Acquire, Learn, Share, Repeat

Innovation Academy

2nd December 2016

viapath

Programme

INTRODUCTION	
9.15	Registration
9.45	Welcome **Dr David Bennett**
MORNING SESSION	
	Chair: Dr Edward Davies, Princess Royal University Hospital
10.00	**Prof Jonathan Edgeworth** Community transmission of community-associated MRSA strains linked to social and material deprivation
10.35	**Prof Graham Taylor** Acquiring, managing and sharing genomic data for clinical benefit
11.10	**Petros-Pavlos Ypsilantis** Deep learning for medical diagnosis
11.45	BREAK
	CQI in Healthcare Chair: Dr Yusof Rahman, Evelina London
12.05	**Kaiya Chowdhary**
12.10	**Jean Straus** with **Dr Katharine Bates** The Hackathon
12.25	**Kamla Reddi** The application of A3 thinking in pathology
12.40	**Dr Martin Myers MBE** Laboratory Anywhere
12.55	**Panel discussion**
1.00	LUNCH
	Excellence in Pathology Awards 2016
2.00	**Volha Klimovich** Clinical utility of PIVKA-II in the diagnosis of hepatocellular carcinoma
2.05	**Andrew Bond** A Better way to order whole exome sequencing (WES) tests
2.10	**Dr David Taylor** Development of a 13 steroid serum panel based on liquid chromatography-tandem mass spectrometry: use in detection of adrenocortical carcinoma
AFTERNOON SESSION	
	Chair: Miss Natalie Walsham, University Hospital Lewisham
2.15	**Dr Mark Zuckerman** with **Dr Melvyn Smith** Hepatitis E virus testing
2.45	**Frances Smith** The impact of next generation sequencing on the diagnosis of rare red cell disorders
3.15	**Prof Roy Sherwood** Alcohol, the DVLA and dry January
3.45	**Winners of 'Excellence in Pathology' and 'CQI in Healthcare' session presentations**
4.00	CLOSE

Dr Dominic Harrington

It gives me great pleasure to welcome you all to our sixth Innovation Academy Scientific Symposium, 'Acquire, Learn, Share, Repeat'.

At our fifth symposium we shifted our focus from 'Diagnostics' to 'Diagnosis'. We acknowledged that working at the limits of science in itself is not enough. We must also consider the wider healthcare community and constantly strive to improve the quality of the services we deliver to the patient. Today we build on that theme.

Recent advances in technology and data science mean that we have more data about people, their habits and their health than we have ever had before – astonishingly 90 % of all recorded human data has been captured in the last two years.[1]

The potential clinical utility of the data we acquire cannot be fully realised without the successful integration and analysis of this information. Master this, and the world will be transformed around us.

[1]http://www.sciencemuseum.org.uk/about-us/press/april-2016/our-lives-in-data

Welcome: Dr David Bennett

David has been Chair of Viapath since February of this year. Before this, from 2010 until 2015, he was Chief Executive, and for three of those years also Chair, of the healthcare regulator Monitor (now part of NHS Improvement). Monitor was responsible for authorising and overseeing all NHS foundation trusts in England. There were 152 FTs when David left office. Monitor was also the economic regulator for all healthcare provision in England.

Prior to this, David was Chair of 'The 10 Partnership', a start-up company that provided strategic and operational support to the public sector, particularly in health. He was also a Non-Executive Director of GHK Holdings, an international consultancy providing economic and policy advice and support to governments and multi-lateral funding agencies around the world.

From the General Election in 2005 until Tony Blair's resignation in 2007, David was the Prime Minister's Head of Policy and Strategy. Responsible for the Policy Unit in No. 10 and the Prime Minister's Strategy Unit, his role was to oversee the development and implementation of domestic policy on the PM's behalf, with a particular focus on public service reform, especially in healthcare.

Before working at No. 10 David was a Director with McKinsey & Co. where he was co-founder of the Firm's European Utilities Practice and of its Global Business Technology Office. His work covered a wide range of sectors, but with a particular focus on highly regulated and technology-intensive industries. Before that, he was a research scientist and then head of scenario planning in Shell International.

David has a doctorate in nuclear physics and a first degree in physics. He is currently Visiting Professor at the Institute for Global Health Innovation at Imperial College, London.

Morning Session

Chair: Dr Edward Davies

Before becoming a clinical scientist, I trained initially as a biomedical scientist at King's College Hospital London in the late 1960s.

In September 1973 I was given the opportunity with other colleagues to start a department of Immunology within the Division of Pathology at King's, under the headship of Dr Dudley Tee. I have a passion for diagnostic immunology but was drawn especially into liver disease by my colleague Professor Diego Vergani whose enthusiasm for immunopathology of the liver was infectious. Teaching is a large part of my career, both formally (MB Pathology, MSc Medical Immunology (King's College London) and MSc Immunology (Modernising Scientific Careers, Manchester University) and informally via internal seminars. Invitations to speak at national and international meetings are an opportunity I never decline.

I gained my MSc in biochemical immunology at the then North East London Polytechnic, my PhD at King's College London and Membership of the Royal College of Pathologists some years later. I formally retired as Consultant Clinical Scientist from the Department of Allergy and Clinical Immunology (KCH) in June 2014 and since then I hold the same post at the Princess Royal University Hospital, now part of the Viapath group, on a part-time basis.

