



CURRENT AFFAIRS



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NEXCAR19: REVOLUTIONIZING CANCER TREATMENT

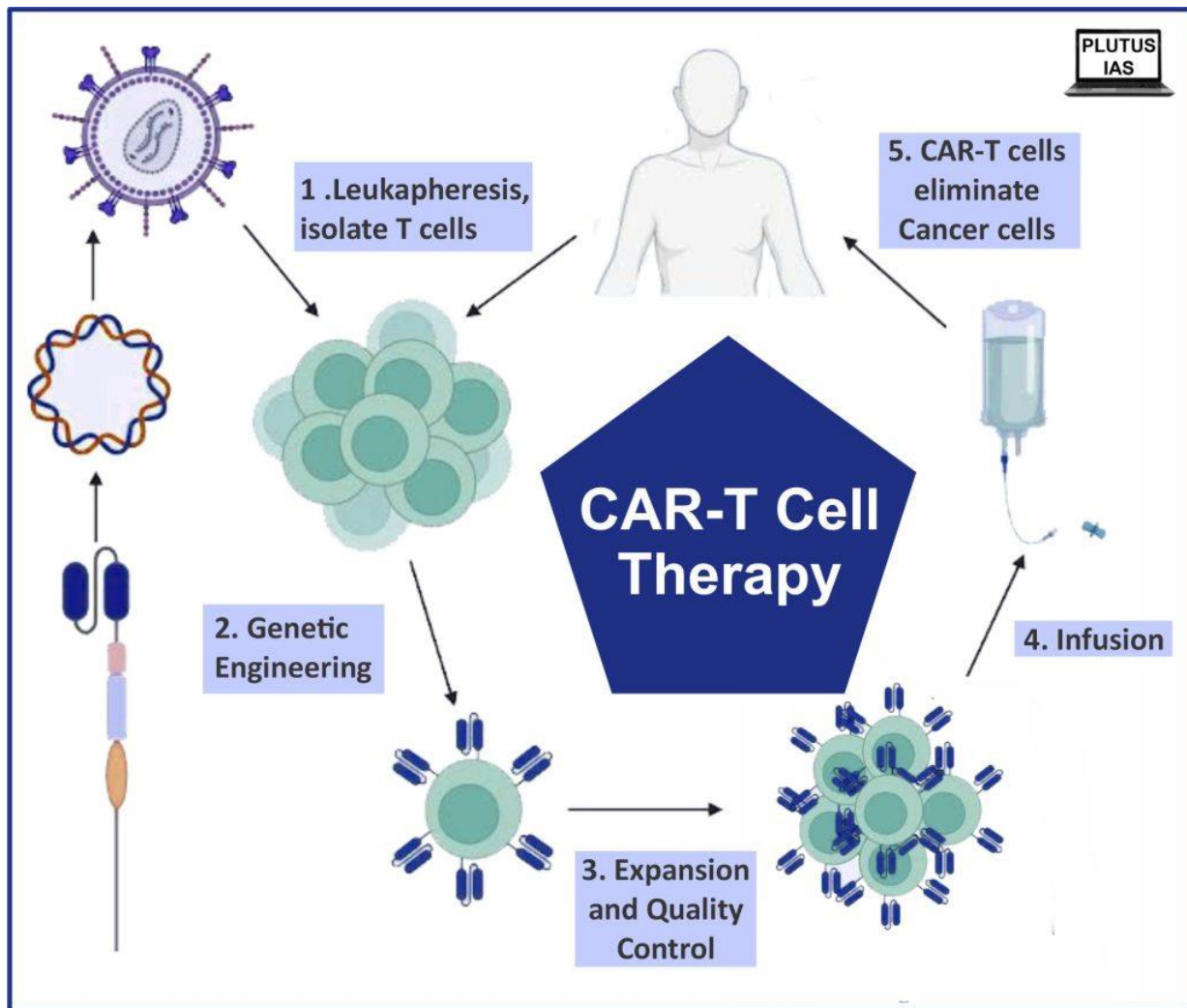
THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF "NEXCAR19: INDIA'S OWN CAR-T CELL THERAPY". THIS TOPIC IS RELEVANT IN THE "SCIENCE & TECHNOLOGY" SECTION OF THE UPSC CSE EXAM.

WHY IN THE NEWS?

Months after India's medicinal authority approved CAR-T cell therapy, Dr. (Col) V K Gupta became one of the first patients to get it. **NexCAR19** is India's first indigenously created CAR-T cell treatment. ImmunoACT (an IIT Bombay-incubated firm) received commercial authorization for NexCAR19 from the Central Drugs Standard Control Organisation (CDSCO) in November 2023.

