



cancer.org | 1.800.227.2345

Targeted Therapy

Targeted therapy is a type of cancer treatment that uses drugs or other substances to precisely identify and attack certain types of cancer cells. A targeted therapy can be used by itself or in combination with other treatments, such as traditional or standard chemotherapy, surgery, or radiation therapy. If your treatment plan includes targeted therapy, knowing how it works and what to expect can often help you prepare for treatment and make informed decisions about your care.

[How Targeted Therapies Are Used to Treat Cancer](#)

[Getting Targeted Cancer Therapy](#)

[Targeted Therapy Side Effects](#)

[Targeted Therapy Safety](#)

Related Topics

- [Intravenous \(IV\) Lines, Catheters, and Ports Used in Cancer Treatment](#)
- [Tubes, Catheters, and Drains Used in Cancer Treatment and Care](#)
- [Compassionate Drug Use](#)
- [Off-label Drug Use](#)

How Targeted Therapies Are Used to Treat Cancer

- [What is targeted therapy?](#)

- [How is targeted therapy different from chemotherapy?](#)
- [How targeted therapy works](#)
- [Targeted therapy as precision medicine](#)
- [Types of targeted therapy](#)

What is targeted therapy?

Targeted therapy is a type of cancer treatment that uses drugs designed to "target" cancer cells without affecting normal cells.

Cancer cells typically have changes in their genes that make them different from normal cells. Genes are part of a cell's DNA that tell the cell to do certain things. When a cell has certain gene changes, it doesn't behave like a normal cell. For example, gene

Targeted therapy drugs, like other drugs used to treat cancer, are technically considered chemotherapy. But targeted therapy drugs don't work the same way as traditional or standard [chemotherapy](#)¹ (chemo) drugs. Targeted drugs zero in on some of the changes that make cancer cells different from normal cells. This makes them work differently from chemotherapy in two key ways:

- Because of their targeted action, these drugs have an effect on the cancer cells and mostly leave normal, healthy cells alone. Traditional chemotherapy is *cytotoxic* to most cells, meaning it can damage normal, healthy cells in addition to damaging and killing cancer cells.
- Targeted drugs often work by blocking cancer cells from copying themselves. This means they can help stop a cancer cell from dividing and making new cancer cells. Traditional chemotherapy, however, kills cancer cells that have already been made.

How targeted therapy works

Targeted therapies are made to find and attack specific areas or substances in cancer cells, or can detect and block certain kinds of messages sent inside a cancer cell that tell it to grow. Some of the substances in cancer cells that become the "targets" of targeted therapies are:

- Too much of a certain protein on a cancer cell
- A protein on a cancer cell that is not on normal cells
- A protein that is mutated (changed) in some way on a cancer cell
- Gene (DNA) changes that aren't in a normal cell.

The action of targeted drugs can work to:

- **Block or turn off chemical signals** that tell the cancer cell to grow and divide
- **Change proteins** within the cancer cells so the cells die
- **Stop making new blood vessels** to feed the cancer cells
- **Trigger your immune system** to kill the cancer cells
- **Carry toxins to the cancer cells** to kill them, but not normal cells

The action of the drugs can affect where these drugs work and what side effects they cause.

It's important to note that some targeted therapy drugs, for example, monoclonal

antibodies, work in more than one way to control cancer cells and may also be considered immunotherapy because they boost the immune system.

Targeted therapy as precision medicine

Targeted therapy is sometimes called *precision medicine* or *personalized medicine*.

This is because they are made to exactly target specific changes or substances in cancer cells, and these targets can be different even when people have the same type of cancer.

respond better to allow the body to find and attack cancer cells more effectively.
Proteasome inhibitors: These disrupt normal cell functions so the cancer cells



- **IV infusion:** a typical infusion can last from a few minutes to a few hours. A mixed drug solution flows from a plastic bag through tubing that's attached to the catheter. The flow is usually controlled by a machine called an IV pump.

