

Scientists genetically engineer patients' own cells to attack cancer

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In a pioneering trial taking place in London, doctors are harnessing patients' own immune systems in an effort to find a new effective treatment for resistant head and neck cancer.

The trial of the novel therapy, which involves genetically engineering the patient's white [blood cells](#) so that they recognise and attack the tumour, is taking place at the National Institute for Health Research (NIHR) Biomedical Research Centre (BRC) at Guy's and St Thomas' and King's College London, with funding from the Wellcome Trust and the J P Moulton Charitable Foundation.

Dr John Maher, Principal Investigator at the BRC, says: "In most cancers, metastasis, the spread of a disease from the part of the body where it started to another not directly connected, is the commonest cause of death. However, head and [neck cancer](#) is unusual in that local spread or recurrence of the disease accounts for most suffering and death. This means that tumours may become inoperable and do not shrink in response to traditional treatments such as chemotherapy or radiotherapy."

White blood cells of the immune system are naturally equipped to eliminate cells that shouldn't be there, especially infected cells. However, they sometimes need help to recognise and attack [cancer cells](#). Using a blood sample, Dr Maher's team are genetically engineering the patients' own white blood cells by treating them in the laboratory with a harmless virus that introduces two new genes. The first gene makes it easier to

grow the cells during their time in the laboratory while the second enables these [white blood cells](#) to recognise and attack the tumour. The resulting treatment is called a CAR T-cell and takes two weeks to produce.

To maximise the safety and effectiveness of this new form of treatment, they are injecting the CAR T-cells directly into the tumour. CAR T-cell treatment has proven very effective in some forms of leukaemia but needs to be tested and developed further to benefit patients with solid cancers, such as head and neck cancer.

The main goal of the trial is to test the safety and effectiveness of this new treatment. Patients have been enrolled in groups of three and, if significant side effects are not seen, successive groups will receive a higher number of cells to establish safe dosage.

So far the team has completed the first cohort of three patients in this ongoing trial.

Dr Maher adds: "If this trial is successful, it could have significant implications for other solid cancers, especially those that spread within a natural space in the body, such as ovarian cancer (lining of the abdomen) or mesothelioma (lining of the lungs). In that setting, it may be possible to inject the CAR T-cells from the patient directly into the cavity, to localise the treatment where it is needed most."

Life Sciences Minister George Freeman MP said: "This world first trial is an illustration of the value of our £1bn per annum National Institute for Health Research, which pioneers and tests new treatments for the benefits of patients and the NHS. Through our Accelerated Access Review, we intend to fast track breakthroughs like this."

Dr Stephen Caddick, Director of Innovations at the Wellcome Trust,

said: "Immunotherapy is a very exciting new approach to treating cancer, which takes advantage of the body's own immune system to tackle the disease. By precision engineering immune cells to recognise and destroy tumours, researchers are hopeful that they will be able to improve the prospects for [patients](#) who have, until now, faced very limited [treatment](#) options."

Provided by Wellcome Trust

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