well varied West Midlands session was chaired by Alexandra Yates and involved three great talks followed by active discussions with the audience

Diagnosis and monitoring of heavy metal poisoning: interactive case illustrations

Nicola Barlow presented four cases on heavy metal poisoning, in which the audience was invited to participate using Slido. This made for a highly engaging session, with polls including the most appropriate test to perform in each scenario and the actions that would be advised based on the results. One case which intrigued the audience described a 7-year-old female whose parents were concerned about arsenic toxicity from some magnetic putty with which she had been playing. Her urine arsenic/creatinine ratio was significantly elevated at 1312 nmol/mmol creatinine (reference range <17). Arsenic speciation found no evidence of exposure to toxic inorganic arsenic, but did show markedly elevated arsenobetaine levels. Arsenobetaine is found in fish and seafood and is considered non-toxic. Despite her parents initially denying any fish or seafood intake, it later transpired that she had eaten fish fingers the day before the test, which the parents had not considered as being fish or seafood! This confirmed the cause of the raised arsenic levels being non-toxic arsenobetaine from the fish, with no concerns of inorganic arsenic exposure from the magnetic putty.

The other cases were also very interesting, including lead poisoning in a four-year-old male with behavioural concerns and pica, raised blood mercury levels in a 52-year-old female from excessive predatory fish intake and inorganic arsenic exposure in a 68-year-old male drinking from local contaminated borehole water. These cases all showed the importance of interpreting heavy metal concentrations in the context of clinical and exposure history, while also highlighting the different characteristics and toxicities of metal species.

From the laboratory to the headlines, the emergence of nitazene opioids in the UK

Alex Lawson introduced the recent opioid crisis in the US, which has also seen an increase in opioid deaths in the UK. These have recently involved novel nitazene opioids, which are highly potent. The first case in which University Hospitals Birmingham (UHB) detected nitazene opioids was a 27-year-old male who suddenly died after taking a blue pill bought from the internet. Sertraline and a benzodiazepine were detected, however, fatality from these alone was unlikely.

Testing a sample of the blue pill failed to find a match to any drug in the laboratory GC-MS library. Comparison with an American Emerging Substances group was then able to identify this substance as N-pyrrolidino-etonitazene (NPE), a nitazene opioid. A triple quadrupole method with liquid-liquid extraction was then developed for NPE and other nitazene opioids. This has led to the identification of 10 NPE cases since 2021, mostly in males aged 20-35 who all thought they had bought oxycodone, a significantly less potent opioid, online. More recently, cases of deaths from other nitazene opioids have been identified, including metonitazene and protonitazene. A recent death from xylazine, known as the 'zombie drug' and described as 'tranq-dope' when combined with fentanyl, has also been seen at UHB.

Several of these cases have made the headlines, due to being the first deaths from these drugs seen in the UK. Alex summarised that routine screening methods may not always detect these drugs, so they should be tested for if there is suspicion of opioid involvement despite a negative or equivocal toxicology report. The value in monitoring US drug trends in order to proactively detect novel and emerging drugs was also highlighted. This great talk was followed by topical questions and discussion, where it was agreed that international collaboration to identify new emerging drugs would be beneficial.

Diagnostic difficulties in bile acid diarrhoea

Bile acid diarrhoea (BAD) is caused by excessive bile acids in the large intestine, causing irritation leading to chronic watery diarrhoea. This excess in bile acids can be either due to reduced reabsorption of bile acids in the ileum, or increased bile acid production. BAD can easily be treated with bile acid sequestrants, however diagnosis is not simple. The gold standard is a 75-SeHCAT scan, in which the percentage retention of radiolabelled bile acids over 7 days is calculated, with <15% confirming BAD. Disadvantages of SeHCAT include it being time-consuming, expensive and not always locally available.

Lauren Starbrook presented the Black Country Pathology Service's (BCPS) work on alternative biomarkers for BAD. An enzymatic assay to quantify faecal bile acid levels was tested on 118 patients, including those with confirmed BAD by SeHCAT, and controls with chronic diarrhoea but negative SeHCAT results. While a significant difference was seen between cases and controls, there was a poor correlation between faecal bile acid levels and SeHCAT percentages. It was concluded that this may not be appropriate for screening patients with chronic diarrhoea for BAD. BCPS also studied serum 7α-hydroxy-4-cholesten-3-one (7αC4), a precursor in bile acid synthesis known to increase in BAD. A liquid chromatography-tandem mass spectrometry method for serum 7αC4 was developed and validated, and used to test 40 serum samples from patients receiving SeHCAT scans. A significant difference in the median 7αC4 levels in those with positive and negative SeHCAT results was found. Lauren proposed cut-offs of <50 nmol/L to rule out BAD (93% sensitivity), >275 nmol/L to rule in BAD (100% specificity), with indeterminate values (50-275 nmol/L) being referred for SeHCAT for confirmation. Further work will involve increasing the sample size and looking at preanalytical influences including diurnal variation, fasting and medications. This was a really interesting talk showing the potential for future improvements in the diagnosis of BAD, which could lead to reduced referrals for SeHCAT along with the potential to diagnose BAD through primary care. ■

