Lung probe that spots infections aims to cut antibiotic overuse

March 30 2017

A new imaging tool that rapidly diagnoses bacterial lung infections could help prevent unnecessary use of antibiotics in intensive care units.

The bedside technology can detect whether harmful bacteria are present within 60 seconds, so that patients can be treated with the right medicine quickly.

Accurate diagnosis means unnecessary use of antibiotics can be avoided if an infection is not present, helping to stop the emergence of bacteria that are resistant to the medicines, experts say.

Further development of the technology has received £2million from Wellcome Trust and will receive up to £0.9m (US $1.12m) from CARB-X, a major international initiative to tackle antibiotic resistance co-funded by the US Government and Wellcome.

The interdisciplinary collaboration - called Proteus - is led by researchers at the Universities of Edinburgh and Bath and Heriot-Watt University. It has been supported by the UK's Engineering and Physical Sciences Research Council with additional support from the Wellcome Trust and Medical Research Council.

Proteus uses chemicals that light up when they attach to specific types of bacterial infection. This fluorescence is detected using fibre-optic tubes that are small enough to be threaded deep inside patients' lungs.

The technology easily reaches parts of the lungs existing tools cannot, the team says. It could revolutionise the way critically ill patients - and others with long-term lung conditions - are assessed and treated. It could also aid understanding of bacterial diseases.

Researchers are initially focused on helping patients with lung infections and intensive care patients with suspected pneumonia who are being ventilated to help them breathe.

Around 20 million patients in intensive care need machines to help them breathe each year. Up to one third of these patients are suspected as having serious lung infections during their time in intensive care.

Doctors currently rely on X-rays and blood tests for diagnosis, but these can be slow and imprecise. Patients are often treated with antibiotics as a precaution, which exposes them to potential side effects.

Experts say that a blanket approach to therapy contributes to the emergence of bacteria that are resistant to antibiotics.

Kev Dhaliwal, who is leading the CARB-X supported project and is a Consultant in Respiratory Medicine at the University of Edinburgh, said: "We need to understand disease in patients better so that we can make better decisions at the bedside. The Proteus project and clinical partners brings together scientists and clinicians from many disciplines from all corners of the United Kingdom to develop technology that can help us spot disease in real time at the bedside and help us to give the right treatments at the right time. The rise of antimicrobial resistance is the biggest challenge in modern medicine and the support and mentorship from CARB-X will accelerate development of Proteus technology to be ready for clinical use faster and more widely than previously possible."

Kevin Outterson, Executive Director of CARB-X and Professor of Law

at Boston University, said: "CARB-X is a bold new approach to developing life-saving treatments for antibiotic-resistant infections. By accelerating promising research into novel drugs, diagnostics and vaccine, it is our hope that we can speed up the delivery of new effective antibacterials, vaccines and rapid diagnostics to patients who need them."

Tim Jinks, Head of Drug Resistant Infection at Wellcome Trust, said: "Drug resistant infection is already a huge global health challenge - and it is getting worse. We need global powers to work together on a number of fronts - from the beginning to the end of the drug and diagnostic development pipeline. CARB-X is supporting projects like Proteus to build a robust pipeline of products to fulfil this need."

CARB-X is the world's largest public-private partnership devoted to antibacterial preclinical research and development. It will spend $450 million from 2017-2021 to support innovative products moving towards human clinical trials.

The partnership is funded by the US Government and the Wellcome Trust. It is led by Boston University School of Law. Other partners include the Broad Institute of Harvard and MIT, MassBio, the California Life Sciences Institute and RTI International.

Provided by University of Edinburgh