

Difference Between Chemotherapy and Targeted Therapy

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Key Difference - Chemotherapy vs Targeted Therapy

Cancer is considered as one of the most prevalent disease conditions in the world. It belongs to a collection of related diseases that arise due to uncontrolled cell proliferation. Cancer can be of different types; [breast cancer](#), [lung cancer](#), [colorectal cancer](#), [leukemia](#). Cancer is caused due to mutational defects of three genes; [proto-oncogenes](#), tumor suppressor genes, and [DNA](#) repair genes. Cancer therapy is currently a popular topic of research. Chemotherapy and Targeted therapy are two important types of cancer treatments. Targeted therapy is a specific treatment process which uses a [drug](#) that can block the synthesis, growth, and spread of specific biomolecules which are involved in the development of cancer. Chemotherapy is probably the oldest type of cancer therapy which uses cytotoxic drugs and chemicals which are capable of destroying cells; both [malignant](#) and non-malignant type. Hence it is nonspecific. The **key difference** between immunotherapy and chemotherapy is the specificity of the treatment. **Chemotherapy is non-specific and participates in the destruction of all cell types, whereas Targeted therapy targets specific molecules in order to inhibit the development of cancer cells.**

What is Chemotherapy?

Chemotherapy is the most common type of cancer therapy used worldwide to treat all type of cancers. It's a systemic treatment method. However, its specificity is low compared to other methods. Chemotherapy uses cytotoxic drugs and chemicals which have the ability to destroy cells of a specific type; lung cells, liver cells, blood cells. But it does not distinguish between malignant and nonmalignant cell types. Hence, chemotherapy results in the destruction of both healthy cells and malignant cells. Chemotherapy is administered intravenously, and they are commercially available in sealed packages with necessary warning signs.



Figure 01: Chemotherapy treatments

Chemotherapeutic drugs possess different mechanisms in which they damage the cells. Some of the mechanisms are;

- Blocking the transcription of genes producing the cells.
- Decreasing the speed of the cancer cell proliferation.
- Targeting the destruction of the [cell membrane](#).
- Inhibition of the nutrition uptake process of the cells.

Chemotherapy can be administered as a single drug or as a multi drug treatment using many different drugs targeting different cell types. The type of chemotherapy depends upon the state of cancer, type of cancer and the status of the patient. Chemotherapy has side effects in comparison to other therapeutic procedures. It is because of the destruction of the healthy cells. Some of the side effects are,

- Hair fall
- Skin pigmentation
- Respiratory problems
- Ulcers in the oral cavity and along the gut or respiratory tract
- Pains and inflammation.

What is Targeted therapy?

Targeted therapy is a specific type of therapy against cancer which targets the specific molecules which stimulate the cancer cell proliferation. Targeted therapy drugs are mostly cytostatic. They halt the cancer cell development. Hence, they are not particularly cytotoxic. Different targeted therapies have been approved worldwide to be used as cancer therapy. They include; [hormone](#) therapies, signal transduction inhibitors, gene expression

modulators, [apoptosis](#) inducers, angiogenesis inhibitors, immunotherapies, and [toxin](#) delivery molecules.