Professor Jonathan Edgeworth

COMMUNITY TRANSMISSION OF COMMUNITY ASSOCIATED MRSA STRAINS LINKED TO SOCIAL AND MATERIAL DEPRIVATION.

Jonathan started as a medical student at Guy's Hospital but quickly got drawn into research doing an intercalated BSc and then PhD in immunology and macrophage biology at Cancer Research UK, before deciding to return to medicine to complete basic clinical training.

After qualifying he went back to the laboratory to do post-doctoral research for two years and then became a clinical microbiologist combining his interest in immunology with bacterial infections. After becoming a consultant he did a further postdoctoral fellowship in Shigella disease pathogenesis at the Pasteur Institute in Paris and then on return to the UK took up a Clinical Microbiology consultant post at Guy's and St Thomas' in 2002. Seeing the dramatic rise in MRSA that had occurred within just a few years he focussed his research interest in that field – the focus for today's talk.

At the same time as beginning his research on MRSA, and having spent almost as long in the laboratory as on the wards, he increasingly recognised the importance of leadership in helping make things better, and therefore applied and was appointed to the position of Clinical Director of Pathology in 2006. One main objective from the start was to help bring pathology scientists and clinicians closer together to build critical mass for our energies, talent and resources in improving delivery and development of services for patient benefit. To this end, in 2009 he led the creation of Viapath (then GSTS) as a novel partnership to catalyse laboratory modernisation, service improvement and growth. The Innovation Academy has been one of the outstanding success stories of Viapath and he is delighted to be invited to speak at this 6th Symposium.

Abstract

MRSA was the scourge of hospitals in the 1990s with the UK having the highest rates in Europe. From 2001 hospital MRSA rates were published for all to see, with Guy's, St Thomas' and Kings College Hospitals having some of the highest rates in the country. In 2004 the Government set an ambitious target to reduce rates by 50 % prompting a national infection control campaign with publication of The Health Act, hospital inspections, national guidance, strengthened Board accountability, education and training in basic infection control (hand hygiene, barrier nursing and isolation), and targeted measures particularly universal screening and decolonisation. To the surprise of many, the target was achieved and exceeded with rates now down by about 90 %. MRSA for many is a distant memory.

The laboratory played a significant role in control of this epidemic supporting the universal screening programme. MRSA culture initially took 3-5 days, improving to 24-48 hour with chromogenic agar, same day with laboratory-based PCR and even one or two hours with ward-based MRSA. Finally, the arrival of whole pathogen genome sequencing now has the potential to identify emergence of new strains, confirm outbreaks and link isolates to potentially identify exactly where someone's MRSA came from.

In my talk I will reflect on this remarkable success story and look ahead to where next for MRSA and how diagnostics might help future preventative strategies. I will discuss MRSA in the context of the wider global antimicrobial resistance agenda and how our learning from MRSA can give us some reason to not lose hope as we face the new scourge of untreatable multi-drug, extremely-drug and pan-drug resistant Gram negative bacteria.

Professor Graham Taylor

ACQUIRING, MANAGING AND SHARING GENOMIC DATA FOR CLINICAL BENEFIT

With a long-standing interest in translating genomic technology into diagnostics, Graham developed and published the first use of microsatellites for genetic diagnosis, the first report of genetic diagnosis from foetal necropsy material, the first use of automated fluorescent fragment analysis for genetic diagnosis and numerous other initiatives in the area of molecular genetics and pathology. He led the pilot project and was a member of the steering group for the first UK diagnostic mutation database: DMuDB.

In 2006 Graham led the UK Department of Health Funded project "New genetic diagnostic technologies for consanguineous families at risk of recessive genetic disease" and joined Cancer Research UK as Director of Genomic Services and led an evaluation of Next Generation Sequencing (NGS) technology and bioinformatics.

As Professorial Head of the Genomics Translation Unit his team developed methods for diagnostic amplicon sequencing in fixed tissue, copy number variation analysis by NGS and also streamlined conventional genetic testing by using NGS, halving the unit costs of familial breast cancer testing tests. National cost savings for BRCA testing estimated at $50M p.a.

In 2012 he joined the Department of Pathology at Melbourne University as The Herman Professor of Genomic Medicine, Director of the Australian Node of the Human Variome Project and Director of the Victorian Clinical Genetics Laboratories.

From February 2016 he took up the post of Scientific Director of Clinical Genomics with ViaPath at Guy's & St. Thomas's Teaching Hospitals in London. Current research interests are around the application of long sequencing read technology in genetic diagnosis.

Petros-Pavlos Ypsilantis

DEEP LEARNING FOR MEDICAL DIAGNOSIS

Petros-Pavlos Ypsilantis is a PhD student in the Department of Biomedical Engineering at King's College London. He received a Master degree in Statistics from Imperial College London, Departments of Mathematics in 2013 and an undergraduate degree in Applied Mathematics and Natural Sciences from the National Technical University of Athens in 2012. His research lies in machine learning with application to medical diagnosis.

