UNDER THE MICROSCOPE: MICROBIOLOGY AND INFECTION

David Westrip, Senior Biomedical Scientist and Deputy Chair of the British Society for Microbial Technology, provides a preview to its forthcoming annual microbiology conference.

After last year's necessary re-scheduling to early summer to accommodate lingering pandemic restrictions and concerns, the British Society for Microbial Technology (BSMT) Annual Microbiology Conference in 2023 returns to its traditional May slot. Returning to the RAF museum at Hendon on Thursday 11 May, it will include a full and stimulating programme with seven highly respected speakers and an exciting trade show showcasing the newest innovations from our commercial colleagues within the field of diagnostic microbiology.

As the world moves on from the recent SARS-CoV2 situation, microbiologists are again able to consider all the issues that never really went away but perhaps fell out of the headlines in favour of the urgency and to some degree the novelty of a global respiratory pandemics. This year's conference will cover some of these resurgent subjects.

Antimicrobial resistance (AMR)

AMR remains on the national risk register, which indicates drug-resistant infections are predicted to lead to 10 million deaths worldwide annually by 2050. While there remains some debate about the veracity of this widely used figure, the impact of increasing resistance will no doubt be significant. The potential consequences within medicine is perhaps the most obvious where increased prevalence could impact areas such as routine surgery and treatments such as chemotherapy may become more complicated. Clinical decision making

Left. Culture of the bacteria *Staphylococcus pyogenes* (aureus).

"We know that antimicrobial resistance remains a problem and is likely to present more challenges in the future"

and patient care pathways will likely be affected and we could enter a scenario where some routine interventions will need to be re-evaluated as risks begin to outweigh potential benefits. Beyond the hospital walls, AMR has the potential to have wider socioeconomic consequences, affecting areas such food production, security and global trade in unpredictable and complex ways.

These points have been discussed and written about in more detail many times previously and what is accepted is that we know that antimicrobial resistance remains a problem and is likely to present more challenges in the future. Resistance will inevitably increase if left unchecked. Nearly 100 years of well-documented antimicrobial usage has made that clear to anyone who has even a passing familiarity with the subject.

The morning sessions of this year's conference will focus on discussing the complexity of the issue of AMR beginning with our Keynote speaker Professor Alasdair MacGowan. Professor MacGowan, who is a consultant at the North Bristol NHS Trust, will give an overview of the development of AMR and discuss approaches for control. Given his longstanding research interest in various aspect of antimicrobial stewardship and antimicrobial pharmokinetics, and as a former President of the British Society of Antimicrobial Chemotherapy, he has a long association with this subject. His insight within this area will surely be both informative and valuable for delegates.

Wider perspective

Dr Mandy Wootton from Public Health Wales will then provide an update on laboratory diagnostics in relation to the detection of AMR. This is an area of keen interest to those of us routinely working to provide susceptibility data on clinical isolates in the face of ever-changing dynamics and constantly evolving guidelines.

Taking a wider perspective, Dr Claire Gordon will take a look at AMR surveillance in low- and middle-income countries. The burden of infection and impact of antimicrobial resistance still currently falls greatest on areas where resources are more limited. Diagnostics, surveillance and treatment are all harder to implement and maintain when they are competing for already limited available resources. However, as SARS-CoV2 showed elegantly and brutally, pathogens are not bound by human borders. Transmission in today's interconnected, globalised environment can happen with astonishing rapidity and certainly quick enough to challenge the speed of political response. This has been shown to be true even within high-income regions and countries with effective healthcare facilities and strategies. Self-interest may not be the most humanist argument for addressing issues such as antimicrobial resistance in low- and middle-income regions, but it may prove to be one of the more effective. We could quickly move from viewing with academic interest the situation in resource-limited regions to being more directly confronted with the issues.

Emerging technologies

No modern microbiology conference is complete without a discussion around the potential impact of next-generation and other rapid sequencing techniques. Dr Nathaniel Storey, a bioinformatician (our third speaker) who has significant experience in this area, will be able to discuss the advantages and present day limitations of these approaches and give us some insights into the timescale for their adoption by the diagnostic laboratory.

