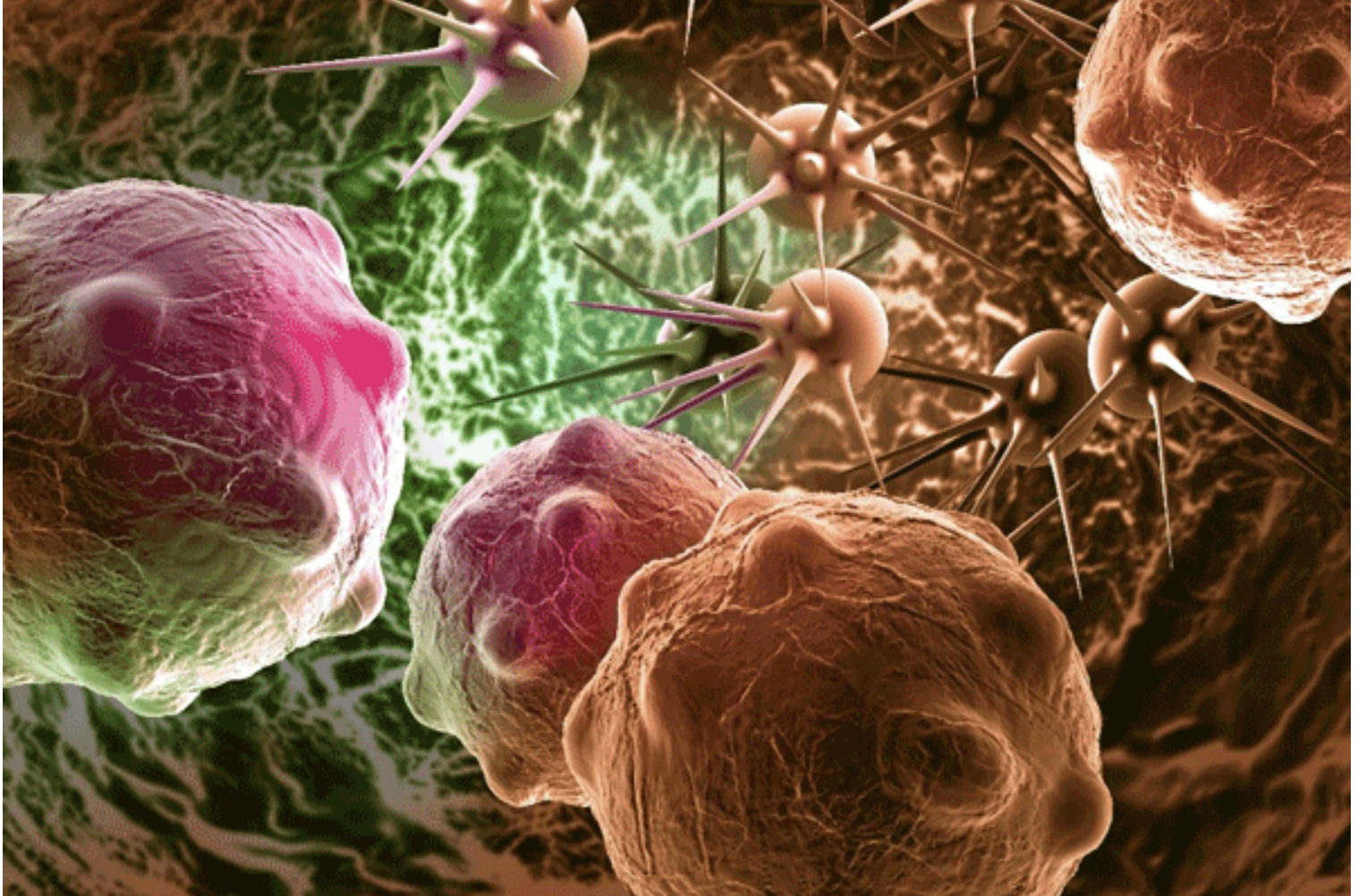


NexCAR19

By IASToppers | 2024-02-08 15:30:00



NexCAR19

First patient become free of cancer following treatment with an indigenous Chimeric Antigen Receptor (CAR) T-cell therapy- NexCAR19.

[ref- genengnews]

About NexCAR 19:

TREATMENT FOR SPECIFIC B-CELL CANCERS

NexCAR19 is a prescription drug for B-cell lymphomas, lymphoblastic leukaemias when other treatments have been unsuccessful

PATIENT'S WHITE blood cells are extracted by a machine through a process called leukapheresis and genetically modified, equipping them with the tools to identify and destroy the cancer cells.



NEXCAR19 IS manufactured to an optimal dose for the patient, and typically administered as a single intravenous infusion. Prior to this, the patient is put through chemotherapy to prime the body for the therapy.

HOW NEXCAR19 WORKS



T-cells are naturally made by the body as an advanced defence against viruses and cancer cells.

As T-cells mature, they develop specific connectors (receptors) to target key signals on cancer cells.



However, cancers can limit the inbuilt extent and efficiency with which T-cells are able to seek and fight them. This results in an increase in cancer burden.



Scientists have identified certain proteins that are abnormally expressed on the surfaces of specific types of cancer cells. Specially designed receptors can find and bind to these cells.



A safe shell of a virus is used to genetically engineer T-cells so they express Chimeric Antigen Receptors — connectors that target a protein called CD19 on B-cell cancer.

