The Latest Research Progress of CAR-T Cell Therapy

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Abstract

CAR-T (Chimeric Antigen Receptor T-Cell Immunotherapy), a chimeric antigen receptor T cell immunotherapy, has been in use for many years but has only been used in clinical practice in recent years. It has significant curative effect in the treatment of acute leukemia and non-Hodgkin's lymphoma, and is considered as one of the most promising approaches to treatment of cancer. As with all technologies, CAR-T technology has also undergone a long evolutionary process. It is during this series of evolution that CAR-T technology has gradually matured.

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CAR-T (Chimeric Antigen Receptor T-Cell Immunotherapy), a chimeric antigen receptor T cell immunotherapy, has been in use for many years but has only been used in clinical practice in recent years. It has significant curative effect in the treatment of acute leukemia and non-Hodgkin's lymphoma, and is considered as one of the most promising approaches to treatment of cancer. As with all technologies, CAR-T technology has also undergone a long evolutionary process. It is during this series of evolution that CAR-T technology has gradually matured.

The key to this new therapeutic strategy is to identify artificial receptors called chimeric antigen receptors (CARs) of target cells, and after genetic modification, patient T cells can express such CARs. In human clinical trials, scientists extracted a number of T cells from a patient's body through a process similar to dialysis. Then they genetically modified them in the laboratory and introduced the gene encoding this CAR, so that these T cells could express This new receptor. These genetically modified T cells are proliferated in the laboratory and then injected back into the patient. These T cells use the CAR receptors to bind to molecules on the surface of target cells, and this binding triggers an internal signal generation, and then this internal signal activates these T cells so potently that they quickly destroy the target cell.

In recent years, in addition to being used to treat acute leukemia and non-Hodgkin's lymphoma, CAR T immunotherapy has also been improved to treat diseases such as solid tumors, autoimmune diseases, HIV infection and transplant rejection.

Chimeric antigen receptor therapy was rated as the largest research breakthrough in 2017 by the American Society of Clinical Oncology. This personalized gene therapy uses the patient's own immune cells to fight cancer. The FDA has now approved CAR T cell therapy products for adult patients with diffuse large B-cell lymphoma and acute lymphoblastic leukemia in children and young adults. Researchers at the Moffett Cancer Research Center are now extending this revolutionary therapy to other cancers.

One potentially beneficial disease is acute myeloid leukemia (AML), which is the most common acute

leukemia in adults. More than half of AML patients will fade after chemotherapy. However, there are also many patients with residual cancer cells that can tolerate chemotherapy and escape the immune system and will therefore relapse. A new Phase 1 clinical trial (Therapeutic Immunotherapy with NKG2D, THINK) is investigating Celyad's novel CAR T therapy (CYAD-01, which genetically engineered immune cells to express natural killer cell receptors) to target leukemia Efficacy.

According to a recent case study published in Haematologica, a patient undergoes bone marrow transplantation after being treated with CAD-01, and there is still no evidence of recurrence after 9 months.

In another study, scientists from Thomas Jefferson University in Philadelphia, Pennsylvania, USA, led by Dr. Adam E. Snook, PhD in pharmacology and experimental therapeutics, used human-specific GUCY2C-directed single-chain variable regions as targets. Humans express GUCY2C metastasis of the basis of the composition of the CAR. Researchers have shown that upregulation of activation markers, cytokine secretion, and killing of cancer cells expressing GUCY2C (but not GUCY2C deficiency) in vitro indicate that human GUCY2C-targeted mouse CAR T cells can promote antigen-specific T cell activation.

In the homologous mouse model, the researchers found that GUCY2C CAR T cells can protect mice from lung metastasis of colorectal cancer in the long term. GUCY2C CAR T cells can recognize and kill human colorectal cancer cells that exogenously express GUCY2C, allowing long-term survival of immunodeficient mice transplanted with human tumors.

Overall, the researchers found in this study a human GUCY2C-specific CAR T cell therapy that may be developed as an effective therapy for metastatic colorectal cancer that expresses GUCY2C.

Author Bio
As a global company, Creative Biolabs has more than 200 talented and well-trained scientists located in different continents working closely with partners from the entire world to develop and produce medicines of tomorrow. Specifically, we are the established leading expert in TCR T and CAR T&NK cell immune therapy development, as we offer the one-stop custom services that cover the entire new drug development pipeline. Additionally, we also offer an exclusive line of ready-to-use TCR and CAR T&NK cell construction products, such as virus packaging, purification, expansion and titer determination kits. Furthermore, we have built up a unique unparalleled CAR construction and production platform for all four CAR generations.