Diagnosis and treatment of diabetes in Scotland: the past, present and future

Marketa Zajicek, Trainee Clinical Scientist, Glasgow Royal Infirmary

The Scottish session was given by four excellent speakers, focusing on the diagnosis and treatment of diabetes in Scotland

Past, present and future of specialist endocrine testing

The first talk of the session was given by **Karen Smith**, a Consultant at Glasgow Royal Infirmary specialising in Endocrinology. Karen went through the development that happened in Endocrinology in each decade, starting from the 1920s to the present and what the future holds for endocrine testing. Karen started the talk with the advent of ward glucose testing for diabetic patients in 1926, which marked the beginning of biochemistry testing. The 1950s saw an increase in testing, reaching around 9000 tests per year, including the measurement of urea and glucose. The laboratory at the time was run by one Biochemist and four Biomedical Scientists. Endocrine assays started in the 1960s with the development of radioimmunoassays and fluorimetry, enabling the measurement of roughly 20 steroids in urine. The first automated immunoassay was developed in the 1980s, with a scintillation counter used for the measurement of androstenedione and 17-hydroxyprogesterone. Radioimmunoassays entailing five-day assays for peptides, included insulin, tumour markers and thyroid function tests. There started to be more collaboration between laboratories, academia and companies. Gold standard methods and reference methods were also used. In the 1990s, monoclonal antibodies enabled higher specificity in two-site immunoassays; the introduction of wash steps increased the sensitivity and decreased non-specific binding. There was also the formation of NEQAS, bringing forward efforts of standardisation of steroid hormone assays. In the 2000s, tandem mass spectrometry brought higher sensitivity and specificity, along with the

Karen Smith

ability to simultaneously measure a panel of tests. The future of Endocrinology testing will hopefully include automated tandem mass spectrometry and an effort to ensure quality of tests with further standardisation.

C-peptide measurement in diabetes

Mark Strachan is a Consultant based at the Western General Hospital, Edinburgh. One of his specialities include diabetes. NHS Scotland recently changed their guidelines in 2021 to include C-peptide measurements for the diagnosis of type 1 diabetes mellitus (DM). C-peptide can be measured in both urine and serum and must be paired with a glucose. It is most discriminatory if glucose is over 4 mmol/L. The measurement of C-peptide has enabled the discrimination between type 1 and 2 diabetes and monogenic diabetes. The right diagnosis enables the patient to get the most appropriate treatment. The features to determine the aetiology of DM are imperfect: age, body mass index, ethnicity, ketosis. Antibodies can also be problematic with low titres and false positives. Some type 1 diabetics can be negative for all three antibodies. The measurement of C-peptide has reclassified some patients, including one of Professor Strachan's patients who after initially being diagnosed with type 1 DM, had variable glucose levels on insulin therapy. His C-peptide levels revealed he actually had MODY and they replaced his insulin for glicazide which enabled him to have much better control over his glucose levels. Measuring C-peptide helps to increase diagnostic accuracy in patients. Preserving C-peptide secretion has now become a key outcome target in trials of biologics in early type 1 diabetes.

Islet cell transplant

Kirsty Duncan is a pancreatic islet cell transplant co-ordinator from NHS Lothian. Islet cell transplant is available for patients with a diagnosis of Type 1 DM of over five years, with at least two episodes of severe hypoglycaemia in the last two years as well as an impaired awareness of hypoglycaemia. Possible contraindications include malignancy, poor renal function,

Mark Strachan

Kirsty Duncan

high insulin requirements (>0.7 units/kg) and active proliferative retinopathy. The aim of the transplant is to decrease the frequency of hypoglycaemic episodes, restore hypoglycaemic awareness, increase the quality of life in patients and prevent diabetic complications. The procedure is also able to decrease insulin dependence, with 35% of patients being able to come off insulin. The procedure consists of removing the pancreas from a deceased donor and placing it in a Ricordi Chamber, which isolates the islets. The islets are then introduced into the portal vein of the recipient's liver. Around 5000 islets/kg of the recipient's body weight are donated. Monitoring graft function is carried out using mixed meal tolerance, fasting glucose and C-peptide measurements, hypoglycaemic awareness and the BETA-2 score. The latter takes into account the fasting C-peptide, insulin dose and fasting glucose to calculate a score that estimates the islet cell graft function for up to five years following an islet cell transplant. A score of over eight is associated with freedom from hypoglycaemia and a score of over 15 is associated with insulin independence.

