TANG PRIZE

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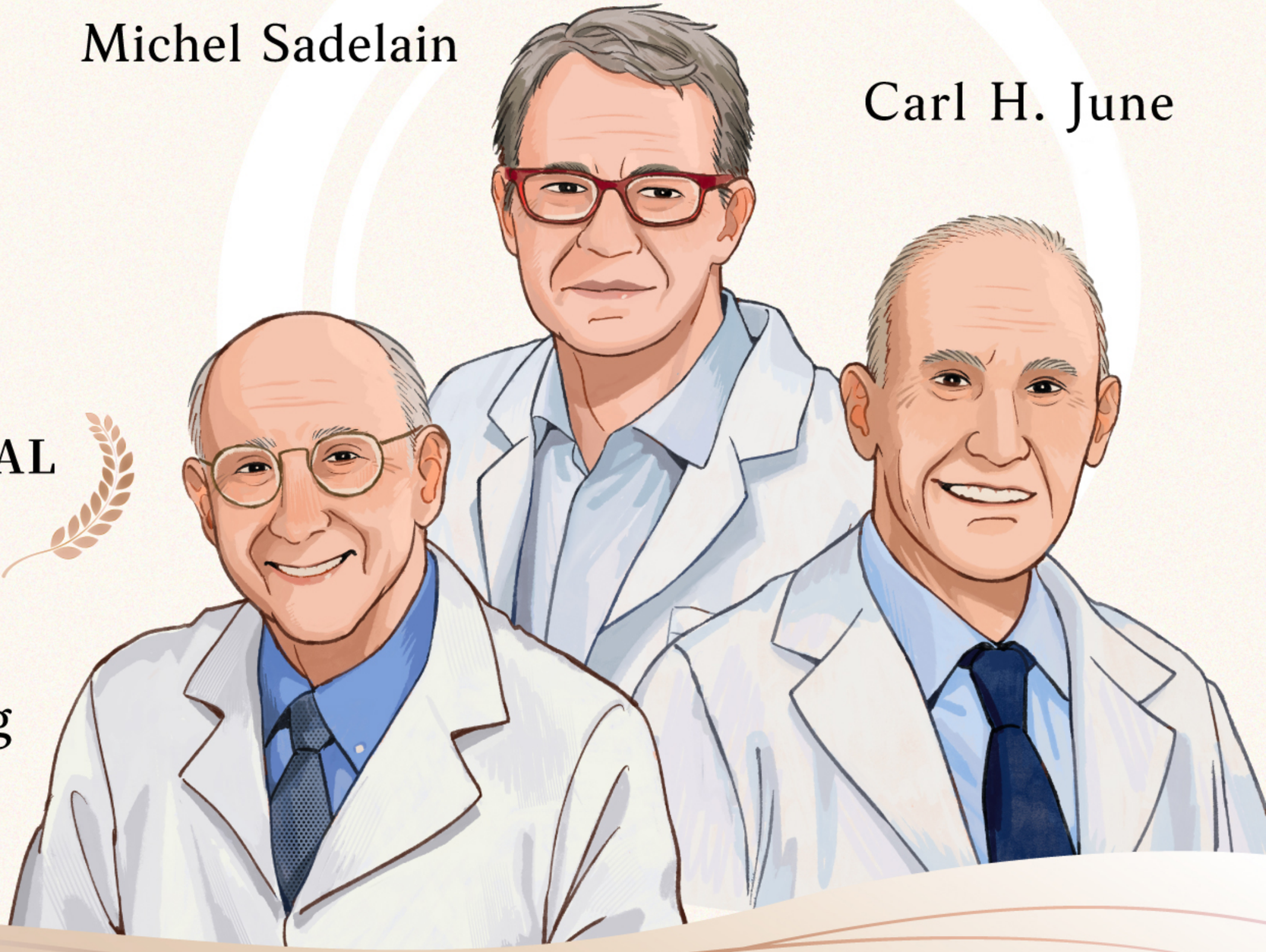
2026 Tang Prize