Getting Oral Targeted Therapy

If a targeted therapy drug is taken by mouth, you swallow the pill, capsule, or liquid just like other medicines. Oral targeted therapy is usually taken at home. Because of this, it's very important to make sure you know exactly how it should be taken. If you and your doctor have decided oral chemo is the best treatment option for you, be sure to ask questions and get instructions about:

- **How and when to take it.** You should have clear instructions on how much and when to take your treatment. You need to take the exact dosage, at the exact right time, for exactly as long as you're supposed to do so. Oral doses are set up so that the same level of drug stays in your body to target and kill the cancer cells. Not taking your treatment the right way can affect how well it works. Sometimes dose changes are needed, but don't make any changes unless your doctor tells you to do so. If you miss a dose or are late taking one, tell your doctor or nurse about it. They need to know about this when deciding if treatment is working. It may also help the doctor decide whether to change how much of the medicine you take or when you take it.
- **Special handling.** Not a lot is known about long-term effects of certain targeted therapies that might make special handling needed. But many experts recommend taking precautions just in case. To learn more, see [Targeted Therapy Safety](#).
- **Cost.** Oral anti-cancer drugs can be expensive. Make sure you ask your doctor about the cost of your treatment so you are not surprised when you get to the pharmacy or when you get your bill if the treatment is not available at pharmacies. Depending on the type of drug, some insurances don't cover the full cost, or may not cover it at all. Sometimes you can get assistance but many people have to pay more of their other

Depending on the s44.45 Tm 0 0 0 rg /GS283 gF2 neeye ots de rgc2 ne5rg

treatment at home. For instance, if you're [throwing up or feel sick to your stomach](#)⁵, you might feel too sick to take your treatment. Or, you might not be able to keep your treatment pill down and could throw it up. Your doctor needs to know about any problems so they can change your treatment plan, if needed.

Do I need to protect others from exposure to my targeted drug?

Much is known about the need to protect others from exposure to traditional or standard chemotherapy because it is hazardous. However, because targeted therapy drugs are newer, there is not as much information about long-term effects of exposure. To be safe, many experts recommend treating targeted therapy drugs as hazardous and taking the same precautions. To learn more read [Targeted Therapy Safety](#).

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/treatment-types/chemotherapy.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/immunotherapy.html
3. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/tubes-lines-ports-catheters.html
4. www.cancer.org/cancer/financial-insurance-matters/understanding-health-insurance.html
5. www.cancer.org/cancer/managing-cancer/side-effects/eating-problems/nausea-and-vomiting.html

References

American Society of Clinical Oncology (ASCO). Understanding targeted therapy. Accessed at cancer.net. Content is no longer available.

Brown VT. Targeted therapy. In Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*

Last Revised: December 27, 2019

Targeted Therapy Side Effects

Targeted therapy drugs have different side effects than standard or traditional chemotherapy. Some targeted drugs have very few side effects, and others can cause more or more serious problems. There are many different types of targeted drugs, and their side effects depend largely on the type of drug that's given and what it targets.

- [What should I know about side effects?](#)
- [How long do side effects last?](#)
- [Skin problems](#)
- [Other common and serious side effects](#)

What should I know about side effects?

- Not every person gets every side effect, and some people get few or none.
- How severe a side effect might be can vary greatly from drug to drug and from person to person. Be sure to talk to your cancer care team about which side effects are most common with your treatment, how long they might last, how bad they might be, and when you should call the doctor's office about them. Your doctor may give you instructions to follow or medicines to help prevent some side effects before they happen.
- Rare and unusual side effects can happen with some of these drugs, and some can be serious. Report all changes and side effects as soon as possible to your cancer care team.

How long do side effects last?

Most side effects go away over time after treatment ends and the healthy cells recover. The time it takes to get over some side effects varies from person to person. It depends on many factors, including your overall health and the drugs you were given.

even after very little sun exposure or exposure to sun coming through windows.

