

Targeted Cancer Therapies Fact Sheet

This fact sheet is based on information provided by the National Cancer Institute.

Key Points

- Targeted cancer therapies are drugs or other substances that block the growth and spread of cancer by interfering with specific molecules involved in tumor growth and progression.
- Because scientists call these specific molecules “molecular targets,” therapies that interfere with them are sometimes called “molecularly targeted drugs,” “molecularly targeted therapies,” or other similar names.
- Targeted cancer therapies include drugs that interfere with cell growth signaling or tumor blood vessel development, promote the specific death of cancer cells, and stimulate the immune system to destroy specific cancer cells.

1. What are targeted cancer therapies?

Targeted cancer therapies are drugs or other substances that block the growth and spread of cancer by interfering with specific molecules involved in tumor growth and progression. Because scientists often call these molecules “molecular targets,” targeted cancer therapies are sometimes called “molecularly targeted drugs,” “molecularly targeted therapies,” or other similar names. By focusing on molecular and cellular changes that are specific to cancer, targeted cancer therapies may be more effective than other types of treatment, including chemotherapy and radiotherapy, and less harmful to normal cells.

Targeted cancer therapies are being studied for use alone, in combination with other targeted therapies, and in combination with other cancer treatments, such as chemotherapy.

2. How do targeted cancer therapies work?

Targeted cancer therapies interfere with cancer cell division (proliferation) and spread in different ways. Many of these therapies focus on proteins that are involved in cell signaling pathways, which form a complex communication system that governs basic cellular functions and activities, such as cell division, cell movement, cell responses to specific external stimuli, and even cell death. By blocking signals that tell cancer cells to grow and

divide uncontrollably, targeted cancer therapies can help stop cancer progression and may induce cancer cell death through a process known as apoptosis. Other targeted therapies can cause cancer cell death directly, by specifically inducing apoptosis, or indirectly, by stimulating the immune system to recognize and destroy cancer cells.

The development of targeted therapies, therefore, requires the identification of good targets—that is, targets that are known to play a key role in cancer cell growth and survival. (It is for this reason that targeted therapies are often referred to as the product of “rational drug design.”)

Examples of targeted therapy include drugs such as toceranib (Palladia) or masitinib (Kinavet-CA), which target specific molecules on the surface of the cancer cells that form Mast Cell Tumors in dogs.

3. What impact will targeted therapies have on cancer treatment?

Targeted cancer therapies give doctors a better way to tailor cancer treatment, especially when a target is present in some but not all tumors of a particular type. Eventually, treatments may be individualized based on the unique set of molecular targets produced by the patient’s tumor. Targeted cancer therapies also hold the promise of being more selective for cancer cells than normal cells, thus harming fewer normal cells, reducing side effects, and improving quality of life.

Nevertheless, targeted therapies have some limitations. Chief among these is the potential for cells to develop resistance to them. It is for this reason that targeted therapies may work best in combination, either with other targeted therapies or with more traditional therapies.