



NOVEL CAR T-CELL THERAPY FOR TARGETED TREATMENT OF NEURODEGENERATIVE AND AUTOIMMUNE DISEASES

TECHNOLOGY DESCRIPTION

Chimeric antigen receptor (CAR) T-cell therapy has revolutionized the field of oncology through the use of programmed killer T cells. This latest innovation from the Buck Institute relies on CAR technology to program regulatory T-cells (Tregs) and use their innate immunosuppression response to help patients with neurodegenerative and autoimmune diseases.

Buck investigators have created a delivery platform for modified CAR-Tregs called **Smart Cell Delivery** (SmaCD). SmaCD's proof-of-concept work was done in models for Alzheimer's Disease (AD). Traditionally, AD has been treated with antibodies targeting amyloid β ($A\beta$) and tau proteins, marking them as targets to be eliminated by microglia, the brain's immune cells. However, this approach causes the microglia to release pro-inflammatory factors, thus leading to brain inflammation in patients, which, as data have shown, can negatively impact cognitive function. But targeting $A\beta$ with CAR-Tregs uses the Tregs' natural anti-inflammatory properties to mitigate this side effect, opening new avenues for monotherapy as well as adjuvant therapy to immunotherapy for AD.

The SmaCD platform also allows targeted drug delivery to the brain by creating a system where CAR-Tregs not only detect pathological features of AD (or other indication) but respond to them by synthesizing and delivering the drug of interest specifically to the area of disease pathology. The system allows for a drug delivery of any antibody or peptide (novel or FDA approved), with proof-of-concept work done on two FDA approved drugs that have previously caused toxicity in the clinic. The delivered drug remains autonomously renewable in the patient in response to pathology for as long as the CAR-Treg clones remain. This innovative approach can open therapeutic windows for drugs previous thought to be too toxic and allow for combination therapy in cases that were previously thought to be unfeasible.

APPLICATIONS

- Antibody or peptide CAR T-reg immunotherapy for neurodegenerative or autoimmune diseases
- Adjuvant to antibody immunotherapy for AD and other indications
- Combination antibody or peptide therapy for neurodegenerative or autoimmune diseases
- Potentially increased therapeutic window for compounds that may have had toxic side-effects in earlier trials
- Platform can be used for drug delivery or drug discovery

PATENT STATUS

PCT pending

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PUBLICATIONS

[Smart drug delivery system to treat multiple Alzheimer's pathologies bags \\$2.4m funding](#) in Longevity.Technology® October 4, 2022

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CASE NUMBER

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