ABOUT CAR-T CELL THERAPY

- The therapy marks a significant advancement in cancer treatment. Unlike chemotherapy and immunotherapy, which require mass-produced injectable or oral drugs, **CAR T-cell therapies use the patient's cells.**
- They are engineered in the laboratory to **stimulate T-cells**, a kind of immune cell, to attack tumours.
- These modified cells are then put back into the patient's bloodstream after being programmed to proliferate more efficiently.
- CAR T-cell treatment is now **licensed for leukaemias** (cancers of the cells that make white blood cells) **and lymphomas.**



HOW DOES CAR-T CELL THERAPY WORK?

- This therapy involves drawing the patient's blood to **harvest T-cells**, which are immune cells that play an important role in eliminating cancer cells.
- In the laboratory, researchers modify these cells to express certain proteins on their surface, known as **chimeric antigen receptors (CAR)**, which have an affinity for proteins found on **the surface of cancer cells**.
- This change in cellular structure enables CAR T-cells to successfully bind to and eliminate tumours. The tumour's demise concludes with its elimination by the patient's immune system.
- The immune system is activated in CAR T-cell treatment when the transformed T-cells are reintroduced into the body, allowing for progressive and persistent tumour death as these cells multiply.

WHY IS IT BETTER THAN OTHER CANCER TREATMENTS LIKE CHEMOTHERAPY?

- While chemotherapy and immunotherapy may extend a cancer patient's life by a few months or years, cell-and-gene therapy is **intended to cure and provide long-term benefits**.
- It simplifies treatment by providing a single treatment [as opposed to multiple chemotherapy sessions].
- It provides a lifeline for cancer patients who have not responded to treatment.

ABOUT NEXCAR19

- **NexCar19 is a form of CAR-T and gene therapy created in India by ImmunoACT, an IIT Bombay-incubated firm.** This therapy is intended to target cancer cells expressing the **CD19 protein**.
- This protein works as a flag on cancer cells, allowing CAR-T cells to detect and bind to them, thus initiating the process of elimination.
- India is currently among the first developing countries to have its own CAR-T and gene therapy platforms.

ELIGIBILITY AND TREATMENT PROCESS

- **Intended Patients:** People with **B-cell lymphomas** who have not responded to traditional treatments (such as chemotherapy).
- **Procedure:** The patient contributes blood; **T-cells** are changed in the lab and reinfused 7-10 days later. Recovery normally takes two weeks.

EFFECTIVENESS AND UNIQUE FEATURES

- Approximately **70%** of patients react to NexCAR19 treatment, and some achieve complete remission.
- **Lower drug-related toxicities**, such as decreased neurotoxicity and Cytokine Release Syndrome (CRS), have been shown in laboratory and animal investigations.
- Research for paediatric patients are currently being conducted at Tata Memorial Hospital, assuring wider applicability.

AVAILABILITY AND AFFORDABILITY.

- **ImmunoACT** is in the process of acquiring licenses and forming partnerships with hospitals in numerous locations, including Tata Memorial, Nanavati, Fortis, and Jaslok.
- ImmunoACT, which is **initially priced at Rs 30-40 lakh**, seeks to reduce the cost to Rs 10-20 lakh over time, making the therapy more accessible.
- Approval by regulatory organisations such as CDSCO should result in insurance coverage, though the extent may differ, and conversations with insurers and the government are ongoing.

PRELIMS PRACTICE QUESTIONS

Q1) Which one of the following statements best describes the role of B cells and T cells in the human body?(UPSC Prelims-2022)

- a) They protect the environmental allergens. body
- b) They alleviate the body's pain and inflammation.
- c) They act as immunosuppressants in the body.
- d) They protect the body from diseases caused by pathogens.

ANSWER: D

Q2) Consider the following statements:

- 1) T cells are genetically modified in CAR-T cell therapy

- 2) CD19 is commonly targeted in CAR-T cell therapy for B-cell malignancies
3) The primary purpose of the chimeric antigen receptor (CAR) in CAR-T cell therapy is to suppress the immune response

Which of the above statements are correct?

- a) 1 and 3
b) 1 and 2
c) 2 and 3
d) 1, 2 and 3

ANSWER: B

MAINS PRACTICE QUESTION

Q1) Describe the underlying principles of CAR-T cell therapy and how it differs from traditional cancer treatments.

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