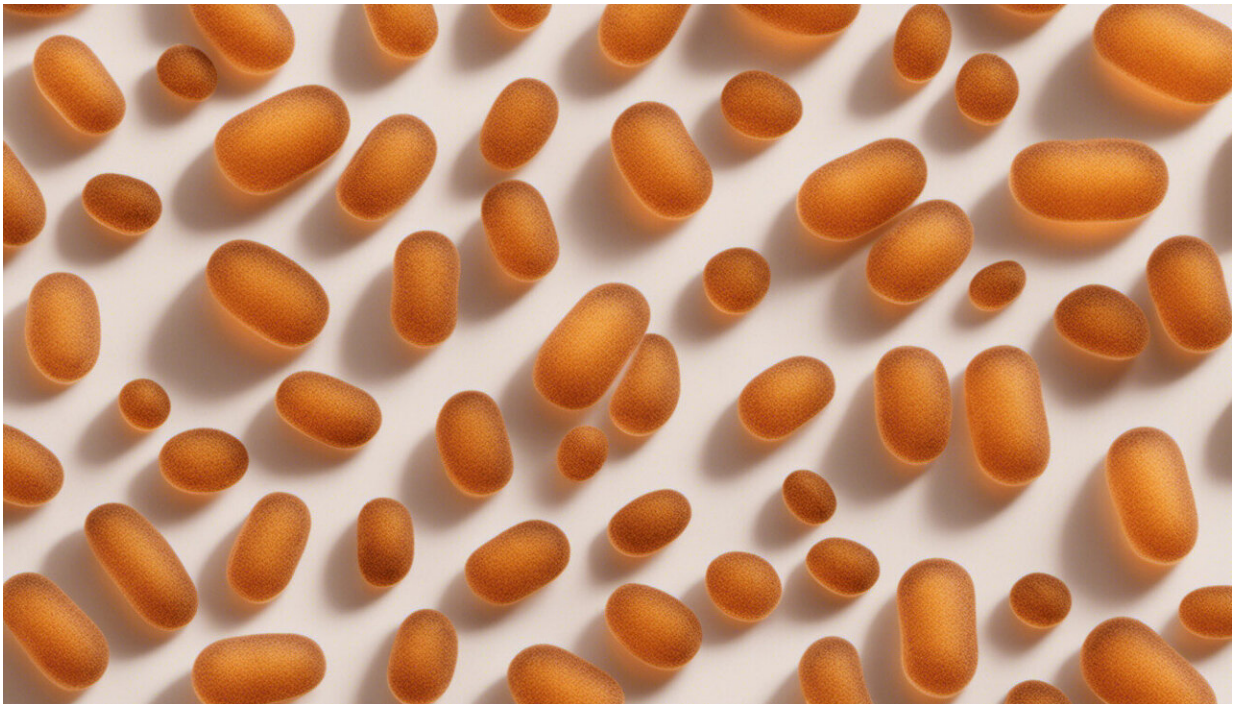


The answer to tackling superbugs could be more superbugs

May 11 2015, by Ruth Massey



Credit: AI-generated image ([disclaimer](#))

Hard-to-kill bacteria or "superbugs" have become a major problem for hospitals. Between 5% and 12% of hospital patients in the EU are thought to acquire an infection [during their stay](#), with many caused by bacteria such as *Clostridium difficile* (*C. diff*) that are resistant to antibiotics.

In the US, *C. diff* is the [leading cause](#) of [hospital](#)-acquired infections and, in the UK – although it is declining – it remains a major healthcare problem implicated in [thousands of deaths](#) every year. But a group of researchers believe they may have found [a surprising answer](#) to treating *C. diff*: giving patients another dose of the bacterium.

The effects of *C. diff* range from mild diarrhoea to more serious and life-threatening conditions such as pseudomembranous colitis (inflammation of the intestines) and toxic megacolon, which often require surgery to remove the affected tissue and can be fatal.

Despite being a major human pathogen, *C. diff* is actually part of the normal group of microorganisms found in the gut ([in 3% of healthy adults](#)). But sometimes it takes advantage of disruptions in our bacterial flora to cause disease. These changes are typically caused when [antibiotics](#) are used to treat an unrelated condition, killing off the protective microorganisms of our gut and allowing *C. diff* to flourish.

Paradoxically, more antibiotics are typically used in an attempt to kill off the *C. diff* as well. However, this can create the same problem again, leading to a [recurrence of the infection](#) in approximately 30% of cases. And once the infection has recurred once, it recurs again in 60% of cases. This has led doctors to consider many alternative strategies.

Giving patients bacteria thought to promote a healthy digestive system (probiotics) has been tried as a way of replacing the normal gut flora killed by antibiotics, but with [little evidence](#) of success.

More recently, [trials have begun](#) with the more controversial "faecal transplants". Both selected bacteria from the faeces of a healthy donor and entire samples faecal matter have been implanted in a patient's colon to test the idea. There is a growing [body of evidence](#) to suggest this can provide both resolution and protection from recurrence.

Researchers from Loyola University Health System in Illinois have now [published a trial](#) of a technique that could be described as a more refined and specific version of probiotic treatment or faecal transplant. Rather than replacing the entire gut-flora of an individual, the researchers introduced a different, harmless strain of *C. diff* that doesn't produce any toxins.

Having already conducted an initial trial, the researchers expected that the non-toxic bacteria would outcompete the toxic strain and prevent the progression and recurrence of infection. The latest trial demonstrated the safety of the treatment and presented further evidence for its efficacy. The most effective dose of bacteria reduced the rate of recurrence to 5%, compared to 30% in a placebo group.

This is an extremely encouraging result. The next stage in the translation of this into the clinic is a phase III trial which will determine the efficacy and safety over many thousands of diverse patients. If successful this could lead to an incredible, cost-effective and widely applicable treatment. Further work is needed to understand why and how this non-toxic strain outcompetes the toxic strains in the gut.

There is a cautionary note, however. *C. diff* [has been shown](#) to transfer its DNA (containing the toxin genes) from toxic strains to non-toxic strains in the laboratory. If the non-toxin strain is inherently more fit in the human gut than the toxic ones, and if it could readily acquire the toxin genes and become a fitter [toxic strain](#), we may head straight back to square one. This would add yet another, even more dangerous superbug to the ever-growing list.

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