ACTA SCIENTIFIC CANCER BIOLOGY (ISSN: 2582-4473)

Volume 7 Issue 2 April 2023

Short Communication

CAR-T Therapy for Solid Cancer: Challenges and Solutions

Deepak Rohila*

Department of Pathology, Uniformed Services University of the Health Sciences and Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, USA

***Corresponding Author:** Deepak Rohila, Department of Pathology, Uniformed Services University of the Health Sciences and Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, USA.

Received: February 27, 2023

Published: March 27, 2023

CAR-T therapy, or chimeric antigen receptor T-cell therapy, has shown remarkable success in treating certain blood cancers, such as leukemia and lymphoma. However, the use of CAR-T therapy for solid tumors has been more challenging. Solid tumors are complex and heterogeneous, making it difficult to identify specific antigens that can be targeted by CAR-T cells. In addition, solid tumors often have a hostile microenvironment that can inhibit CAR-T cell function and survival.

Some of the major challenges in using CAR-T therapy for solid tumors are:

- **Antigen selection:** Finding an appropriate target antigen that is expressed on the surface of cancer cells, but not on healthy tissues, is crucial for the success of CAR-T therapy. However, solid tumors often have a limited number of target antigens, and some of these antigens may also be expressed on healthy tissues, leading to off-target toxicity.
- **Tumor heterogeneity:** Solid tumors are often composed of multiple cell types with different antigen expression profiles. This heterogeneity can make it difficult to identify a single target antigen that can be targeted by CAR-T cells.
- **Tumor microenvironment:** The microenvironment surrounding solid tumors can be hostile, with factors such as hypoxia, acidic pH, and immune-suppressive cells inhibiting CAR-T cell function and survival.
- **Trafficking and infiltration:** Getting CAR-T cells to the tumor site and having them effectively infiltrate the tumor is a significant challenge, particularly in the case of solid tumors that are often located in deep tissues.

Some potential solutions to these challenges are:

- **Dual-targeting:** Targeting multiple antigens on cancer cells could increase the specificity and efficacy of CAR-T therapy. This could be achieved by engineering CAR-T cells with multiple antigen-specific receptors or combining CAR-T therapy with other treatments that target different antigens.
- **Tumor-agnostic targeting:** Rather than targeting specific antigens, CAR-T therapy could be designed to target common tumor-associated markers, such as the glycoprotein mesothelin, which is expressed on multiple solid tumors.
- **Enhancing CAR-T cell persistence and function:** Strategies such as engineering CAR-T cells to resist immunosuppression, incorporating cytokine signaling to enhance T cell proliferation and persistence, and modifying the tumor microenvironment to be more favorable to CAR-T cell function could improve the efficacy of CAR-T therapy for solid tumors.
- **Improving delivery:** Approaches such as intratumoral injection, local administration of CAR-T cells, and using nanoparticles or viral vectors to facilitate CAR-T cell infiltration into tumors could improve the delivery and efficacy of CAR-T therapy for solid tumors.

In summary, while there are significant challenges to using CAR-T therapy for solid tumors, there are also promising strategies and approaches being developed to address these challenges and improve the efficacy of CAR-T therapy in treating solid cancers [1-5].

Bibliography

1. Hegde M., *et al*. "Tandem CAR T cells targeting HER2 and IL13Rα2 mitigate tumor antigen escape". *Journal of Clinical Investigation* 126.8 (2016): 3036-3052.

2. Newick K., *et al*. "CAR T Cell Therapy for Solid Tumors". *Annual Review of Medicine* 68 (2017): 139-152.

3. Drent E., *et al*. "Pre-clinical evaluation of CD38 chimeric antigen receptor engineered T cells for the treatment of multiple myeloma". *Haematologica* 101.5 (2016): 616-625.

4. Liu X., *et al*. "A Chimeric Switch-Receptor Targeting PD1 Augments the Efficacy of Second-Generation CAR T Cells in Advanced Solid Tumors". *Cancer Research* 76.6 (2016): 1578-1590.

5. Zhang E., *et al*. "Prospects for chimeric antigen receptor-modified T cell therapy for solid tumors". *Molecular Cancer* 17 (2018): 7.