

## RAPID ISOLATION OF CENTRAL MEMORY T CELLS FOR ADOPTIVE IMMUNOTHERAPY

### SUMMARY

The National Cancer Institute (NCI), Surgery Branch is seeking parties interested in in-licensing or collaborative research to co-develop a methodology for the isolation of memory T cells for adoptive immunotherapy.

### REFERENCE NUMBER

E-228-2010

### PRODUCT TYPE

- Therapeutics

### KEYWORDS

- adoptive immunotherapy
- combination therapy
- immune response
- T cells
- IL-2
- interferon-gamma
- qPCR

### COLLABORATION OPPORTUNITY

This invention is available for licensing and co-development.

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### DESCRIPTION OF TECHNOLOGY

The National Cancer Institute (NCI), [Surgery Branch](#) is seeking parties interested in collaborative research to further co-develop a methodology for the isolation of memory T cells for adoptive immunotherapy.

The technology needing commercial development is a new method to rapidly isolate tumor-reactive central memory T cells in a highly enriched, non-invasive manner from the peripheral blood of cancer patients for cancer adoptive cell immunotherapy. In this method, cells are drawn from a patient's blood, divided into subsets, and contacted with the tumor antigen of interest to identify T cells whose T cell

receptor (TCR) recognizes the tumor antigen. Such T cells are identified by measuring the levels of interleukin-2 (IL-2) and interferon-gamma (IFN-gamma) produced by the cells (i.e. the IL-2 index) using high-throughput quantitative PCR (HT-qPCR). NIH scientists have identified that cells with a specific IL-2 index consistently contain central memory T cells for the tumor antigen of interest.

Animal studies suggested that central memory T cells can proliferate, persist, and survive better after adoptive transfer compared to other T cell types. Central memory T cells also show increased anti-cancer activity. Clinical trials using central memory T cells represents an important extension of these studies. Adoptive immunotherapy is showing promise as a cancer treatment, but one drawback to this method, prior to this invention, has been the laborious and time consuming nature of the cell isolation process and the unpredictable and sometimes ineffective nature of the cells infused into patients.

### Related Opportunities

U.S. Patent Application No. 12/866,919 filed 10 Aug 2010, and foreign counterparts in Europe and Australia

### POTENTIAL COMMERCIAL APPLICATIONS

- Improved adoptive immunotherapy approach to treat and/or prevent the recurrence of a variety of human cancers, infectious diseases, and autoimmune diseases by identifying central memory T cells;
- Component of a combination therapy where improving immune response quality is critical, such as introducing central memory T cells into a vaccine regimen for longer term immune responses, or to treat malignancies that thrive by circumventing the patient's immune system.

### COMPETITIVE ADVANTAGES

- Eliminates the need for invasive surgery to eliminate tumors;
- Isolates better cell cultures for adoptive immunotherapy than previously available;
- Predicts and isolates central memory T cell populations consistently using the IL-2 index;
- Expands the number of patients where adoptive immunotherapy can become a cancer treatment option;
- Sensitive, efficient, and rapid approach to identify and isolate Central Memory T cells for various therapeutic applications.

### INVENTOR(S)

[Udai Kammula \(NCI\)](#)

### DEVELOPMENT STAGE

- Pre-clinical (in vivo)

### PUBLICATIONS

- Wang A, Chandran S, Shah SA, Chiu Y, Paria BC, Aghamolla T, Alvarez-Downing MM, Lee CC, Singh S,

Li T, Dudley ME, Restifo NP, Rosenberg SA, **Kammula** US. The Stoichiometric Production of IL-2 and IFN- $\gamma$  mRNA Defines Memory T Cells That Can Self-Renew After Adoptive Transfer in Humans. **Science Transl Med.** 2012 Aug 29;4(149):149ra120.

- Kammula US, Serrano OK. Use of high throughput qPCR screening to rapidly clone low frequency tumor specific T-cells from peripheral blood for adoptive immunotherapy. *J Transl Med.* 2008 Oct 20;6:60. [PMID 18937837]

#### **PATENT STATUS**

- **Not Patented**
- **Foreign Filed:** PCT Patent Applications filed for AU, EP, CA

#### **THERAPEUTIC AREA**

- Cancer/Neoplasm