Docket #: S18-453

Chimeric Antigen Receptors Targeting Glycipan-2

Researchers at Stanford have developed chimeric antigen receptors (CARs) that target glypican-2 (GPC2) and can be used to treat solid tumors. CAR-engineered T cells have shown great promise as cancer therapeutics. In CAR T cell therapy a patient's T cells are collected and engineered to produce CARs on their surface. These CARs then target and bind to a specific antigen on the patient's tumor cells to kill them. CARs, unlike naturally occurring T cell receptors, can directly recognize their target antigens without restriction. Thus, T cells engineered to express CARs have potential to generate high-levels of antitumor activity. Despite this potential only a few CARs targeting solid tumors have been developed, as many target antigens that are also present on normal cells which can lead to undesired off-target killing. Thus, new approaches that minimize off-target effects are needed. To help meet this need the inventors have developed CARs that selectively target GPC2. GPC2 has very restricted expression in normal tissue but is expressed on many hard-to-treat pediatric and adult solid tumors. This technology provides new CARs that may be used as therapeutics for difficult to treat solid tumor cancers.

Stage of Research
The inventors have engineered and optimized CARs targeting GPC2. Further, they have shown these CARs to be highly effective against GPC2 expressing malignancies in vitro and in vivo in murine xenograph models.

Applications

- CAR T cell immunotherapy for cancers expressing GPC2 including:
    - Glioblastoma
    - Small cell lung cancer
    - Uterine carcinoma
    - Neuroblastoma

    - Medulloblastoma

Advantages

- Novel therapeutic for difficult to treat cancers
    - Distinct from targets already available for CAR therapy of solid tumors
    - GPC2 is expressed in many incurable cancers
- Potential to minimize off target effects as GPC2 has minimal normal tissue expression
- GPC2 contributes to oncogenesis- less likely to be susceptible to antigen evasion resistance

Publications

- Heitzeneder, Sabine, et al. "GPC2-CAR T cells tuned for low antigen density mediate potent activity against neuroblastoma without toxicity." *Cancer Cell* (2021).

Patents

- Published Application: WO2020227447
- Published Application: 20220315665
- Published Application: 20260209384
- Issued: 12,630,646 (USA)

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