Role of immunotherapy in non-small cell lung cancer.

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Abstract

Immunotherapy has emerged as a promising treatment strategy for non-small cell lung cancer (NSCLC), a type of lung cancer that accounts for the majority of cases. NSCLC cells can evade the immune system, but immunotherapy drugs such as checkpoint inhibitors can help to activate T cells and enhance immune response against cancer cells. While not all patients respond to immunotherapy, those who do often experience durable responses with fewer side effects than traditional chemotherapy. Ongoing research is focused on identifying biomarkers that can predict response to immunotherapy and developing combination therapies to further improve outcomes for patients with NSCLC.

Keywords: Immunotherapy, Non-small cell lung cancer, Biomarkers, Neoantigens.

Introduction

Non-small cell lung cancer (NSCLC) is one of the most common forms of lung cancer, accounting for about 85% of all cases. It is often diagnosed at an advanced stage, which limits the effectiveness of traditional treatments such as surgery and chemotherapy. However, recent advancements in cancer treatment have led to the development of immunotherapy, which has shown promising results in the treatment of NSCLC. Immunotherapy is a type of cancer treatment that uses the body's immune system to fight cancer. The immune system is responsible for identifying and destroying abnormal cells in the body, including cancer cells. However, cancer cells can evade the immune system by producing proteins that prevent immune cells from recognizing them as abnormal. Immunotherapy works by blocking these proteins, allowing the immune system to recognize and attack cancer cells [1].

The two main types of immunotherapy used in the treatment of NSCLC are immune checkpoint inhibitors and CAR-T cell therapy.

Immune checkpoint inhibitors work by blocking proteins that inhibit the immune system's response to cancer cells. The two most commonly targeted proteins are programmed cell death protein 1 (PD-1) and cytotoxic T-lymphocyte-associated protein 4 (CTLA-4). PD-1 is expressed on the surface of T cells, which are a type of immune cell that plays a critical role in the immune response. When PD-1 binds to its ligand, which is expressed on the surface of cancer cells, it inhibits the T cell response. By blocking PD-1, immune checkpoint inhibitors allow T cells to recognize and attack cancer cells. CTLA-4 is another protein that inhibits the immune response, and blocking it has a similar effect to PD-1 inhibitors [2].

CAR-T cell therapy is a type of immunotherapy that involves modifying T cells in a laboratory to express chimeric antigen receptors (CARs) that recognize specific proteins on the surface of cancer cells. These modified T cells are then infused back into the patient, where they recognize and destroy cancer cells.

Immunotherapy has revolutionized the treatment of NSCLC and has become a standard of care for many patients. However, there are still challenges to be addressed in order to improve the effectiveness of this type of treatment. One of the main challenges is identifying biomarkers that can predict which patients are most likely to respond to immunotherapy. PD-L1 expression is currently the most widely used biomarker, but it is not always a reliable predictor of response. Other biomarkers, such as tumor mutational burden and immune cell infiltration, are being studied to identify better predictors of response to immunotherapy [3].

Despite the promising results of immunotherapy in the treatment of NSCLC, not all patients respond to this type of treatment. One potential reason for this is the presence of other inhibitory proteins that prevent the immune system from recognizing cancer cells. Additionally, some tumors may have low levels of PD-L1 expression, which can limit the effectiveness of PD-1 inhibitors. To address these limitations, researchers are exploring the use of combination therapies that target multiple immune checkpoint proteins or use a combination of immunotherapy and chemotherapy. For example, the combination of nivolumab and ipilimumab, a CTLA-4 inhibitor, has been shown to improve overall survival in patients with advanced NSCLC compared to chemotherapy alone. Similarly, the combination of pembrolizumab and chemotherapy has been shown to improve overall survival and PFS in patients with advanced NSCLC [4].

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Conclusion

Immunotherapy has emerged as a promising treatment option for patients with NSCLC. PD-1 inhibitors, PD-L1 inhibitors, and CAR-T cell therapy have shown efficacy in clinical trials, and combination therapies are being explored to improve response rates. Although challenges remain, such as identifying reliable biomarkers and addressing resistance mechanisms, the future of immunotherapy in the treatment of NSCLC looks bright. As research continues in this area, we can hope to see even more effective and personalized treatments for patients with NSCLC.

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