Diabetes in adolescence

The session was concluded by **Ian Hunter**, a Consultant in NHS Lanarkshire, with a talk on diabetes in adolescence. There has been a marked increase in diagnosis of diabetes in adolescence in the last five years, with a wide spectrum, ranging from maturity-onset of diabetes in the young (inability to produce insulin) to type 1 DM (beta cell loss) and type 2 DM (insulin resistance). Patients with type 1 DM are prone to also develop other autoimmune conditions, such as hypothyroidism and coeliac disease. All type 1 DM patients are placed on intensive insulin regimens,

Ian Hunter

trained to carbohydrate count and educated to be aware of symptoms of DKA. COVID-19 has been responsible for a marked increase in DKA presentations, increasing from 17% to 60%. Point-of-care devices are available for patients to take responsibility for their own monitoring. They can monitor their glucose levels with finger pricks, glucose strips and blood glucose diaries. The glucose strips, however, have poor accuracy and are not standardised. Patients can monitor their ketone levels with ketone meters and strips, which use beta-hydroxybutyrate dehydrogenase coupled with electrochemical detection. Sensor-based monitors have increased in use, with the sensors placed subcutaneously to detect interstitial glucose. All the data can be uploaded onto the FreeStyle Libre website for the patient and the doctors to access. The introduction of insulin pumps has also enabled patients to have better glucose control. ■

ACB Medal Award

Carina Conceicao, Trainee Clinical Scientist, Glasgow Royal Infirmary, NHS GG&C

The ACB Medal Award is always an exciting event that gives Trainees an excellent opportunity to showcase their work and gives colleagues within the profession an insight into new methodologies and solutions for old problems.

This session started off with an overview of newborn screening (NBS) and how the quality of dried blood spots (DBS) can impact screening results. **Nick Flynn** told us that DBS are visually inspected and the rejection criteria is highlighted in national guidelines. However, not all laboratories are applying these guidelines. Therefore, he developed an algorithm that takes advantage of the camera integrated into auto-punchers to determine DBS suitability. The algorithm assessed a number of parameters, including blood spot diameter, roundness, elongation and circular extent to identify correct blood spots. This algorithm showed high sensitivity and specificity (≈95%) for the identification of suitable DBS. The computer vision algorithm was shown to improve DBS quality, and comparison of the DBS result with the NBS outcome indicated that for every 1 mm reduction in size, there was a decrease in results of up to 4.3%. The algorithm is available at https://github.com/nf260/nbscv and shows promising value for real-time assessment of DBS quality.

Louise O'Donnell presented her work looking at point-of-care analysis for monitoring of renal patients post-transplantation in the West of Scotland. The aim was to replace frequent and invasive venepuncture, which can lead to long-term vein damage. Capillary blood was assessed for its viability to measure a series of analytes, including bicarbonate, albumin, ALP, calcium, phosphate, U&Es, FBC and HIL indices. A Likert Scale questionnaire was also included to get feedback on the patient experience. This study revealed that all samples had acceptable icterus and lipaemia indices, but the raised haemolysis index compromised some of the results, namely for potassium and phosphate, where 40% of patients had non-reportable results. For samples with a low haemolysis index, potassium and phosphate results showed acceptable reference change values and compared well with the laboratory measurement. This was also observed for U&Es, albumin, ALP and calcium. Furthermore, capillary sampling was well-received amongst patients, with the majority preferring this over venous sampling as capillary sampling was less painful and less time consuming.

Next, **Jonathan Atkins** presented his project that focussed on developing a liquid-chromatography tandem mass spectrometry method for the measurement of serum 7α-hydroxy-4-cholesten-3-one (C4), a bile acid precursor that is useful in the investigation of bile acid diarrhoea (BAD). BAD and irritable bowel syndrome (IBS) present with a similar clinical picture. However, the current gold standard for the diagnosis of BAD relies on nuclear medicine, namely the 75-selenium homocholic acid taurine (SeHCAT) test. This test is well established and has very good diagnostic accuracy, although it incurs high costs and a relatively long turnaround time, with exposure of patients and medical staff to radioactive substances. Conversely, C4 has been shown to have a high negative

predictive value, hence it can be used to rule-out disease. Therefore, the aim of measuring C4 is to reduce the time to diagnosis and save resources by reducing the number of SeHCAT referrals. Jonathan presented all the parameters he assessed for method validation, which met the criteria highlighted in national and international guidelines. This test has been implemented into care pathways in collaboration with gastroenterology consultants, and future work includes establishing a local reference range.

The next project, presented by **Trish Woodley**, investigated the stability of faecal calprotectin and elastase in different collection devices and the suitably of at-home patient-led extraction. Faecal elastase is a marker of pancreatic insufficiency, whereas calprotectin is a marker of gut inflammation. The local practice for these samples is that patients collect the samples and deliver them to their GP, who passes these onto the local laboratory for testing. This process occurs at room temperature, which can impact the results. As Trish pointed out, calprotectin is stable for three days while elastase is stable for seven days at room temperature. Firstly, the stability of these enzymes was assessed, which confirmed a 30% degradation in calprotectin at day seven, whereas elastase was unaffected. The trial of patient-led extraction revealed that samples had overall increased calprotectin values and that Calex tubes significantly prevented sample degradation. From the patient's perspective, the response was quite poor, likely due to the high number of kits being sent in one package for the trial. However, the overall outcome was positive and there is definitely potential to implement a patient-led extraction that can help to better manage resources; however Trish acknowledged that a limitation of this study was the small sample size.

