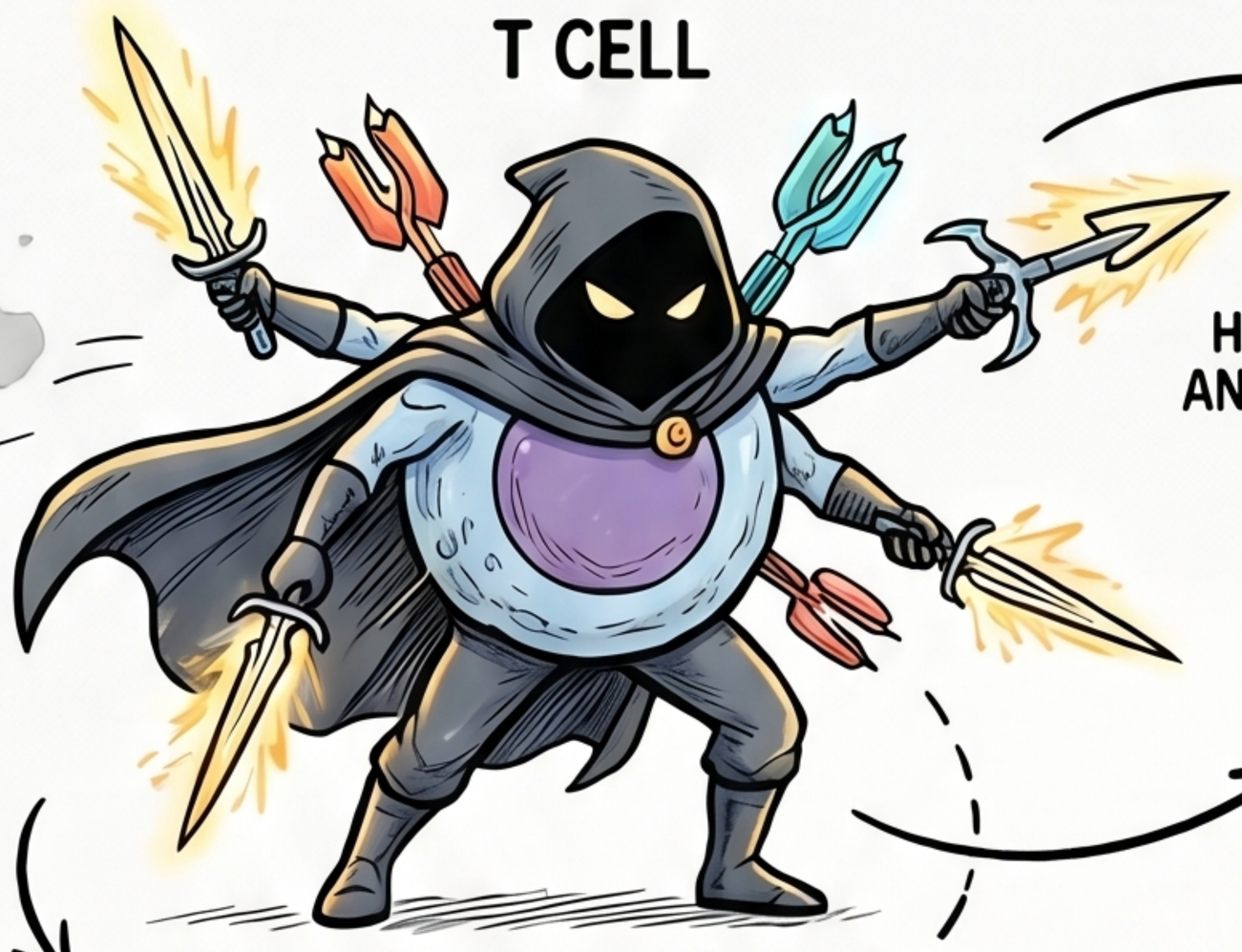
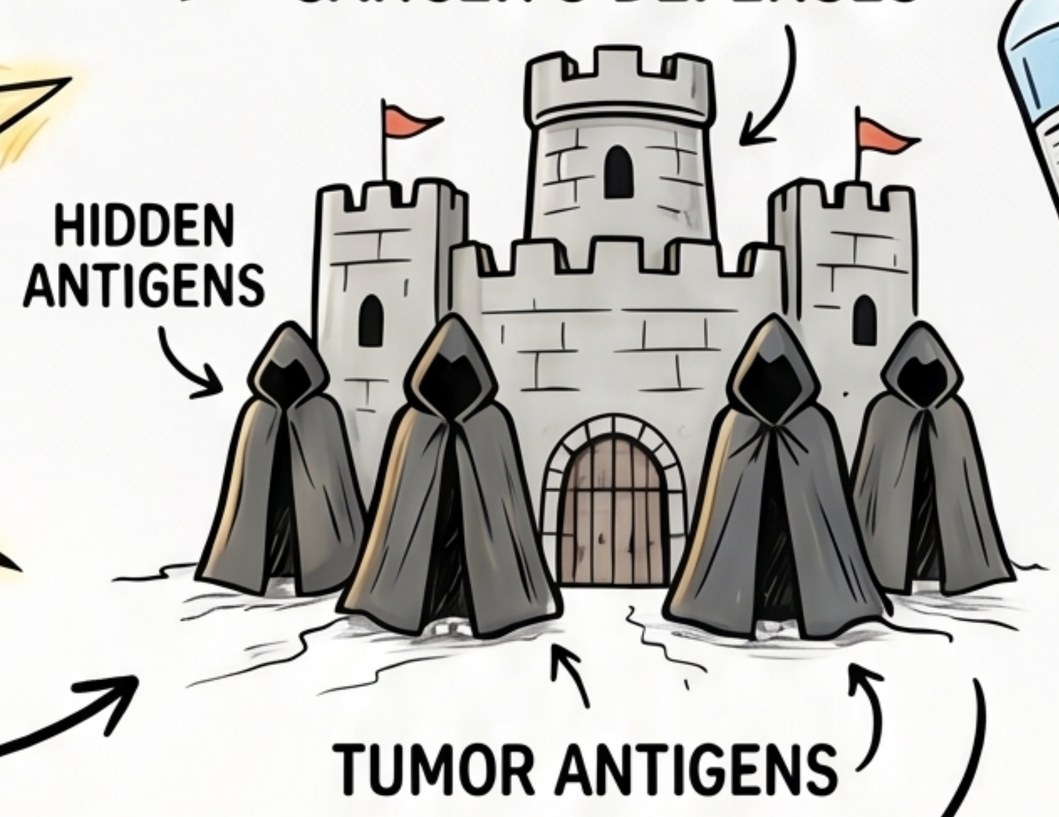
