

# Freeze-dried gut bacteria could be the key to tackling asthma, Alzheimer's, Parkinson's disease and even cancer

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SCIENCE EDITOR

**F**reeze-dried bacteria from the guts of healthy people could be the key to tackling asthma, Alzheimer's, Parkinson's disease and even cancer, experts believe.

British scientists have isolated several strains of friendly bugs which appear to have significant effects on the immune system, and hope they could replace harsh chemotherapy drugs or steroids.

The first trials have now begun to see if introducing just a single species of bacteria in pill form could benefit a huge range of diseases.

The human gut contains trillions of bacteria - known collectively as the microbiome, which has evolved with us over millions of years. But the overuse of antibiotics and hyper-cleanliness in everyday life can kill off helpful bugs, contributing to the rise of disease.

A recent study by University College London (UCL) found that a single course of antibiotics can alter the microbiome for at least a year, and poor gut health is now linked to the development of Alzheimer's, Parkinson's, Crohn's disease, asthma, allergies, inflammatory bowel disorder (IBS), diabetes, multiple sclerosis, autism, cancer, and even HIV.

Duncan Peyton, founder and CEO of British company 4D pharma, which is launching the first trials into a new era of biotherapeutics, believes that replacing the missing bacteria could restore good health.

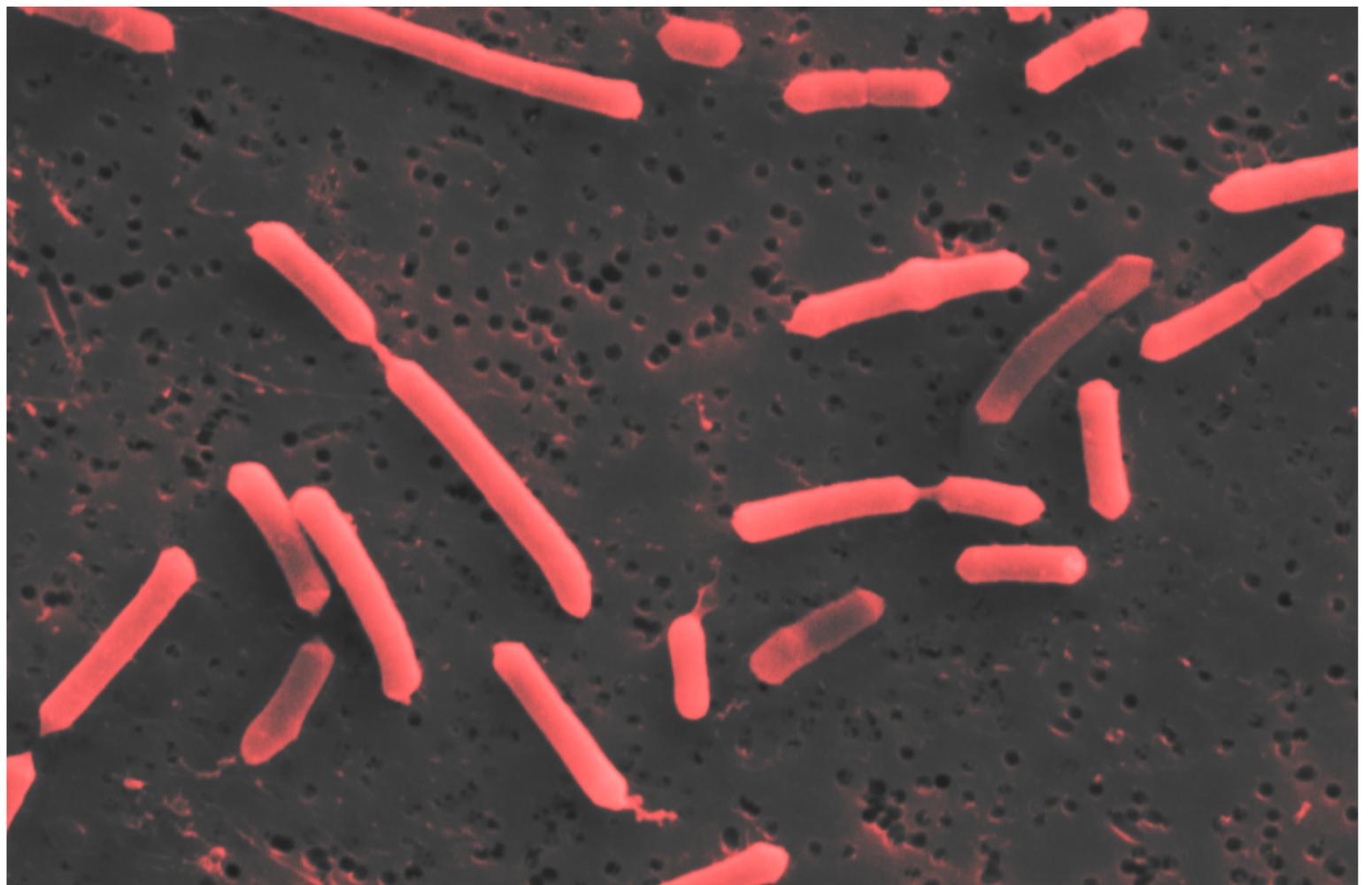
"We always thought of bacteria as causing disease," he said. "Everyone has had some sort of food poisoning or skin infection but if they can seriously change how we feel for the worse, then clearly they could also have a positive effect."