The last presentation of this session was from **Eun Ji Kim** with her work on how vitamin K1 and K2 regulate FGF-21. She highlighted the role of vitamin K in insulin secretion and sensitivity, and the fact that FGF-21 is known to be involved in glucose metabolism, where there is a positive correlation with metabolic conditions. The aim of the study was to evaluate insulin and FGF-21 response post-vitamin K supplementation. Firstly, an ELISA method to measure FGF-21 was developed; all parameters assessed met the acceptance criteria. However, the reference interval was positively skewed, thus non-parametric reference limits were established. Evaluation of post-menopausal women revealed that vitamin K1 and K2 both increased insulin at 6 and 18 months post-supplementation, with the increase in FGF-21 being more pronounced with vitamin K2. Eun acknowledged that this study was performed in a non-diabetic population, however the findings give insight into other factors that can affect this metabolic condition.

On this occasion, Nick Flynn (pictured below) was awarded the ACB Medal Award as a result of his outstanding dedication and hard-work that led him to learn more about computer programming in order to improve the DBS quality, which is crucial to ensure accurate and reliable screening results. ■

ACB North-West Ian Ward Members' Papers Meeting

Caitlin Kyle, Trainee Clinical Scientist, NHS Northern Care Alliance

The ACB North-West Ian Ward Members' papers meeting took place on 30 March 2023. Clinical Scientists from all over the North-West Region gathered both in-person and virtually for this meeting's first hybrid event.

Chicken Pox: a rare trigger for atypical haemolytic uraemic syndrome in the paediatric population

Ellen Mobley (Trainee Clinical Scientist, Royal Preston Hospital) began the day by presenting a paediatric case of atypical haemolytic uraemic syndrome (HUS). The patient was a three-year-old female referred from the emergency GP due to a three-day history of excessive vomiting and not passing urine. On presentation, the patient had a non-blanching rash and spontaneous bruising and was reported to be lethargic and confused after the first day of vomiting. Past medical history identified a varicella infection (chicken pox) a few weeks prior, but otherwise the patient was fit and well.

Biochemistry investigations revealed profound hyperkalaemia, severe AKI, uraemia of renal failure and hyperphosphataemia. Haematology testing identified significant anaemia and thrombocytopenia alongside a raised nucleated red blood cell count. This patient also had a negative direct Coombs test, excluding autoimmune causes of haemolytic anaemia. Peripheral blood film analysis identified multiple abnormalities, most notably numerous schistocytes. Collectively, the laboratory results were indicative of microangiopathic haemolytic anaemia.

When considering the differential diagnosis, viral gastroenteritis was excluded as it is not associated with anaemia or thrombocytopenia and no diarrhoea was reported. This patient presented with several features frequently seen in thrombotic thrombocytopenic purpura (TTP) and haemolytic uraemic syndrome (HUS). The patient was finally diagnosed with atypical HUS due to its association with varicella infection. This talk emphasised the clinical importance of not overlooking chicken pox in the diagnosis of atypical HUS.

Comparison of thyroglobulin measurement by immunoassay and radioimmunoassay

The second talk was presented by **Hannah Fearon** (Liverpool Clinical Laboratories) and compared immunoassay and radioimmunoassay methods to measure thyroglobulin (Tg). Thyroglobulin is measured in post-total thyroidectomy patients to detect if thyroid tissue is present and regrown. Thyroglobulin antibodies (TgAb) pose a challenge for many in-use Tg methods due to interference. In immunometric assays, TgAb interference produces erroneously low Tg results; however, in radioimmunoassay methods this interference yields overestimated results. The purpose of this comparison was to review their current protocol for Tg confirmatory testing via another method and establish the circumstances under which samples require secondary testing.

Data analysed included all Tg samples sent for confirmatory testing over a two-year period. Comparison of samples with Tg levels <1 µg/L and TgAb <25 IU/L demonstrated similar results and