[ref-IndianExpress]

- NexCAR 19 is an **innovative CAR-T Cell Therapy** drug developed by **ImmunoACT**, an IIT-Bombay incubated startup, for blood cancers.
- It involves **genetically modifying patient's T cells** to enhance the immune system's ability to combat cancer cells.
- It is a **novel drug**, manufactured in India, with **potential cost-effectiveness** compared to existing alternatives.

- It is designed for treating **lymphomas and leukaemia**, types of blood cancers.

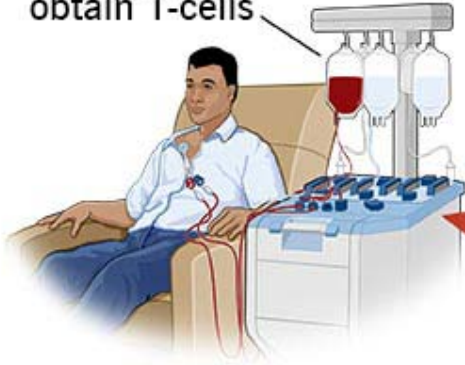
Mechanism:

- NexCAR19 therapy is designed to **target cancer cells** that carry the **CD19 protein**.
- CD19 protein **acts like a flag on cancer cells**, which allows **CAR-T cells to recognise and attach themselves** to the cancer cells and start the process of elimination.

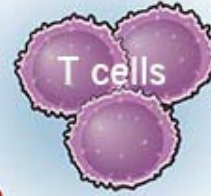
What is CAR-T cell therapy?

How CAR T-cell therapy is used to treat cancer

Healthcare providers collect blood to obtain T-cells

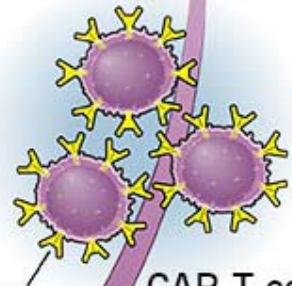


Providers return remaining blood



T-cells are separated and removed

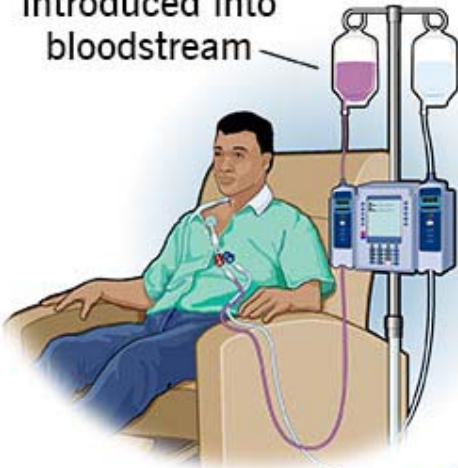
T-cells are genetically altered to have special receptors called chimeric antigen receptors (CAR)



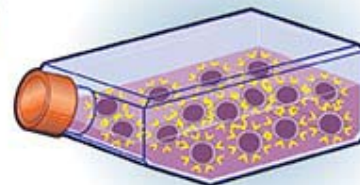
Receptor

CAR T-cells

New CAR T-cells introduced into bloodstream



Chemotherapy is given before CAR T-cell therapy



Millions of CAR T-cells are grown

 Cleveland Clinic ©2022

[ref- clevelandclinic]

- Chimeric Antigen Receptor (CAR) T-cell therapy is a revolutionary therapy that **modifies immune cells**, specifically T-cells, by turning them into **potent cancer fighters known as CAR-T cells**.
 - T-cells are special cells (**white blood cells** that find and fight illness and infection) whose primary function is **cytotoxic**, meaning **it can kill other cells**.
- In CAR-T therapy, **T-cells are genetically modified** to enhance their **cancer-fighting**

capabilities.

- T cells are extracted from the patient's blood, and in a laboratory setting, a specific receptor known as a **chimeric antigen receptor (CAR)** is **genetically added to these T cells**.
 - This receptor is designed to **bind to a particular protein** found on the **patient's cancer cells**.
- Once modified, these cells are **reintroduced into the patient's body**, where they target and attack cancer cells, particularly in **blood cancers** such as **leukemia and lymphomas**.

How is CAR-T cell therapy different from chemotherapy and immunotherapy?

- Unlike chemotherapy and immunotherapy, which may offer temporary relief, **cell-and-gene therapy is engineered** with the goal of providing a **potential cure** and **long-term benefits for cancer patients**.
- Cell-and-gene therapy stands out by offering a **one-time transformative treatment**, eliminating the need for multiple sessions typically associated with chemotherapy.

Significance of CAR-T cell therapy:

- The therapy is for people with **B-cell lymphomas** who **didn't respond to standard treatments** like **chemotherapy**, leading to **relapse** or **recurrence of the cancer**.
- It causes **minimal damage to neurons** and the **central nervous system**, a condition known as **neurotoxicity**.
 - Neurotoxicity can sometimes occur when **CAR-T cells recognise the CD19 protein** and **enter the brain**, potentially leading to life-threatening situations.
- The therapy also results in **minimal Cytokine Release Syndrome (CRS)**, which is characterised by **inflammation and hyperinflammation** in the body due to the death of a significant number of tumour cells, as CAR-T cells are designed to target and eliminate cancer cells.
- CAR T-cells are often referred to as "**living drugs**" because they persist in the body for the long term, providing potential benefits for many years.