CD83 Targeting Chimeric Antigen Receptor Expressing T cell (CAR-T) to prevent GVHD

A chimeric antigen receptor (CAR) that works by using an anti-CD83 scFv region to enable an immune effector cell to target dendritic cells (DCs) expressing CD83. CD83 CAR-T cells target alloreactive host and donor DCs in a subject receiving a transplant. CD83 is expressed on the surface of mature antigen presenting DCs but not on immature DCs. CD83 CAR-T therapy therefore marks mature DCs for elimination and spares immature DCs to maintain DC-mediated beneficial immune tolerance, subsequent maturation and antigen presentation for adaptive resistance to infection.

COMMERCIAL OPPORTUNITY

- Graft-versus-host-disease (GVHD) is a major cause of non-relapse mortality in patients receiving an allogenic hematopoietic cell transplantation (alloHCT), of which approximately 8,000 are performed in the US annually. GVHD is caused by alloreactive donor T cells. GVHD prevention typically includes immunosupressive drugs that broadly suppress donor T cells. However this approach also impairs beneficial regulatory T cells (Treg) required for immune tolerance and cytotoxic T lymphocytes (CTL) that mediated the anti-tumor activity of the transplant.
- Ultimately, GVHD can add a cost of up to $67,000 to the treatment of a patient who has undergone a transplant. The number of patients likely to develop GVHD within 100 days of the transplant in the United States alone can be as great as 4,000/year, bringing the market size to $268 million.
- Today about 35,000 allogeneic Hematopoietic Stem Cell transplants are carried out annually worldwide and they are increasing each year. Around 40-60% of HSCT recipients will develop aGVHD. 30% of GVHD cases result in death.
- CD83 antibodies have been shown to target activated DC, preventing GVHD but not interfering with engraftment of human T cells. CD83 antibodies have been shown to suppress the human immune response in vitro and in vivo.

TECHNOLOGY

Human T cells were incubated with dendritic cells at DC:T ratio of 1:30. CD83 CAR T cells were added to DC at different ratios 3:1 to 1:10. T cell proliferation was measured by Ki-67 after 5 days. The positive alloresponse of the T cells was 36.5% proliferating T cells against DCs. The CD83 CAR T potently reduced alloreactive proliferation from 3:1 to 1:3, and still reduced alloreactivity by 50% at 1:10 Control CAR T that did not express a chimeric antigen receptor did not have a suppressive effect, and caused increased alloreactivity

PUBLICATION/PATENT

- Provisional patent application filed February 23, 2018 for Dr. Davila and Dr. Betts.

CONTACT

Haskell Adler PhD MBA
Senior Licensing Manager
Haskell.Adler@Moffitt.org
(813) 745-6596

LICENSING OPPORTUNITY

MOFFITT CANCER CENTER