

Bacteria programmed to eat up a tumour.

Can this revolutionise cancer treatment?

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Clostridium sporogenes, found in the gut, holds big promise.

But scientists first need to overcome an oxygen challenge

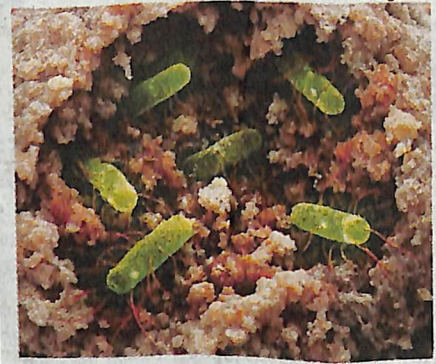
Scientists have experimented with bacteria as potential cancer therapy for a while now — some introduced to trigger an immune response that would kill off cancer cells (bladder cancer); others used to carry chemotherapy drugs or anti-cancer vaccines to target tumours (colon, ovarian and breast cancers); and yet others to train immune cells to attack by feeding them tumour proteins (colorectal cancer).

In a first, researchers from University of Waterloo in Canada have tweaked the genes of a bacteria so that it can literally gobble up a tumour from the inside.

TECHNOLOGY FOR HEALTH

The team has used bacteria called *Clostridium sporogenes*, commonly found in soil as well as the gut. It has the ability to survive and thrive in environments with no oxygen at all, which is typically the inner core of solid cancerous tumours.

“Bacteria spores enter the tumour, finding an environment with lots of nutrients and no oxygen, which this organism prefers, and so they start eating those nutrients and growing in size. We are colonising that central space, and the bacterium is essentially ridding the body of the tumour,” lead researcher Dr Marc Aucoin, a chemical engineering professor at



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Waterloo, told ScienceDaily. There’s a catch, though. Once the bacteria proliferate after feeding off the tumour and reach its outer margins, that’s where they begin

to die because of oxygen exposure. To get over this problem, researchers decided to insert a gene from a related bacterium that has better tolerance of oxygen.

But what if the newfound oxygen tolerance makes the bacteria grow in the bloodstream, which is rich in oxygen? That would be counterproductive, and unsafe. So, the team needed to control exactly when the tolerance ‘switch’ was turned on. That’s where quorum sensing came in — chemical signals released by the bacteria to communicate. As the bacteria grew by feeding on the tumour, so did the signal strength. In a later experiment, the researchers programmed the bacteria to release a fluorescent green protein once their quorum sensing got activated.

News Medical reports how the programming happened, in the words of Dr Brian Ingalls, project supervisor and professor of applied mathematics at the university. “Using synthetic biology, we built something like an electrical circuit, but instead of wires, we used pieces of DNA. Each piece has its job. When assembled correctly, they form a system that works in a predictable way,” says Dr Ingalls.

They now plan to merge the oxygen-resistant gene with the quorum-sensing mechanism in a single bacterium for a pre-clinical trial on cancerous tumours. The therapy holds promise, no doubt, and can revolutionise cancer treatment. But bacteria have a mind of their own just like other organisms, and can evolve in mysterious ways. Till scientists perfect their biocontainment safeguards, these ‘living bug drugs’ will remain more promise than the medical answer the world is searching for.