Anti-Dpp6 Car For Targeted Regulatory T Cell Therapy For Inflammation In Pancreatic Islets And Central Nervous System

Tech ID: 32629 / UC Case 2021-066-0

TECHNOLOGY DESCRIPTION

Dysregulated immune cells targeting and destroying pancreatic islets and neurons is a hallmark of Type 1 diabetes and many central nervous system (CNS) diseases, respectively. Over 2.2 million people in the US are affected by Type 1 diabetes while about 23.5 million people in the US are affected by autoimmune diseases, such as multiple sclerosis which affects the CNS.

Regulatory T cell (Treg) therapy can be used to treat such diseases. However, polyclonal Tregs are nonspecific, reducing their efficacy and unwanted side effects outside the diseased tissue. Specifically targeting Tregs to the organ of interest could be key to curing such diseases rather than merely treating symptoms. Dipeptidyl Peptidase Like 6 (DPP6), is known to be expressed in islet and CNS cells. UCSF scientists have engineered regulatory T cells (Tregs) that express anti-DPP6 chimeric antigen receptors (CAR). This new property enables Tregs to traffic and accumulate in the pancreatic islets and CNS to subdue unwanted autoimmune reactions in these tissue with great precision. Preclinical findings demonstrate the feasibility of the new approach:

1. Several versions of anti-DPP6 CAR are expressed on the surface of primary human CD4+ T cells and Tregs.

2. Human T cells expressing anti-DPP6 CARs are activated by isolated human islets *in vitro*.

3. Anti-DPP6 CAR human CD4+ T cells and Tregs traffic to the CNS and transplanted human pancreatic islets in immunodeficient mice.

ADVANTAGES

1. Anti-DPP6 CARs enable efficient targeting of T cells to pancreatic islets and CNS.

2. When expressed in Tregs, anti-DPP6 CARs can trigger immunosuppressive function of the Tregs locally to dampen inflammation - root cause of the disease.

3. Compared with polyclonal Treg cell-based therapy, anti-DPP6 CAR expressing Tregs are likely to be more potent and specific.

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OTHER INFORMATION

KEYWORDS

T1D, type 1 diabetes, neurodegenerative disease, autoimmune, cell therapy, Tregs, regulatory T cells

CATEGORIZED AS

- **Medical**
  - Disease: Autoimmune and Inflammation
  - Disease: Central Nervous System
  - Disease: Metabolic/Endocrinology

4. Lower risk of treatment resistance and off-target immunosuppression compared to polyclonal Treg therapy.

RELATED CASES

2021-066-0

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Robust Genome Engineering in Primary Human T Cells using CRISPR/Cas9 Ribonucleoproteins
- Anti-Hla-A2 Chimeric Antigen Receptor

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