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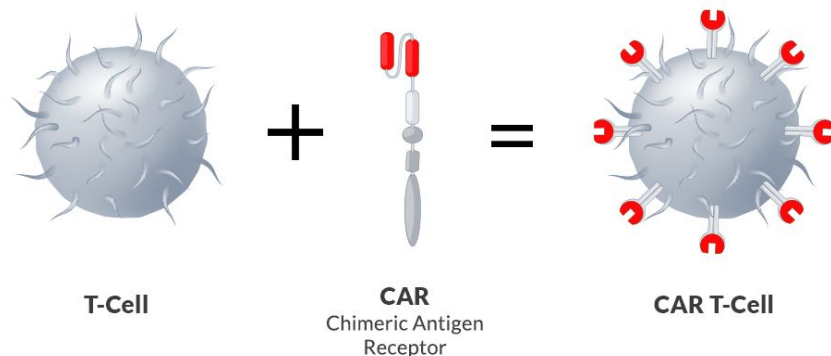
## What is Cellular Therapy?

Cellular therapy is a form of therapy which utilises modified patient cells or new, healthy cells from a donor to replace ineffective or missing cells in patients. CAR T-cell therapy is a form of immunotherapy that involves collecting a patient's immune cells and modifying them in a laboratory to target against specific cancer cells. These modified cells are then returned into the patient to strengthen their immune system against the cancer cells. This treatment is effective against some forms of blood cancers in children and adults.

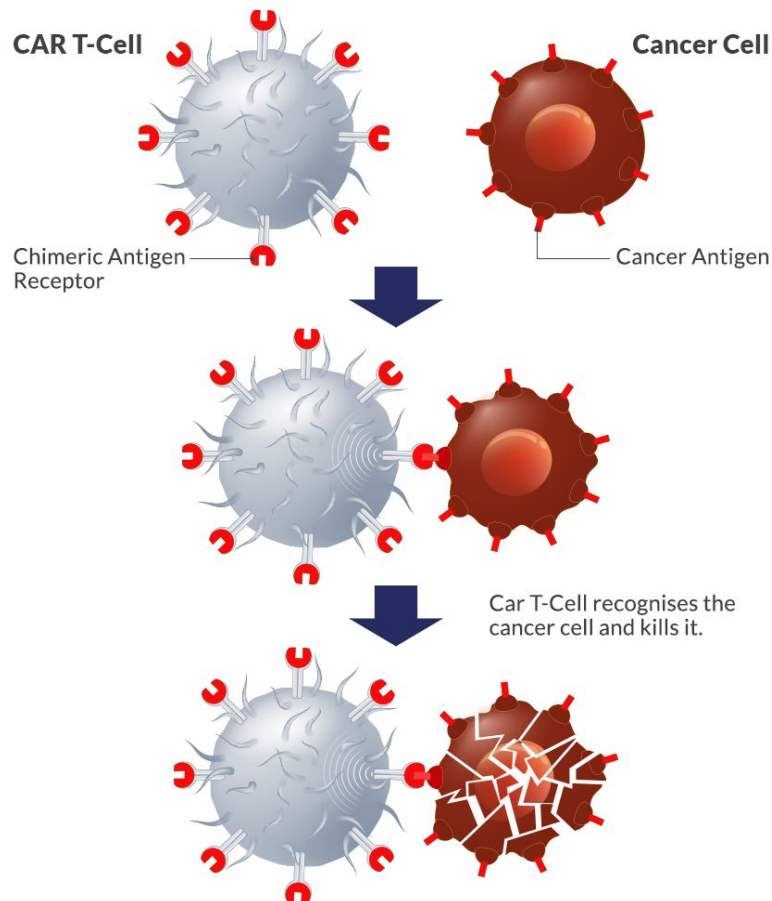
## What are CAR T-cells?

T-cells, also called T-lymphocytes, are white blood cells developed from healthy stem cells in the bone marrow and form a part of the body's immune system to identify and fight abnormal cells, including cancer cells.

These T-cells can be collected from the body and genetically modified in a laboratory. The modified T-cells have special receptors on their surfaces, to target particular proteins or antigens on cancer cells. These receptors are called Chimeric Antigen Receptors, and the modified T-cells are called CAR T-cells.