BIOPHARMACEUTICAL SCIENCE

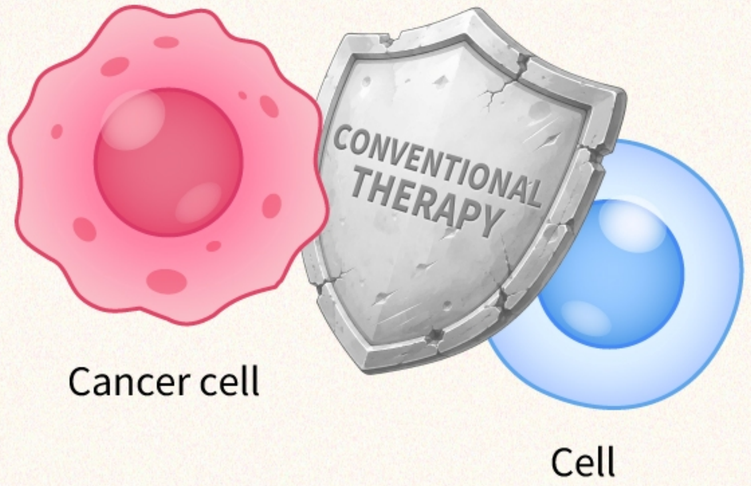
Steven A. Rosenberg

Michel Sadelain

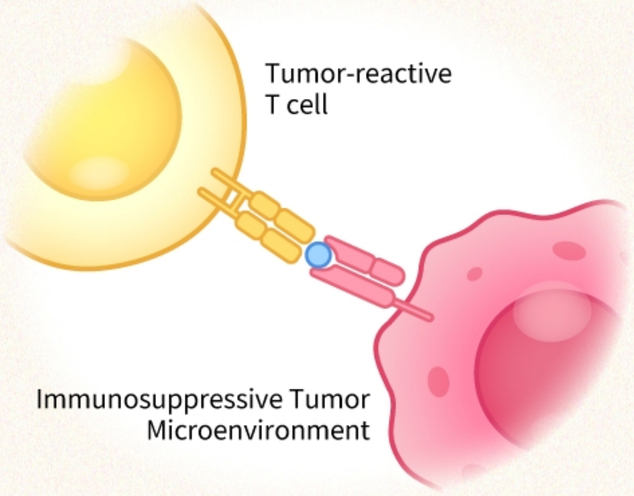
Carl H. June



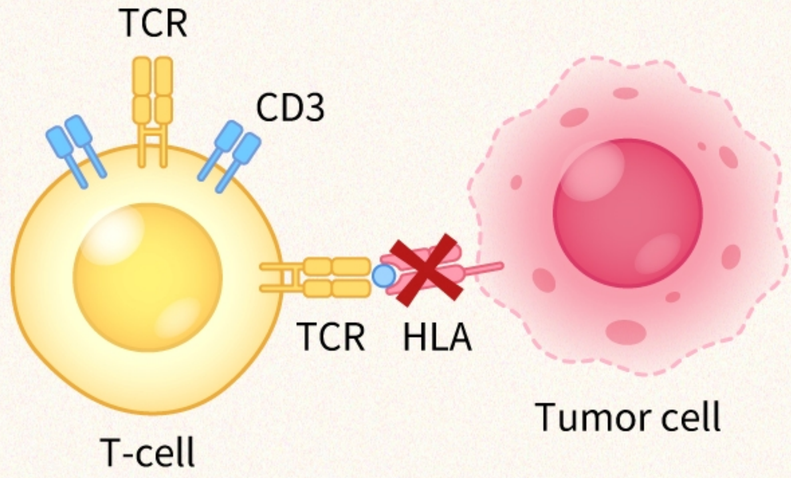
Can a Weakened Immune System Still Fight Cancer?



