Using viruses to beat superbugs

March 26 2012

Viruses that can target and destroy bacteria have the potential to be an effective strategy for tackling hard-to-treat bacterial infections. The development of such novel therapies is being accelerated in response to growing antibiotic resistance, says Dr David Harper at the Society for General Microbiology's Spring Conference in Dublin.

Bacteriophages are viruses that can infect bacteria and multiply within them, breaking down the cell and destroying the bacteria - amplifying themselves in the process to deal with more bacteria. They are found everywhere including in river water, soil, sewage and on the human body . Soon after their initial discovery in 1915, bacteriophages were investigated as antibacterial therapeutic agents. A limited understanding of their mode of action meant early work was often unsuccessful and with the advent of the chemical antibiotic era, bacteriophages were passed over as therapeutics.

Dr Harper, Chief Scientific Officer at AmpliPhi Bioscience in Bedfordshire explains why bacteriophages are being revisited as antibacterial agents. "Each bacteriophage is highly specific to a certain type of bacteria and needs the right bacterial host cell in order to multiply. The more bacterial targets there are, the quicker they grow by killing the host cells. Therefore it seems very likely that infections harbouring high numbers of bacteria will benefit most from bacteriophage therapy – for example chronically infected ears, lungs and wounds," he said. "For these types of infection, only a tiny dose of the virus is needed - as small as one thousandth of a millionth of a gram. This can usually be administered directly to the site of infection in a

spray, drops or a cream. The major advantage to bacteriophages is that they don't infect human cells so seem likely to be very safe to use."

Increasing resistance to antibiotics has meant that bacterial infections are becoming more and more difficult to treat. With fewer antibiotics available to treat drug-resistant infections, research into bacteriophage therapy has been accelerated. "The rate of new antibiotics coming onto the market does not match the rate of increasing drug-resistance. The need for new approaches to counter such high resistance is both urgent and vital. New approaches will save lives," stressed Dr Harper.

Clinical trials for bacteriophage therapy are now underway. The first clinical trial for safety was reported in 2005 and the results demonstrating the effectiveness of bacteriophage therapy were published in 2009. This clinical trial was conducted by AmpliPhi. The company is planning further clinical trials in conditions where existing antibacterial therapies are not able to help. "With the results of further clinical trials, once regulatory issues are overcome and future investment secured in this area of research, this should lead to the development of novel products suitable for widespread use to tackle bacterial diseases and overcome antibiotic resistance", said Dr Harper.

Provided by Society for General Microbiology