A Booster Vaccine for CAR-T Cells
Technology #19933

Applications

This technology has applications as a vaccine to increase the in vivo expansion of CAR-T therapies.

Problem Addressed

The immune system is precisely tuned to destroy cells identified as foreign. Chimeric antigen receptor (CAR) T cell therapies exploit the immune system's cytotoxic functions to attack cancer cells. Adoptive CAR-T therapies take patients' own T cells, and reprogram them to identify tumor epitopes using an engineered antigen receptor. This is a time- and labor-intensive process that requires significant expansion of the CAR-T cells in vitro prior to transfer into a patient. Additionally, some patients fail to respond to therapy, often due to a failure of the CAR-T therapies to expand in vivo post-transplantation. These inventors describe a technology that increases the in vivo expansion of CAR-T cells.

Technology

Interaction of T cells with antigen presenting cells (APCs) is an important component of a natural immune response, but CAR-T therapies currently lack in vivo stimulation by APCs. This technology uses a molecule designed to facilitate CAR-T cell interaction with APCs to stimulate CAR-T activation and in vivo expansion. The molecule contains the lipid DSPE, a polyethylene glycol linker, and the protein epitope recognized by the CAR-T cell. This amphiphilic molecule binds serum albumin to hitchhike a ride to the lymph nodes, where it is incorporated into the membrane of APCs including dendritic cells and macrophages. When this molecule is injected with an APC stimulating adjuvant, the CAR-T cell binds to the APC displayed epitope and results in robust CAR-T activation and expansion. These inventors used an in vivo mouse model to demonstrate successful APC targeting of the amphiphilic molecule and significant expansion of CAR-T cells upon treatment with the molecule. This technology could boost the efficacy of current CAR-T therapies by increasing the ability of CAR-T cells to survive and expand in vivo. Efficient in vivo expansion of CAR-T cells could also potentially allow adoptive transfer of fewer CAR-T cells, thereby reducing the time and money required to generate CAR-T therapies. Finally, this technology could prevent CAR-T exhaustion by providing the CAR-T cells with natural stimulatory signals from APC cells.

Advantages

- Increases in vivo survival and expansion of CAR-T cells
- Minimizes in vitro expansion required to achieve robust CAR-T response.
- Efficient targeting to the lymph node and APCs
- Easy assembly and modification of epitope allows simple tailoring to different CAR-T therapies

Categories For This Invention:
Life Sciences  
Clinical Applications  
Oncology  
Therapeutics  
Peptide  
Vaccine  

**Intellectual Property:**  
Compositions for chimeric antigen receptor T cell therapy and uses thereof  
PCT  
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