Reflecting the eclectic nature of developments in microbiology, the afternoon session will deliberately move away from antimicrobial resistance and will contain a number of standalone talks from specialists in their fields. To kick this off Michael Perry will provide a perspective on the network wide implementation of molecular enteric techniques within Wales.

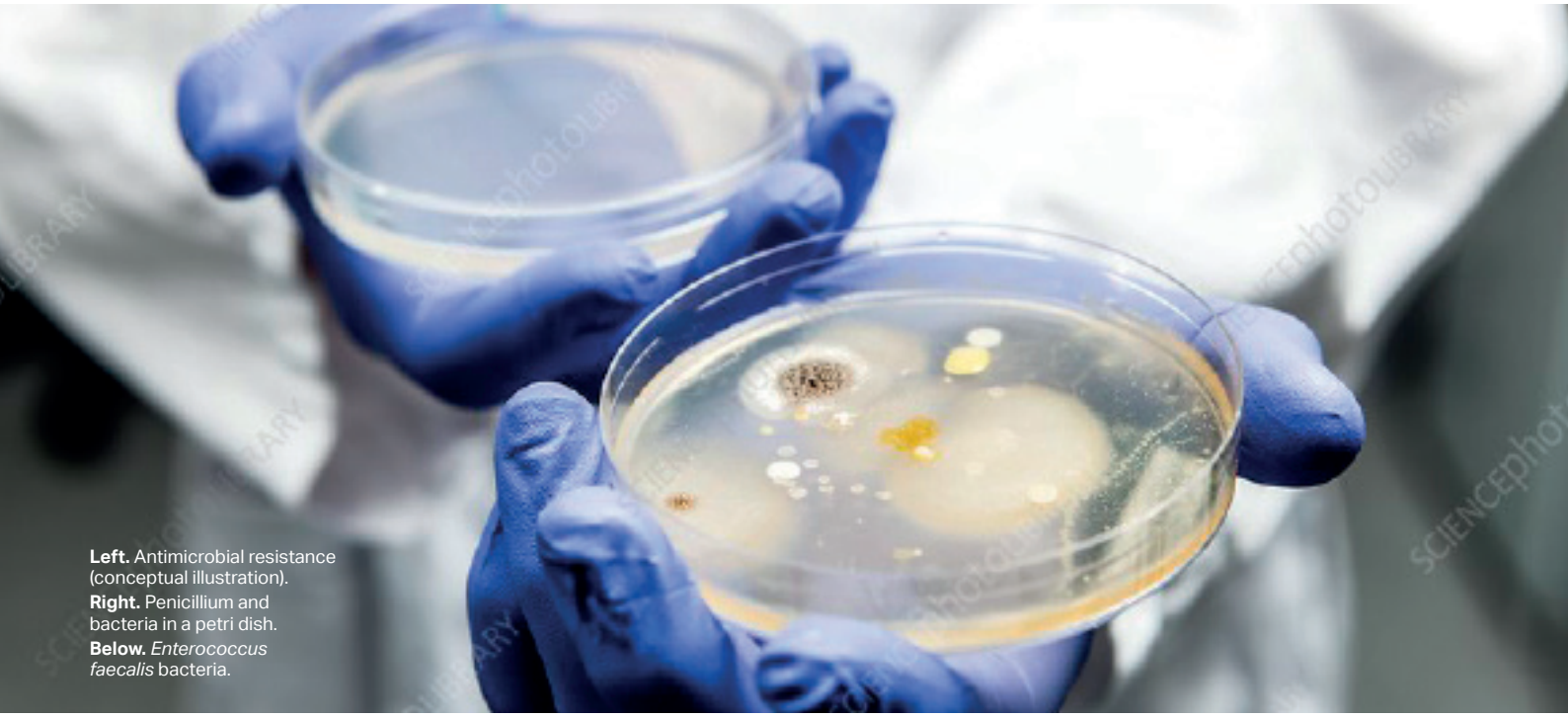
The network approach to pathology is one which is becoming more widespread throughout the UK, and Wales has embraced this on a national scale through continuation and development of the national pathology network following the break-up of the Public Health Laboratory Service in 2003. This provides the framework for standardising methodology (contributing to the UK-wide Standards for Microbiology Investigations programme) as well as equipment procurement pathways with collaboration and co-ordination between traditional geographic and professional areas of responsibility. It will be interesting to hear about practices and outcomes that can be applied to other regional pathology networks, specifically in respect to facilitating the move to molecular services from traditional microbiology techniques, a change that hasn't always been easy for individual laboratories, partly because of the significant cost disparity between these technologies.