Chemotherapy and targeted therapy provide short-term control of relapse or refractory hematologic malignancies, they often fail in later stages of disease and rarely achieve sustained remission.



Persistent antigen stimulation and inhibitory signaling in the TME lead to progressive T cell exhaustion, resulting in reduced proliferative capacity and impaired anti-tumor activity.



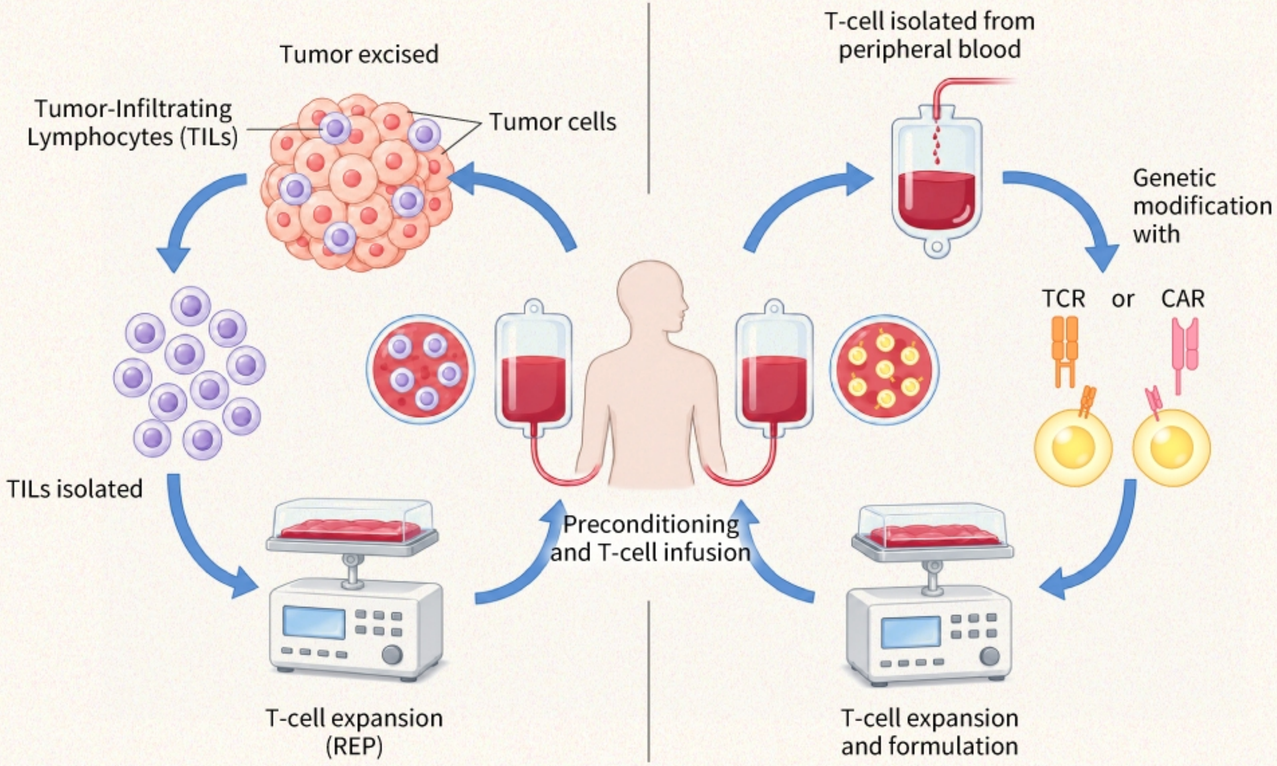
Cancer cells evade immune surveillance through antigen downregulation and activating immune checkpoint pathways, thereby impairing T cell function in the TME.