"It's increasingly becoming apparent that the gut acts like a second brain. We're always told to go with your gut feeling and there is clearly an association between health and what's going on in your gut."

"If you have a condition like asthma we want to dampen down the inflammatory effect, whereas in cancer we want to take the brakes off the immune system. And bacteria seem to be able to do that but without the side effects of a lot of drugs, as they are natural."

The tails of some bacteria help stimulate the immune system into fighting disease CREDIT: 4D PHARMA

At Imperial College in London the first trial began last month to give a strain of bacteria - *Enterococcus gallinarum* - known as to MRx0518 to treat up to 120 patients suffering from breast, prostate, ovarian, bladder, lung,



Single strains of bacteria have the potential to slow down or ever cure illnesses, scientists believe CREDIT: 4D PHARMA

head, neck and skin cancer in the weeks before surgery.

Scientists are hoping that when the tumours are removed they will show the bacteria has increased the body's own ability to fight off the cancer. Oddly, it appears it is the tail-like structure of the bacteria, known as the flagellin, which triggers the boosted immune response.

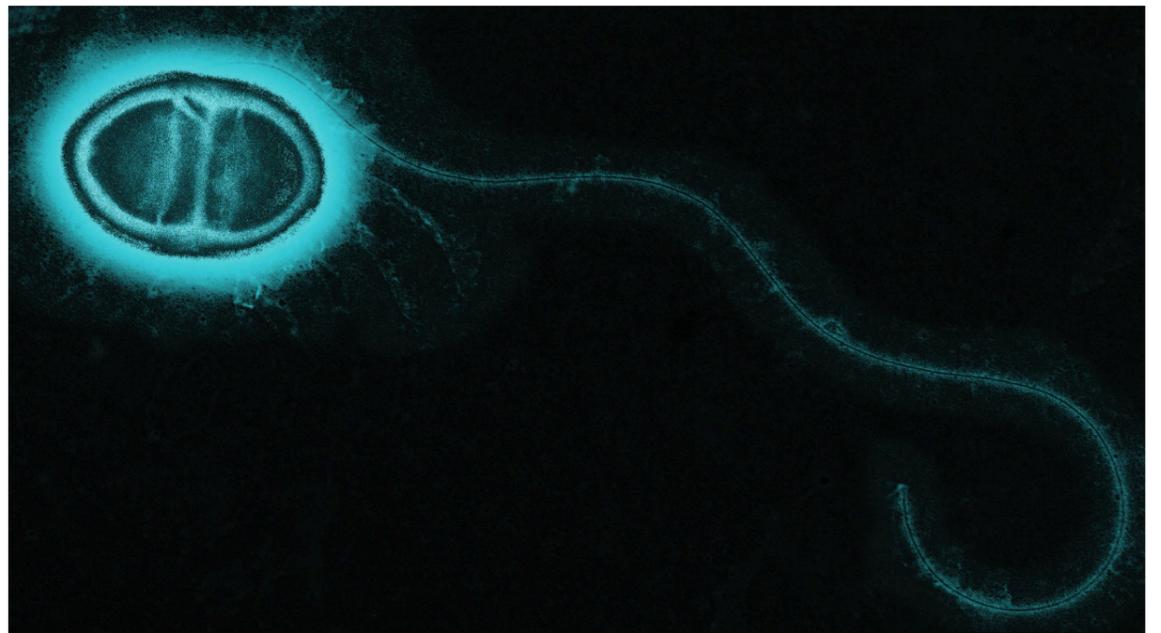
Likewise, in June trials are due to start in six centres across Britain to find out if the gram-positive anaerobic bacteria MRx4DP0004 can help asthma sufferers.

The company also began a phase II trial for Irritable Bowel Syndrome in October following promising early results in humans.

Bacteria work like little chemical factories pumping out important molecules which increase or dampen down the immune system in the body.

For diseases like asthma the immune system overreacts to harmless irritants and needs to be suppressed. Alternatively for cancer, doctors want to increase the immune response which is often smothered by tumours.

The bacteria is taken from the faeces of healthy people, isolated and multiplied in the lab. It is then freeze-dried to put the bugs into a kind of suspended animation, and given orally via a daily pill. The bacteria live in the gut for



The tails of some bacteria help stimulate the immune system into fighting disease CREDIT: 4D PHARMA

two to three weeks before being flushed out.

Unlike faecal transplants, where the entire microbiome is transferred, just one strain is used so there is no chance of inadvertently passing on other conditions. It is now thought that obesity, immune disorders and even cancer could be transplanted with a full microbiome.

The gut is thought to be so pivotal to human health - and even mood - that some scientists have

dubbed it 'the second brain' and believe disease can travel up the vagus nerve directly to the brain, triggering Parkinson's or dementia.

Earlier this month, 4D pharma released new results showing how two strains of bacteria can protect brain cells against Parkinson's, reducing inflammation and boosting cells which produce dopamine, an important chemical lost in the disease.

Alex Stevenson, Chief Scientific Officer said the company wanted to

create a new kind of therapy which 'not only halts the disease, but reverses it, neither which have been achieved so far.'

"The gut-brain link is more significant than people think. In models we have shown these bacteria can impact parts of the disease that can't currently be treated. It's able to reduce inflammation and boost dopamine producing cells. We hope to be ready to test this in 12 to 18 months."