New CAR T-cell therapy research shows potential in solid tumors

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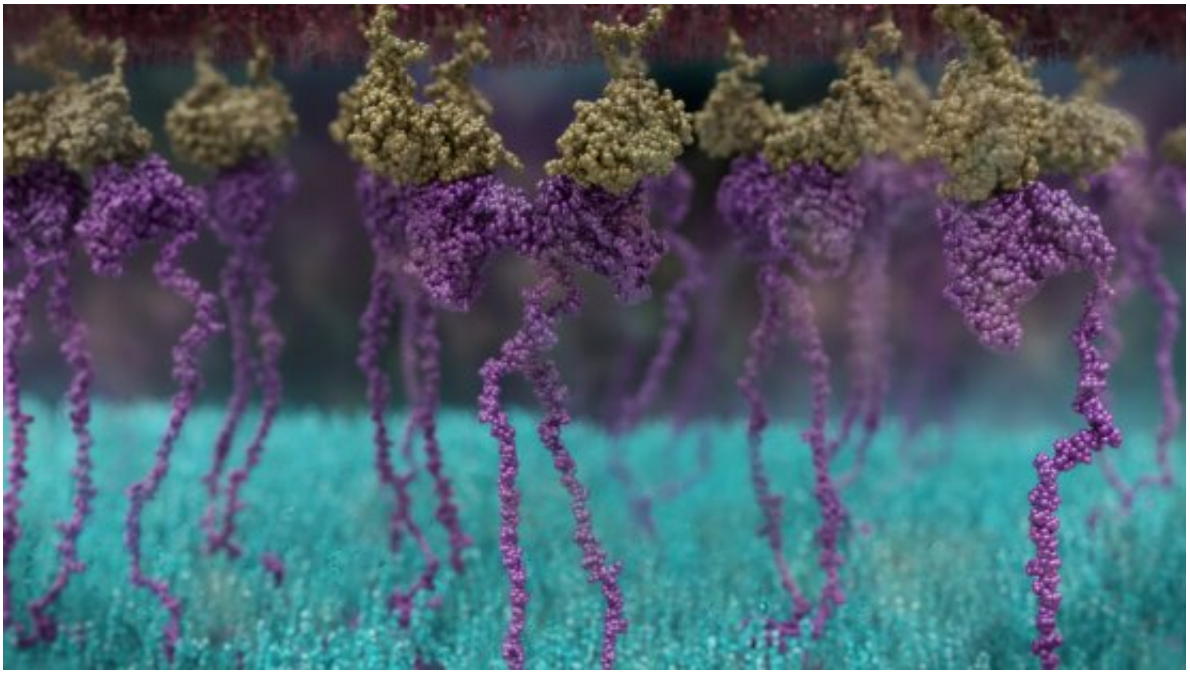

Credit: Peter MacCallum Cancer Center

Peter Mac researchers have developed a new approach to chimeric antigen receptor (CAR) T-cell therapy which has proven effective in fighting solid cancer tumors.

CAR T-cell therapy is an innovative form of immunotherapy that uses naturally occurring T-cells which form an essential part of the body's immune system to target and destroy infected cells. These T-cells are

collected, re-engineered with the CAR receptor, and then re-infused as a once-off procedure to fight the cancer cells.

This latest Peter Mac-led study—published in *Science Translational Medicine* this week—uses younger, stem-like T-cells rather than conventional T-cells. In an exciting development, these cells, called T stem-like CAR T-cells, have shown an increased ability to reproduce when carrying the CAR receptor.

Peter Mac Human Immunology Translational Lab Head, Professor Paul Neeson, said this study is a major step towards CAR T-cell therapy being effective in solid cancers.

"While CAR T-cell therapy has been approved in some types of blood cancers like leukemia, lymphoma and myeloma, the success of CAR T-cells in solid cancers is limited. This is due to factors including poor CAR T-cell expansion, persistence and exhaustion when fighting the tumor," he said.

"Importantly, these T stem-like CAR T-cells have improved anti-tumor function in the culture dish and in four pre-clinical models. In fact, they completely eradicated pre-existing solid tumors when combined with the immune checkpoint drug anti-PD1.

"Furthermore, they persist long-term, indicating these cells have all the hallmark traits of CAR T-cells which have had outstanding success in blood cancers."

The study first created a production protocol that generates fully functional stem-like CAR T-cells in an abbreviated six-day period instead of the standard 14 days, opening the door for a more cost-effective and scalable process in the future.

These significant results support the implementation of production strategies to generate stem-like CAR T-cells for clinical use.

"We would aim to use these cells in two pediatric leukemias that are resistant to treatment. We believe our protocol will harmonize the CAR T-cell product to one that has consistent anti-tumor function and the important ability to persist," Prof. Neeson said.

"Once we show these cells are safe, we will turn our attention to developing this treatment for pediatric solid cancers including osteosarcoma and neuroblastoma."

More information: Deborah Meyran et al, T STEM -like CAR-T cells exhibit improved persistence and tumor control compared with conventional CAR-T cells in preclinical models, *Science Translational Medicine* (2023). DOI: 10.1126/scitranslmed.abk1900

Provided by Peter MacCallum Cancer Center