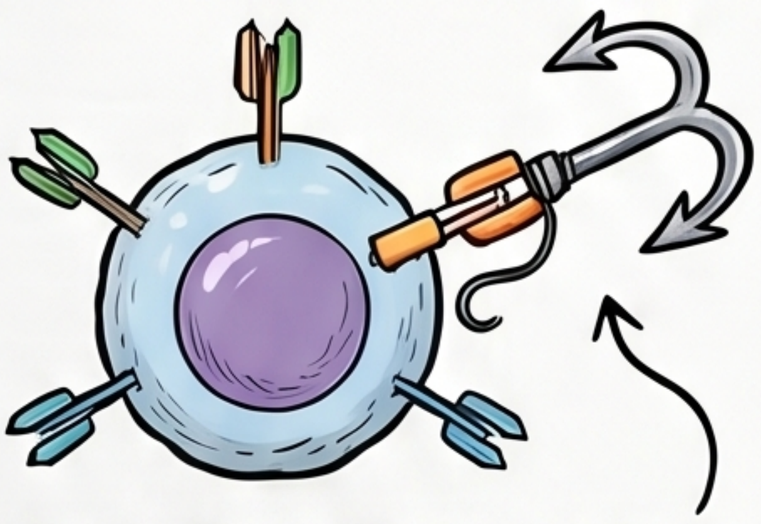
Engineering the Killer:
How CAR-T Bypasses Cancer's Defenses





