Docket #: S21-173

Bacteria-engineered to Elicit Antigen-Specific T-Cells

Researchers at Stanford have developed a new avenue for stimulating T effector and Treg immune cells in an antigen-specific manner.

Commensal microbiota have been shown to functionally regulate the innate and adaptive immune systems and must establish distinct niches at barrier sites throughout the human body. To prevent aberrant immune responses to commensal microbiota, Treg cells participate in tissue-specific immune regulation at barrier sites where they typically reside. In contrast, T effector cells generally amplify pro-inflammatory responses in an antigen-specific manner. In another vein, autoimmune diseases are estimated to effect up to 1 in every 10 individuals. Expanding Treg populations in the setting of autoimmune diseases is highly desirable and has shown favorable results in several animal models. However, methods for expanding these specific cells in vivo in a safe and efficacious
manner are still elusive.

Stage of Development
Research:

in vivo

Stage of Research
The inventors have pioneered a new approach to elicit and expand antigen-specific Tregs and T effector cells. Helicobacter hepaticus bacteria can be engineered to express a heterologous non-native protein or peptide. This peptide or protein could be of interest in an autoimmune disease or a specific cancer, among other things. Subsequently, dendritic cells will then phagocytose the bacteria, digest, and present the heterologous protein or peptide to naïve T-cells. In parallel, Treg-inducing cytokines will be administered to induce differentiation of naïve T-cells into Tregs. Once completed, this process will result in a Treg cell that has a TCR specific for a

host antigen of interest. The inventors have also laid out a similar process for producing antigen-specific T effector cells.

Technology Reference Numbers
CZ Biohub SF ref. no. CZB-199S & CZB-122S
Stanford ref. no. S21-173 & S18-507

Applications

- To create T effector cells that are antigen-specific for proteins or peptides selectively expressed on the cell surface of cancer cells
- To create Tregs that are antigen-specific for proteins or peptides implicated in autoimmune diseases

Advantages

- Customizable platform that is able to be modified to treat a number of diseases

Publications

- Published Patent Application: WO2020257519 - BACTERIA-ENGINEERED TO ELICIT ANTIGEN-SPECIFIC T-CELLS

Patents

- Published Application: 20240024380

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