These CAR T-cells then attach to the cancer cells and destroy them more effectively:



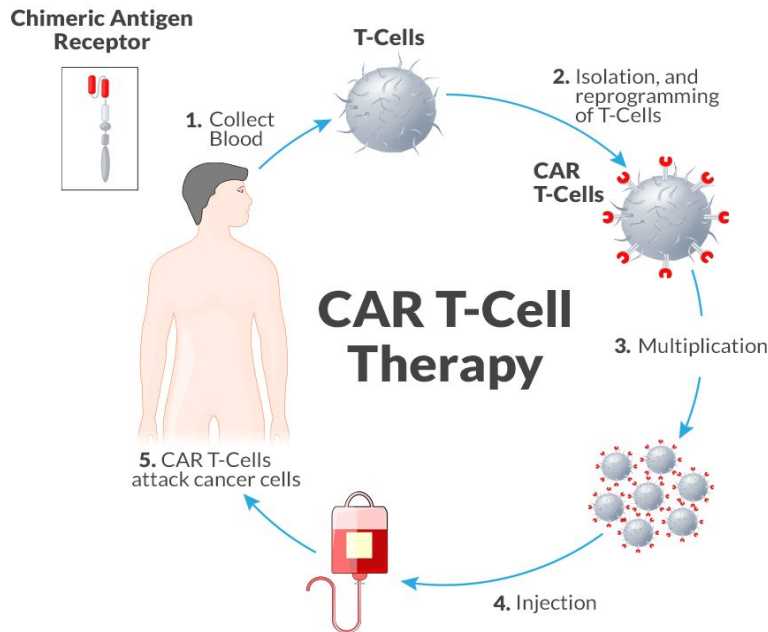
## What types of conditions can benefit from CAR T-cell therapy?

CAR T-cell therapy is particularly effective for patients diagnosed with **Myeloma**, aggressive forms of **ALL (Acute Lymphoblastic Leukaemia)**, and high-grade **NHL (Non-Hodgkin Lymphoma)**.

Relapse of non-Hodgkin lymphoma such as diffuse large B-cell lymphoma can be managed with CAR T-cell therapy, especially when at least two prior treatment regimens have failed to produce the desired outcomes.

Several research studies are being conducted to assess the effectiveness of Cellular Therapy against other forms of leukaemia and solid tumours.

## The Process of CAR T-cell Therapy



CAR T-cell therapy involves the following phases:

- 1. Evaluation:** The patient undergoes a series of tests to evaluate if CAR T-cell therapy is an appropriate option.
- 2. Collection:** The T-cells are collected from the patient's blood. The procedure is known as apheresis or leukapheresis.
- 3. Engineering:** The collected T-cells are sent to a laboratory to be genetically engineered into the CAR T-cells.
- 4. Multiplication:** The modified CAR T-cells are grown and multiplied in the laboratory. These cells are then frozen and sent back to the clinic for the treatment. This process of multiplying the CAR T-cells can take several weeks.
- 5. Conditioning:** Before the new CAR T-cells are infused into the patient's body, the patient will have a brief course of chemotherapy. This will help to improve the chances of the body accepting the new CAR T-cells.
- 6. Infusion:** Shortly after the chemotherapy, the modified CAR T-cells are infused into the patient through a process similar to a blood transfusion.
- 7. Recovery:** After the CAR T-cell infusion, the patient may experience some side effects for the first 30 days after the infusion, and the recovery of the body's immune system may take several months.

## What are the side effects of CAR T-cell therapy?

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The common side effects of CAR T-cell therapy include:

- **Cytokine release syndrome**  
In some cases, patients may develop flu-like symptoms such as fever, chills, headache, nausea, vomiting, loose stools, and muscle or joint pains. It may also cause low blood pressure, difficulty in breathing, and a fast heart rate. These side effects are due to the release of cytokines by the immune cells during CAR T-cell therapy. These symptoms are usually mild, but can be serious and life threatening in some patients.
- **Neurological events**  
Neurological events can occur and can be serious in some patients. Such events include encephalopathy (brain injury and malfunction), confusion, difficulty speaking, agitation, seizures, drowsiness, altered state of consciousness and loss of balance.
- **Neutropaenia and Anaemia**  
Some patients may develop neutropenia or low white cell count. Similarly, anaemia or low red blood cell count may also occur due to this therapy.

Fortunately, most of these side effects usually resolve on their own or can be managed with the use of medications.

## What is the prognosis of using CAR T-cell therapy for patients with lymphoma or other blood cancers?

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The results of CAR T-cell therapy for the management of lymphoma and other blood cancers have been highly encouraging. Many patients with a history of relapse of blood cancers achieved successful outcomes without any signs of cancer after CAR T-cell therapy. It has also helped to improve the recovery of patients in whom other conventional cancer treatments failed to produce the desired response.

However, longer-term trials with more substantial participation of patients are needed to confirm the effectiveness of this therapy. Large scale trials will also help to assess the possibility of developing side effects and the best ways to manage them.

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