Abstract

Deep Learning is a branch of Machine Learning, which has dramatically improved the recognition, interpretation and classification of images, text, speech, etc. It has also been widely investigated and applied to the identification of faces in social networks, object detection, segmentation and caption generation in natural images.
The dramatic progress of deep learning lies in three main factors: the ability of deep learning architectures to discover intricate structure in high-dimensional data in ways that humans and traditional machine learning methods cannot, the increases in the amount of available computation and the existence of enormous data storehouses.

The power of deep learning is very interesting in the medical field. Here we show how deep learning can be used to achieve promising results in tasks such as histology image analysis, chest x-rays classification and interpretation, lung nodule detection in computed tomography (CT) scans and chemotherapy response prediction from FDG-PET Imaging. Our preliminary results indicate that deep learning techniques can potentially assist medical experts to increase the accuracy and the speed of diagnosis.

Notes

CQI In Healthcare

Chair: Dr Yusof Rahman

Dr Yusof Rahman is a Consultant in Adult Inherited Metabolic Disease with some sessions in the Blood Sciences Laboratory, at Guy's & St Thomas' NHS Foundation Trust in London and an Honorary Senior Lecturer at King's College London School of Medicine.

After graduating from University College Medical School in 1998 in Dublin, Ireland, he completed his general medical training and obtained the Membership for the Royal College of Physicians (MRCPI).

He spent further three years in Dublin as an Endocrine research fellow and worked on his doctoral thesis. In 2004, Yusof moved to London to join a Metabolic Medicine Specialist Registrar Training Programme at the Imperial College / Hammersmith Hospitals.

As part of his specialist training, he also spent two years at the Charles Dent Metabolic Unit, National Hospital for Neurology and Neuro Surgery, Queen Square in London. He obtained his Fellowship for the Royal College of Pathologists (FRCPath) in 2008.

He completed his specialist training with dual accreditations in Chemical Pathology with Metabolic Medicine in February 2009 prior to taking up the current consultant position. Despite spending more than half of his life abroad, as a true Malaysian, Yusof still enjoys good food, travelling and playing badminton on a regular basis.

Jean Straus

with Dr Katherine Bates

THE HACKATHON

Abstract

The Innovation Agency together with the Chief Scientific Officer's Quality Improvement Champions combined forces to hold a two day Hackathon in Liverpool in July 2016. The theme for the Hackathon was Collaborate to Improve Care, based around problems associated with care homes. Two members of the winning team, Katharine Bates and Jean Straus, will talk about their experiences at the Hackathon and where they're now headed after their win.

Jean Straus
Jean Straus is here today as a judge and speaker as a result of representing a less-well-known viewpoint, that of the patient. As Jean was retiring as a teacher of teenagers with mental health problems, she suddenly lost her hearing, and so was propelled into a world of unanswered questions. Unsatisfied with the status quo, she began volunteering, public speaking, campaigning, writing and fundraising. This year she qualified for a CLAHRC Fellowship (Collaboration in Leadership for Applied Research and Care) in Northwest London with the aim of improving communication and hearing for residents in care homes. As part of this Fellowship, she entered the Hackathon for Care competition in Liverpool where she discovered that representing herself as a patient, of whatever condition, carries with it a great deal of interest.

Dr Katharine Bates
Katharine Bates is a Senior Clinical Scientist who works in both the Molecular Pathology and Clinical Biochemistry departments at King's College Hospital. Since her appointment in 2009, she has transferred the Biochemistry molecular assays to the purpose built molecular laboratories and has developed and introduced new tests, including a porphyria genetics service to complement the porphyria clinic and specialist porphrin lab at Kings' College Hospital. Her current interests are in developing and establishing a Next Generation Sequencing service with particular interest in iron studies, porphyria and the inherited endocrine cancers.

Kamla Reddi

USING A3 THINKING TO INVESTIGATE THE PATIENT SAMPLE DELIVERY FROM KING'S COLLEGE HOSPITAL TO GUY'S HOSPITAL

Kamla Reddi is a Clinical Scientist in Histocompatibility and Immunogenetics (H & I) and works in the Clinical Transplantation Laboratory at Guy's Hospital. Over the last 10 years she has completed a BSHI diploma in H & I, gained an MSc in Immunology, and registered as a Clinical Scientist. She is now in the process of sitting the RCpath part 1 examination.

Recently taking on the role of Training Manger within the laboratory she is involved in organising monthly journal clubs, case study reviews and monitoring mandatory training. She has taken part in a continuous quality improvement (CQI) project improving sample delivery pathway from King's College Hospital to Guy's Hospital.

She is a new member of the Future Leaders in Innovation Group and is currently involved in training within Viapath. Her current interests include training of new clinical scientists and STP's, research and development within the laboratory and Lean working.

Abstract

Background: The Clinical Transplantation Laboratory (CTL) provides Histocompatibility and Immunogenetics testing to support clinicians for renal and liver transplant patients. CTL provides this support on site at Guy's Hospital and off site hospitals such as Kent and Canterbury, King's College Hospital (KCH), Great Ormond Street and St Helier. Currently samples from King's College Hospital (KCH) are couriered to CTL at Guy's Hospital via City Sprint as previously using the Viapath sample delivery system has resulted in missing or delayed samples.

