NATIONAL CANCER INSTITUTE
Technology Transfer Center

# Fully-human Heavy-chain-only Anti-B-cell Maturation Antigen (BCMA) Chimeric Antigen Receptors (CARs)


## Summary

Chimeric Antigen Receptor T cell (CAR-T) therapies that specifically target B-cell maturation antigen (BCMA) are strong therapeutic candidates for patients with plasma cell malignancy diseases such as, multiple myeloma (MM), as well as for patients with Hodgkin's lymphoma. BCMA is a cell surface protein preferentially expressed on a subset of B cells and mature plasma cells, but not on other cells in the body. The limited expression of BCMA on B and plasma cells makes BCMA an attractive therapeutic target for B cell and plasma cell malignancy diseases. The 12 anti-BCMA CARs described are fully human CARS and have the potential to treat patients with various plasma cell and B cell malignancy diseases.


## NIH Reference Number

E-183-2017

## Product Type

- Therapeutics

## Keywords

- Multiple Myeloma, MM, Hodgkin Lymphoma, Non-Hodgkin Lymphoma, Hodgkin's Lymphoma, Non-Hodgkin's Lymphoma, B-cell Maturation Antigen, BCMA, Adoptive Cell Therapy, ACT, Chimeric Antigen Receptor, CAR, Plasma Cell Malignancies, B-cell Malignancies
- Cancer, Biologic, Kochenderfer

## Collaboration Opportunity

This invention is available for licensing and co-development.

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## Description of Technology

Immortalization of plasma cells leads to plasma cell malignancy diseases such as multiple myeloma (MM). B-cell maturation antigen (BCMA) is a protein that is preferentially

expressed by malignant and normal B cells and plasma cells, butnot on other cells in the body. This limited expression profile suggests that BCMA is a promising target for anticancer therapeutics for cancers in which there is excess production of plasma cells and B cells.
Researchers in the National Cancer Institute (NCI) Experimental Transplantation and Immunology Branch (ETIB) previously reported anti-BCMA CARs, which are currently being tested in the clinic for patients with multiple myeloma. While the results from clinical trials have demonstrated the efficacy of anti-BCMA CARs, the CAR being used in this clinical trial has an antigen recognition domain derived from mouse antibody; this allows for the possibility of an immune response by the patient against the CAR. The development of CARs with antigen-recognition domains comprising a fully human heavy chain variable region can mitigate this potential immunogenicity against the CAR T cells, thereby enhancing therapeutic function.
The inventors have developed 12 novel anti-BCMA CARs with fully human heavy chain variable region sequences, each of which specifically recognizes BCMA in vitro and in vivo. Each of these CARs is available for licensing under a variety of conditions, including expression on autologous or allogeneic T cells.

**Potential Commercial Applications**

- Treatment of plasma cell malignancy diseases such as multiple myeloma
- Treatment of B cell malignancy diseases such as Hodgkin’s lymphoma and non-Hodgkin’s lymphoma

**Competitive Advantages**

- The fully human nature of this anti-BCMA CAR can increase therapeutic effectiveness because it is less immunogenic to human patients
- The fully human CARs are already known to bind to BCMA in vitro and in vivo

**Inventor(s)**

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**Development Stage**

- Pre-clinical (in vivo)

**Publications**

Ali S.A, et al. T cells expressing an anti–B-cell maturation antigen chimeric antigen receptor cause remissions of multiple myeloma. [PMID 27412889]

**Patent Status**

- **U.S. Provisional:** U.S. Provisional Patent Application Number 62/527,556 , Filed 30 Jun 2017

**Related Technologies**

- E-040-2012

**Therapeutic Area**

- Cancer/Neoplasm

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