NATIONAL CANCER INSTITUTE
Technology Transfer Center

Method of Neoantigen-Reactive T Cell Receptor (TCR) Isolation from Peripheral Blood of Cancer Patients

Summary

The National Cancer Institute (NCI) seeks research co-development partners and/or licensees for a novel method for isolation and construction of neoantigen-reactive T-cell receptors (TCRs) from peripheral blood lymphocytes (PBL) of cancer patients. This method generates accurate scoring of single T cells from tumors, as well as facilitates identification and reconstruction of unknown TCRs for immunotherapy.

NIH Reference Number

E-102-2020

Product Type

- Therapeutics

Keywords

- T Cell Receptors, TCRs, Tumor Infiltrating Lymphocytes, TILs, Adoptive Cell Transfer, ACT, Immunotherapy, Neoantigen, Rosenberg

Collaboration Opportunity

This invention is available for licensing and co-development.

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Description of Technology

Adoptive cell transfer (ACT) uses tumor infiltrating lymphocytes (TILs) that recognize antigens expressed by cancer cells (neoantigens). Neoantigen specific TIL administration in patients has resulted in long-term regression of certain metastatic cancers. However, current procedures for TIL therapy are highly invasive, labor-intensive, and time consuming. The success of these procedures is limited and differs between patients and histologies. Isolation of neoantigen reactive TCRs have historically been challenging due to very low precursor frequencies of these T-cells as well as lack of technical advances that can determine phenotypic markers of these cells from the blood.

Researchers at the National Cancer Institute (NCI) have developed a novel method for

isolation and construction of neoantigen-reactive T-cell receptors (TCRs) from peripheral blood lymphocytes (PBL) of cancer patients. This method allows direct isolation of T cells from the blood, based on a distinct T cell gene signature; thus, it does not require tumor cells to be gown or propagated in vitro. In this method, peptide-HLA tetramers (pHLA) are used to isolate neoantigen reactive T cells based on patient specific information on major histocompatibility complex and tumor specific mutations. By taking advantage of the unique genetic signatures of neoantigen specific T cells, this method not only generates accurate scoring of single T cells from tumors, but also facilitates identification and reconstruction of unknown TCRs for immunotherapy. Additionally, these gene signatures can be used to identify TCRs from chronic infections (such as HIV).

NCI seeks commercial partners to co-develop and/or license this technology.

Potential Commercial Applications

- Personalized cell therapy to treat cancer patients
- Testing for the presence of tumor-relevant T cells in the blood of cancer patients
- Isolation of cell populations ideal for introduction of stem-like factors for cell therapy
- Biomarkers for cancer immunotherapy
- Developing treatment against chronic infections which are expected to have similar T-cell dysfunction signatures (e.g. HIV, HCV, TB, etc.)

Competitive Advantages

- Widely applicable to treat different types of cancer
- Eliminates the expensive and time-consuming procedures of tumor cell culture, propagation, and screening in vitro
- High specificity and sensitivity significantly reduce off-target effects
- Patient-specificity to improve efficacy of ACT or TCR therapy
- Rapid and scalable method of isolating neoantigen-specific TCRs

Inventor(s)

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Development Stage

- Discovery (Lead Identification)

Patent Status

- **U.S. Provisional:** U.S. Provisional Patent Application Number 62/992,715 , Filed 20 Mar 2020

Related Technologies

- E-229-2014 - T-Cell Therapy Against Patient-Specific Cancer Mutations
- E-233-2014 - T-Cell Therapy Against Patient-Specific Cancer Mutations
- E-067-2017 - A Rapid Method of Isolating Neoantigen-specific T Cell Receptor Sequences

- E-061-2020 - Extremely Rapid Method to Isolate Neoantigen Reactive T Cell Receptors (TCRs)

Therapeutic Area

- Cancer/Neoplasm

Updated

Wednesday, January 25, 2023

Source URL:https://techtransfer.cancer.gov/availabletechnologies/e-102-2020