Antibody-Based Chemically Induced Dimerizers (AbCIDs)

Tech ID: 33632 / UC Case 2016-081-0

INVENTION NOVELTY

This novel technology enables refined temporal control of protein-protein interactions that can be used to regulate cell therapies, including CAR T-cells and “cell factories”.

VALUE PROPOSITION

Genetically engineered cell therapies are a promising new therapeutic approach. These include chimeric-antigen-receptor (CAR) T-cells for the treatment of cancer, and cell factories able to deliver biomolecules for enzyme replacement therapy. However, the efficacy and safety of these cell therapies can be limited by a lack of control over their activity and lifespan. Chemically induced dimerizers (CIDs) allow for temporal control of biological processes through the addition of a small-molecule dimerizing agent. Unfortunately, the classical FKBP/FRB CID system utilizes the small molecule rapamycin, which is both toxic and immunosuppressant, making it undesirable for use with cell therapies. Orthogonal “rapalogs” show reduced toxicity, but have horrible PK properties, greatly reducing their utility in regulating cell therapies. Several plant-based CID systems have been developed, but the non-human nature of these proteins results in immunogenicity issues if incorporated into a cell therapy. UCSF researchers have designed a new strategy to generate novel human-protein-based CIDs and apply them to regulating cell therapies. This technology can be used to activate CAR T-cells in a dose-dependent manner. This technology can also be applied to the regulation of gene expression in cell factories. Additional applications could include CAR T-cell kill switches, regulation of stem cell therapies, and microbiome engineering.

ADVANTAGES:

- Fully human CID systems
- Novel CID systems can be rapidly generated with customized small molecule inputs specific to each cell therapy application
- Highly selective and dose dependent

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OTHER INFORMATION

KEYWORDS

Cancer Immunotherapy, CAR T cells, Chemical Induced Dimerization

CATEGORIZED AS

- Medical
  - Disease: Cancer
  - Therapeutics

RELATED CASES

2016-081-0

- Utilizes drug-like small molecules with desirable PK properties and safety profiles
- Utilizes FDA approved small molecules for reduced regulatory burden

TECHNOLOGY DESCRIPTION

The Wells Lab at UCSF has designed a method using antibody phage libraries for the selection and development of antibodies that selectively bind protein-small molecule complexes. These antibodies bind to the complex only in the presence of a particular small molecule. A CAR T-cell that is engineered to express the antigen on its cell surface can thus be stimulated with the antibody in the presence of the small molecule. Such antibodies can be made bi-specific to specifically bind to cancer cells and controllably co-localize CAR T-cells to the target cancer.

RELATED MATERIALS

▶ Human Antibody-Based Chemically Induced Dimerizers for Cell Therapeutic Applications - 02/14/2018

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,939,379	03/26/2024	2016-081

Additional Patent Pending

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