Harmless soil-dwelling bacteria successfully kill cancer

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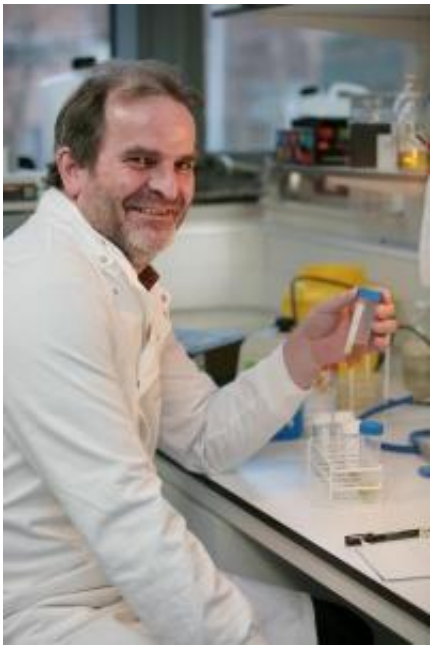

Professor Nigel Minton works at the University of Nottingham. Credit: University of Nottingham

A bacterial strain that specifically targets tumours could soon be used as a vehicle to deliver drugs in frontline cancer therapy. The strain is expected to be tested in cancer patients in 2013 says a scientist at the Society for General Microbiology's Autumn Conference at the University of York.

The therapy uses *Clostridium sporogenes* – a bacterium that is widespread

in the soil. Spores of the bacterium are injected into patients and only grow in solid tumours, where a specific bacterial enzyme is produced. An anti-cancer drug is injected separately into the patient in an inactive 'pro-drug' form. When the pro-drug reaches the site of the tumour, the bacterial enzyme activates the drug, allowing it to destroy only the cells in its vicinity – the tumour cells.

Researchers at the University of Nottingham and the University of Maastricht have now overcome the hurdles that have so far prevented this therapy from entering clinical trials. They have introduced a gene for a much-improved version of the enzyme into the C. sporogenes DNA. The improved enzyme can now be produced in far greater quantities in the tumour than previous versions, and is more efficient at converting the pro-drug into its active form.

A fundamental requirement for any new cancer therapy is the ability to target cancer cells while excluding healthy cells. Professor Nigel Minton, who is leading the research, explains how this therapy naturally fulfils this need. "Clostridia are an ancient group of bacteria that evolved on the planet before it had an oxygen-rich atmosphere and so they thrive in low oxygen conditions. When Clostridia spores are injected into a cancer patient, they will only grow in oxygen-depleted environments, i.e. the centre of solid tumours. This is a totally natural phenomenon, which requires no fundamental alterations and is exquisitely specific. We can exploit this specificity to kill tumour cells but leave healthy tissue unscathed," he said.

The research may ultimately lead to a simple and safe procedure for curing a wide range of solid tumours. "This therapy will kill all types of tumour cell. The treatment is superior to a surgical procedure, especially for patients at high risk or with difficult tumour locations," explained Professor Minton. "We anticipate that the strain we have developed will be used in a clinical trial in 2013 led by Jan Theys and Philippe Lambin

at the University of Maastricht in The Netherlands. A successful outcome could lead to its adoption as a frontline therapy for treating solid tumours. If the approach is successfully combined with more traditional approaches this could increase our chance of winning the battle against cancerous tumours."

Provided by Society for General Microbiology