Adoptive cell therapy for cancer teatment.

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Abstract

Adoptive cell therapy, also referred to as cellular immunotherapy, is a sort of treatment that eliminates cancer by using the cells of our immune system.

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Description

Adoptive cell therapy, also referred to as cellular immunotherapy, is a sort of treatment that eliminates cancer by using the cells of our immune system.

Our immune system is capable of recognizing and eliminating cells that have become infected or damaged as well as those that have become cancerous. In the case of cancer, immune cells referred to as killer T cells are particularly powerful against cancer, as they have the ability to bind to markers known as antigens on the surface of cancer cells. This natural ability is advantageous to cellular immunotherapies as it can be deployed in different ways:

• Tumor-Infiltrating Lymphocyte (TIL) therapy

• Engineered T Cell Receptor (TCR) therapy

• Chimeric antigen receptor (CAR) T cell therapy

• Natural Killer (NK) cell therapy

Today, new options are provided to cancer patients as the cell therapies are constantly evolving and improving. In a variety of cancer types in clinical trials, cell therapies are currently being evaluated, both alone and in combination with other treatments.

Cancer cells are often targeted by the naturally occurring T cells in the cancer patients as they are capable of targeting these cancer cells. These T cells are foremost powerful immune cells in our body, and come in several types. The "killer" T cells, especially, are capable of recognizing and eliminating cancer cells in a very precise way.

Tumor-infiltrating lymphocyte (TIL) therapy is one form of adoptive cell therapy that attempts to address these issues. This approach harvests naturally occurring T cells that have already infiltrated patients' tumors, and then activates and expands them. Then, these tumors are seeking out and destroyed by the large numbers of these activated T cells which are re-infused into patients.

Unfortunately, not all patients have T cells that have already recognized their tumors except for variety of reasons, these T cells might not be capable of being activated and expanded to sufficient numbers to enable rejection of their tumors. For these patients, doctors may employ an approach referred to as engineered T cell receptor (TCR) therapy.

T cells from patients is taken in this approach, but rather than just activating and expanding the available anti-tumor T cells, the T cells also can be equipped with a new T cell receptor that permits them to focus on specific cancer antigens. By allowing doctors to settle on an optimal target for every patient's tumor and distinct sorts of T cell to engineer, the treatment is often further personalized to individuals and, ideally, provide patients with hope for relief.

The above mentioned TIL and TCR therapies can only target and eliminate cancer cells that present their antigens during a certain context (when the antigens are bound by the main major histocompatibility complex, or MHC).

Latest advances in cell-based immunotherapy have enabled doctors to overcome this limitation. Scientists equip a patient's T cells with an artificial receptor referred to as a CAR, which stands for chimeric antigen receptor.

CARs have advantage as they have ability to bind to cancer cells even if their antigens aren't presented on the surface via MHC, which may render more cancer cells vulnerable to their attacks. However, CAR T cells can only recognize antigens themselves and naturally expressed on the cell surface, therefore the range of potential antigen targets is smaller than with TCRs

CARs are being used in a variety of strategies for many cancer types. One approach currently in clinical trials is using stem cells to make a limitless source of off-the-shelf CAR T cells. This may have application to only selected settings, but could allow doctors to treat patients in a timelier fashion.

More recently, adoptive cell therapy strategies have begun to include other immune cells like Natural Killer (NK) cells. One application being explored within the clinic involves equipping these NK cells with cancer-targeting CARs.

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