Orthopaedic infections

Another area where there are significant

ATTEND THE CONFERENCE

The BSMT Annual Microbiology Conference provides scientists with a learning experience and the opportunity to discuss and debate their experiences, network with fellow professionals and build contacts with some of the most innovative companies in the field. Registration is now open via the BSMT website (bsmt.org.uk) with early bird rates available until 10 April.

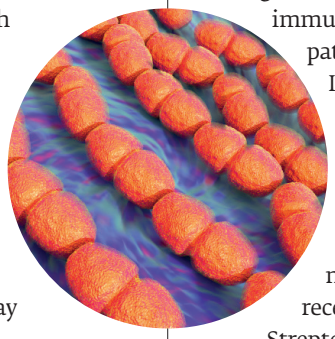


Left. Antimicrobial resistance (conceptual illustration).
Right. Penicillium and bacteria in a petri dish.
Below. *Enterococcus faecalis* bacteria.

limitations with traditional culture-based techniques is in the detection of orthopaedic infections and it feels this has been an area of discussion without any real conclusions for some time now. Low pathogens numbers and their stubborn adherence to surfaces either native or prosthetic results in low sensitivity and significant skill and time is required to do these important investigations well. Enrichment cultures seek to increase the sensitivity to detect pathogens, but require extended incubation and these can be prone to contamination, producing misleading and difficult-to-interpret results. Despite some national standards, it is likely that there is significant variation in techniques across between laboratories, as what may be applicable to a major orthopaedic centre may not be viable in other situations. One potential solution to this is the use of molecular methods and Dr Kevin Cole, a Senior Biomedical Scientist from North Tyneside General Hospital in Newcastle, will discuss both the advantages and disadvantages to this approach.

Necessary developments

No doubt technologies such as next-generation sequencing will eventually have a role to play in many areas of routine diagnostics and it is undeniable that molecular techniques are now more commonplace than they were even a few years ago in many microbiology departments. It is an enticing prospect and potentially a powerful new tool in the diagnosis, management and treatment of infections, with further implications from infection control or outbreak management perspective. Although new technologies may represent an intimidating looming threat to those more comfortable with traditional bacteriology, it is necessary that the advantages are widely discussed, and the current and future workforce is engaged in these developments. Switching from metal loops and agar plates to NGS sequencers may make some nervous. The arguments in favour may be clear in terms of the outcomes achieved, but getting to a position where these are fundamentally ingrained in routine diagnostic microbiology departments will no doubt present significant challenges. Financial justification, particularly within the NHS, requires some creative thinking to demonstrate advantages beyond departmental budgets and such a fundamental change in technologies will have significant impact on training and staff development within the workforce.



Group A Streptococcus

As COVID waned, other respiratory infection seem to rear up with renewed enthusiasm, traditional "seasonality" seems to have shifted and everything just seems to get more unpredictable. This may be due to the effects of reduced social mixing during period of lockdown, immune reductions or more pathogenic strains emerging. It is perhaps not yet clear what combination of these and other factors are behind this. One pathogen that has made regular appearances in the mainstream media was in recent months was Group A Streptococcus (GAS), leading to a flurry of diagnostic activity. Did this represent a true increase in the prevalence or severity of infection, or was it more driven by the increased media exposure to a few tragic cases? Time brings a clearer perspective and Dr Charlene Rodrigues, our last speaker, will conclude the meeting with an update on this current outbreak and discuss the behaviour of GAS and other respiratory infection in children in this "post-pandemic" period. BMS

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