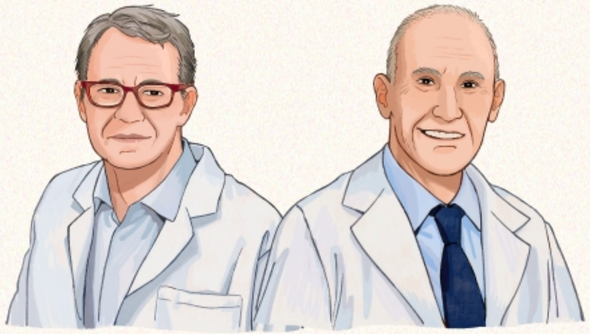
Overcoming these limitations requires precise and durable therapeutic approaches - CAR-T cell therapy

Their Contributions

They are awarded for the discovery and development of tumor-infiltrating lymphocyte (TIL) and chimeric antigen receptor T-cell (CAR-T) therapies, which have revolutionized treatment for blood cancers and solid tumors.

TIL therapy

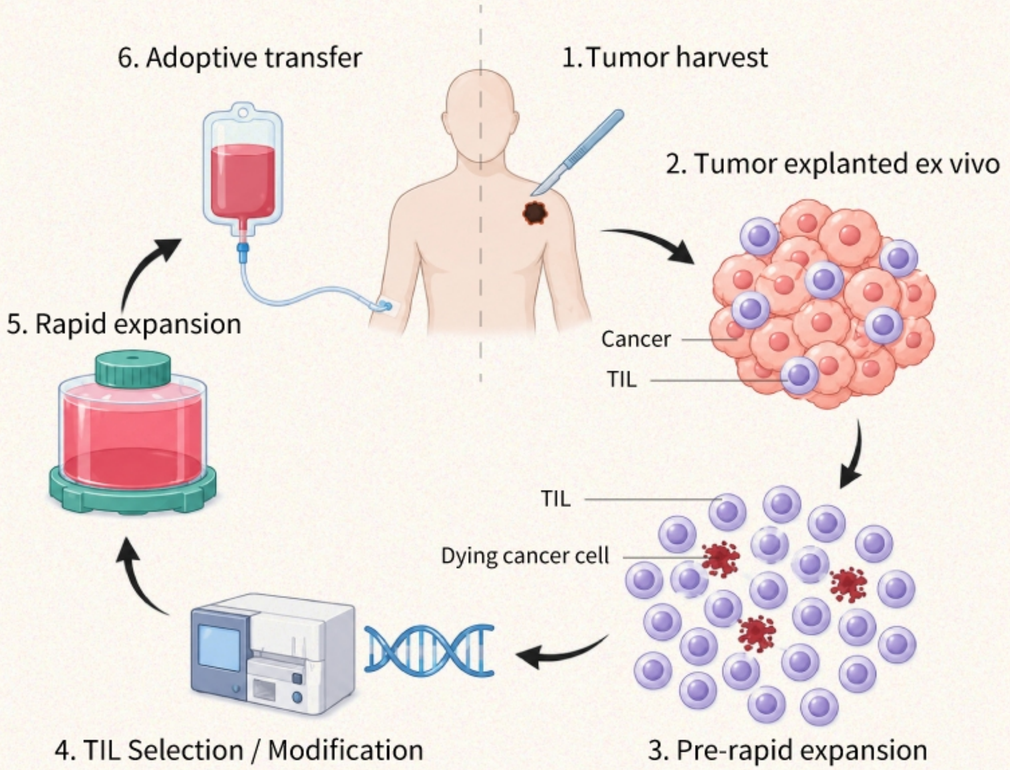




CAR-T therapy

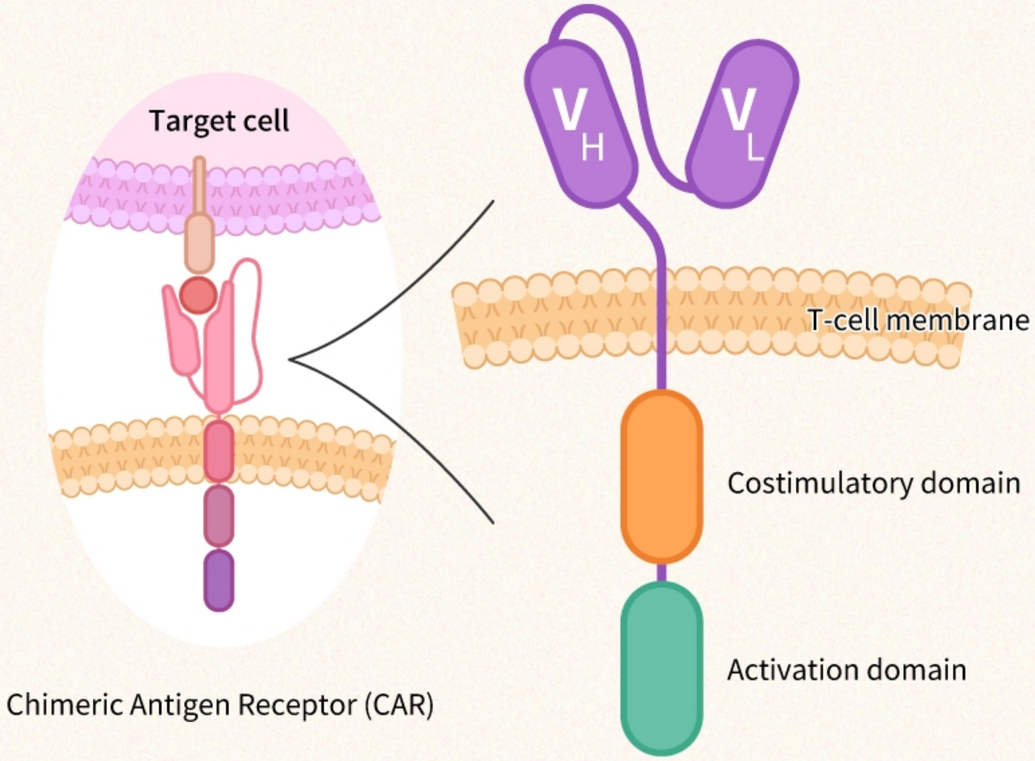
Pioneer of Cancer Immunotherapy: Steven A. Rosenberg

- Dr. Rosenberg established the clinical framework of adoptive cell therapy (ACT), creating an important clinical pathway for subsequent T cell–based cancer immunotherapies.
- He was the first to demonstrate that tumor-infiltrating lymphocytes (TILs) isolated from tumors, expanded ex vivo, and reinfused into patients could induce significant regression of metastatic melanoma, thereby confirming the therapeutic efficacy of T cells in human cancer.
