3. Chimeric Antigen Receptor (CAR) T-cell Therapy

Why in News?

- Recently, Surgery and radiotherapy have improved over time, but advances in systemic therapy have been particularly impressive, with Chimeric antigen receptor (CAR) T-cell therapy being a recent breakthrough attracting global attention.

Highlights

- Systemic therapy began with chemotherapy, which attacks cancer cells due to their fast growth.
- Chemotherapy drugs have limited success and significant side effects because they affect many types of cells in the body.
- The next advancement was targeted agents, also known as immunotherapy, which work by binding to specific targets on the cancer or immune cells supporting its growth.
- This approach is less toxic as it affects fewer non-tumor cells, but only works on tumours that have these targets.
- CAR T-cell therapies are a major breakthrough in cancer treatment.
- Unlike chemotherapy or immunotherapy which involve taking drugs, CAR T-cell therapies use a patient's own cells. They are modified in the laboratory to activate T-cells and target tumor cells.
- CAR T-cell therapy has been approved for leukaemias (cancers arising from the cells that produce white blood cells) and lymphomas (arising from the lymphatic system).
- T cells are taken from a patient's blood and then the gene for a special receptor that binds to a certain protein on the patient's cancer cells is added to the T cells in the laboratory.
- The special receptor Is called a chimeric antigen receptor (CAR). Large numbers of the CAR T cells are grown in the laboratory and given to the patient by infusion.
- CAR T-cell therapies are even more specific than targeted agents and directly stimulate the patient's immune system to fight cancer, leading to greater clinical efficacy.
- That's why they're referred to as "living drugs."
- Introduction of CAR T-cell therapy in India can face challenges of cost and value.
- Critics argue that developing CAR T-cell therapy in India may not be cost-effective as it will still be unaffordable for most people.