A conversation with ...

Dr Simon Waddell

Tell us about your role

I'm a senior lecturer in Microbial Pathogenesis in the newly created Department of Global Health and Infection, and I'm part of the Wellcome Trust Centre for Global Health Research at BSMS. I teach molecular biology to first-year medical students and a little on infectious diseases to third-year students and Global Health MSc students. I'm also co-lead for the independent research project, which aims to give all fourth-year students a taste of conducting medical research whether in the clinic, GP surgery or laboratory.

What are your particular research interests?

My group, situated in the microbiology labs of the Medical Research Building, works on infectious bacterial diseases with a particular focus on tuberculosis (TB). We try to understand how bacteria adapt to our body during infection and how these changes alter the effectiveness of anti-microbial drugs that are used to treat the disease. A better understanding of what bacteria do to cause TB will help us to develop new ways of tackling these infections.

We also work to discover how potential new drugs kill bacteria, a necessary step in the development of the next generation of anti-microbial drugs that are so desperately needed.

What are you working on at the moment?

I've been working with an international team on an exciting proof-of-principle study, which may lead to a breakthrough in the way TB is treated. We've discovered bacterial biomarkers that predict the early success of drug treatment, which for TB lasts at least six months at the moment. In the future, this may allow patients to finish drug therapy early, reducing the difficult and debilitating side effects of the drugs and cutting treatment costs.

Tell us a bit more about TB. Is it still around?

Yes, tuberculosis is still very much with us. There were 9.6 million new cases and 1.5 million deaths from TB across the globe in 2014. While it is certainly more of a problem in low and middle income countries, there are around 6,000 cases each year in the UK. TB is spread through inhaling tiny droplets from the coughs of an

Patients at a sanatorium recuperate in the sun, 1937

Historical images courtesy of Wellcome Library, London

Far left: Glasgow's x-ray campaign against TB, 1957

Left: Advertisement for Angier's emulsion, used to treat TB in the late 19th and early 20th century

Below: Village doctor in Multan, Pakistan, checks villagers for TB

infected person. Treating the disease is complex and costly. Standard drug therapy is a combination of four drugs taken over six months, and side effects can be severe. So it is difficult for patients to stay on treatment for the duration. Drug resistance is becoming a problem, so new drug combinations and new ways of assessing these novel combinations are needed.

What did your research involve?

We mapped the responses of TB bacteria coughed out in sputum from patients on standard drug therapy to understand why some bacteria survive through months of treatment. The study showed for the first time that specific changes to the TB bacteria two weeks after starting drug therapy could predict the success of treatment six weeks later.

What does this mean in terms of treating the disease?

The study showed that bacterial responses measured during treatment could be used to understand drug action in patients, and that these signatures may be used as biomarkers, allowing us to predict when patients may safely finish treatment.

What is the impact of this?

Profiling TB bacteria in this way could help find predictive markers of treatment success that are desperately needed in clinical trials and in the clinic. This would reduce the cost of drug trials needed to test new drugs for TB, and allow doctors to quickly stratify patients who are not responding to drug therapy. It could potentially save millions of pounds worldwide in drug costs and spare many patients from suffering the severe side effects of such long treatment.

Read about the study at **http://bit.ly/TB_SW**

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