

Does CAR-T Immunotherapy Indicate that Cancer Will Be Conquered?

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Abstract

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Although modern medicine is already very developed, cancer is still one of the most deadly diseases in humans.

The exploration of cancer treatment methods has experienced the development of surgery, chemotherapy, radiotherapy and biological therapy. As a kind of biological therapy, tumor immunotherapy has made a major breakthrough in the anti-tumor research in the past decade. Especially worth mentioning is the chimeric antigen receptor T cells (CAR-T), which is an exciting clinical effect and has broad application prospects.

It can be said that it is still too early to say that it can completely overcome cancer, and it has a long way to go. At present, CAR-T has only a certain clinical effect on hematological tumors. In the application of solid tumors, there are still many places to be studied and tried. CAR-T is the first step in the long march of cancer. If you want to further explore the relationship between CAR-T and cancer, you must have a certain understanding and understanding of CAR-T.

What is CAR-T?

CAR T is a T cell modified by genetic recombination technology. CAR in CAR-T is a recombinant receptor, and its structure mainly includes three parts: extracellular antigen binding domain, transmembrane domain and intracellular signal domain.

As an effector cell of the human immune system, T cells are the only cells known to specifically kill tumors. However, before killing tumor cells, T cells must first "transform" into activated T cells, and the "transformation" process requires activation of both signals:

The first signal activation mode is that T cell receptors (TCRs) bind to major histocompatibility class (MHC) on antigen presenting cells;

The second signal is activated by the co-stimulatory molecule on the antigen-presenting cell. The B7

family molecule binds to the ligand CD28 molecule on the T cell. Under the condition that both signals are activated, T cells can change from resting state to activated T cells, thereby interfering and killing tumor cells by secreting granzyme, perforin, inducing and releasing pro-inflammatory factors.

In tumor patients, a large number of tumor cells can down-regulate MHC expression, which in turn affects T cell activation and causes "immune escape". To solve this problem, the scientists invented CAR-T cell immunotherapy, which genetically modified T cells *in vitro* to make them *in vitro* activated T cells.

CAR-T treatment process

In short, it is mainly divided into three steps. The first step is to extract and isolate T cells from the patient (or others). The second step is to genetically modify the T cells by the technician, and then transfect the designed CAR into T cells are expressed into CAR-T cells and expanded *in vitro*. In the third step, the amplified CAR-T cells are returned to the patient, and the CAR-T cells can exert anti-tumor effects *in vivo*. Of course, in this process, hospitalization should be closely monitored for vital signs to respond to adverse reactions in a timely and effective manner.

The emergence of CAR-T therapy has brought hope to patients with cancer, especially those with hematological malignancies. Although it is impossible to achieve the current situation, please give CAR-T and the research team enough time and patience, I believe not far away. In the future, the design of CAR-T will become more mature and the adverse reactions will be improved. At the same time, we also expect that CAR-T cell drugs for the treatment of solid tumors will appear in front of our eyes as soon as possible, bringing good news to more cancer patients.

Chimeric antigen receptor (CAR)-engineered T cell therapy is the most promising immunotherapy for cancer treatment, which has shown remarkable ability to eliminate various kinds of tumors. It is expected to become the mainstay of cancer immunotherapy for treating more patients.

About Creative Biolabs

As a global company, Creative Biolabs have 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 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.