On 10th September 2015, we organised a talk with the Microbiology Society at the British Science Festival in Bradford. In front of an audience of 75 people, speakers Dr Lloyd Czaplewski (Director at Chemical Biology Ventures), Victoria Wells (Science Communicator at The British Society for Antimicrobial Chemotherapy) and Chair Dr Adam Roberts (Senior Lecturer in Microbial Diseases, University College London) discussed the consequences of a world without antibiotics.

### The biggest threat to mankind’s wellbeing

Adam Roberts opened the debate by providing some background to antibiotic resistance and its spread across the world, including the worrying prediction that by 2050, 390,000 deaths per year in Europe alone will be attributable to antibiotic resistance.

So, what would be the consequences of a world without antibiotics? Modern healthcare as we know it would cease to exist, meaning a range of procedures such as transplants would become impossible, and childbirth would become very risky for mothers and their children. Essentially, many people would die. There would also be societal consequences to consider, such as people living in a perpetual state of fear; a small cut could result in a life-threatening infection, our society would become more risk averse and health tourism would increase. We could also face economic and social instability, or possibly even war, as desperate people do desperate things, suggested Roberts.

### Why have we failed to find new antibiotics?

Next Czaplewski explained that antibiotic resistance is a global problem, and to overcome it we need academia, pharma and biotech companies to work together in partnerships such as the New Drugs for Bad Bugs initiative.
He explained that to date we have been focusing on trying to find novel antibiotics that would solve the problem of antibiotic resistance but also need to look for alternative treatments. Earlier this year, the Wellcome Trust and Department of Health asked a group of researchers to identify some alternative treatments; non-compound treatments to target the bacteria, or drugs that target the patient. Some replacement treatments for antibiotics could be probiotic treatments for diarrhoea, or using bacteriophages to target bacteria. The working group for this project estimated it would cost £1.6 billion to find out whether these treatments would actually work!

Are you an antibiotic survivor?

In order to combat antibiotic resistance, everyone who uses antibiotics needs to be made aware of the problem. The charity Antibiotic Research UK has been set up to encourage fund raising, research and discovery for bacterial infections, much like Cancer Research UK does for cancer treatments. Antibiotic Action, a global public awareness initiative, seeks to educate people on the need for effective treatments for bacterial infections. Wells, our final speaker, discussed the importance of this initiative and the work that it does in the fight against antibiotic resistance.

Victoria Wells reminded us that it is the responsibility of everyone, governments, industry, healthcare providers and the general public, to ensure antibiotics are used appropriately. By providing information on antibiotic stewardship, Antibiotic Action engages with the public for a number of reasons; aiming to reduce the amount of prescriptions for antibiotics, encouraging people to complete full courses of treatment and to stop sharing antibiotics. If we changed the products we used, such as cleaning products that contain antibiotics or food that has been reared using antibiotics for growth promoters, this could put pressure on the industrial companies who make these products to reduce their usage of antibiotics.

Examples of questions from the Audience:

Is there any research/trials using bacteriophage? And is any of the research from Russia from the early 20th Century being used today?
Although this treatment has been used since 1923 in the former Soviet Union, it has not been tested in full clinical trials and does not meet the standards of western medicinal products. It involves infecting people with a live virus that kills bacteria, and accepting this treatment would require further testing and an adjustment of current attitudes.

Have bacteria started to become resistant more quickly than they used to?
Bacteria acquire resistance at different rates. Some bacteria are susceptible to antibiotics for a long time before acquiring resistance to them, whereas other bacteria become resistant to antibiotics very quickly.

Is there any regulation on antibiotics, e.g. for growth promotion?
There is a trans-Atlantic split. In countries such as the United States of America, antibiotics are fed to pigs and cattle to increase their growth. However, this practice has been banned in Europe.

How far do we understand the mechanisms of how bacterial infections occur?
We now have a good understanding of how this works, and we have learned from antibiotic resistance that we need to use new treatments in a better way. We would like to be able to switch off the mechanisms for antibiotic resistance in bacteria, but this is very difficult. Perhaps we will be able to do this in 300 years!

Could you create a self-modifying antibiotic that could change to target resistant bacteria?
Not at the moment, but it’s an interesting idea for the future!

Does Public Engagement work? Big headlines and scary news stories don’t, so what is it that we do in Public Engagement that is different and effective?
We try to change our wording to standardise news stories around this topic. We also need to change our messaging to make sure the public realise the impact of antibiotic resistance. It’s also a case of building trust; many people don’t believe what they see and hear in the media, so they don’t follow the suggested protocols.

We would like to say thank you to our brilliant speakers for providing engaging presentations and answering the questions from the audience. We would also like to thank the audience for taking part in this event, and to the British Science Festival for hosting our event.

See the June 2015 issue of The Biochemist (theme: antibiotics and antibiotic resistance) for more information on antimicrobial resistance.