Rash: This is the most common skin change from targeted drugs. The risk of getting a rash and how bad it gets depends on the type and dose of the targeted drug. In most people, the rash is mild. It often looks like acne and shows up on the scalp, face, neck, chest, and upper back. In severe cases it can affect other parts of the body.

The rash most often starts as skin redness and swelling. It's often worst within the first few weeks of treatment. By about a month into treatment, the skin usually crusts and gets very dry and red. In the weeks after that, round, flat or raised red spots and pimples with pus in the center often appear. In some people this can lead to skin infections. The rash can itch, burn, or sting, and may be painful. It may get better on its own or stay about the same during the rest of treatment, but it should go away completely about a month after treatment is stopped.

The rash can be very distressing and make a person feel self-conscious around others. There are some medications that your doctor can try to make you feel better while you have the rash. Prevention and treatment of rashes are discussed later.

Dry skin: This is very common for many targeted therapy drugs. It can start within the first few weeks, but nearly everyone getting targeted therapy has dry skin after 6 months of treatment. The skin can become very dry, brittle, itchy, and scaly and may even crack open – especially on the hands and feet. Cracking can happen by itself, but it tends to be worse when there's also a rash.

Itching: Many skin changes, like rash or dryness, can cause itching.

Red, sore cuticles (the areas around the nails): Some targeted drugs can cause swollen, red, and painful sores around the fingernails and toenails. (This can look a lot like an infection or an ingrown nail.) This most often happens to the big toes and thumbs. These sores may become infected. Nails may also become brittle and grow more slowly.

Hand-foot syndrome: Hand-foot syndrome (HFS) has been linked to many cancer treatment drugs, including some targeted therapies. The cause of this syndrome isn't known for sure. It may have to do with damage to the tiny blood vessels in the hands and feet, or with the drugs themselves leaking out of the blood vessels and causing damage.

HFS usually starts during the first two to six weeks of treatment. Painful sensitivity, tingling, or numbness in the hands and feet are the earliest symptoms of HFS. Then, the palms of the hands and the soles of the feet become red and swollen. The redness

looks a lot like sunburn and may blister. In severe cases, the blisters can open up and become sores. The affected skin also can become dry, peel, and crack.

HFS can be painful and can affect your ability to walk and do your normal activities. If it becomes severe, pain medicines may be needed. Let your doctor know if you're having HFS symptoms – even if they're mild. Treating HFS early can help keep it from getting worse. Like the other skin changes, it can be treated, and there are things you can do to try to prevent it.

Changes in hair growth: Some targeted drugs can cause the hair on your head to become thin, dry and brittle, or even curly. Long-term use may lead to bald patches or complete loss of scalp hair. Facial hair may grow faster than usual, including longer, thicker, curly eyebrows and eyelashes that may need to be trimmed. But in some men, facial hair growth slows down. Eyebrows may thin out as well. These changes usually don't happen right away, but you may notice them later as treatment goes on.

Some people notice sores on their scalp and on other hairy areas. Scars caused by these sores may keep your hair from growing back after treatment.

Changes in hair or skin color: Some targeted drugs can turn the skin or hair a yellowish color during treatment. In a few people, hair and/or skin gets darker. This tends to go away once treatment ends.

Changes in and around the eyes: The eyes may burn, and become dry or red. In some people, the eyelids get red, tender, and swollen, and the lashes may become crusty. Sometimes the eyelids may turn inward or outward. Distorted eyelids or prolonged dryness can damage the outer part of the eye (the cornea). Talk with your doctor or nurse about managing these changes to avoid injury, pain, or infection.

Can skin changes be prevented?

There are things you can do to help prevent skin changes or at least try to keep them under control. Your doctor may ask you to start doing these things as soon as targeted treatment starts – before you have skin problems.

Starting good skin care before you have side effects may help to minimize the problems. You may be asked to:

- Use very mild soaps, body washes, and shampoos that do not contain alcohol, perfume, or dye.
- Take baths instead of showers, and try oatmeal bath products to soothe your skin.

