

# Navigating the Side Effects of Immune Checkpoint Inhibitors

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## ABOUT THE STUDY

Immune Checkpoint Inhibitors (ICIs) are a type of immunotherapy that works by blocking certain molecules called checkpoints that prevent the immune system from attacking cancer cells. These drugs have revolutionized the treatment of several types of cancer, including melanoma, lung cancer, and kidney cancer. In this article, we will discuss immune checkpoint inhibitors in detail, including their mechanism of action, clinical applications, and potential side effects.

### Immune checkpoint inhibitors

Immune checkpoint inhibitors are drugs that target proteins on the surface of T cells and other immune cells. These proteins, called checkpoint proteins, are designed to prevent the immune system from attacking healthy cells in the body. However, cancer cells can also use these proteins to evade the immune system and grow unchecked.

Immune checkpoint inhibitors work by blocking these checkpoint proteins, allowing the immune system to recognize and attack cancer cells. The two main types of checkpoint proteins that ICIs target are PD-1 (Programmed cell Death protein 1) and CTLA-4 (Cytotoxic T-Lymphocyte-Associated protein 4).

### Mechanism of action

PD-1 and CTLA-4 are proteins that are expressed on the surface of T cells, which are a type of immune cell. These proteins act as brakes on the immune system, preventing T cells from attacking healthy cells in the body. When T cells encounter cancer cells, they express PD-1 or CTLA-4, which allows cancer cells to evade the immune system and grow unchecked.

ICIs work by blocking PD-1 or CTLA-4, which prevents cancer cells from evading the immune system. By blocking these checkpoint proteins, ICIs allow T cells to recognize and attack cancer cells. This can lead to the destruction of cancer cells and the prevention of tumor growth.

### Clinical applications

Immune checkpoint inhibitors have been shown to be effective in the treatment of several types of cancer, including melanoma, lung cancer, kidney cancer, bladder cancer, and others. The FDA has approved several ICIs for the treatment of these cancers, including pembrolizumab, nivolumab, ipilimumab, atezolizumab, and others.

**Melanoma:** ICIs have been shown to be particularly effective in the treatment of melanoma, a type of skin cancer. In clinical trials, pembrolizumab and nivolumab, both PD-1 inhibitors, have been shown to improve survival in patients with advanced melanoma. These drugs have become standard of care for the treatment of advanced melanoma.

**Lung cancer:** ICIs have also been shown to be effective in the treatment of Non-Small Cell Lung Cancer (NSCLC), the most common type of lung cancer. In clinical trials, pembrolizumab and nivolumab have been shown to improve survival in patients with advanced NSCLC. Atezolizumab, a PD-L1 inhibitor, has also been approved for the treatment of NSCLC.

**Kidney cancer:** ICIs have also been shown to be effective in the treatment of kidney cancer. Nivolumab and ipilimumab, both immune checkpoint inhibitors, have been shown to improve survival in patients with advanced kidney cancer. These drugs are often used in combination with other treatments, such as targeted therapies.

**Bladder cancer:** ICIs have also been shown to be effective in the treatment of bladder cancer. Atezolizumab and pembrolizumab have been approved for the treatment of bladder cancer that has spread or cannot be removed by surgery. These drugs have been shown to improve survival in patients with advanced bladder cancer.

### Side effects

While immune checkpoint inhibitors can be effective in the treatment of cancer, they can also cause significant side effects. The most common side effects of ICIs are immune-related Adverse

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Events (irAEs). These can affect any organ in the body, including the skin, lungs, liver, and intestines. Skin reactions, such as rash and itching, are common side effects of ICIs. More severe skin reactions, such as blistering and peeling, can also occur. Lung problems, such as coughing and shortness of breath, can also occur. More severe lung problems, such as pneumonia, can also occur. Liver problems, such as elevated liver enzymes, can also occur with ICIs. More severe liver problems, such as hepatitis, can also occur. Intestinal problems, such as diarrhea and abdominal pain, can also occur. More severe intestinal problems, such as colitis, can also occur. Other less common side effects of ICIs include endocrine problems, such as thyroid dysfunction, and neurological problems, such as neuropathy. Immune checkpoint inhibitors have revolutionized the treatment

of several types of cancer, including melanoma, lung cancer, and kidney cancer. By blocking certain molecules that prevent the immune system from attacking cancer cells, ICIs allow T cells to recognize and destroy cancer cells. However, ICIs can also cause significant side effects, including immune-related adverse events that can affect any organ in the body. As with any cancer treatment, the decision to use immune checkpoint inhibitors should be made in consultation with a healthcare provider, taking into account the individual patient's medical history and current health status. Close monitoring for side effects is essential for patients receiving ICIs. While ICIs have shown significant promise in the treatment of cancer, continued research is needed to optimize their use and minimize their side effects.