

Immunotherapy for Cancer

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Introduction

Immunotherapy is an application of immunology (branch of biological therapy) to treat cancer, which helps immune system to fight cancer. Biological therapy is a type of treatment where the disease is treated using the substances made from living organisms. These substances can be natural (obtained from the body) or synthetic (made in laboratory). Biological therapies stimulate or suppress the immune system to help body fight cancer. Some biological therapies prevent the cancer cells from growing or destroy them by targeting the specific cancer cells. Immune systems normal function is to detect and kills abnormal cells and prevent the growth of cancer cells. Tumor-infiltrating lymphocytes (TILs) are the immune cells occasionally found around the tumors, as a response to tumor. However, the immune system attempts to suppress the cancer cell progression, they have their own way to bypass immune system's target. Cancer cells have genetic changes, proteins on the surface which makes them invisible. Immunotherapy helps body immune system to fight better against cancer.

Types of Immunotherapies

Types of immunotherapies include Immune checkpoint inhibitors, T-cell transfer therapy, Monoclonal antibodies, treatment vaccines and immune system modulators.

Immune Checkpoint Inhibitors (ICIs)

It also called as Immunomodulators, are the drugs that block immune checkpoint (a part of immune system) to stop immune responses from being effective. This checkpoint inhibitor targets PD-1/PD-L1 pathway. These checkpoints are blocked to allow the immune system to respond strongly.

T-Cell Transfer Therapy

It also called as adoptive cell therapy is a type of treatment to enhance the natural ability of the T-cells to fight cancer. In this treatment, the immune cells (the active cells found around the tumor) are removed, modified and re-introduced into the body that targets the cancer cells and destroy them.

Monoclonal Antibodies (MAB)

These are synthetic immune system proteins. They bind to specific cancer cells and help the immune system to seek and destroy the cancer cells.

Treatment Vaccines or Cancer Vaccines

It stimulates the immune system's response to cancer cells. Routes of administration of immunotherapy include Intravenous (IV), Oral, Tropical and Intravesical.

Immune System Modulators

Enhance immune systems response against cancer cells. Cytokines, an immune system modulator are a proteins made by white blood cell (WBC), which play an essential role in body's immune responses and its ability to response to cancer cells. Cytokines used in the treatment of cancer include.

Interferons (INFs)

These are the proteins synthesized and released by the host cells in response to the presence of foreign bodies or tumor cells in the body. They trigger the protective defense of the immune system. INF-alpha is one type of interferon which can improve the immune response to cancer by activating certain white blood cells such as natural killer cells and dendritic cells.

Interleukins (ILs)

are a sub-group of cytokines which are rapidly stimulated in response to presence of infectious agents. One of the ILs is IL-2 also called as T-cell growth factor. IL-2 helps in producing certain substances to target cancer cells. Hematopoietic growth factors are cytokines which helps to promote the growth of blood cells that are damaged by chemotherapy thus reducing side effects of cancer treatment.

Bacillus Calmette Guerin (BCG)

It is the weakened form of bacteria that causes tuberculosis that does not cause disease in humans. BCG is used in the treatment of bladder cancer. Immunomodulatory

drugs include Thalidomine, Lenadomine, Pomalidomine, Imiquimod. Pembrolizumab, Transtuzumab, Nivolumab, Transtuzumab and Ramucirumab.

Side Effects

Immunotherapy effects people in different ways, it depends on the type of treatment and the drug, how advanced cancer stage is, health of the person is before the treatment. Immune-modulating agents can cause flu-like symptoms including fever and chills, dizziness, headache, loss of appetite, shortness of breath, muscle or joint pain, nausea, fatigue.

Cytokines may cause some serious side effects including trouble in breathing, high or low blood pressure, serious allergic reactions, clotting in blood, low blood counts which may lead to bleeding, skin reactions like rash, swelling, soreness, itchiness and burning at the site of injection.

Conclusion

Immunotherapy is an evolving cancer treatment. The treatment showed promising results. The FDA approved the use of immunomodulators with chemotherapy as second line treatment or can be used by itself after the surgery.

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