A time of transformation

The past 12 months have been an exciting time of transformation for everyone involved with HSL. In the opening address of the 3rd Annual Research and Innovations Symposium, HSL’s chief executive, David Byrne, reflected on a busy and successful year.

The Halo – HSL’s flagship laboratory – is now live. As one of the largest laboratories in the UK, the Halo has the capacity to support HSL’s thriving research portfolio, which currently comprises nearly 500 translational research projects and clinical trials.

Work has now begun on the transformation of 60 Whitfield Street, which is being converted into a rapid response laboratory (RRL) for UCLH and a specialist centre for HSL’s cellular pathology department. The project should be completed in early 2019.

David also extended a warm welcome to Barnet and Chase Farm Hospitals, whose contract with HSL began in October 2017. Discussions regarding service redesign are currently underway, and the on-site RRL is expected to go live in 2019.

Other exciting opportunities for HSL include the launch of 29 new pathology networks across the country, and a proposed redesign of national genetic laboratory services. Professor Geoff Bellingan, Medical Director for the Surgery and Cancer Board at UCLH, and Professor Michael Patton, Medical Director at HSL, are closely involved with the national genetics reconfiguration and are working hard to ensure that HSL plays a central role in this.

HPV primary screening for cervical cancer

The NHS cervical cancer screening programme is “the most impressive cancer screening programme in the world”, according to Mr Adam Rosenthal, consultant gynaecologist at UCLH. Since the 1970s, the mortality rate for cervical cancer in the UK has reduced by a remarkable 72% - primarily a result of improved screening services. Current practice relies on cytology as a first-line screening tool. While effective, this is always slightly subjective and depends on the quality of the sample and the skill of the cytologist.

It is well-known than virtually all cases of cervical cancer are caused by high-risk human papilloma virus (HPV) subtypes. Cytology samples with low-grade or borderline changes are now tested for HPV, in a process known as HPV triage. Women who test positive for high-risk HPV are invited to colposcopy, whereas those who test negative return to routine screening.

In his talk, Future Directions in the Prevention of Cervical Cancer, Mr Rosenthal discussed a new approach - HPV primary screening – which turns the current programme on its head. Cervical samples will first be tested for HPV, and only those that test positive will be examined under the microscope. The advantage of this is that HPV testing is a fully automated process. As a PCR-based assay, it has a higher sensitivity, lower false negative rate and higher negative predictive value compared to cytology alone – meaning women with pre-cancerous changes can be identified more effectively.

HPV primary screening has been trialled at six test sites across England. Northwick Park hospital was the pilot site for London. During the trial they found that high-grade lesions were not only picked up more effectively, but patients were also much more satisfied with the service.

In July 2016 it was announced that HPV primary screening will be rolled out across the whole of England in 2019.
Liquid biopsy: the future of lymphoma care?

Lymphoma is the fifth most common cancer in the UK, but there are still well-established problems with diagnosis. In his talk, Advances in the Diagnosis and Management of Lymphoproliferative Diseases, Dr Chris McNamara argued that these problems can be overcome with proper integration of diagnostic services, including histopathology, flow cytometry and molecular diagnostics.

Patients with tumours that are clinically and morphologically very similar can have very different outcomes. This is due to molecular heterogeneity amongst lymphoma subtypes. Supplementing current diagnostic methods with information obtained from new molecular techniques – including flow cytometry, FISH and whole exon sequencing – can help identify signature disease-defining patterns of mutations.

Detecting these mutations can have a profound impact on patient outcome. It allows for the possibility of personalised medicine: treating patients with highly successful, targeted therapy, specific to the tumour’s molecular signature.

For Dr McNamara, an exciting new development in this field is the use of ‘liquid biopsy’. Tumour cells excrete DNA into the circulation when they undergo programmed cell death. Using molecular techniques, it is now possible to test this cell-free DNA for somatic mutations. All that is required from the patient is a simple blood test.

‘Liquid biopsy’ could transform the diagnosis and management of lymphoma. Cell-free DNA appears in the blood before clinical signs and symptoms develop, allowing for earlier diagnosis and the possibility of screening. For patients undergoing treatment, serial liquid biopsies could be used to monitor response to therapy in a non-invasive way. In the words of Dr McNamara, this is a major game changer in the field of lymphoma research.
Training within HSL

From its inception, HSL has been committed to providing high-quality education and training to its staff, an important point raised by both Wendy Leversuch, HSL's Head of Scientific Training, and Dr Keith Gomez, Head of Medical Training. In her talk, Training Programmes for Scientific Staff, Wendy focused on the IBMS registration and specialist training portfolios, as they encompass the majority of training delivered by HSL and impact the most staff.