- He also obtained the first regulatory approval for the transfer of exogenous genes into humans, and demonstrated that high-dose interleukin-2 (IL-2) could effectively eradicate metastatic tumors, thereby laying the foundation for gene therapy.



Founding Architect of CAR-T Therapy: Michel Sadelain

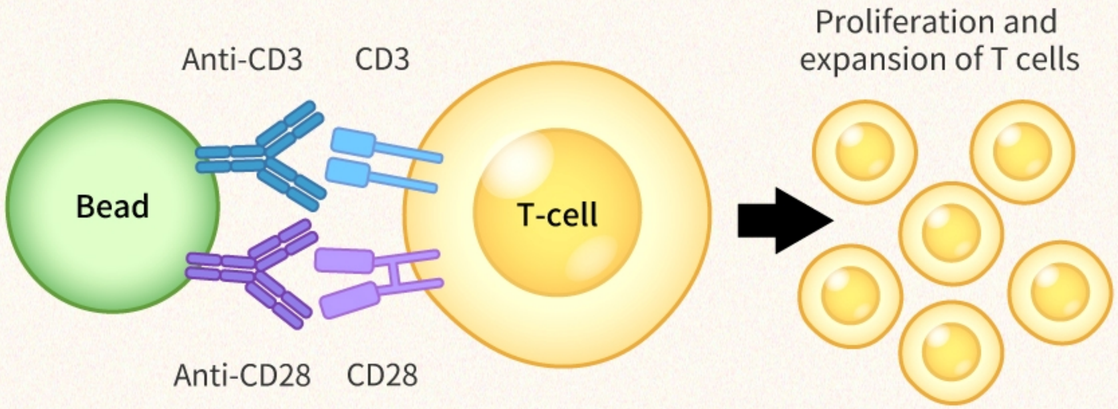
- Dr. Sadelain advanced the genetic engineering of human T cells and design chimeric antigen receptors (CARs) capable of precisely recognizing and targeting cancer cells, laying the foundation for modern therapeutic cell engineering and CAR-T therapy.
- He further incorporated the CD28 co-stimulatory domain into CAR design, developing second-generation CARs that overcame the limitations of first-generation constructs by enabling robust in vivo T cell expansion and long-term persistence.
- Dr. Sadelain helped establish CD19 as a critical target for B cell malignancies, and his team demonstrated in clinical trials the remarkable efficacy of CD19 CAR-T therapy in relapsed or refractory adult acute lymphoblastic leukemia (ALL).