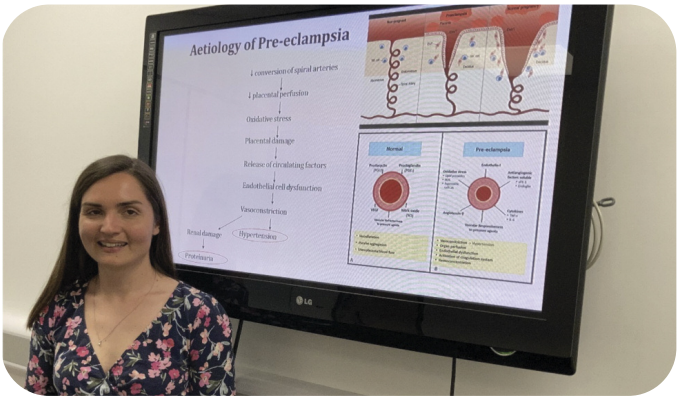
therefore no longer required confirmatory testing. Samples with Tg >1 µg/L and TgAb <25 IU/L demonstrated lower results by radioimmunoassay, therefore confirmatory testing was no longer required as immunoassay has a positive bias when compared to radioimmunoassay methods. Comparison of samples with Tg >1 µg/L and TgAb >25 IU/L identified no clear correlation between assays and, as a result, there is little clinical value in generating more results through 'send away' testing. Samples with Tg <1 µg/L and TgAb >25 IU/L demonstrated positive bias when analysed by radioimmunoassay, and consequently these samples will continue to be sent away.

Establishing a protocol to measure placental alkaline phosphatase and determining its utility in aiding the diagnosis of pre-eclampsia

Jessica Brown (Trainee Clinical Scientist, Bolton Royal Infirmary) presented their MSc project on the measurement of placental alkaline phosphatase (ALP) and its clinical applications in diagnosing pre-eclampsia. Pre-eclampsia has an incidence of 2-5% in pregnant women in the UK and results in 160,000 deaths a year worldwide, mostly due to poor access to healthcare. Pre-eclampsia is diagnosed by new onset hypertension after 20 weeks, proteinuria and increased sFLT1:PLGF.

Placental ALP increases with gestation and is altered in pre-eclampsia and in intra-uterine growth restriction. Samples were heat inactivated and then analysed using an ALP assay. Placental ALP is the most thermostable ALP isoform, therefore heat inactivation allows for only placental ALP to be measured. Three heat inactivation temperatures were investigated and 60°C was selected; inactivation was also confirmed by electrophoresis of ALP isoforms. Method validation confirmed heat inactivation and identified good precision for a manual method (CV <5%), linearity and spike recovery.

Samples from patients undergoing investigation for pre-eclampsia were analysed for placental ALP and criteria were identified from those who developed pre-eclampsia. Pre-eclampsia patients were divided into early or late onset pre-eclampsia, defined as onset before or after 34 weeks, respectively. Early onset pre-eclampsia demonstrated notably elevated placental ALP to total ALP ratios across gestation compared with late onset pre-eclampsia and pre-eclampsia negative groups. Comparing early onset pre-eclampsia to the negative group showed good separation across gestation and was proven to be statistically significant ($p<0.001$).



Jessica Brown

Waters Clinical Diagnostic Solutions

Marie Lee (Clinical Business Development, Waters) spoke about the increasing clinical focus of Waters and development of dedicated clinical teams in 2022. The COVID-19 pandemic highlighted the importance and benefits of clinical diagnostics and advanced therapies, as well as the increased demand on diagnostic testing.

Common therapeutic areas covered by Waters include endocrinology, therapeutic drug monitoring, metabolic disorders and clinical/forensic toxicology. This talk also covered Waters sample preparation products (Oasis, Ostro, Acquity columns) and their application notes aimed to reduce method development time. Marie explained the benefits of ready-made kits and QC materials for mass spectrometry, helping to streamline the method development processes. Waters are in the process of developing their own calibrators, QC and internal standard materials for a variety of tests. Marie highlighted the benefits of mass spectrometry over immunoassay, such as specificity and multiplexing. Marie introduced Waters newest LC-MS/MS product, the Xevo TQ Absolute, describing it as the most sensitive on the market, with up to 15 times more sensitivity for challenging negative ionising compounds, increased sustainability and reduced operational costs.

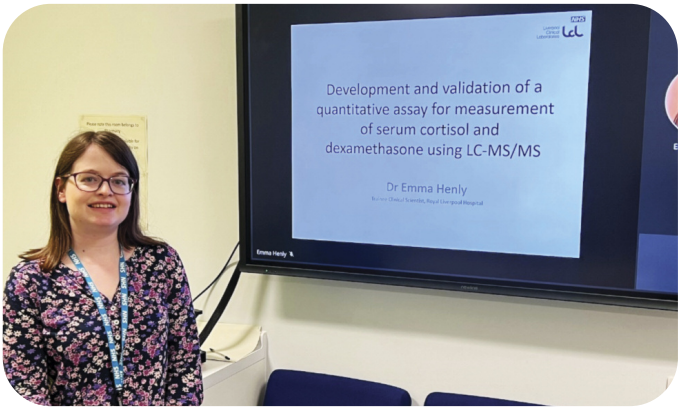
Development and validation of a quantitative assay for measurement of serum cortisol and dexamethasone using LC-MS/MS

Emma Henly (Trainee Clinical Scientist, Royal Liverpool Hospital) presented their MSc project; the aim of Emma's project was to develop and validate a quantitative LC-MS/MS method for the measurement of serum cortisol and dexamethasone. Serum cortisol is measured as part of a dexamethasone suppression test (DST) for the diagnosis of Cushing's syndrome. Dexamethasone is given to patients with suspected Cushing's syndrome to suppress ACTH production; in individuals with Cushing's, ACTH is not appropriately suppressed and measured serum cortisol levels remain elevated. Dexamethasone measurement is recommended as part of a DST because of the risk of possible false positives and negatives.

