

AMIDST A MOUNTING CHALLENGE PRESENTED BY ANTIBIOTIC RESISTANT BACTERIA, **PROFESSOR ANTHONY COATES**, OF HELPERBY THERAPEUTICS, DISCUSSES HOW INDIVIDUAL EUROPEAN COUNTRIES CAN TAKE THE LEAD IN COUNTERING THIS THREAT TO PUBLIC HEALTH

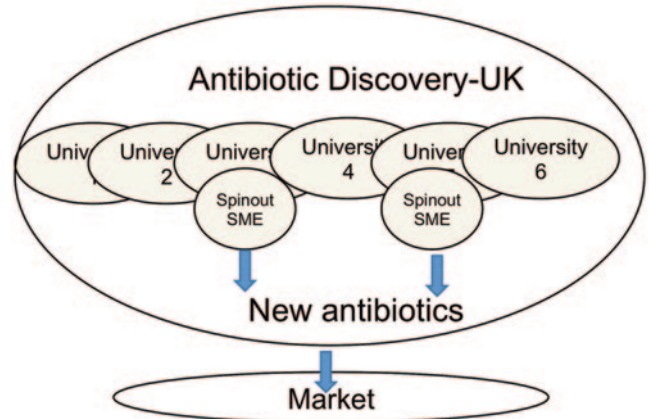
# Antibiotic resistance – them or us?

**B**acteria are developing resistance to antibiotics faster than we can bring new antibiotics to market. If this situation continues, the world will soon run out of effective antibiotics, particularly for Gram-negative bacterial infections. The director general of the World Health Organization has pointed out that modern medicine without effective antibiotics will find it increasingly difficult to support cancer treatments, sophisticated surgical operations and organ transplantations.

In my first two papers for PEN, I stated my view that the antibiotic market is broken. The scale of the problem is immense, and it is likely that 20 new classes of antibiotics will be required over the next 30 years. I suggested that the European Commission sets up a European 'antibiotic recovery programme', in the style of the European Recovery Program (Marshall Plan) after the Second World War. This programme could regenerate antibiotic discovery with a mixture of grants to universities and loans to industry, particularly SMEs. I also suggested that the regulatory authorities, who are working hard on this problem, should consider widening the number of clinical indications for which a microbiological endpoint (rather than a clinical endpoint) in clinical trials is allowed in pivotal trials for market authorisation. This would reduce the cost of Phase III clinical trials, whilst not sacrificing the safety of patients.

In this article, I concentrate on what individual countries in the European Union might do now, in order to rebuild their infrastructure for antibiotic discovery. In the past, large pharmaceutical companies have been the mainstay of antibiotic discovery, but most have now moved out of the field leaving it largely untended. Similarly, universities were active in the field of antibiotic discovery, for example, Alexander Fleming was a professor at St Mary's Hospital Medical School in the University of London. But universities have also largely moved out of the antibiotic discovery field, although molecular approaches to antibiotic discovery have been quite popular in the university sector in recent years. Unfortunately this has not led to marketed antibiotics so far. In the future, in my view, the seeds of antibiotic discovery will mainly come from universities and SMEs. So, the first task is to rebuild the infrastructure of antibiotic discovery in each European country. In Fig. 1, I envisage ideas for antibiotic discovery emanating from universities, which then spin out small companies which develop antibiotics, with, perhaps large pharmaceutical companies buying the small companies at some stage of development, or helping with marketing of the antibiotics. Of course, this is only one scenario of many different permutations of antibiotic discovery.

Where do we start? In the UK, I have founded an organisation called Antibiotic Discovery-UK, which promotes collaboration between universities and SMEs in the UK. This concept is based upon a previous, successful initiative, TBD-UK (tuberculosis drug discovery) which was started by Professor Stephen Gillespie, currently at the University of St Andrews, and is run by Dr Geoff Coxon at the University of Strathclyde.



**Fig. 1** A model of Antibiotic Discovery-UK, showing the universities within it. Several universities have, or will have, spin out SMEs which develop novel antibiotics. In collaboration with larger pharma companies, the antibiotics are marketed

TBD-UK brought together virtually all those in the UK who are involved in tuberculosis drug discovery and development. A tangible benefit of TBD-UK is that a number of members, by collaborating, attracted grants. Like TBD-UK, Antibiotic Discovery-UK is a member-led, collaborative not-for-profit organisation. So far, groups from seven UK universities and two companies have expressed interest in Antibiotic Discovery-UK. The objectives of the organisation are to rebuild antibiotic discovery in UK universities and SMEs, and collaboratively attract grants and loans into this area. At the first meeting of the core group in October 2012, a road map of antibiotic discovery for the next 30 years was initiated.

Clearly, rebuilding antibiotic discovery in Europe will not happen within one or two years, but a commitment from the EU to help with grants and loans would be a major step forward. Organisation within individual member states, along the lines of Antibiotic Discovery-UK could start now, and costs very little. This approach should enrich the existing and future collaborations between groups in member states. Antibiotic Discovery-Europe may be the next step, and this too would cost very little but could enhance collaboration in the continent. Eventually, Global Antibiotic Discovery may emerge, but may be too large to be more effective than the institutions which already exist in the world in the field.

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