Problem statement: The current patient sample delivery pathway from King's College Hospital (KCH) Renal and Liver Outpatient Departments to CTL at Guy's hospital is not adequate leading to loss of samples (0.14 % per month), user courier cost (£680 per year), and re bleeding of the patient, along with significant delays in reported results and clinical decision.

Goal: To use A3 thinking to implement an efficient and timely sample delivery pathway through Viapath and reduce the number of missing or delayed samples from 0.14 % to none. Pathway walk: A pathway walk from KCH Renal Department to CLT at Guy's was performed. Using a Fishbourne diagram the cause and effect of the pathway was identified and an action plan was devised to implement the new pathway in October 2016.

Results: Since the implementation of the new pathway no sample loss has been reported.

Next stage: All samples from Renal and Liver teams use the new pathway for sample delivery

Dr Martin Myers MBE

LABORATORY ANYWHERE: DELIVERING DIAGNOSTICS WHERE IT IS MOST EFFECTIVE - A NEW PARADIGM OF DIAGNOSTICS DELIVERY

Dr Myers is a Consultant Clinical Biochemist at Lancashire Teaching Hospitals NHS Foundation Trust (LTH), Preston UK, Laboratory Director of Clinical Biochemistry and Associate Divisional Medical Director for Diagnostics. Dr Myers is also the Lead Scientist for the Trust.

Dr Myers has taken a lead role in a continuous program of Pathology re-design as well as ensuring the effectiveness of Pathology delivery. This spans pathology delivery using state of the art robotics and advanced technology through to the use of point of care devices used anywhere. He chairs the Trust Point of Care Testing Committee.

His scientific interests include the use of automation, point of care testing and informatics in improving the quality of the diagnostic process, redesigning pathology delivery through innovation, and delivering a distributed and integrated laboratory service.

His clinical interests include the use of laboratory testing in improving patient pathways and he has introduced the "Laboratory Anywhere" concept of Pathology delivery where Lab in a Box and Lab in a Bag models are delivered in a variety of locations. He is involved in several projects for the direct delivery of diagnostics to BAME communities and vulnerable groups requiring different diagnostic pathways.

Dr Myers is on the CSO LIA team and within the CSO team he is leading on the delivery of Point of Care diagnostics in patients with Learning Difficulties and patients experiencing Mental Health issues.

Abstract

In the modern NHS, healthcare is being delivered anywhere along the continuum between the Specialist Hospital and the Hospital at Home. As over 80 % of healthcare requires diagnostics for decision making, it is clear that the delivery of this model of healthcare can only occur if it is supported appropriately by diagnostics.

A diagnostic test is more than a cost; it has value, yet many of the strategies that have been developed for the delivery of diagnostics have been cost-orientated, and laboratory-focussed, and not value-orientated and patient pathway-focussed. These cost-orientated strategies have been successful, with a reduction in the NHS reference cost for pathology of about 25 % in the past 6 years. However to support the modern NHS there is now a requirement to include value-orientated, patient-focussed strategies, which have the potential to reduce pathway cost.

The centralised laboratory will always have its role, but it is not the only model of diagnostics that should be used. For example there is evidence that BAME, patients with learning disabilities and patients experiencing mental health do not access traditional pathways of diagnostics delivery; new models of diagnostics delivery are required to ensure diagnostic support to these patients. The Laboratory Anywhere model, utilising Lab-in-a-Box and Lab-in-a-Bag technologies, can deliver diagnostics at point of care for these groups, using, for example, pop-up diagnostic clinics. In addition placing diagnostic devices in wards, outreach teams, pharmacies, GP surgeries, patient homes (using self-testing or passive testing) etc, supported by the clinical governance and IT infrastructure of a UKAS accredited laboratory will ensure that the Laboratory Anywhere model can support modern healthcare delivery wherever it is required.

Innovation Academy

CQI in Healthcare – The Finalists

1. Dr Stamatina Agalou

Title: "Where on earth are my results"?

Using A3 methodology to reduce turn-around times of referral tests and improve patient care.

Biography

My name is Dr Stamatina Agalou and I am a HCPC registered Senior Clinical Scientist currently working in the IMD (inherited metabolic disorders) laboratory in the Biochemical Sciences department at Viapath, St Thomas' Hospital.

I finished my BSc degree in 2000 (B.Sc. Hons in Biochemistry and Molecular Medicine), University of Essex (UK). I subsequently secured a studentship from Baxters Pharmaceutical, for a PhD in Biochemistry in the same university. It was very successful with numerous publications and a patent. However, my passion for the clinical perspective led me to the Clinical Scientist training program in September 2004 and as part of it I was awarded an MSc Clinical Biochemistry in 2007, King's College (UK).

Currently, I am a Clinical Scientist with nearly 12 years of experience in one of the leading specialised laboratories. I have extensive experience with technical and clinical validation of IMD assays. I am frequently involved in teaching and training of laboratory staff and trainees. I undertake a variety of activities to provide quality assurance including audits, service improvements, EQA result interpretation and performance monitoring.

2. Ian Hutton

Title: Evolution of cystic fibrosis testing in South East Thames newborn screening laboratory.