- Bathe with cool or lukewarm (instead of hot) water. And avoid hot, humid places.
- Moisturize your skin at least twice a day with a thick emollient cream that has no alcohol, perfumes, or dyes. The best time to do this is right after you bathe, while your skin is still damp.
- Wear loose, soft clothing.
- Keep nails short.
- Use laundry detergents and fabric softeners without strong perfumes
- Stay out of the sun as much as possible, because sunlight seems to trigger and/or worsen rashes in some people. If you'll be outside during the day, wear a hat and clothes with long sleeves. Use a broad-spectrum sunscreen with SPF of at least 30 and zinc oxide or titanium dioxide at least 1 hour before going out. Be careful near windows too.
- Not use acne medicines. Though the rash may look like acne, acne medicines don't work. They can even dry it out and make it worse.
- Try gel shoe inserts if the soles of your feet are tender.
- Wear shoes that fit well and aren't too tight. Thick, soft socks may help if you have shoes that are big enough for the extra bulk.

Ask your doctor or nurse if there are other things you can do to help lower your chance of skin problems.

What should I do if I have skin changes?

It's very important to tell your cancer care team right away if you notice any rashes or skin changes. Left untreated, rashes can get worse and lead to infections, which might then lead to delaying or even stopping treatment.

Don't treat your skin with over-the-counter medicines or stop taking your targeted drug without talking to your doctor first. Your doctor may give you a skin cream or a medicine to take by mouth to treat the skin.

Be sure to let your doctor or nurse know if:

- You notice a burning feeling, redness, or rash. There are creams you can use to try to keep it from getting worse.
- Your skin is dry, flaking, or cracked. Moisturizing cream may help with this.
- Your skin is itchy. There are creams and gels you can use to ease itching. There are also some medicines you can take by mouth to try to stop the itching.
- The area around your fingernails or toenails becomes sore or red. Creams and

soaks can help with this. But you and your cancer care team will need to watch for changes that could be signs of infection, which need to be treated quickly.

- You have very dry, red, or tender eyes, or if you notice eyelashes growing inward toward the eyeball.
- You get sores on your scalp or other areas with hair. You'll want to get them treated to help prevent scars that may keep hair from growing later.

Your doctor may tell you to avoid direct exposure to sunlight when possible. Even after treatment is over, you may find that you're more sensitive to sunlight than before.

Can skin changes be treated?

If you have skin changes, your doctor will need to check your skin fairly often to figure out the problem, the best course of action, and whether treatment is helping. You'll probably need extra doctor visits while the problem is being brought under control.

Mild changes: Patients with mild skin changes may not need treatment. These changes include rashes that are only in a limited area, that are not causing any distress, and are not infected. Heavy skin creams or ointments that contain no alcohol, perfume, or dye can sometimes help with dryness. Be sure to talk with your cancer care team before using anything on your skin.

The doctor may prescribe a mild corticosteroid cream or antibiotic gel to put on the rash.

If your eyelids are crusty or swollen, careful cleansing and clean, warm, wet cloths laid over your closed eyes may help.

For mild skin problems, the dose of the targeted drug usually does not need to be changed. You'll be watched closely to see if the rash gets better or worse.

Moderate changes: These include a rash over a larger area of the body or skin changes causing mild distress from itching or soreness, but with no signs of infection. The skin may be treated with a prescription cream or gel. The doctor may also prescribe an antibiotic you take by mouth. Drops or ointments may be prescribed to help with eye problems.

The dose of the targeted therapy drug usually does not need to be changed for moderate skin problems. Still, you will be watched closely to see if the rash gets better or worse.

Severe changes: These are bad rashes that cover a lot of skin, cause itching and soreness that affect your quality of life (such as sleep problems or pain), and are likely to get infected. Treatment is much like that used for moderate changes, including creams or gels, as well as an antibiotic that's taken by mouth. Along with this, a course of corticosteroid pills is often given.

