Development of Methods and Protocols for Use of Human Cish-/- IPSC-NK Cells for Cancer Therapy

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BACKGROUND

Natural killer (NK) cells are a key component of the innate immune system and are involved in early defense against viruses and cancer cells. NK cells have the ability to lyse cells without prior sensitization and therefore are the subject of intense interest to be potentially used as immunotherapeutic targets to treat cancer. The crucial element for using NK cells in immunotherapy is the ability to control the signaling and activation pathways. Recent work has shown that the cytokine-inducible SH2-containing protein (CIS), encoded by the *Cish* gene, can act as a checkpoint in NK activation by inhibiting IL-15 signaling, a major upregulator of NK cell activity. Furthermore, deletion of the *Cish* gene has been shown to increase the sensitivity of NK cells to IL-15, resulting in mice that are resistant to experimental metastasis.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have developed a method whereby modified NK cells can be used to treat cancer. The modified NK cells exhibit hypersensitivity to cytokines, such as IL-2 and or IL-15 stimulation and maintain expansion and anti-tumor functions with lower concentrations of IL-2 and IL-15.

APPLICATIONS

The inventors have developed human *Cish*-/- NK derived cells and methodology to use these cells for cancer therapy.

ADVANTAGES

Compared to existing NK cell therapy, that uses unmodified NK cells, the inventors gene modified iPSC-derived *Cish*-/-NK cells have better anti-tumor effects. They also require lower doses of IL-2 and IL-15 to maintain expansion and anti-tumor function and can persist more than 3 weeks in vitro.

STATE OF DEVELOPMENT

The technology is at the experimental stage with a large number of in vitro studies completed. The next phase of development is to start in vivo studies.

INTELLECTUAL PROPERTY INFO

This technology is patent pending and available for licensing and/or research sponsorship.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	2019/217956	11/14/2019	2018-268

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OTHER INFORMATION

KEYWORDS
Natural kill cells, NK cells, IL-2, IL-15, iPSC cells, immunotherapy, cancer therapy, Cish, modified immune cells, innate immunity, cytokine-inducible SH2-containing protein (CIS)

CATEGORIZED AS
- Medical
  - Disease: Cancer
  - Other
  - Stem Cell
  - Therapeutics

RELATED CASES
2018-268-0

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