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Understanding Chimeric Antigen Receptor (CAR) T Cell Technology

Overview

Chimeric antigen receptor (CAR) T cell therapy is a type of immunotherapy – it involves harnessing the power of a patient's own immune system by engineering T cells to recognize and attack cancer cells.[1]

The role of the T cell[1,2]

T cells are a type of cell that are critical to the immune system's ability to detect and attack cancer cells. However, the immune system is unable to attack cancer cells when T cells are unable to recognize tumor cells as foreign, T cell activation is sub-optimal or when T cell activity is suppressed. CAR T therapy can potentially overcome these obstacles and harness the power of the immune system to target cancer cells.

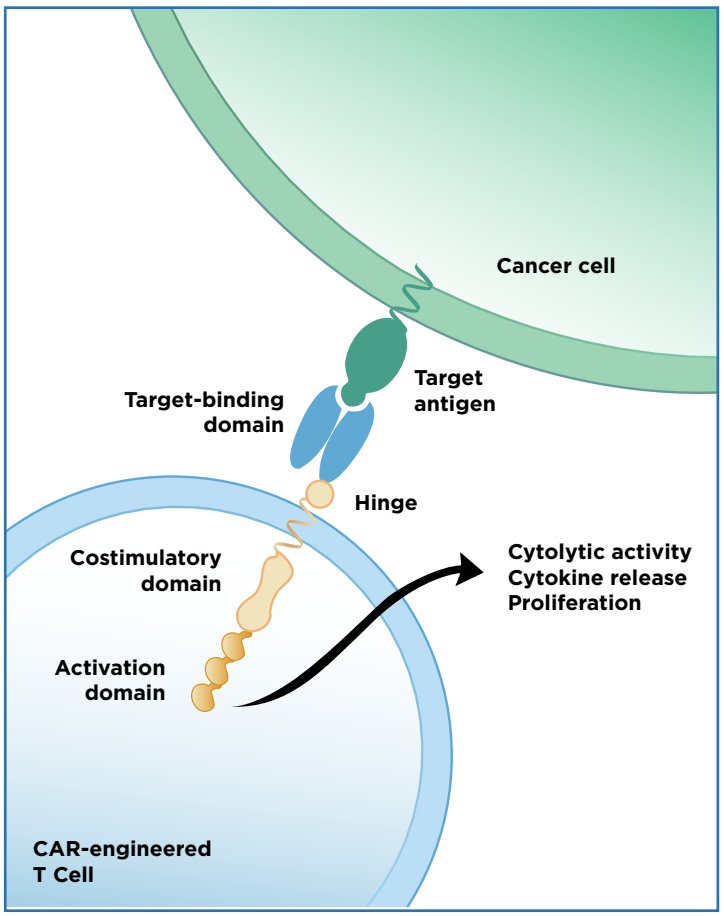
Chimeric antigen receptor (CAR) components[1,3]

CARs are engineered proteins mainly composed of distinct functional components:

- An antibody fragment or target binding domain that allows CARs to recognize targets that are present on the surface of cancer cells
- Components that provide signals that activate the T cell to attack cancer cells

There is the potential for future CARs to be composed of additional functional components.

Chimeric Antigen Receptor (CAR)



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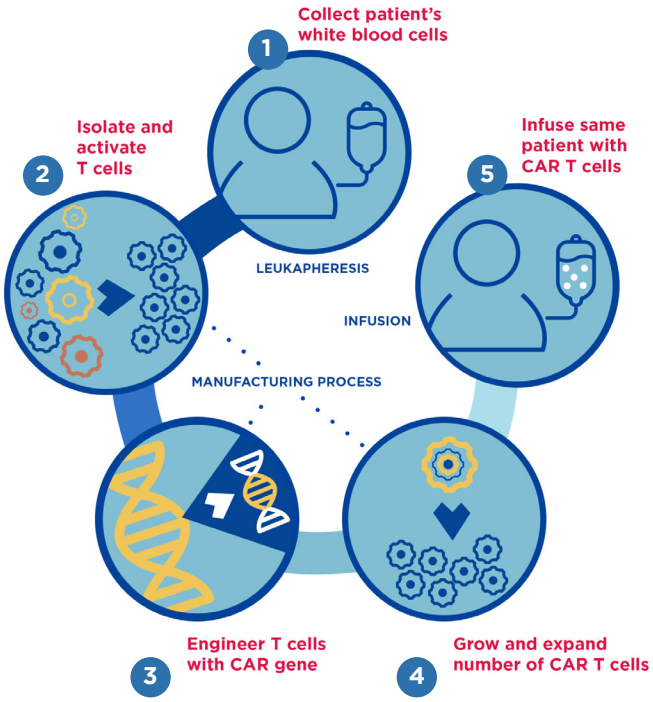
How CAR T is designed to work[1]

CAR T therapy is a one-time treatment of a single infusion of the patient's own T cells that have been engineered to target cancer.

The processing of CAR T therapy begins with the collection of the patient's white blood cells (leukapheresis).

The cells are then sent to a central manufacturing facility at which time the T cells are isolated and activated. These cells are transduced with a retroviral vector to introduce the CAR construct into the patient's T cells and then stimulated to proliferate. The CAR T cells increase in number, and once a sufficient number of cells are available for infusion back into the patient, they are frozen and sent back to the CAR T-enabled clinical center where they can be administered to the patient.



At the CAR T-enabled clinical center, in preparation for administration of CAR T therapy, the patient undergoes a short chemotherapy conditioning regimen prior to infusion of the CAR T cells. Once infused, the CAR T cells replicate and expand in vivo and are designed to recognize and attack cancer cells.[1]

Possible Side Effects of CAR T Therapy[1,4,5]

Serious adverse events associated with CAR T therapy include cytokine release syndrome (CRS) and neurological events, which can be life-threatening, include:

- Fever (100.4˚F/38˚C or higher)
- Difficulty breathing
- Chills or shaking chills
- Confusion
- Dizziness or lightheadedness
- Severe nausea, vomiting, or diarrhea
- Fast or irregular heartbeat
- Severe fatigue or weakness

These adverse events are monitored and managed by the treating healthcare professional.

These are not all the potential side effects associated with CAR T therapy. For more information, patients should speak with their healthcare provider.

REFERENCES

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2400 Broadway, Santa Monica, CA 90404 | 310.824.9999

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