Docket #: S25-407

Genetically Encoded STING Agonists for Programmable Immune Activation in Cell Therapies

Researchers at Stanford have developed genetically encoded STING agonists that enable controlled activation of the STING pathway from within engineered cells. The agonists are derived from the human antimicrobial peptide LL37 and fusogenic peptides, and are designed to improve cytosolic DNA delivery and transport of cGAMP between cells. This creates a new way to trigger STING signaling with greater control over where, when, and how strongly the pathway is activated.

STING is an important regulator of immune responses and a major target in cancer immunotherapy. However, current STING agonist approaches have been limited by poor control of dose, timing, and localization in vivo, which can reduce antitumor activity and complicate therapeutic use. This invention addresses that challenge by encoding STING agonist activity directly into therapeutic cells, where expression can be tuned through promoter strength or linked to synthetic gene circuits for more precise and localized activation.

In proof-of-concept studies, CAR T cells expressing these genetically encoded STING agonists showed enhanced killing of glioblastoma cells and increased extracellular cGAMP levels. When co-expressed with a synthetic cytokine receptor, the agonists further improved survival in an orthotopic glioblastoma mouse model. These results suggest that genetically encoded STING agonists could improve the performance of CAR T cell therapies against solid tumors. More broadly, the technology may also serve as a research tool for spatially and temporally controlled STING activation in engineered cells.

Stage of Development
Research - in vivo

Applications

- Improved CAR-T and other engineered immune cell therapies for cancer
- Programmable activation of immune signaling in the tumor microenvironment
- Synthetic gene circuit-controlled immunotherapy approaches

Advantages

- Enables more precise control of STING agonist dose, timing, and location
- Avoids reliance on separate delivery of conventional STING agonists
- Can be integrated into inducible gene circuits for safer and more localized activity
- Enhanced CAR T cell efficacy in glioblastoma models
- Improved specificity through the use of fusogenic peptides and cell-targeting designs

Innovators

- Kyle Daniels
- Wansang Cho
- Michael Lim
- John Choi
- Annelise Barron

Licensing Contact

Minxing Li

Licensing and Strategic Alliances Manager

Email