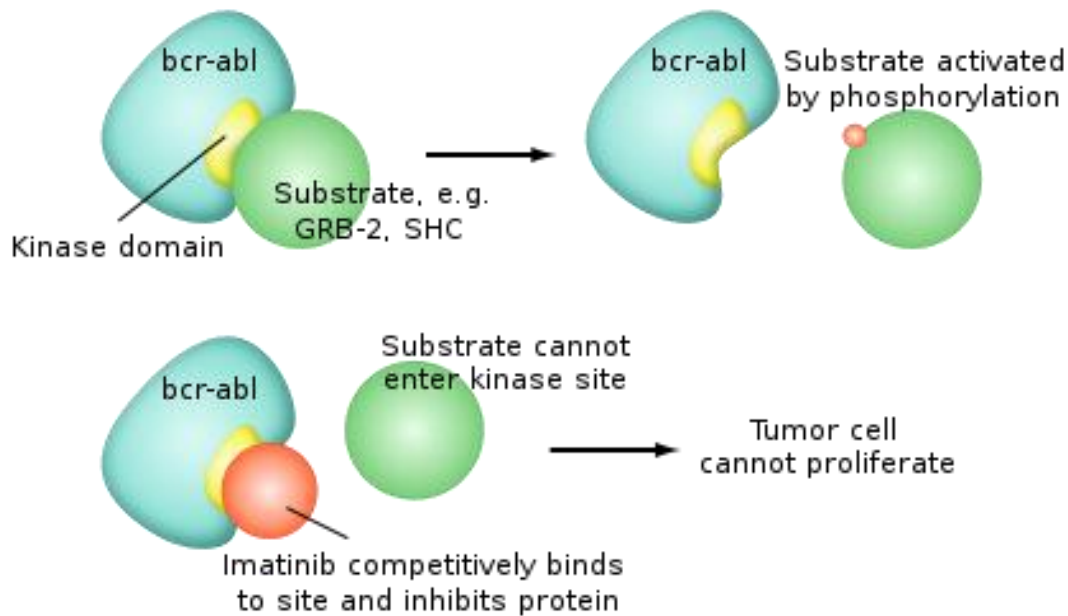


Figure 02: Targeted therapy

Targeted therapies most often use [monoclonal antibodies](#) as the mediator of treatment. They are administered via vaccinations. They bind to specific [antigens](#) on the specific molecular targets. This binding results in the inactivation of the particular molecular target which in turn inhibits the cancer cell development.

Targeted therapy is an emerging field of therapy which incorporates personalized medicine techniques. Thus it is a costly technique but is considered to have a low number of side effects in comparison with the other cancer treatment methods. The reduction of side effects is due to the specificity of the treatment procedure. Healthy cells are not damaged by the targeted therapy.

What are the Similarities Between Chemotherapy and Targeted Therapy?

- Both are systemic treatment methods used to treat cancer.
- Both therapies are administered intravenously.
- Both therapies can be administered as a single drug or a group of drugs.

What is the Difference Between Chemotherapy and Targeted Therapy?

Chemotherapy vs Targeted Therapy	
Chemotherapy is a treatment method which uses cytotoxic drugs to destroy cells which include cancer cells.	Targeted therapy is a treatment method where drugs which target specific molecules are used in order to inhibit cancer development.
Specificity	
Chemotherapy is non – specific or less specific.	Targeted therapy is highly specific.
Mechanism	
Chemotherapy drugs are cytotoxic– destruct cells.	Targeted therapy drugs are cytostatic – inhibits cancer cell proliferation.
Effector of the drug	
Cell / cell surface receptors are the effectors of the chemotherapy drugs.	Molecular targets are the effectors of the targeted therapy drugs.
Types	
Single cytotoxic drug administration and multiple cytotoxic drug administration are the types of chemotherapy.	Targeted therapy can be of different types of treatment mechanism depending on the type of inhibition.
Side-effects	
There are many side effects of chemotherapy as it can destroy the healthy cells as well.	Targeted therapy has fewer side effects.

Summary - Chemotherapy vs Targeted Therapy

Cancer therapy is one of the most popular treatment techniques in the world due to the high prevalence of cancer worldwide. Targeted therapy and chemotherapy are two chemical treatment methods used in cancer treatment. They differ in their specificity. The difference between these two treatments is that Targeted therapy is highly specific whereas chemotherapy is not. In most cases both these treatment methods are administered according to a defined treatment plan to combat cancer. Much research is ongoing to develop more specific drugs with fewer side effects.

Reference:

1. "Targeted Cancer Therapies." National Cancer Institute. [Available here](#)
2. Van, R G, et al. "Combining immunotherapy with chemotherapy to treat cancer." Discovery medicine., U.S. National Library of Medicine, June 2005. [Available here](#)

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