The targeted therapy drug dose often needs to be reduced when a person has severe skin changes. Expect to see your doctor often during this time. If the rash doesn't get better within about 2 weeks, the targeted drug is often stopped until the skin changes improve. It may then be re-started with continued skin care.

A note about steroid skin creams and gels

Steroids that are spread on the skin in the form of creams, ointments, or gels can help many skin problems. But it's important to know that using steroid creams for too long can actually cause other skin problems, and can make you more likely to get a skin infection. For this reason, only use steroid creams (even those that don't require a prescription) as directed by your doctor.

Other common and serious side effects

Some of the other common and serious side effects caused by targeted therapy drugs are listed here. This is not a complete list, as each targeted drug can have different side effects.

High blood pressure

Some targeted drugs, especially those called **angiogenesis inhibitors**, can raise your blood pressure. There isn't really anything you can do to prevent this, but your doctor will watch your blood pressure closely if you're getting a drug that can cause this side effect. Some people need medicine to bring their blood pressure down to safe levels during treatment. They should stay on this medicine until their doctor tells them it can be stopped.

Bleeding or blood clotting problems

Some targeted therapy drugs interfere with new blood vessel growth. This can lead to problems with bruising and bleeding. These problems are not common and do not happen to everyone. But it can help to be aware of them because there's no known way to prevent them.

Bleeding, such as from the stomach and intestines, can be severe and even life threatening. Tell your doctor if you throw up blood or material that looks like coffee grounds, or if you notice dark or black stools or bright red blood in your stool. These can be signs of bleeding in the stomach or intestines.

Some drugs can also cause blood clots in the lungs and legs, as well as heart attacks and strokes. Let your doctor know if you have problems with sudden swelling, pain, or tenderness in the arm or leg. If you have chest pain, sudden shortness of breath, vision problems, weakness, seizures, or trouble speaking, get emergency help. These can be symptoms of serious problems caused by blood clots.

Slow wound healing

By blocking new blood vessel growth, some of these drugs interfere with wound healing. This can lead to old wounds (cuts) opening up again and new wounds not closing. It can also lead to holes (called perforations) opening up in the stomach or intestine. Tell your doctor right away if you have pain in your belly or vomiting.

Because some of these drugs can affect wound healing, they usually need to be stopped before any planned surgery, including dental procedures. Talk to your cancer doctor as soon as you know about a planned surgery or other procedure so you can find out what to do.

Heart damage

Some drugs can damage the heart, especially if used with certain chemotherapy drugs. Your doctor may test your heart function before starting treatment. Possible symptoms of heart damage might include chest pain, increased coughing, trouble breathing (especially at night), rapid weight gain, dizziness, fainting, or swelling in the ankles or legs.

Autoimmune reactions

Certain targeted therapy drugs work by basically taking the brakes off the body's immune system. This can lead to serious side effects if the immune system starts to attack healthy parts of the body. In some people this can cause serious reactions in the lungs, intestines, liver, skin, eyes, nerves, hormone-making glands, or other organs. This isn't common but in some people it might be serious enough to be life threatening.

Swelling

Some targeted therapies cause facial swelling, especially around the eyes. They can also cause swelling in the feet and legs, as well as the hands. This usually doesn't need to be treated, but a diuretic (water pill) may be used in severe cases.

Other side effects

Other side effects have also been linked to treatment with some targeted therapy drugs. Many of these side effects are the same as those seen with standard chemo drugs, and include:

- Nausea and vomiting
- Diarrhea or constipation
- Mouth sores
- Shortness of breath or trouble breathing
- Cough
- Feeling tired all the time (fatigue)
- Headache
- Hair loss
- Damage to organs such as the thyroid gland, liver, or kidneys
- Allergic reactions (while getting an IV drug)
- Increased risks of certain infections
- Second cancers

Your cancer care team will watch you closely during treatment and will check you often. Side effects can and should be treated as early as possible. It's important that you tell your cancer care team about any changes in how you feel or anything you notice that's new or unusual. Tell them right away so they can treat any problems and try to keep them from getting worse.

