

Scarless isolation of antigen-specific T cells for CAR T cell manufacturing via DNA-gated sorting

CAR T cell therapies are often limited in effectiveness against solid tumors

The problem with current CAR T cell therapies is their limited effectiveness against solid tumors due to the expansion of non-specific T cell populations and the difficulty in isolating antigen-specific T cells. Conventional sorting methods exacerbate this issue by causing T cell receptor (TCR) hyperactivation and apoptosis.

The novel DNA-gated sorting (DGS) technology solves these problems by employing a DNA gate mechanism for the label-free, multiplexed isolation of antigen-specific CD8⁺ T cells. This technique enhances the scalability and therapeutic effectiveness of CAR T cells, leading to improved in vivo persistence and more effective treatment outcomes, particularly for solid tumors

A novel CAR T cell therapy improves therapeutic effectiveness

The technology introduces a novel approach to CAR T cell therapy through the development of DNA-gated sorting (DGS), a method for the label-free and multiplexed isolation of antigen (Ag)-specific CD8⁺ T cells. DGS employs a molecular 'DNA gate' mechanism that attaches a magnetic bead to peptide-major histocompatibility complex class I (pMHC I) molecules via DNA hybridization, enabling the targeted capture, release, and recovery of Ag-specific T cells through toehold-mediated strand displacement. This technique facilitates the generation of CAR T cells from these isolated Ag-specific T cells, leading to improved in vivo persistence and therapeutic effectiveness, particularly against solid tumors.

Summary Bullets

- This technology introduces DNA-gated sorting (DGS) for label-free isolation of antigen-specific CD8⁺ T cells, improving CAR T cell therapy.
- The prototype enhances CAR T cell scalability and therapeutic effectiveness against solid tumors by using a DNA gate mechanism for targeted T cell capture and release.
- DGS improves in vivo persistence and specificity of CAR T cells, offering better treatment outcomes for solid tumors and other cancers.

Solution Advantages

- Enhanced scalability through the use of synthetic DNA constructs, allowing for unprecedented multiplexing capabilities.
- Generation of label-free cell products
- Improved in vivo persistence and therapeutic effectiveness of CAR T cells

Potential Commercial Applications

- Chimeric Antigen Receptor (CAR) T cell therapy for the treatment of solid tumors and other cancers.
- Enhanced cell therapy products with improved specificity, efficacy, and safety profiles.

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IP Status

<p>The patent application has filed</p>:

Publications

[DNA-Barcoded pMHC Tetramers for Detection of Single Antigen-Specific T Cells by Digital PCR](#), Analytical Chemistry - 2019

Images

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