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Perspective

Types of Adoptive Cell Therapies

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DESCRIPTION

These therapies use patients' own immune cells to attack tumors more powerfully by increasing the number and effectiveness of the body's own immune cells, leading to a stronger immune response against the cancer.

Chimeric antigen receptor T-cell therapy

T cells taken from the patient's blood are altered in the laboratory to add specific man-made receptors (CARs) that help the T cells identify specific cancer cells. These altered T cells are then grown in the lab to increase their numbers, before returning to the patient's body to seek out and destroy the specific cancer. Before the modified T cells are returned to the patient, they must undergo chemotherapy or radiation to deplete the patient's unaltered immune cells, which could prevent the modified T cells from effectively fighting the cancer cells. This type of therapy has been shown to be successful in cancer cells where chemotherapy has failed in the past in some types of lymphoma (acute lymphoblastic leukemia and B-cell lymphoma) and relapsed or difficult-to-treat leukemia.

CAR natural killer cell therapy

Tumor cells are known to have adapted mechanisms to evade detection and inhibit the effectiveness of NK cells in identifying and killing abnormal cells, thereby hindering the immune response. Similar to CART therapy, NK cells are removed and modified in the laboratory to better identify and kill specific cancer cells. However, it is not required that the CAR-NK cells match a particular patient. While CAR T-cell therapies have already been approved by the FDA, CAR NK-cell therapy is still a new immunotherapy available only through clinical trials.

Tumor infiltrating lymphocytes therapy

TILs are white blood cells that play an important role in antitumor immunity, expressing a variety of different antigens to regulate the immune response and suppress tumor growth. Research has shown that increased immune cell expression correlates with more favorable clinical outcomes in malignant cancers including colorectal, lung and breast cancer.

TIL expression serves as a prognostic biomarker in various cancers, providing a new avenue for targeted immunotherapy. Similar to CAR T-cell therapy, TIL therapy uses T-cells isolated from a patient's surgically removed tumor and expanded in the laboratory, significantly increasing the number of TILs, which are normally very low, before reintroducing them into the patient to improve their function against cancer.

Endogenous T-cell therapy

Naturally expressed tumor-reactive T cells are taken from the patient's blood, filtered to select and strengthen only those T cells capable of recognizing cancer cells, and expanded in the laboratory before being reintroduced into the patient. Although initially a very laborious process, research has made significant progress in isolating and increasing the expression of these T cells. Small initial clinical trials have shown complete and durable responses in metastatic patients who have failed traditional chemotherapy and even immune checkpoint immunotherapies.

Oncolytic viral therapy

This type of therapy uses a non-pathogenic, genetically modified virus to help the immune system destroy cancer cells without harming healthy cells. The virus is directly injected into the tumor, where it is able to enter the cancer cells and replicate uncontrollably until the cancer cell bursts and dies. Cancer cells release antigens upon apoptosis that trigger the immune system to launch a targeted response against all cancer cells with the same antigens.

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