Emma used liquid-liquid extraction to extract steroids from patient serum. Spiking post-extraction identified negligible matrix effects for cortisol and dexamethasone. In line with CLSI guidelines, this method had intra-assay and inter-assay precision <15%. Lower limit of quantification for both analytes was 0.5 nmol/L. Spiking of exogenous and endogenous steroids was used to identify possible interferences. Beclomethasone and betamethasone both had significant positive interference with dexamethasone measurement. These compounds are structurally similar to dexamethasone; however, the presence of betamethasone can be identified by abnormal ion ratios. Despite insufficient patients to consider clinical dexamethasone cut-offs, data identified that patients with diabetes mellitus and those with increasing renal impairment had higher dexamethasone concentrations.

Paradoxical refractory hypocalcaemia in metastatic breast cancer

Rosalyn Dunstan (Trainee Clinical Scientist, Royal Preston Hospital) presented a case of hypocalcaemia secondary to osteoblastic bone metastases. The patient was a 44-year-old female who presented to A&E with dizziness, shortness of breath and a five-week history of dizziness and significant weight loss. This patient had been diagnosed with grade three invasive primary breast carcinoma 2.5 years prior. She was treated with hormonal and targeted therapy, a mastectomy and



Emma Henly

appropriate chemotherapy; all treatment was completed 17 months before presentation. Initial investigations identified deranged liver function tests, low adjusted calcium with an inappropriate PTH response, elevated phosphate and vitamin D deficiency. A body CT scan revealed hepatic and bony metastases, leading to further chemotherapy.

Six-weeks later, this patient presented again to A&E and on assessment was positive for Chvostek and Trousseau signs. Laboratory testing confirmed severe hypocalcaemia with an inappropriate PTH response and elevated phosphate. After medications were excluded, differential diagnosis included hypoparathyroidism, tumour lysis syndrome and osteoblastic metastases. Normal uric acid measurement excluded tumour lysis syndrome. Further investigations showed P1NP levels nine times the upper limit of normal and widespread bone metastases on an isotope bone scan. IV calcium was required to maintain normal serum calcium levels; the PTH was constantly inappropriate, demonstrating an element of relative hypoparathyroidism. The initial hypocalcaemia could have been due to exacerbation by chemotherapy or because of bone metastases progression.

A case of premature adrenarche

Dr David Oleeskey (Consultant Chemical Pathologist, Mid Cheshire Hospitals) gave the final talk of the day, discussing a case of premature adrenarche in a six-year-old female. This patient presented with pubic hair, no breast development and was quite tall (98th-99.6th centile) with wrist X-rays indicating a bone age of nine years.

Initial investigations revealed a low cortisol, with elevated testosterone, DHEAS, androstenedione and 17-hydroxyprogesterone. A short synacthen test confirmed inadequate cortisol response and notably elevated 17-hydroxyprogesterone, indicative of congenital adrenal hyperplasia (CAH). Mineralocorticoid deficiency was excluded by further testing. Urine steroid profile identified an excess of 17-hydroxyprogesterone metabolites, confirming a diagnosis of CAH due to 21-hydroxylase deficiency. The patient was started on hydrocortisone therapy and prescribed intramuscular hydrocortisone injection for emergency use.

All presentations were of high quality, providing a challenge for this year's judging panel, and were well received by both the in-person and online audience. Following much discussion, Jessica Brown was announced the winner of this year's prize with Emma Henly as runner-up.

ACB Wales Spring Scientific Meeting

Scott Lake and Laura Parry, Aneurin Bevan University Health Board, Gwent

The ACB Wales Spring Scientific Meeting was held at the Angel Hotel, Cardiff on 20 April, and was very well attended. The focus of the meeting was porphyria and inherited metabolic disease to honour Professor Mike Badminton's contribution to these specialist areas. The morning session concentrated on the porphyrias and the afternoon focussed on inherited metabolic disease. Attendees were treated to a wide range of interesting talks covering topics such as clinical presentation, necessary biochemical tests required for diagnosis and available treatment and management regimes from past and present colleagues of Professor Badminton.