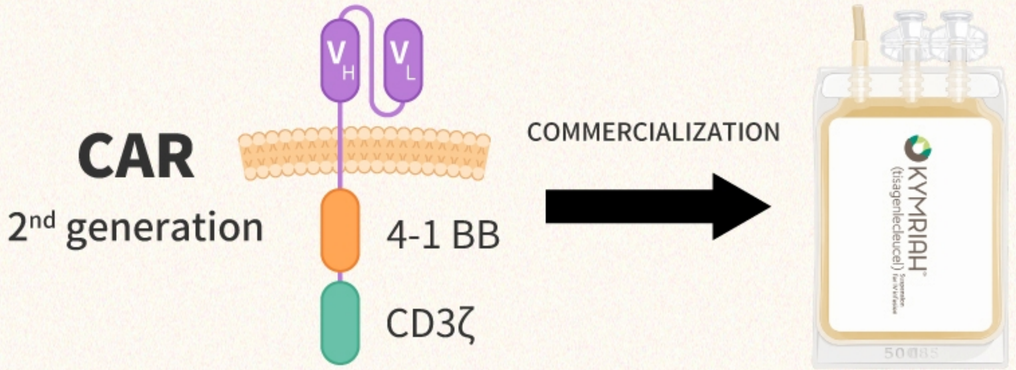
Driving Force of CAR-T Therapy Mass Production:
Carl H. June

- Dr. June demonstrated that CD28 co-stimulation provides the essential second signal for full T cell activation, explaining why early cell therapies often failed and laying the foundation for co-stimulatory domain design in all subsequent CAR-T therapies.

- To address the challenge of large-scale ex vivo T cell production, he developed anti-CD3/CD28 magnetic bead–based T cell expansion technology, which then became a global manufacturing standard for CAR-T cell production.



- Dr. June helped intergrate the 4-1BB (CD137) co-stimulatory domain into CAR design, significantly enhancing T cell persistence and cytotoxicity in vivo. He also collaborated with Novartis, contributed to the approval of Kymriah in 2017 as the first FDA-approved cell and gene therapy.

