

CASY^{VIVO} Cell Counter & Analyzer - Powering Breakthroughs in Cell Research

CRISPR Boosted CAR T Cells for Cancer Immunotherapy

Datlinger et al. (2025). Systematic discovery of CRISPR-boosted CAR T cell immunotherapies; Nature, 646. DOI: 10.1038/s41586-025-04201-x

CRISPR; CAR T; Immunotherapie	
Index	IM15
Standardization	X
Counting	X
Viability	
Volume	

The Challenge:

Overcoming CAR T cell therapy failure caused by poor cell fitness, exhaustion, and immunosuppressive tumor environments by identifying gene knockouts that enhance therapeutic efficacy.

CASY's Contribution:

The CASY system provided automated, high-precision cell counts during T cell expansion and after organ dissociation in mouse models. This data was essential for standardizing cell doses and accurately quantifying the abundance of edited cells within the bone marrow and spleen.

Key Benefits to Researchers:

- **Robustness in Complex Matrices:** Accurately quantifies cells in bone marrow and spleen dissociates by distinguishing target cells from tissue debris via high-resolution signal processing.
- **Precise In Vivo Tracking:** Provides objective metrics to quantify expansion and persistence, ensuring "fold-increase" values are based on absolute cell numbers rather than estimates.
- **Standardized Dosing:** Ensures consistent seeding and injection densities (\$cells/mL\$), critical for the reproducibility and statistical power of large-scale CRISPR screens.
- **Label-Free Quantification:** Enables rapid T-cell analysis across all stages—from expansion to post-organ recovery—without staining, preserving sample integrity.

Fold increase in CAR T cell population. This box plot presents the relative increase in cell abundance for specific knockouts compared to controls. The primary data for these measurements was generated through the automated counting of cells isolated from bone marrow and spleen using the CASY system.

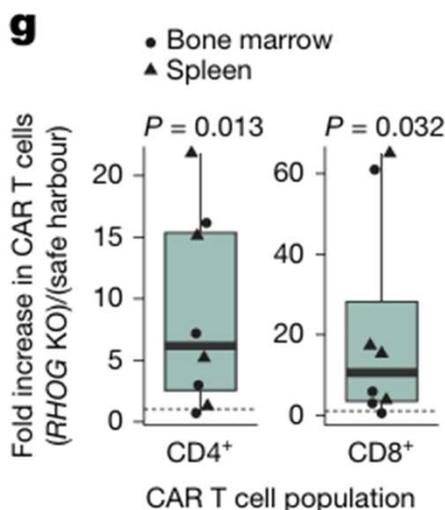


Fig. 4 | RHOG and FAS knockout CAR T cells enhance leukaemic cell control and survival in vivo. ... **g**, Fold increase in CD4⁺ or CD8⁺ CAR T cell numbers in mice treated with RHOG-knockout (KO) or standard CAR T cells, measured on day 15 after CAR T cell injection (four donors). The box plot's centre line is the median, the box limits are the upper and lower quartiles, and the whiskers extend to 1.5 times the interquartile range. ...