Methods for Producing Stem Cell-Like Memory T Cells for Use in T Cell-Based Immunotherapies

Summary (1024-character limit)
Researchers at the National Cancer Institute (NCI) seek research & co-development and/or licensees for a novel, ex vivo method by which stem cell-like memory T cells (Tscm) can be generated by stimulating naïve T cells in the presence of inhibitors of GSK-3beta, which are capable of activating the Wnt pathway. These Tscm cells, generated using GSK-3beta inhibitors, display enhanced survival and proliferation upon transfer, have multipotent capacity to generate all memory and effector T cell subsets, and show increased anti-tumor activity in a humanized mouse tumor model.

NIH Reference Number
E-174-2012

Product Type
• Therapeutics

Keywords
• Stem Cell, T Cell, Immunotherapy, Cancer, Infection, Wnt, GSK-3beta, anti-tumor activity, Gattinoni

Collaboration Opportunity
This invention is available for licensing and co-development.

Contact
• John D. Hewes
  NCI - National Cancer Institute
  240-276-5515
  John.Hewes@nih.gov

Description of Technology
T cells currently employed for T cell-based immunotherapies are often senescent, terminally differentiated cells with poor proliferative and survival capacity. Recently, however, scientists at the National Cancer Institute (NCI) identified and characterized a new human memory T cell population with stem cell-like properties. Since these T cells have limited quantities in vivo, the scientists have developed methods by which high numbers of these cells can be generated ex vivo for use in T cell-based immunotherapies. Specifically, this invention describes a method for generating the stem cell-like memory T cells by stimulating naive T cells in the presence of GSK-3beta inhibitors. The invention also provides methodology for obtaining the stem cell-like memory T cells by sorting T cell lymphocytes using
flow cytometry. These stem cell-like memory T cells display enhanced proliferation and survival upon transfer, have the multipotent capacity to generate all memory and effector T cell subsets, and show increased anti-tumor activity in a humanized mouse tumor model. Consequently, the coupling of T cell receptor or chimeric receptor gene transfer with this method will enable the generation of a large number of memory stem cells with the desired specificity to effectively treat patients with cancer and chronic infectious diseases.

Potential Commercial Applications
- Ex vivo generation of stem cell-like memory T cells for T cell-based immunotherapy
- Treatment for patients with cancer and chronic infectious diseases

Competitive Advantages
- Enhanced proliferation and survival upon transfer
- Multipotent capacity to generate all memory and effector T cell subsets
- Increased anti-tumor activity

Inventor(s)
Luca Gattinoni M.D. (NCI), Nicholas Restifo M.D. (NCI)

Development Stage
- Pre-clinical (in vivo)

Publications
Gattinoni L, et al., A human memory T cell subset with stem cell-like properties. [PMID 21926977]
Gattinoni L, et al., Wnt signaling arrests effector T cell differentiation and generates CD8+ memory stem cells. [PMID 19525962]
Lugli E, et al., Identification, isolation and in vitro expansion of human and nonhuman primate T stem cell memory cells. [PMID 23222456]

Patent Status

Therapeutic Area
- Cancer/Neoplasmin
- Infectious Diseases