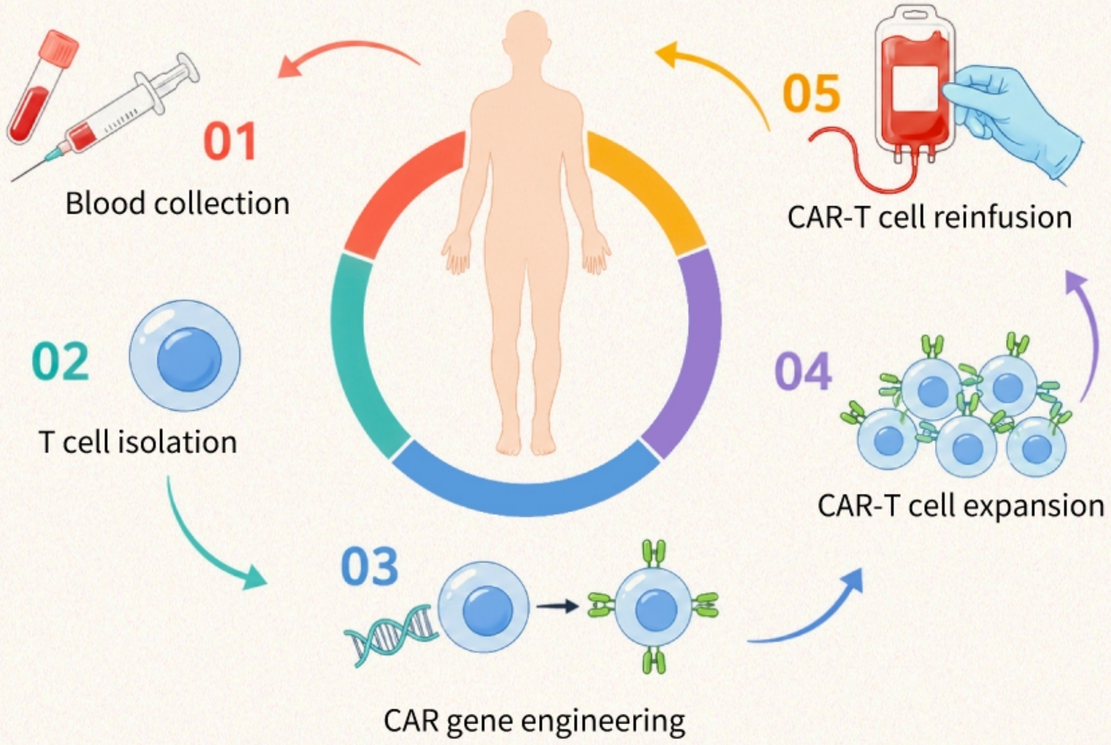


Living Drugs:
CAR-T Cell Immunotherapy

Cell-based immunotherapy harnesses a patient's own immune cells to fight disease, particularly cancer.

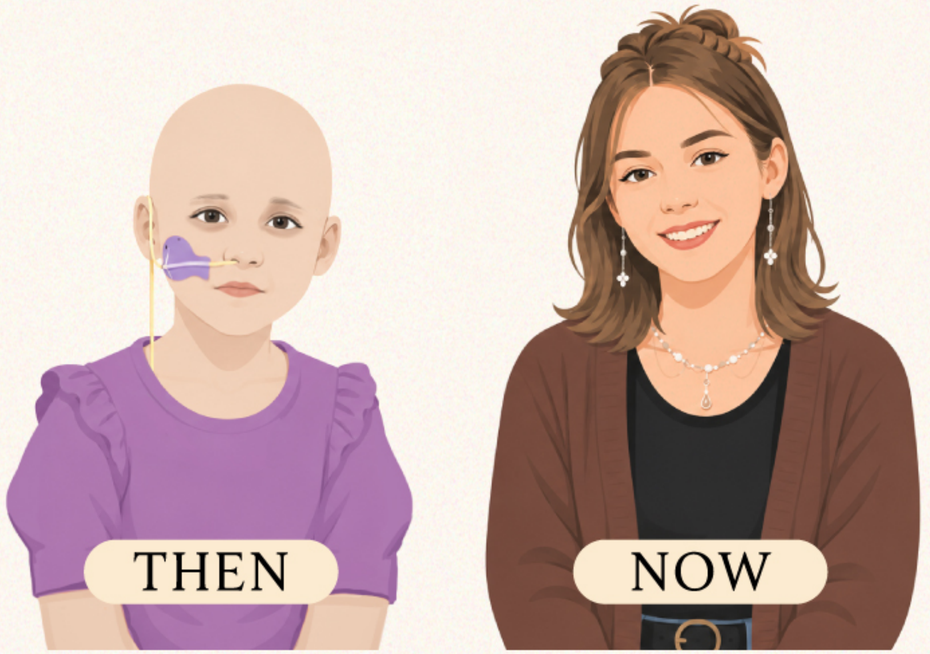
Clinicians first extract immune cells from the patient, which are then expanded, activated, or genetically engineered in the laboratory to enhance their ability to recognize and attack cancer cells. These cells are subsequently reinfused into the patient, enabling the immune system to eliminate tumors by harnessing immune mechanisms, rather than through the direct cytotoxic damage caused by chemotherapy or radiotherapy.

