CAR-T Cell Therapy

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Why in News?

Recently, The **Central Drugs Standard Control Organisation (CDSCO)** has granted market authorisation for **NexCAR19**, India's first indigenously-developed **Chimeric Antigen Receptor T cell (CAR-T cell) Therapy.**

- India is now one of the first developing countries to **have its indigenous CAR-T and gene therapy platform.**

What is NexCAR19?

- **About:**
  - NexCar19 is a **type of CAR-T and gene therapy** developed indigenously in India by ImmunoACT, which is a **company incubated at IIT Bombay.**
  - It is designed to target **cancer cells that carry the CD19 protein.**
    - This 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.
  - Even some developed nations don't have their own CAR-T therapies; they import them from the **United States or Europe.**

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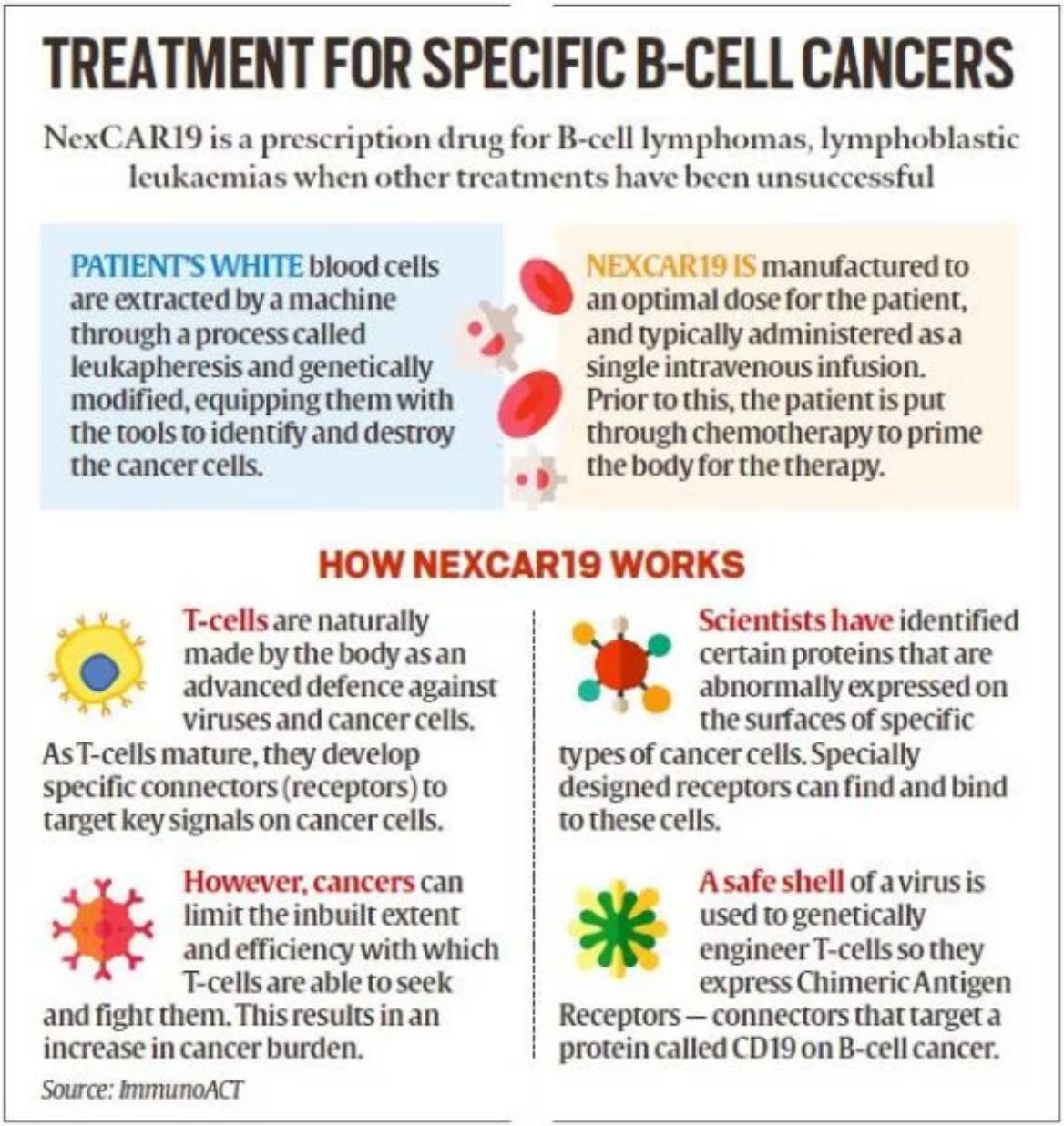
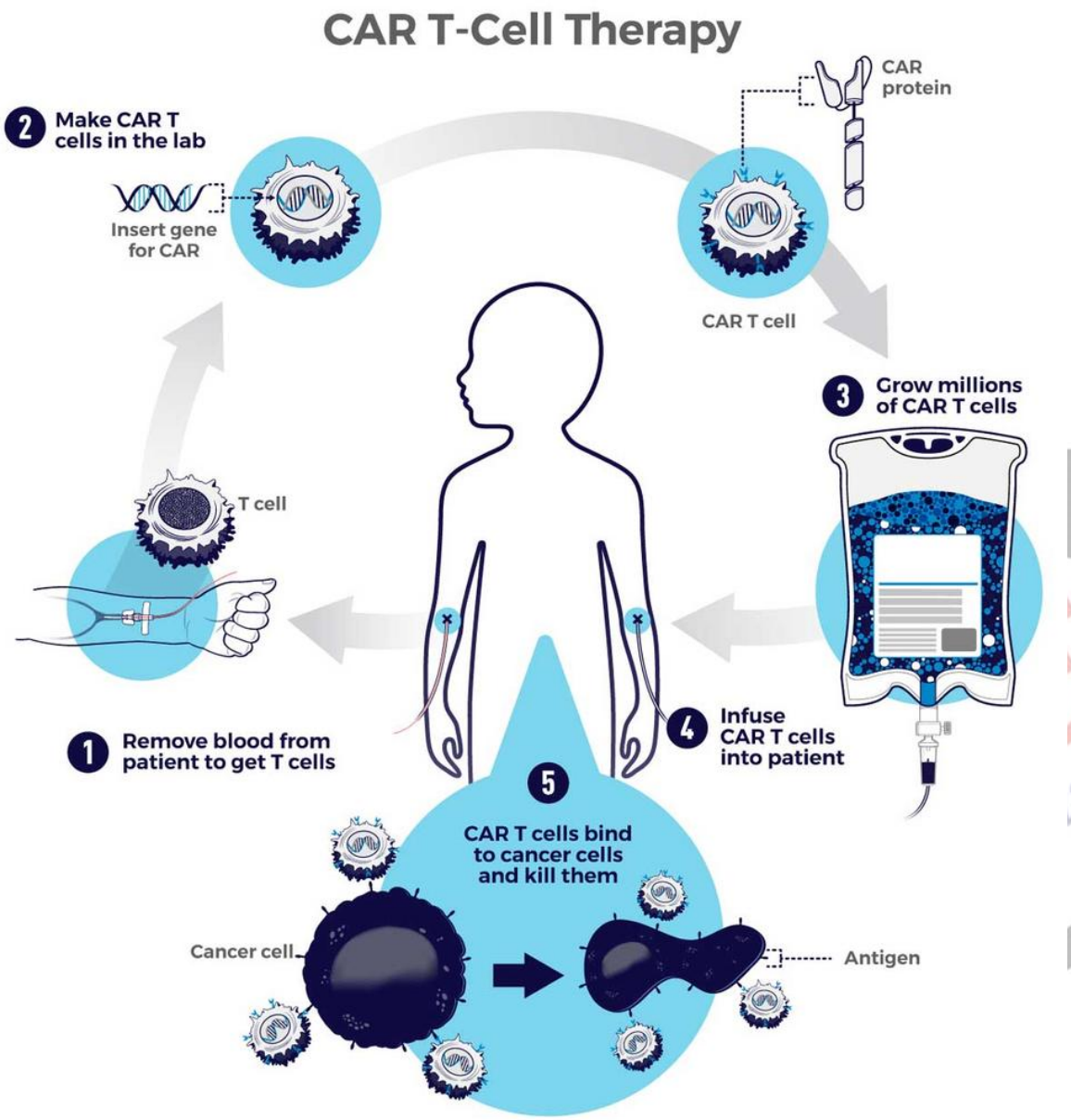


- **Patient Eligibility:**
  - NexCAR19 therapy is intended for people with **B-cell lymphomas** who have not responded to standard treatments like chemotherapy and have experienced relapse or recurrence of cancer.
  - Initially, the therapy is approved for **patients aged 15 years and older.**
- **Procedure:**
  - The process commences with the patient donating blood at a transfusion center. The T-cells are genetically modified and reinfused into the patient within a period of 7-10 days.
- **Efficacy:**
  - It leads to significantly **lower drug-related toxicities**. 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.**
  - This therapy also results in Minimal **Cytokine Release Syndrome (CRS),** which is characterized 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-cell therapy is a type of treatment in which a patient's T cells are genetically engineered in the laboratory so they will bind to specific proteins (antigens) on cancer cells and kill them. **(1)** A patient's T cells are removed from their blood. Then, **(2)** the gene for a special receptor called a chimeric antigen receptor (CAR) is inserted into the T cells in the laboratory. The gene encodes the engineered CAR protein that is expressed on the surface of the patient's T cells, creating a CAR T cell. **(3)** Millions of CAR T cells are grown in the laboratory. **(4)** They are then given to the patient by intravenous infusion. **(5)** The CAR T cells bind to antigens on the cancer cells and kill them.

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