Enhancing Cancer Immunotherapy with Modified Adaptor Protein and CAR-NK Cell Technology

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TECHNOLOGY DESCRIPTION

This cancer immunotherapy leverages engineered natural killer (NK) cells enhanced by a novel recombinant polypeptide technology. At its core, the FcεR1γ transmembrane domain is modified with a 4-1BB co-stimulatory motif, driving superior activation of NK cell receptors such as NKp30, NKp46, and CD16. Further innovation combines this construct with chimeric antigen receptor (CAR) extracellular domains, such as CD19ScFv-CD8hinge, creating a dual-activation mechanism that integrates innate and adaptive immune responses. This approach enables NK cells to effectively target tumor-associated antigens while overcoming challenges posed by immune inhibitory mechanisms like HLA-E-mediated tolerance.

Competitive Advantages:

- **Enhanced NK Cell Function:** The modified FcεR1γ with 4-1BB significantly increases the surface expression and activation of NK cell receptors, boosting lytic efficiency against cancer cells.
- **Overcoming Inhibitory Mechanisms:** Superior activation of NKp30 and CD16 enables NK cells to bypass HLA-E-mediated immune suppression, a critical barrier in cancer immunotherapy.
- **Dual-Targeting Capability:** Combining CAR and FcεR1γ modifications allows NK cells to simultaneously recognize tumor antigens and stress-induced ligands, improving precision and potency.
- **Versatility Across Indications:** Tailored CAR designs (e.g., CD19, BCMA, CD33) make this platform adaptable for hematological malignancies and solid tumors, offering broad therapeutic potential.
- **“Off-the-Shelf” Treatment:** Leveraging NK cell sources such as NK92 cell lines or iPSC-derived NK cells supports scalable, allogeneic therapies with reduced risk of adverse effects like cytokine release syndrome.

STAGE OF DEVELOPMENT

Preclinical studies have demonstrated robust efficacy of FcεR1γ41BB and CAR-FcεR1γ constructs in enhancing NK cell-mediated cytotoxicity. Key results include:

- Increased NKp30, NKp46, and CD16 expression in FcεR1γ41BB-modified NK cells.

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OTHER INFORMATION

KEYWORDS

NK Cells, CAR-NK, Cancer Immunotherapy

CATEGORIZED AS

- Medical
  - Disease: Cancer
  - Therapeutics

RELATED CASES

2024-070-0

- Potent killing of cancer cells in vitro, including HLA-E+ targets, using CD19ScFv-CD8hinge-FcεR1γ41BB CAR constructs.
- Enhanced antibody-dependent cellular cytotoxicity (ADCC) with therapeutic antibodies such as Rituximab.

RELATED MATERIALS

- Fc?R1?-based activating chimeric antigen receptor enhanced natural killer cell function against HLA-E+ cells - 11/02/2025

PATENT STATUS

Patent Pending

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