Among these therapies, CAR-T cell therapy is a leading example. CAR-T cells can expand in vivo, persist for long periods, and continuously attack tumors, earning them the designation of "living drugs."



Advantages and Importance of Cell-Based Immunotherapy

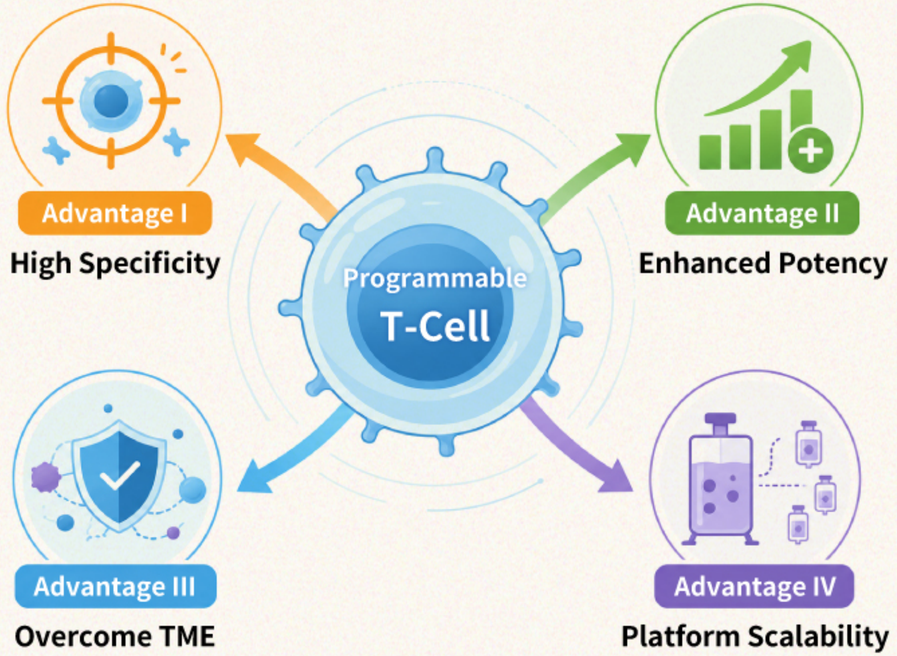
- CAR-T cells can proliferate in vivo upon recognition of target antigens, sustaining anti-tumor activity.
- CAR-T therapy transforms the immune system into a cancer-fighting system with precise recognition and powerful cytotoxic activity against cancer cells.
- CAR-T cells incorporating co-stimulatory domains such as CD28 or 4-1BB can persist for extended periods in some patients, exhibiting durable effects resembling immune memory.



The first pediatric patient to receive CAR-T therapy, Emily Whitehead, has remained cancer-free for 14 years following treatment, providing compelling evidence that this therapy can transform outcomes from short-term remission to potential long-term cure.

The Boundless Potential of CAR-T Technology: Ushering in a New Era of Human Health

The applications of CAR technology extend far beyond cancer therapy. Recent studies have demonstrated that CAR-T and CAR-NK therapies show promising efficacy in severe autoimmune diseases, such as systemic lupus erythematosus and systemic sclerosis, offering patients renewed hope for recovery. Looking ahead, this technology is also expected to be applied to cardiac injury repair and anti-aging.



The most powerful medicines may ultimately be found in our own bodies.