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New drug to wipe out superbugs

It would be almost impossible for bacteria to develop resistance to the new treatment

Andrew Brookes/Corbis

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British scientists have developed an antibiotic from human breast milk that can wipe out drug-resistant bacteria.

The breakthrough opens a new front in the fight against superbugs, a threat that David Cameron has warned could plunge modern medicine "back into the Dark Ages".

A panel set up by the prime minister to tackle antibiotic-resistant bugs forecast that they would cost the world ten million lives and £700 billion a year by 2050 if the problem went unchecked.

At present the infections kill about 700,000 people each year, including at least 10,000 in Britain. Unlike most conventional antibiotics, the new drug attacks the basic biology of bacteria in a way that makes it almost impossible for them to evolve defences.

It emerged last night that ministers have not planned for a world without antibiotics. Dame Sally Davies, the chief medical officer, told*The Times* that Whitehall was not preparing because officials hoped powerful new antibiotics would be discovered in time. Asked whether the government was readying plans for the disaster scenario, she said: "Not at this time, because we're planning to sort this. But if others do not work with us, it's not something we can sort on our own. This is a global problem. I am optimistic about this. The science is crackable. It's doable."

The new superbug-killing antibiotic is the type of breakthrough on which Dame Sally is relying. Developed at the National Physical Laboratory in southwest London, it can tear bacteria apart within a fraction of a second. It could also be used to treat genetic diseases such as sickle-cell anaemia by rewriting a cell's DNA, its inventors said.

Dame Sally said that there was already a "serious prospect" of bringing new classes of antibiotic into hospitals. "We need on average ten new antibiotics every decade," she said. "So I don't just want some for my old age: I want them for my children's old age, and their children's old age. And we did disinvest as a world in this sort of research, so we need to make an investment and sustain it."

Colin Garner, honorary professor of pharmacology at the University of York and head of the charity Antibiotic Research UK, said that the situation was too urgent to wait for international consensus. The pipeline of new drugs had dried up and the problem was on the brink of becoming "intractable".

He said: "My heart sinks when I hear the term 'global initiative'. How long has it taken the world to come to a sort of consensus about climate change? The problem of antibiotic resistance will be at least as intractable because each nation takes a different view of what is required."

Adam Roberts, senior lecturer in microbial diseases at University College London, said that he was "pleasantly surprised" by Dame Sally's optimism. "Everything's getting into place in order to try and solve this, at least at a societal level," he said.

The compound developed by the NPL scientists was isolated from the active ingredient in breast milk, which has long been known to have innate but weak anti- microbial properties.

Scientists rigged up part of the protein into an artificial virus that rapidly bursts bacteria while leaving human cells alone. The drug acts as a microscopic "projectile", killing infectious bugs such as *E. coli*and *Staphylococcus aureus* at a rate comparable to established antibiotics.

Max Ryadnov, the NPL's lead biotechnologist, said he was in talks with drugs companies about refining his antibiotic. One of the challenges is to make sure that enough of the virus gets to the infected area without being broken down in the bloodstream.

When it meets human cells, the chemical bullet does something different. Instead of attacking them, it could be used to ferry in new instructions to rewire faulty cells in a technique known as gene therapy. It may be at least a decade before it is clear whether

the drug works in the clinic, underlying the threat from drug-resistant strains of bacteria such as *E. coli*.

Rein Ulijn, director of Central University of New York's nanoscience initiative, said: "In terms of creative thinking, this is a good step forward."

The findings appear in the Royal Society of Chemistry journal *Chemical Science*.