To learn more about any of the side effects mentioned here, see [Managing Cancer-related Side Effects](#)¹.

American Society of Clinical Oncology (ASCO). Understanding targeted therapy. Accessed at cancer.net. Content is no longer available.

Brown VT. Targeted therapy. In Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Pittsburgh, PA: Oncology Nursing Society; 2019:103-139.

Mori S, Hickey A, Dusza SW, et al. Markers of systemic involvement and death in hospitalized cancer patients with severe cutaneous adverse reactions. *J Am Acad Dermatol*. 2019; 80(3):608-616.

National Cancer Institute (NCI). *Targeted cancer therapies*. Accessed at <https://www.cancer.gov/about-cancer/treatment/types/targeted-therapies/targeted-therapies-fact-sheet> on July 14, 2019.

Ocvirk J, Heeger S, McCloud P, Hofheinz RD. A review of the treatment options for skin rash induced by EGFR-targeted therapies: Evidence from randomized clinical trials and a meta-analysis. *Radiol Oncol*. 2013;47:166-175.

Peuvrel L, Dréno B. Dermatological Toxicity Associated with Targeted Therapies in Cancer: Optimal Management. *Am J Clin Dermatol*. 2014;15:425-444.

Russo I, Zorzetto L, Chiarion Sileni Vet al. Cutaneous side effects of targeted therapy and immunotherapy for advanced melanoma. *Scientifica (Cairo)*. 2018; 2018:5036213. Accessed at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6332919/> on July 14, 2019.

Van Leeuwen MT, Luu S, Gurney H, , et al. Cardiovascular toxicity of targeted therapies for cancer: A protocol for an overview of systematic reviews. *BMJ Open*. 2018; 8(6):e021064. Accessed at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6042572/> on July 12, 2019.

Williams LA, Ginex PK, Ebanks Jr. GL, et al. *ONS Guidelines for Cancer Treatment-Related Skin Toxicity*. *Oncology Nursing Forum*. 2020; 47(5): 539-540

Xu MJ, Johnson DE, Grandis, JR. EGFR-targeted therapies in the post-genomic era. *Cancer Metastasis Rev*. 2017; 36(3):463-473.

Last Revised: December 10, 2020

Targeted Therapy Safety

Much is known about the need to protect others from exposure to traditional or standard chemotherapy because it is hazardous. This is why there are safety rules and recommendations for people who handle chemo drugs. However, because targeted therapy drugs are newer, there is not as much information about long-term effects of exposure.

To be safe, many experts recommend treating targeted therapy drugs as hazardous and taking the same precautions. This is especially true because many targeted drugs are given along with other drugs that are known to be hazardous, so your cancer care team will take precautions to protect themselves and others from exposure to them.

- [Precautions the cancer care team might take](#)
- [Special precautions when taking targeted therapy by mouth](#)
- [Keeping family and friends safe](#)

Precautions the cancer care team might take

Keeping family and friends safe

Unless your health care team tells you differently, you can usually be around family and friends during the weeks and months you're getting targeted therapy. If you're getting treatment at a center, family and friends can often come with you. However, some treatment centers only allow patients in the infusion area and visitors may need to stay in the waiting room.

You are the only person who should be exposed to the drug you are getting, but any spilled IV drug, and any powder or dust from a pill or capsule, or any liquid from oral or other kinds of targeted therapy might be hazardous to others if they are around it.

It's important to talk to your cancer care team and be aware of any special precautions that might be needed while you are taking a targeted therapy.

References

Brown VT. Targeted therapy. In Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Pittsburgh, PA: Oncology Nursing Society; 2019:103-139.

cancer.org | 1.800.227.2345