The morning session was chaired by **Sarah Tennant**, Principal Clinical Biochemist at the University Hospital of Wales, and comprised of a comprehensive set of talks on the porphyrias. The first presentation of the day, 'Acute Porphyrias' by **Dr Penny Stein**, Consultant at King's College Hospital, gave an overview of the pathophysiology of the acute porphyrias, including the haem synthesis pathway and how enzyme deficiencies in this pathway result in acute porphyria. The prevalence, clinical signs and symptoms of the three acute porphyrias: Acute Intermittent Porphyria (AIP), Variegate Porphyria (VP) and Hereditary Coproporphyria (HCP) were discussed, including factors that can trigger an acute attack, such as hormonal fluctuations in menstruation and pregnancy, alcohol, drugs, and, in some cases, bariatric surgery. Dr Stein discussed the laboratory analysis of urine porphobilinogen (PBG) in patients who are symptomatic and highlighted the importance of interpreting this as a ratio with urine creatinine. The latter part of the talk was about treatment and management options, and this included haem arginate to replenish haem stores, and a newer treatment, givosiran, a siRNA that inhibits the ALA synthase I expression in hepatocytes.

The second talk of the session, 'Porphyria – What should the Biochemist know?' by **Dr Danja Schulenburg-Brand**,

Attendees at the event

provided an excellent overview on the classification of porphyrias and discussed the specimen types required to identify them. Dr Schulenburg-Brand highlighted that a light-protected random urine specimen for porphobilinogen (PBG) can be used to diagnose an acute porphyria attack, and as the acute porphyrias are treated identically, the type is not immediately relevant. However, a further plasma and faecal specimen can then be analysed to identify the type of acute porphyria. It was highlighted that water soluble metabolites within the haem pathway can be measured in the urine, whilst fat soluble metabolites can be measured in faeces, but most importantly, specimens must be light-protected following collection. Dr Schulenburg-Brand went on to discuss the National Acute Porphyria Service (NAPS), which provides 24-hour advice to both clinicians and laboratories and can arrange haem arginate where appropriate. The NAPS can be contacted via the University Hospital of Wales (UHW) switchboard on 02920 747747.

The final session of the morning, 'Acute porphyria: A century of progress' by **Professor George Elde**r, provided a detailed talk on the discovery and classification of porphyrias. He began by talking about the underlying mechanism first being identified in 1871, through to more recent research, which included classification of the various porphyrias.

The afternoon session, on inherited metabolic diseases, was chaired by Dr Danja Schulenburg-Brand, Consultant Chemical Pathologist. Professor Stuart Moat began with an insightful talk titled 'Rare disorders, common test', which reminded us that although individually these conditions are rare, collectively they are common, and how routine laboratory tests in the appropriate clinical context could indicate a rare disorder. He presented a series of nine clinical cases in which an abnormal result in a routine laboratory test was a useful indicator of a rare disorder cause. One case illustrated how a raised uric acid level with a clinical picture of abnormal movements and self-mutilation can provide an indication of Lesch-Nyhan syndrome. The cases presented highlighted the importance of routine analytes and how, together with a thorough clinical history, they can be used to identify further specialist tests required to diagnose inherited metabolic diseases. The final part of this talk discussed the recently published **All-Wales developmental delay guidelines**.

The final talk of the day, 'Getting the diagnosis quicker – the SWAN clinic' by **Dr Graham Shortland**, discussed the pilot for the Syndrome Without A Name (SWAN) Clinic and the patient referral criteria. The basis of the SWAN Clinic is to try to reduce the time patients wait for a diagnosis of a rare disease. It is made up of a multi-disciplinary team who all have a shared interest in rare diseases. The service is primarily based at UHW and Noah's Ark Children's Hospital for Wales, with the Welsh Government providing funding for a two-year pilot that will review the clinical effectiveness of the programme.

The day ended with a presentation to Professor Badminton, highlighting his contribution to the Inherited Metabolic Diseases service, education of Clinical Scientists and Chemical Pathologists and enhancing and promoting the careers of colleagues. Dr Sharon Whatley, who worked with Professor Badminton overseeing the genetic side of the porphyrin service in Cardiff, was also recognised for her contributions to the field of porphyrias.

We'd like to thank all those who attended the meeting. We'd also like to thank our sponsors of this event, Alnylam Pharmaceuticals, Clinuvel and Sanofi for their generosity in making this event such a success. ■

