An iPSC-Derived γδT Cell Platform for Off-the-Shelf Cancer Immunotherapy

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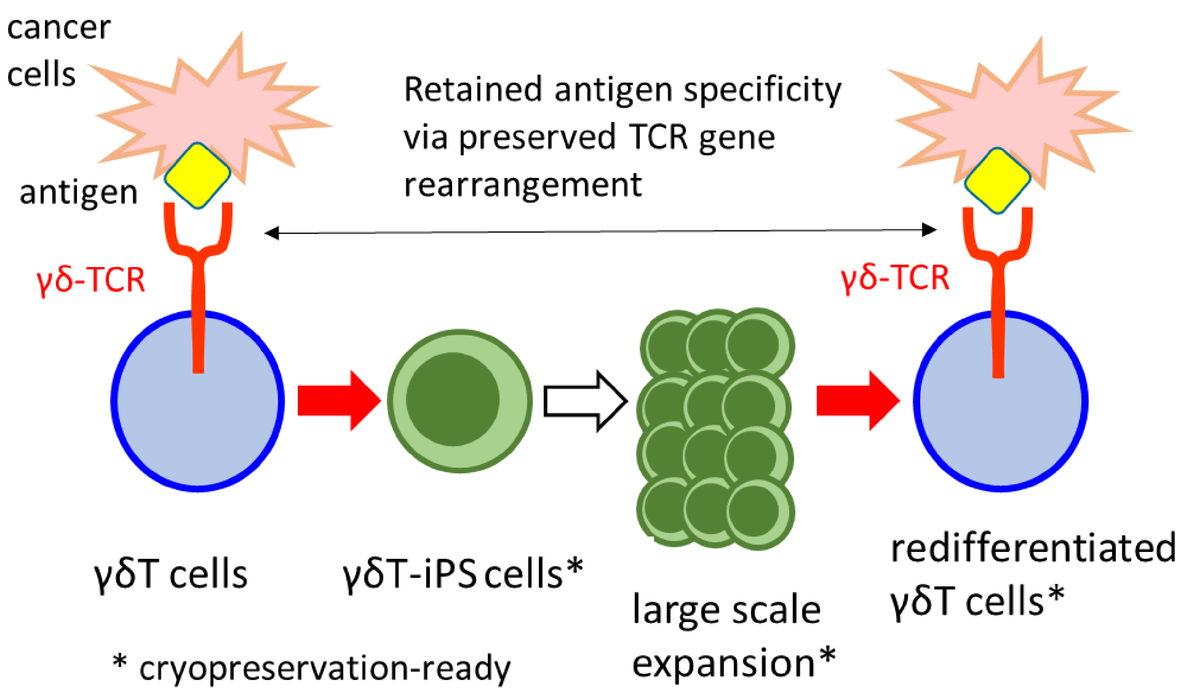
Background: Cancer immunotherapy is an important treatment option, but current cell therapies still face major challenges. CAR-T therapy has shown strong efficacy in hematologic malignancies, while high cost, product variability, and limited activity against solid tumors remain key barriers. Scalable off-the-shelf immune cell therapies are needed.

Current Technologies and Limitations: Most cancer immune cell therapies rely on αβT cells, whose allogeneic use is limited by GVHD risk. Conventional CAR-T cells often target a single antigen and may lose efficacy through antigen escape. Autologous therapies also face challenges in cost, manufacturing time, and product consistency.

Technical Significance

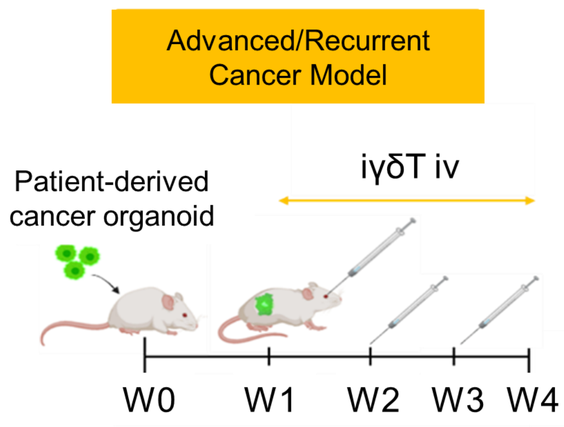
Manufacturing: Scalable production for off-the-shelf use