Biography

Studied Medical Biochemistry at the University of Birmingham between 2004 and 2007. Started training as a clinical scientist in 2008 at St Mary's Hospital Paddington. Completed an MSc in Clinical Chemistry in 2010 at University College London. I joined the pathology department at Barnet hospital as a Clinical Biochemist in 2011 where I was given the additional role Deputy Lead for point of care testing. In 2012 I joined the South East Thames Newborn Bloodspot screening laboratory to ensure the laboratory would be ready to take part in the expanded screening pilot. In 2013 I helped install a new laboratory information system for the SE Thames laboratory and earned a Critical Acclaim award for my work. In 2016 I readied the SEThames laboratory to provide full result reporting to the Newborn failsafe system. Due to my understanding of the failsafe system I was nominated by my peers to become the London Screening laboratory representative for the Newborn Failsafe User group. I have an interest in technology and how it can be used improve healthcare services for both users and staff.

3. Dr Luisa Beltran

Title: Accelerating amino acid analysis the long way: Improving an analytical pathway using A3 methodology.

Biography

I studied Biological Sciences at Warwick University and went on to train as a Biomedical Scientist working in Clinical Biochemistry at Southend Hospital. During my time working there I developed an interest in research work and so I left to complete a PhD at Barts Cancer Institute studying the proteomics of the PI3K signalling pathway. Following this period I entered the Scientist Training Programme, completing my training as a Clinical Scientist in Clinical Biochemistry at the Royal Sussex County Hospital. My paediatric metabolic placement at the Inherited Metabolic Disease lab at St Thomas' Hospital was a highlight of my training and I was thrilled to join the lab as a Senior Clinical Scientist in February 2015. During my time here I have greatly improved my knowledge and understanding of the investigation and diagnosis of inherited metabolic disorders and I have developed a special interest in the applications of mass spectrometry to provide improved approaches to diagnostic testing.

4. Erin Mozley

Title: Use of A3 methodology to put the 'monitor' back into PKU monitoring

Biography

After obtaining an undergraduate Masters in Biochemistry from the University of Oxford, I started my training in Clinical Biochemistry at Southampton General Hospital. During this time I developed an interest in Inherited Metabolic Disease (IMD) and subsequently started in a Senior Clinical Scientist post in the IMD laboratory in Biochemical Sciences at St Thomas'. During my three years in the IMD laboratory I have been involved in a number of Continuous Quality Improvement projects. I have developed my knowledge and experience of Lean methodology through a number of projects including those involving the PKU monitoring service, immunosuppressant analysis, and the post-analytical pathway in the IMD laboratory.

5. Louise James

Title: Sweat and Tears: A3 Quality Improvement Project.

Biography

Louise James is a Specialist Biomedical Scientist who works in the Metabolic Department at Kings College Hospital. Having recently achieved the IBMS Specialist Diploma In Biochemistry Louise is continuing to pursue her academic aspirations by undertaking an MSc in Blood Sciences. She is a member of the Future Leaders in Innovation Team, where she uses her leadership skills to promote innovation and expertise within Viapath. Her current interests include assisting in the development of further biogenic amine assays using LC-MS and the training of biomedical scientists and support staff alike.

6. Kamla Reddi

Title: Using A3 thinking to investigate the patient sample delivery from King's College Hospital to Guy's Hospital

Biography

Kamla Reddi is a Clinical Scientist in Histocompatibility and Immunogenetics (H & I) and works in the Clinical Transplantation Laboratory at Guy's Hospital. Over the last 10 years she has completed a BSHI diploma in H & I, gained an MSc in Immunology, and registered as a Clinical Scientist. She is now in the process of sitting the RCpath part 1 examination.

Recently taking on the role of Training Manger within the laboratory she is involved in organising monthly journal clubs, case study reviews and monitoring mandatory training. She has taken part in a continuous quality improvement (CQI) project improving sample delivery pathway from King's College Hospital to Guy's Hospital.

She is a new member of the Future Leaders in Innovation Group and is currently involved in training within Viapath. Her current interests include training of new clinical scientists and STP's, research and development within the laboratory and Lean working.

Excellence in CQI Award

Fab Change Day took place on October 19th 2016, providing a national opportunity for individuals within healthcare to come together and harness our collective energy, creativity and ideas to make a change. To mark this, a pledge was launched across Viapath to improve pathology-dependent patient pathways with Continuous Quality Improvement (CQI) and shared learning. Following this, we introduced the Viapath Excellence in CQI Award to celebrate the diverse Continuous Quality Improvement work taking place across our sites.

Abstracts of up to 250 words were submitted to an expert panel of judges and 6 finalists have been invited today to present their work as a poster. The Excellence in CQI award 2016 will go to the individual who's project best shows a significant positive impact to the patient pathway whilst using CQI tools and engaging their teams.

With thanks to our judges:

Helen Liggett
Scientific Project Lead for Quality Improvement (Chief Scientific Officers team / NHS ENGLAND)

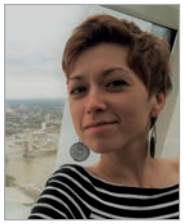
Professor Jonathan Edgeworth
Medical Director (Viapath)

Jean Straus
Patient Advocate, NWL CLAHRC Fellow, and Member of winning team at the NHS Care Homes Hackathon.