ACB News Crossword

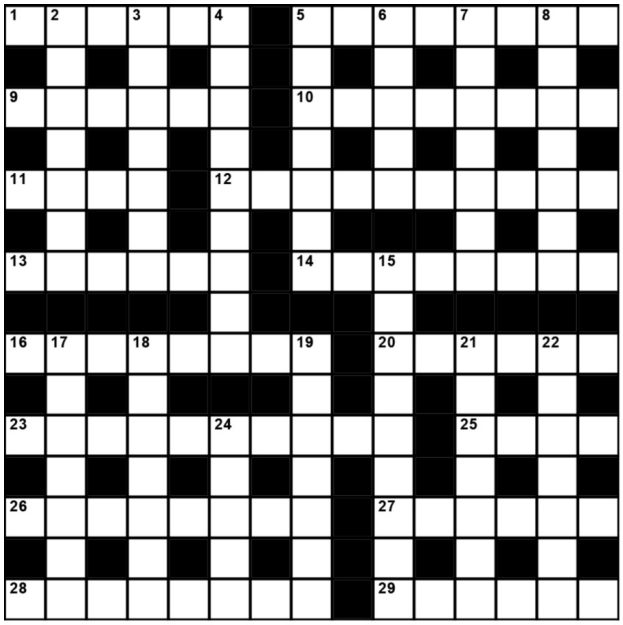
Set by Rugosa

Across

1 Recurrent painful condition from incorrect bearing again (6)
5 Accelerate reaction as acetyl derivative (8)
9 Pity about initial unrealistic requests for perfection (6)
10 Enyme provides ultimate in relief (8)
11 Unruly child kept in for algebra test (4)
12 Medical emergency: perhaps rash could be sign in time (10)
13 Bring to light when inconsistent speciality pays less (6)
14 Complained about chemical list initially lacking a neurotransmitter (8)
16 Group of related microorganisms that reproduce yet spore (8)
20 Arranges US lab requests (6)
23 Ostensibly original play about progenitor (10)
25 Locate position (4)
26 Suggest conserving energy after four could be helpful (8)
27 Without data, hopelessly inadequate animal classification (6)
28 Convince counsel (8)
29 Surprisingly mobile, they nevertheless impair flow (6)

Down

2 Free mid-January rental – no charge (7)
3 Foolish Nan ignored worrying indication (7)
4 Imbalance of nameless demented mystery man (9)
5 Part of an article an editor scrubbed (7)
6 School procession (5)
7 Exceptional humility not unknown to get psychiatric treatment (7)
8 Noises rise around start of school period (7)
15 Open reply about gaseous precursor of plastics (9)
17 Investigate group tradition acquired under former party leader (7)
18 Organs love changes (7)
19 Some pretext! Remedy is egregious (7)
21 Upset freely distributed diet abandoned (7)
22 Hang about, coming up around noon for vitamin (7)
24 Initial biochemical investigation said to identify Miss Doolittle (5)



Solution for April's Crossword

P	L	E	A	S	E	■	■	A	S	S	I	G	N	S
L	■	V	■	E	■	A	■	L	■	E	■	A	■	I
A	N	A	E	R	O	B	I	C	■	R	E	L	I	C
C	■	D	■	O	■	R	■	O	■	U	■	A	■	K
E	L	E	C	T	R	O	C	H	E	M	I	C	A	L
N	■	■	■	O	■	A	■	O	■	■	■	T	■	E
T	R	A	I	N	E	D	■	L	A	P	T	O	P	■
A	■	N	■	I	■	■	■	■	■	S	■	S	■	E
■	P	H	E	N	O	L	■	E	L	E	M	E	N	T
P	■	Y	■	■	■	I	■	U	■	U	■	■	■	H
A	N	D	R	O	S	T	E	N	E	D	I	O	N	E
R	■	R	■	N	■	H	■	U	■	O	■	S	■	R
S	T	O	M	A	■	I	N	C	E	N	T	I	V	E
O	■	U	■	I	■	U	■	H	■	Y	■	E	■	A
N	O	S	T	R	U	M	■	■	A	M	O	R	A	L

ACB News

Situations Vacant Advertising
Please contact the ACB Office:
Tel: 0207-403-8001
Email: admin@acb.org.uk

Display Advertising
PRC Associates Ltd
1st Floor Offices
115 Roebuck Road
Chessington
Surrey KT9 1JZ
Tel: 0208-337-3749
Email: sue@prcassoc.co.uk

ACB Headquarters
Association for Clinical Biochemistry & Laboratory Medicine
130-132 Tooley Street
London SE1 2TU
Tel: 0207-403-8001
Email: admin@acb.org.uk

ACB President
Dr Kath Hayden
Email: president@acb.org.uk

ACB Home Page
http://www.acb.org.uk

Twitter: @TheACBNews

Develop your career and support your profession

ACB welcomes applications for membership from health professionals and corporate bodies from the whole spectrum of laboratory medicine and healthcare science around the world. We are the representative voice for laboratory medicine and an established scientific authority.

ACB members have access to:

- A unified community platform to share best practice in laboratory medicine
- Support from the recognised trade union for laboratory medicine health professionals in the UK
- An internationally peer reviewed journal: the Annals of Clinical Biochemistry
- News and updates on current issues and development opportunities in laboratory medicine through a regular newsletter and digital communications
- A programme of CPD-accredited national and regional education, and training events at free or discounted rates
- A repertoire of educational and scientific resources, and tools to support your development
- Grants, bursaries and scholarships to support your learning, and scientific research and innovation
- The opportunity to contribute to the profession and build your profile through committee engagement, peer reviews and expert representation regionally, nationally and on an international stage

To find out more about the benefits and eligibility for membership please contact Mike Lester: mike@acb.org.uk or +44(0)20 4542 6044

The Association for Clinical Biochemistry & Laboratory Medicine
1953–2023