

Activating the Immune System: Recent Advances in Melanoma Immunotherapy

Brigham Santos*

Department of General Surgery, University of Hague, Hague, Netherlands

Commentary

Received: 27-Dec-2024, Manuscript No. MCO-24-156758; **Editor assigned:** 01-Jan-2025, PreQC No. MCO-24-156758 (PQ); **Reviewed:** 15-Jan-2025, QC No. MCO-24-156758; **Revised:** 07-Mar-2025, Manuscript No. MCO-24-156758 (R); **Published:** 14-Mar-2025, DOI: 10.4172/medclinoncol.9.01.004.

***For Correspondence:**

Brigham Santos, Department of General Surgery, University of Hague, Hague, Netherlands,

E-mail:

santos.186@gmail.com

Citation: Santos B. Activating the Immune System: Recent Advances in Melanoma Immunotherapy. Med Clin Oncol. 2025;09:004.

Copyright: © 2025 Santos B. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

DESCRIPTION

Melanoma, a form of skin cancer originating from melanocytes, is one of the most aggressive cancers and has a high propensity for metastasis. Over the years, advancements in the treatment of melanoma have significantly improved patient outcomes, particularly with the introduction of immunotherapy. Immunotherapy harnesses the body's immune system to target and destroy cancer cells, offering a promising alternative to traditional treatments like surgery, chemotherapy, and radiation. The rapid progress in immunotherapy for melanoma has transformed the landscape of cancer treatment, providing new hope for patients with advanced and metastatic melanoma.

Historically, melanoma treatment was limited to surgical resection, often only effective in the early stages of the disease. Once melanoma metastasized, treatment options were scarce, and survival rates were poor. However, the emergence of immune checkpoint inhibitors in recent years has revolutionized the treatment paradigm. Checkpoint inhibitors work by blocking proteins that prevent immune cells from attacking cancer cells. The two most prominent checkpoint inhibitors in melanoma treatment are programmed cell death protein 1 (PD-1) inhibitors and Cytotoxic T-Lymphocyte-Associated protein 4 (CTLA-4) inhibitors.

PD-1 inhibitors, such as pembrolizumab and nivolumab, work by blocking the PD-1 receptor on T-cells, preventing its interaction with PD-L1, a protein often expressed on melanoma cells. This interaction typically suppresses the immune response, allowing the tumor to evade immune surveillance. By inhibiting this pathway, PD-1 inhibitors reinvigorate T-cells and enable them to recognize and attack melanoma cells. These drugs have demonstrated remarkable efficacy, with some patients experiencing long-term remission, even in advanced stages of the disease.

CTLA-4 inhibitors, including ipilimumab, target the CTLA-4 receptor on T-cells, which normally acts as a brake on the immune response. By inhibiting CTLA-4, these drugs stimulate the immune system to mount a more aggressive attack on the tumor. When used in combination with PD-1 inhibitors, CTLA-4 inhibitors have shown even more significant results, increasing the likelihood of durable responses and improving overall survival rates. This combination therapy has become a standard treatment for patients with advanced melanoma and has contributed to improved survival outcomes in clinical trials.

In addition to immune checkpoint inhibitors, other immunotherapeutic strategies have been explored, including cancer vaccines and Adoptive Cell Transfer (ACT) therapy. Cancer vaccines aim to stimulate the immune system by introducing tumor-specific antigens, thereby prompting an immune response against the cancer. One such vaccine, Talimogene laherparepvec (T-VEC), is a genetically modified herpes simplex virus designed to selectively infect and kill tumor cells while also stimulating a broader immune response. Although T-VEC has demonstrated some success, its clinical use remains limited and is often combined with other therapies for optimal results.

Adoptive Cell Transfer (ACT) therapy involves extracting T-cells from a patient's tumor, expanding them in the laboratory, and reintroducing them into the body to enhance the immune response against melanoma. This personalized approach has shown promise in some patients, particularly those with metastatic melanoma. While ACT is highly effective in a subset of patients, it remains an expensive and complex procedure, limiting its widespread application.

CONCLUSION

The advances in immunotherapy for melanoma have significantly changed the prognosis for patients with this aggressive cancer. Immune checkpoint inhibitors, cancer vaccines, and adoptive cell transfer therapy have all shown promising results, particularly when used in combination. While challenges such as treatment resistance and immune-related side effects remain, ongoing research continues to refine these therapies and explore new ways to enhance their effectiveness. As our understanding of melanoma immunotherapy deepens, it is likely that new strategies will emerge, further improving the survival and quality of life for melanoma patients.