Sarah Allen
Consultant Physicist and Head of Nuclear Medicine (GSTT)

Presentation, Excellence In Pathology Award

Volha Klimovich



CLINICAL UTILITY OF PIVKA-II IN THE DIAGNOSIS OF HEPATOCELLULAR CARCINOMA

Volha Klimovich is a Biomedical Scientist in the Blood Sciences department at St. Thomas'. She graduated from International Sakharov Environment University in Minsk, Belarus, with Biomedicine specialty; and worked in Biochemistry in Belarus for five years. In the UK, prior to joining the Viapath team, Volha worked as a Biomedical Scientist in LabServices Ltd, Watford and Royal Brompton Hospital, London. The presentation for this Excellence in Pathology Award is based on Volha's MSc in Biomedical Science thesis (London Metropolitan University), which she completed in 2016. Volha considers continuous professional growth to be her highest priority. Currently, she is conducting the Continuous Quality Improvement project in the Diabetic Day Care at St Thomas' Hospital.

Abstract

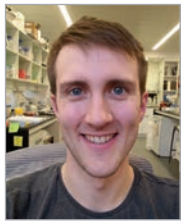
Clinical utility of PIVKA-II in the diagnosis of hepatocellular carcinoma.

Alpha-fetoprotein (AFP), the marker that is currently in widespread use in diagnostic modalities for hepatocellular carcinoma (HCC), lacks sensitivity and specificity. Undercarboxylated forms of the vitamin K-dependent protein prothrombin, protein induced by vitamin K absence/antagonist-II (PIVKA-II), is a tumour marker which has demonstrated higher rates of sensitivity and specificity in the diagnosis of HCC than those of AFP. Furthermore, PIVKA-II can be successfully used as a prognostic marker, which widens the field of the potential application of this tumour marker. However, utilisation of PIVKA-II for this purpose is currently not employed in the UK.

The aim of this research project was to determine the clinical utility of PIVKA-II for the diagnosis of HCC. The project was based in the Nutristasis Unit of Viapath at St. Thomas' Hospital (London). In the course of the project an automated chemiluminescent microparticle immunoassay was validated and used for quantitation of PIVKA-II in 87 patient samples received from the Gassiott Gastroenterology Clinic (St. Thomas' Hospital, London) and the Hepatocellular Carcinoma Clinic in the Institute of Liver Studies (King's College Hospital, London). All samples found to be PIVKA-II positive were screened for the presence of vitamin K antagonists (warfarin) to eliminate possible interference.

In our study PIVKA-II exhibited higher sensitivity and specificity (79.4 % and 96.6 %) comparing to those of AFP (70.6 % and 82.4 %). These preliminary data suggest that PIVKA-II is a promising tumour marker for HCC diagnosis.

Andrew Bond



with Amy Slater

A BETTER WAY TO ORDER WHOLE EXOME SEQUENCING (WES) TESTS

Andrew Bond
I am based within the Viapath Genetics Laboratories in Guy's Hospital. I am in the second year of my three year NHS Scientist Training Programme (STP) in Clinical Bioinformatics. Prior to this I worked at St George's Hospital, Tooting, where I developed laboratory workflows for the 100,000 Genomes Project. Before working in London, I spent 6 months at a stem cell laboratory at the University of Oxford and 4 years in the Genomic Diagnostic Laboratory at the Manchester Centre for Genomic Medicine. I hold a BSc in Genetics from Cardiff University. In my free time I enjoy hiking, listening to music and travelling.

Dr Amy Slater
I am in my second year of the NHS Scientist Training Program (STP) in Clinical Bioinformatics, based within the Viapath Genetic Laboratories.

Prior to starting the STP, I undertook a PhD investigating the epigenetic and genetic variations between different sporadic renal cancers at the University of Birmingham, defending my thesis in December 2015. During my PhD I presented posters at international conferences in Frankfurt and Liverpool and published in peer review journals.

Outside of work I enjoy training and competing my dog Cadbury in dog agility, and I am also a keen sewer and seamstress. Whilst studying for my BSc in Pharmacology and Molecular Genomics at King's College London, I developed a love for amateur dramatics, particularly the works of Gilbert & Sullivan, which I still regularly perform in and direct.

Abstract

WES offers clinicians the ability to interrogate any human gene and discover the genetic reason for a patient's disease. It is particularly suitable for patients with rare diseases where the presentation is complex and difficult to diagnose clinically. As there are ~20,000 genes, the clinician needs to decide which personalised set of genes should be investigated for each patient.

The bioinformatics team within the Genetics Laboratories have created an application for clinicians to order WES tests. The app walks them through the process of creating a bespoke panel of genes that is appropriate for testing in their patient. Once the order is placed, lab processes are triggered automatically and when the results are ready for interpretation, the system helps scientists target their analysis to the right genes. The system also allows clinicians and lab staff to track each sample through the entire testing workflow.

This replaces the former inefficient and disjointed system, whereby test requests and associated information were transferred by email or verbally at multidisciplinary meetings. Having all information entered at the start and stored in one place saves lab time and prevents errors. Feedback from clinical and laboratory users has been very positive.