THE ANATOMY OF A CAR-T CELL

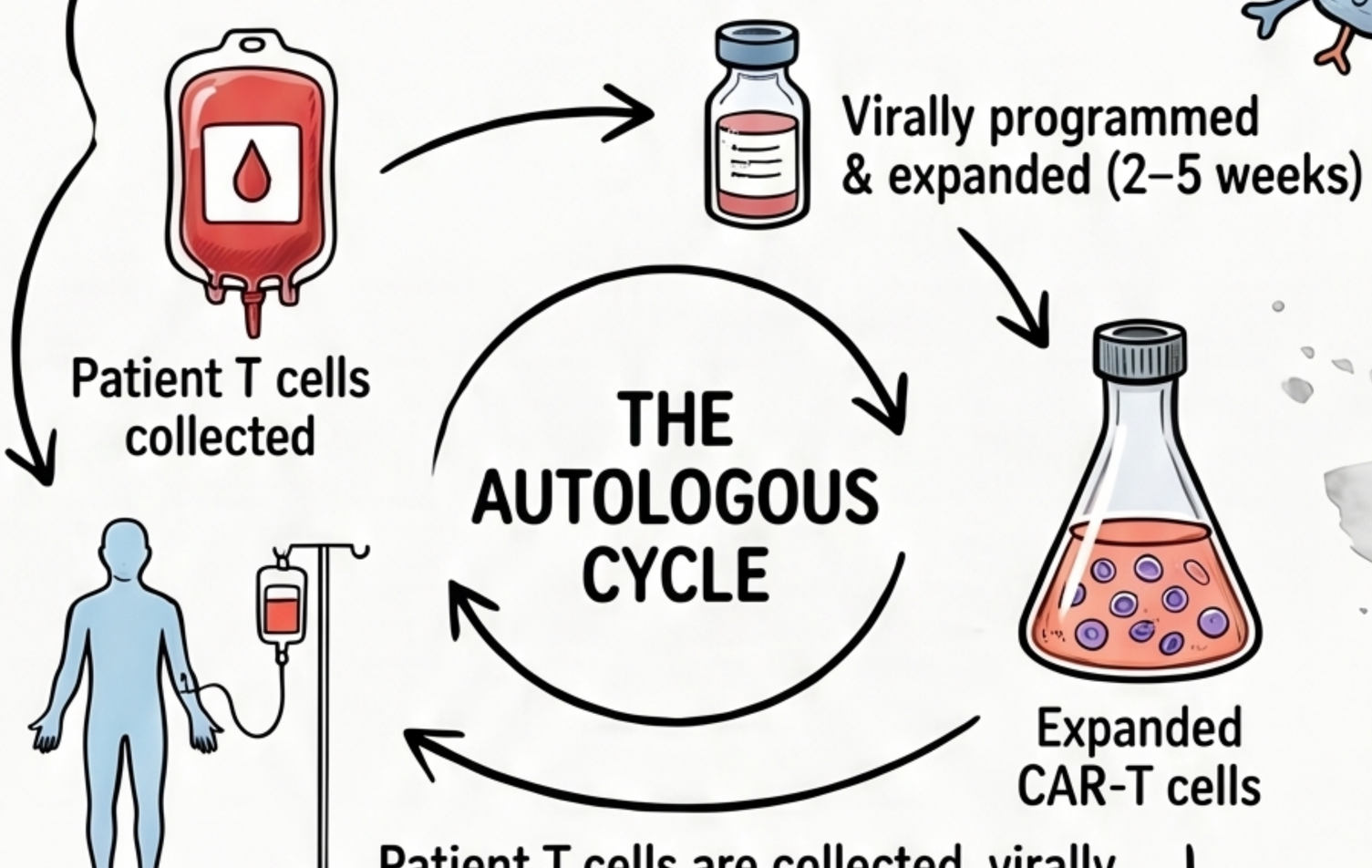


Synthetic Chimeric Receptor
An engineered protein that binds directly to tumor antigens, bypassing cancer's ability to hide.

Dual-Signal Activation
Combines antigen recognition and co-stimulation into one receptor for potent, sustained immune activity.

2nd Gen Persistence
Modern CARs use CD28 or 4-1BB domains to improve cell expansion and longevity.

FROM MANUFACTURING TO CLINICAL IMPACT



Patient T cells are collected, virally programmed, and expanded over 2–5 weeks before re-infusion.

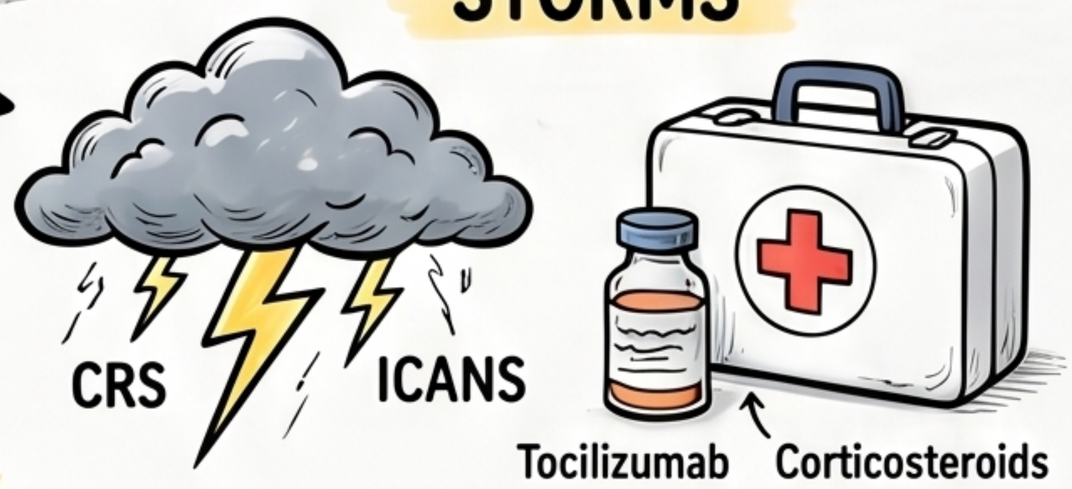
81% REMISSION IN PEDIATRIC ALL

The ELIANA trial proved unprecedented efficacy in patients who failed all other treatments.

CLINICAL TRIAL RESULTS

ELIANA (Pediatric ALL)	JULIET (Adult REOCL)	ZUMA-1 (Adult OLACL)
→ 81% Remission Rate	→ 40% Complete Response	→ 51% Complete Response

MANAGING TOXICITY 'STORMS'



Side effects like CRS and ICANS require specialist management with tocilizumab and corticosteroids.

REFERENCES [1] Maude SL et al. ELIANA. N Engl J Med. 2018;378:439-448 · [2] Schuster SJ et al. JULIET. N Engl J Med. 2019;380:45-56 · [3] Neelapu SS et al. ZUMA-1. N Engl J Med. 2017;377:2531-2544 · [4] Hay KA et al. Blood. 2017;130:2295-2306