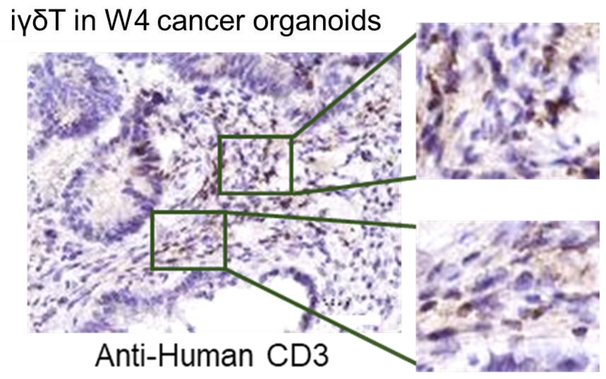
- Established a manufacturing process by reprogramming γδT cells into iPSCs and re-differentiating them into γδT cells.
- Cell isolation and purification processes are not required.
- The resulting cells can be stored and supplied as off-the-shelf cell therapy products.



Efficacy: Potential application to solid tumors

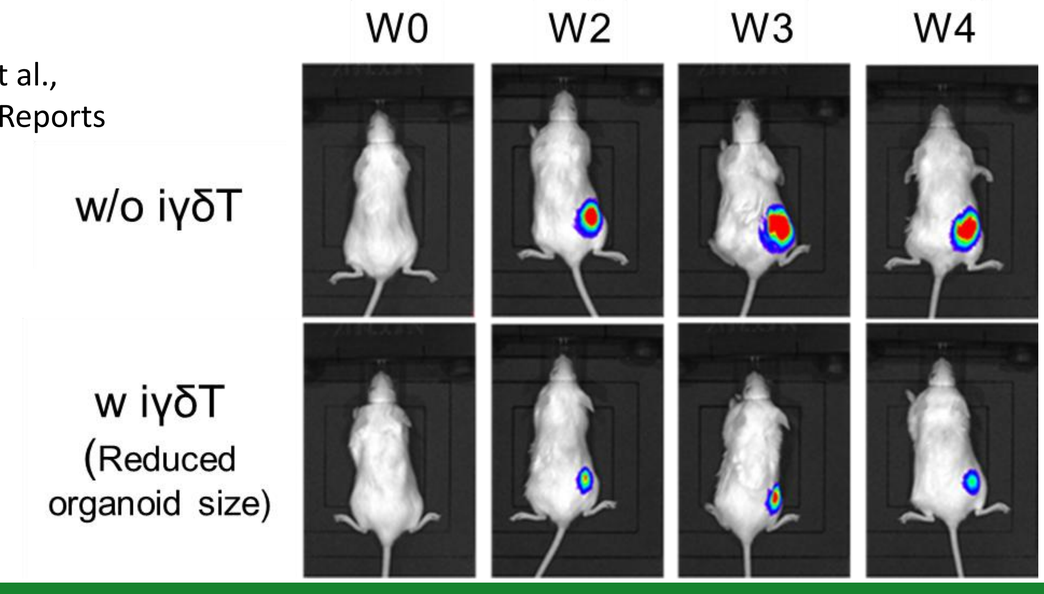
- Demonstrated in vivo antitumor activity using patient-derived cancer organoid models.
- HLA-independent antitumor activity may enable broader applications beyond conventional αβT cell approaches.





Mouse bearing patient-derived colorectal cancer organoids
(*Luminescent signal indicates organoids*)

Futai, R. et al., Stem Cell Reports



Safety and engineering potential

- No evident cytotoxicity against allogeneic normal cells, suggesting reduced GVHD risk.
- Specific Genomic Safe Harbor sites have been identified, supporting future development as an engineered γδT cell therapy platform.

Future Prospects

Possible Applications:

- Development of off-the-shelf cancer immune cell therapies
- Expansion to multiple cancer types, including solid tumors
- Application as an engineered γδT cell therapy platform
- Combination with gene modification technologies for enhanced functionality

Publications & IP:

- Watanabe, D. et al., Stem Cells Transl Med, 2018; 7:34–44
- Murai, N. et al., Stem Cell Reports, 2023; 18:853–868
- Futai, R. et al., Stem Cell Reports, https://doi.org/10.1016/j.stemcr.2026.103018
- JP7,224,021 / JP7,793,209 / US12,529,035 / US12,576,149

Possible Collaboration:

We are seeking industry partners interested in cancer immune cell therapy, allogeneic cell therapy, and engineered immune cell platforms.

- Co-development with pharmaceutical companies developing cancer immunotherapies.
- Collaboration with biotech companies focused on cell therapy or gene-modified cells.
- Partnerships for manufacturing, nonclinical studies, clinical development, and licensing.
- Technology licensing and platform application studies.

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