Dr David Taylor

DEVELOPMENT OF A 13 STEROID SERUM PANEL BASED ON LIQUID CHROMATOGRAPHY-TANDEM MASS SPECTROMETRY: USE IN DETECTION OF ADRENOCORTICAL CARCINOMA

David has been working at King's College Hospital since 2009, initially as a regionally funded Trainee Clinical Scientist, completing an MSc in Clinical Biochemistry in 2011. He holds a BSc and PhD in Biochemistry, both from the University of Leeds.

Since gaining registration as a Clinical Scientist with the Health and Care Professions Council, David has led on the development and implementation of new liquid chromatography-tandem mass spectrometry methods in Clinical Biochemistry, where he is currently Operations Lead. David has a particular interest in endocrinology and is a member of the Association for Clinical Biochemistry and Laboratory Medicine and the Society for Endocrinology.

Abstract

Adrenocortical carcinoma (ACC) is a rare malignancy. Due to de facto enzyme deficiencies in steroid hormone biosynthesis, diagnosis is challenging as up to two thirds are biochemically silent. Urine steroid profiling by gas chromatography-mass spectrometry is an effective diagnostic test for ACC, quantifying the increased metabolites of steroid pathway synthetic intermediates which discriminate ACC from benign adrenal lesions. Corresponding serum assays for most steroid intermediates are unavailable, due to low demand or lack of immunoassay specificity. Serum steroid analysis by liquid chromatography-tandem mass spectrometry (LC-MS/MS) is increasingly replacing immunoassay, especially for those most subject to cross-reaction.

In this study an LC-MS/MS method for measurement of 13 steroids in serum was developed and it's utility in discriminating ACC (10 cases) from 38 non-ACC adrenal lesions assessed. In ACC, between four and seven steroids were increased versus up to 2 in the non-ACC group. 11-Deoxycortisol was markedly increased in all ACC cases, with all steroids in the panel except testosterone in males and corticosterone being useful in discriminating ACC from non-ACC adrenal lesions. In conclusion, serum steroid panelling by LC-MS/MS offers a highly novel diagnostic test for ACC, by combining the measurement of steroid hormones and their precursors in a single analysis.

Excellence in Pathology Award

Abstracts of up to 250 words were received from across the organisation for the 2016 Excellence in Pathology Award. The judging panel were delighted to find out about the innovative science that is taking place throughout Viapath.

Three finalists were shortlisted and have been invited today to present their abstract in a lightning session. After the presentations the audience will be asked to vote for their favourite and the winner will be announced at the end of the day.

Samantha Sheppard
From Future Leaders in Innovation

We would like to thank this year's Judging Panel

Dr Tony Marinaki
Consultant Clinical Scientist (St Thomas' Hospital)

Dr Edward Davies
Consultant Clinical Scientist (Princess Royal University Hospital)

Dr Jim Wade
Viapath Clinical Director of Pathology (King's Denmark Hill site)

Notes

Afternoon Session

Chair: Natalie Walsham

Natalie Walsham is Lead Clinical Scientist and Clinical Director of Pathology at Lewisham and Greenwich NHS Trust.

Her research interests are in the field of biomarkers for the detection of alcohol misuse. She was a member of the group who carried out a study on behalf of the UK Department of Transport of biomarkers for alcohol misuse in the assessment of fitness to return a driving licence following disqualification in high risk offenders.

This study led to the adoption by the Driver Vehicle Licensing Authority (DVLA) of Carbohydrate Deficient Transferrin (CDT) as the sole biological marker in these cases. She also carried out studies on Ethyl Glucuronide (EtG) as a marker of medium-term alcohol excess which led to EtG becoming part of the protocol for assessing patients on the waiting list for a liver transplant.

She has been the co-author on three recent reviews on the subject of biomarkers of alcohol misuse and was the editor of Cardiovascular Disease and Laboratory Medicine for the Association of Clinical Biochemistry and Laboratory Medicine.

Dr Mark Zuckerman

with Melvyn Smith

HEPATITIS E VIRUS TESTING

Dr Mark Zuckerman
Mark Zuckerman is the head of virology and a consultant virologist at King's College Hospital. He is interested in the interface between the clinical service and research and development work.

Dr Melvyn Smith
Melvyn Smith is a Principal Clinical Scientist at Viapath, based in the Microbiology Department at King's College Hospital Foundation Trust. Melvyn obtained his PhD at King's College, University of London, in molecular biology working on the laccase enzymes of the commercial mushroom Agaricus bisorus. Further post-doctoral studies involved characterising fungal manganese peroxidise enzymes, followed by a move to Queen Mary and Westfield College investigating the effects of cytochrome p450s on barbiturate metabolism.

Abstract

Hepatitis E virus (HEV) infections are increasingly reported as a cause of acute hepatitis. HEV can infect both animals and humans and was regarded as a cause of sporadic hepatitis in resource-rich areas of the world, often travel associated and large outbreaks were seen in some resource-poor countries. Although it may lead to a mild hepatitis, immunosuppressed individuals can develop a persistent infection.

An increasing number of HEV infections have been reported in England and Wales attributed to eating processed pork products. Undercooked or raw game meat and shellfish have been implicated too. After HEV infections were reported after blood transfusion and solid organ transplantation, the Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) recommended that HEV negative products were required for specific patient groups, namely allogeneic stem cell/bone marrow transplant and solid organ transplant recipients.

