Novel targeted therapies for cancer treatment: From bench to bedside.

John Mathway*

Department of Cancer Biology, University of Texas MD Anderson Cancer Center, USA

Abstract

Cancer is a complex disease that arises from genetic and epigenetic alterations in cells that result in uncontrolled proliferation and metastasis. The traditional approach to cancer treatment has been based on surgery, chemotherapy, and radiation therapy. However, these treatments have limitations and are often associated with significant side effects. In recent years, there has been a paradigm shift in cancer therapy towards targeted therapies that specifically target cancer cells while sparing normal cells. This article will provide an overview of the latest advances in targeted therapies for cancer treatment, from bench to bedside.

Keywords: Novel, Targeted therapies, Cancer treatment.

Introduction

Targeted therapies are a class of cancer treatments that target specific molecules involved in cancer development and progression. These molecules may include proteins, receptors, enzymes, and other signaling molecules. Targeted therapies can be designed to block the activity of these molecules or to activate them in a way that leads to cancer cell death. Unlike traditional chemotherapy, targeted therapies are often associated with fewer side effects because they selectively target cancer cells. Targeted therapies are developed through a process that begins with laboratory research and preclinical studies in animal models. Once a potential target molecule is identified, drugs that interact with the target are designed and tested in vitro and in vivo. Clinical trials are then conducted to evaluate the safety and efficacy of the drug in cancer patients. If the drug is found to be effective, it may be approved by regulatory agencies for use in cancer treatment.

Types of targeted therapies

There are several types of targeted therapies that are currently used in cancer treatment, including:

Monoclonal antibodies (mAbs): Monoclonal antibodies are laboratory-produced molecules that are designed to recognize and bind to specific proteins on the surface of cancer cells. By binding to these proteins, mAbs can block their activity or target the cancer cells for destruction by the immune system. Some examples of mAbs that are used in cancer treatment include trastuzumab (Herceptin®) for HER2-positive breast cancer, bevacizumab (Avastin®) for various cancers, and rituximab (Rituxan®) for certain types of lymphoma [1].

Small molecule inhibitors: Small molecule inhibitors are drugs that are designed to block the activity of enzymes or other signaling molecules that are involved in cancer development and progression. These drugs are often administered orally and can be effective in treating cancers that have specific mutations or genetic alterations. Examples of small molecule inhibitors that are used in cancer treatment include imatinib (Gleevec®) for chronic myeloid leukemia, vemurafenib (Zelboraf®) for BRAF-mutated melanoma, and crizotinib (Xalkori®) for ALK-positive non-small cell lung cancer.

Immunotherapy: Immunotherapy is a type of cancer treatment that harnesses the power of the immune system to recognize and destroy cancer cells. This can be achieved through the use of checkpoint inhibitors, which block molecules that inhibit the immune system, or through the use of chimeric antigen receptor (CAR) T cell therapy, which involves genetically modifying a patient's own T cells to recognize and attack cancer cells. Examples of immunotherapy drugs that are used in cancer treatment include pembrolizumab (Keytruda®) for various cancers and axicabtagene ciloleucel (Yescarta®) for certain types of lymphoma [2].

Challenges in targeted therapies

Although targeted therapies have revolutionized cancer treatment, there are still several challenges that need to be addressed. One of the main challenges is the development of resistance to targeted therapies. Cancer cells can develop mutations or alternative pathways that allow them to bypass the effects of the drug, leading to treatment failure. To overcome this challenge, researchers are exploring combination therapies that target multiple pathways or molecules to prevent the development of resistance.

Another challenge is the identification of suitable targets for therapy. Not all cancers have specific targetable molecules, and some targets may be shared between normal and cancer cells, leading to off-target effects. Additionally, some targets

***Correspondence to:** John Mathway, Department of Cancer Biology, University of Texas MD Anderson Cancer Center, USA. E-mail: john.mathway@hotmail.com

***Received:** 28-Apr-2023, Manuscript No. AAMOR-23-95108; **Editor assigned:** 01-May-2023, PreQC No. AAMOR-23-95108(PQ); **Reviewed:** 15-May-2023, QC No AAMOR-23-95108; **Revised:** 19-May-2023, Manuscript No. AAMOR-23-95108(R); **Published:** 26-May-2023, DOI:10.35841/aamor-7.3.176*

***Citation:** Mathway J. Novel targeted therapies for cancer treatment: From bench to bedside. J Mol Oncol Res. 2023;7(3):176*

may only be expressed in certain subsets of cancer cells, making it difficult to identify patients who would benefit from the therapy [3].

Finally, targeted therapies can be expensive, and access to these treatments may be limited in some regions of the world. This highlights the need for continued research into more affordable and accessible targeted therapies.

Future directions

Despite the challenges, targeted therapies continue to be an area of active research and development. There are several promising approaches that are currently being explored, including:

Personalized medicine: Personalized medicine involves tailoring cancer treatment to the specific genetic and molecular characteristics of the patient's tumor. This approach can improve treatment outcomes by identifying the most effective targeted therapies for each individual patient [4].

Combination therapies: Combination therapies involve using multiple targeted therapies or combining targeted therapies with other treatments such as chemotherapy or radiation therapy. This approach can help overcome the problem of resistance and improve treatment efficacy.

Novel targets: Researchers are constantly identifying new targets for cancer therapy through advances in genomic and proteomic research. These new targets may provide more effective and specific therapies for certain types of cancer [5].

Conclusion

Targeted therapies have revolutionized cancer treatment, providing more effective and less toxic alternatives to traditional chemotherapy. However, there are still challenges that need to be addressed, including the development of resistance, the identification of suitable targets, and access to affordable treatments. Future research into personalized medicine, combination therapies, and novel targets will be key to advancing the field of targeted therapies and improving outcomes for cancer patients.

References

1. Wrensch M, Minn Y, Chew T, et al. Epidemiology of primary brain tumors: current concepts and review of the literature. Neuro-Oncol. 2002;4(4):278-99.
2. Ron E, Modan B, Boice Jr JD, et al. Tumors of the brain and nervous system after radiotherapy in childhood. N Engl J Med. 1988;319(16):1033-9.
3. Burger PC, Vogel FS, Green SB, et al. Glioblastoma multiforme and anaplastic astrocytoma pathologic criteria and prognostic implications. Cancer. 1985;56(5):1106-11.
4. Pignatti F, Van Den Bent M, Curran D, et al. Prognostic factors for survival in adult patients with cerebral low-grade glioma. J Clin Oncol. 2002;20(8):2076-84.
5. Quinn JA, Reardon DA, Friedman AH, et al. Phase II trial of temozolomide in patients with progressive low-grade glioma. J Clin Oncol. 2003;21(4):646-51.

Citation: *Mathway J. Novel targeted therapies for cancer treatment: From bench to bedside. J Mol Oncol Res. 2023;7(3):176*