HSL was the first group to receive corporate-wide training approval from the IBMS for both pre and post-registration training portfolios. As part of the agreement with the IBMS, HSL must have training programmes in place which meet specific criteria to support successful completion of these portfolios. Wendy described the process of putting a training programme in place, including the importance of portfolio handbooks, monthly training reviews and online tools such as the new HSL training website.

Well-structured training programmes are also important in areas outside the IBMS training portfolio. In his talk, Support for Medical Training, Dr Gomez discussed the opportunities and challenges that moving into the Halo brings in terms of post-graduate medical training. He maintained that service consolidation should help harmonise standards of best practice, ensuring an efficient and equal delivery of training across different departments.

Predicting the success of TB treatment

We have become very good at diagnosing TB, but how can we begin to optimise treatment outcomes? Developing a more personalised approach to TB treatment was the focus of Professor Tim McHugh's talk, Getting More out of TB Laboratory Diagnosis.

Molecular techniques, such as whole genome sequencing, are increasingly being used to identify specific mutations associated with drug resistance. These patterns of mutation are important markers of disease outcome, and can be used to tailor treatment to the individual.

Bacterial load is another important marker of disease severity and treatment response. Professor McHugh outlined his work developing the molecular bacterial load (MBL) assay, a rapid and accurate method of quantifying bacterial load in patients over the course of their treatment. With a turnaround time of only 24 hours, the MBL assay can give an early indication of treatment success before data from culture-based methods becomes available.

By rapidly profiling bacterial drug response, the MBL assay can enable customised TB therapy. The assay is very close to moving away from the research environment and into a diagnostic one. For Professor McHugh, this is an important step forward for improving patient outcomes.

Orine Musonda, a senior biomedical scientist at Northwick Park Hospital who completed her IBMS specialist diploma in clinical biochemistry last year. She credits regular training reviews, lunchtime talks and supplementary assessments as key elements of her success. Orine is now in the second year of her MSc at London Metropolitan University, sponsored by TDL.

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Innovation from the Symposium

• The process of delivering a high-quality sexual health service has changed dramatically over the past three years, according to Dr Simon Edwards, Clinical Director for Sexual Health Services in Central and North West London. Patients want improved access, integrated services and quicker results. These outcomes must be balanced with specific requirements set by commissioners, who want to target certain populations including men who have sex with men (MSM) and the under-25s. In any case, the future appears to be digital. A new e-service is launching this January in London, intended to help meet rising demand for online sexual health services.

• Cytomegalovirus (CMV) is a well-known cause of end-organ disease in people with immature or compromised immune systems, such as neonates and transplant patients. In his talk, Why is CMV a Candidate for Elimination and then Eradication?, Professor Paul Griffiths argued that CMV infection actually carries a significant risk of morbidity and mortality across all patient populations. He discussed two proof-of-concept trials showing that both cell-mediated and humoral immune responses play an important role in CMV vaccine development. While more research needs to be done, he concluded the case is now clear for controlling CMV by universal immunisation – although it may take at least 25 years to eliminate the virus in the UK.

• With flu season in full swing, it was an appropriate time for Paul Grant to discuss his work evaluating Hologic assays for respiratory viruses using the new Panther Fusion system. The main advantage of Panther Fusion is that it is a full random access system, which allows samples to be loaded and processed throughout the day and enables a much quicker turnaround time. Preliminary evaluation of the system is promising, with in-house and Panther assays yielding the same results across the full range of samples tested so far.

• Anna Vassiliou returned to this year’s symposium after winning the prize for best poster at last year’s event. She gave an update on her research in the field of andrology, specifically focusing on the clinical significance of the MiOXSYS system, a new technique measuring the oxidative-reduction potential of sperm samples. Oxidative stress is a major contributing factor to male infertility, but is not yet routinely assessed in conventional semen analysis. Anna hopes that this new assay, which is more efficient, less time-consuming and cheaper to run than any existing test for oxidative stress, will soon become part of routine diagnostic testing and aid more effective management and treatment of male infertility.

• HSL currently supports 22 Master’s students with their studies. Dr Tony Madgwick, principle lecturer in cellular pathology at the University of Westminster, outlined the benefits of undertaking a Master’s degree part-time, as well as the challenges of maintaining a work-life balance during a necessarily fast-paced and intense course. He concluded that success is dependent on effective teamwork between all three of those involved in the degree: the university, the student and the employer.

• The day drew to a close with a personal perspective from Professor Michael Patton discussing the importance of medical research. Using stories from his own life, he reflected on the major advances in medicine that have taken place from his grandfather’s generation to today. None of these would have been possible without years of medical research and development. HSL’s role is to facilitate research with its NHS partners, helping to convert basic science into life-changing diagnostics and treatment. Being part of a team that is helping to advance science and improve patient care in the future is something that everyone working at HSL can take pride in. In the words of Professor Patton: “Today’s research is tomorrow’s treatment”.

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