A review of the clinical issues will be presented together with an outline of how a quantitative real time HEV RNA rt-PCR was developed to meet the needs of monitoring a large transplant cohort at King's College Hospital, London.

Presenter: Frances Smith

THE IMPACT OF NEXT GENERATION SEQUENCING ON THE DIAGNOSIS OF RARE RED CELL DISORDERS

Frances is a Clinical Scientist working in the specialist haematology department at King's College Hospital. She studied Genetics at the University of Sheffield, then worked at the Welcome Trust Sanger Institute in the high throughput DNA sequencing laboratories. Frances completed her Clinical Scientist training in Molecular Genetics Guy's Genetics Laboratory then following registration, moved to the Institute of Cancer Research to help set up a diagnostic laboratory specialising in next generation sequencing for patients with inherited cancer syndromes. She is now working for Viapath on implementation of new genomic technologies in diagnosis of rare inherited anaemias.

Abstract

Diagnosis of rare anaemia is challenging, for example 80 % of congenital non-spherocytic haemolytic anaemia cases are undiagnosed once pyruvate kinase and G6PD deficiencies have been excluded using enzyme assays. This low diagnostic yield is due to the extensive phenotypic and genetic heterogeneity of the conditions and the limited number of phenotypic tests, which are often of low specificity. Rare inherited anaemia can present at different ages but is most difficult to diagnose in neonates that have undergone recurrent blood transfusion as phenotypic testing becomes unreliable and the disease phenotype is masked. Genomic technologies, which are unaffected by the presence of transfused blood, hold more promise for patients with rare anaemia, detecting the underlying changes in their DNA that are causing the disease. We have developed a targeted gene panel to assess approximately 180 genes that are involved in rare anaemia and developed an automated data analysis pipeline to assess sequence and structural variants. We present data from 200 sequential diagnostic cases analysed with our red cell gene panel. These data show that a genomic approach is effective; a clear diagnosis is identified in 60 % cases and a likely diagnosis made in a further 20 % cases. This has led to a more rapid and accurate diagnosis for some patients, where previously this was not always possible. It has influenced patient management decisions regarding blood transfusion regimes and whether splenectomy is appropriate for their care. As a consequence DNA investigations are now being requested prior to specific phenotypic tests for paediatric cases. We have also diagnosed rare anaemia genotypes in patients that have presented with liver failure and one patient with a YARS2 sideroblastic anaemia presenting without the usual myopathy. These cases highlight the importance of data sharing and the collaboration required to realise the full potential of genomic technologies for diagnosis of genetic disease.

Presenter: Professor Roy Sherwood

ALCOHOL, THE DVLA AND DRY JANUARY

Prof Roy Sherwood is Consultant Clinical Scientist and Scientific Director of Viapath (King's College Hospital). He trained at the Royal Sussex County Hospital, Brighton. In 2013 he became Professor of Clinical Biochemistry at King's College London. He has an interest in biomarkers in liver, gastrointestinal and cardiovascular disease in particular. He has built up an interest in tumour markers associated with endocrinology and neuroendocrine tumours and the laboratory at King's will soon be offering a comprehensive service for these. He has a BSc in Clinical Biochemistry from Salford University, and MSc in Clinical Biochemistry from Surrey University and a DPhil from Sussex University.

Abstract

Detection of harmful alcohol intake relies on a combination of self-report questionnaires and biochemical markers. Measurement of ethanol itself in blood or urine detects consumption of alcohol in the previous 12-36 hours but cannot give any information about chronic intake. Urine ethyl glucuronide testing widens the time window to 48-72 hours. Other markers such as gamma-glutamyl transpeptidase (GGT) and Mean Cell Volume (MCV) are increased in chronic alcohol misuse but have poor specificity. Carbohydrate deficient transferrin (CDT) is produced by the direct effects of alcohol on the enzymes involved in the creation or destruction of the carbohydrate side-chains on the transferrin molecule.

In 2008 the Department of Transport begun to realise that the biochemical markers in use for the assessment of high-risk offenders (HROs) seeking the return of their driving licences (GGT & MCV) were often abnormal in individuals who were abstinent from alcohol. This was especially true in subjects who were overweight or who had diabetes. They commissioned a study at King's College Hospital and SLaM that showed that CDT had greater specificity in HROs and CDT was adopted in 2012 as the sole biochemical marker in such cases. King's has carried out CDT testing since 2013 testing more than 90,000 individuals.

In January 2015 King's participated in a study with University College London (UCL) as part of the 'Dry January' national campaign. This was aimed at assessing the benefits of abstinence for one month on general well-being and in the possible mechanisms of the physiological harm due to alcohol excess. CDT was used as in indicator of adherence. The most striking features of the results were reductions in weight, blood pressure and the pro-inflammatory cytokines and chemokines.

Close

We would like to extend our sincere thanks to all the speakers at this sixth Innovation Academy symposium and to all other members of the wider team who have made this event possible with special thanks to Denise Oblein.

Further thanks to the Worshipful Company of Bakers, Baker's Hall for hosting the 'Acquire, Learn, Share, Repeat' symposium and to the sponsors for their support with the event.

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