

## Manipulating the immune system to fight cancer

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The immune system can be manipulated to attack cancer cells. Two ways to manipulate the immune system can be through cancer therapies and cancer vaccines. One of the widely used therapies is adoptive T cell immunotherapy. There are different types of adoptive T cell immunotherapies namely tumour infiltrating lymphocyte (TIL) therapy, T cell receptor (TCR) therapy, and chimeric antigen receptor (CAR) T cell therapy. In the TIL therapy, T cells specific to tumour cells are isolated from the patient and expanded ex vivo. This helps produce more T cells specific to tumour cells; those T cells are re-injected back to the patient. In TCR therapy, T cells are isolated and engineered to recognise tumour-specific antigens. Besides those therapies, CAR T cell therapy is widely used. It overcomes the issues of downregulation of major histocompatibility complex (MHC) molecules. It is basically engineering TCRs that will recognise antigens independent of an MHC molecule. Furthermore, cancer vaccines can be used as an efficient way to manipulate the immune system. Cancer vaccines induce cytotoxic T cells to destroy cancer cells and induce memory helper T cells. Personalised cancer vaccines are the most efficient because they are specific to the patient. This personalised cancer vaccine is generated against a specific antigen which leads to the destruction of cancer cells that express those antigens. There are also other types of vaccines such as vaccination of whole tumour cells. This helps train the immune system to fight against the tumour cells once the body encounters them. In addition, there are monoclonal antibodies that can attack tumour cells. Some antibodies are specific to a tumour that are conjugated with a toxin or can be conjugated to a radionuclide. However, treating cancer completely remains a challenge yet it is being energetically approached by the researchers to find a permanent cure.

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