

Major global investment needed to deliver alternatives to antibiotics

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A handful of alternatives to antibiotics have the potential to combat bacterial infections in the next decade, but they are unlikely to replace traditional antibiotics, according to a new independent report.

Commissioned by the Wellcome Trust and co-funded by the Department of Health, the report assesses whether alternatives to [antibiotics](#) could contribute to controlling the rise of drug-resistant infections, one of the greatest global public health threats of our time.

Professor Aras Kadioglu from the University's Institute of Infection and Global Health, who co-authored the report said: "We've highlighted a wide range of potential alternatives to antibiotics in the treatment of antibiotic resistant infections. However, we estimate that funding of more than £1.5 billion is needed over the next ten years to develop these new therapies towards clinical use, with additional investment required to bring them to market.

"Without such levels of funding, new treatments to replace or supplement antibiotics will probably not be available in the long-term, and the consequences of such a delay for global health needs to be considered now."

Reviewing the options

The authors consulted a wide range of experts who identified novel non-antibiotic approaches that will most likely deliver new options for the treatment and prevention of infections within the next 10 years.

The report focuses on substitutes to antibiotic compounds that target either the bacteria themselves or the host organism. The authors reviewed agents that could be taken orally, by inhalation or by injection to treat invasive bacterial infections.

Nineteen alternatives to antibiotics were identified that are actively being progressed. The most advanced novel therapies are probiotic-based treatments for *Clostridium difficile*, a common cause of diarrhoea, for which the report estimates there will be product approval within the next

decade.

Prevention strategy

The most advanced preventative alternatives include probiotics for prevention of *C. difficile* [infection](#) and novel antibodies for prevention of bacterial infections caused by the bacteria *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

Other potential alternatives to antibiotics, either treatments or prevention strategies, are progressing more slowly and include bacteriophages (viruses that infect and kill bacteria) and lysins (enzymes produced by bacteriophages that digest the cell wall of bacteria). While both have potential to replace the use of some antibiotics, the therapies may be limited to targeting only one bacterial species at a time.

Antibiotic 'enhancers', which use alternative therapies in combination with antibiotics, could also be useful to improve treatment, but insufficient research makes development less likely in the near term.

Global response

Dr Mike Turner, Head of Infection and Immunobiology at the Wellcome Trust said: "Drug-resistant infections are one of the greatest threats to our health, and with limited antibiotics available we must find effective solutions rapidly.

"Some alternative therapies look promising and may contribute to addressing the problem in the longer term. This [report](#) clearly shows however, that conventional antibiotics will still be necessary. Our current cost estimates may be conservative given the scale of the problem, and levels of funding are likely to have a significant impact on global

response."

More information: Lloyd Czaplewski et al. Alternatives to antibiotics—a pipeline portfolio review, *The Lancet Infectious Diseases* (2016). [DOI: 10.1016/S1473-3099\(15\)00466-1](https://doi.org/10.1016/S1473-3099(15)00466-1)

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