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Infections in People with Cancer

Understanding Infections

Cancer itself can increase your risk of getting a serious infection. So can certain types of cancer treatment. By learning more about infections, you and your family may be able to help prevent problems that they can cause.

- [Causes of Infections \(Germs\)](#)
- [Why People with Cancer Are More Likely to Get Infections](#)
- [Managing and Treating Infections](#)

Preventing and Managing Infections

Learn what you can do to help prevent infection and illness when your immune system is weak due to cancer or cancer treatment.

- [Watching for and Preventing Infections in People With Cancer](#)
 - [Caring for Pets During Cancer Treatment](#)
 - [Vaccinations and Flu Shots for People with Cancer](#)
 - [Questions to Ask Your Health Care Team About COVID-19](#)
 - [COVID-19 Vaccines in People with Cancer](#)
-

Causes of Infections (Germs)

Infection is one of the most common complications of cancer and cancer treatment. This is because cancer and cancer treatments can weaken the immune system for a period of time. The immune system is a group of organs, tissues, and cells that work together to resist and fight infections. Some infections can spread to other parts of the body and might become life-threatening if not found early. Infections are caused by germs that enter the body, multiply, and cause harm or illness. The main types of germs that can cause infections are:

- Bacteria
- Viruses
- Protozoa (some of which act as parasites)
- Fungal organisms (also called fungi).

Certain types of cancer itself can increase your risk of getting an infection. So can certain types of cancer treatment. Once the cancer cells are treated and treatment is over, the risk of infection usually goes back down. For most people with cancer, the greatest risk of getting a serious infection only lasts for a limited time. But every patient is different and the side effects of treatments can be very different. So, your risk of infection depends on the [type of cancer](#)¹ you have and the treatment you get. For example, [surgery](#)² and radiation therapy do not weaken a person's resistance to infection nearly as much as a [bone marrow transplant](#)³ that uses high doses of chemotherapy (chemo). And some drugs used to treat cancer are less likely than others to affect a person's ability to resist infection.

Infections that develop in people who have cancer or who are getting cancer treatment can be more serious than those in people who are otherwise healthy. They can also be harder to treat. If you have cancer, it's important to find and treat infections early, before they get worse and spread. Talk to your cancer care team about your risk for infection.

Parts of the body most likely to get infection

Common sites of infection in people with cancer include :

- The skin and mucous membranes (soft linings, like inside the mouth, vagina, and intestines)
- The digestive system (mouth, esophagus, stomach, and intestines)
- The lungs and breathing passages (sinuses and throat)
- The urinary system (bladder and kidneys)
- The nervous system (brain and spinal cord)
- The skin and tissue around a [central venous catheter](#)⁴ (CVC). A CVC is a tube or

catheter put in a vein and used to draw blood and give IV drugs or fluids

Risk factors for infection

- **Neutropenia.** Some types of cancer treatment, such as chemotherapy, radiation therapy, stem cell transplant, or bone marrow transplant can cause [neutropenia](#)⁵ (a decrease in the number of neutrophils, a component of white blood cells, in your blood). This means your immune system is weaker and your body may not be able to fight infections as well as it should.
- **Medications** such as steroids can make your immune system weaker and increase your risk of infection.
- **Certain types of cancers**, such as those that affect the bone marrow or those that can spread to the bone, may increase the risk of an infection. Ask your doctor if your cancer puts you at an increased risk for infection.
- **Mucositis.** Irritation or soreness of the digestive tract lining. Patients with mucositis will often have mouth sores.
- **Having other medical conditions** such as diabetes, chronic obstructive pulmonary disease (COPD), autoimmune disease, among others. If you have other medical conditions, ask your doctor if they put you at increased risk for infection.
- **Other factors**, such as poor nutrition, stress, or lack of sleep.

Know your risk of infection

It's important to weigh the risk of infection and other side effects against the benefits of cancer treatment. Each patient's situation is different because people with cancer might have other health problems that can affect how they respond to cancer treatment. Talk with your doctor before and during cancer treatment about your risk for infection. Here are some questions you can ask your doctor or cancer care team about infection:

- Does my type of cancer or cancer treatment make me more likely to get infections? If so, when am I at increased risk?
- What kinds of infections are most common for someone in my situation?
- What signs or symptoms should I watch for and when should I call you?
- What symptoms would need urgent care at the emergency room? If I have to go to the emergency room, is there anything special I need to tell the people who work there?

- Will you do anything to help keep me from getting infections during treatment?
- What can I do to lower my risk of infection?
- If I get a fever, does that mean I have an infection?
- How will you decide how to treat my infection?

Signs of infection in people with cancer

It's important to watch for early signs of infection and tell your health care team about them right away. This way treatment can be started as early as possible to prevent the infection from spreading to other parts of the body. This is even more important for people who have a low white blood cell count (neutropenia).

Signs and symptoms of an infection might include:

- [Fever](#)⁶ (higher than normal body temperature). Your cancer care team will tell you what temperature they consider a fever.
- Shaking chills or sweats (often goes along with fever)
- Sore throat
- Sores or white coating on your tongue or in your mouth
- Cough or shortness of breath
- Nasal congestion
- Burning or pain when urinating; bloody or cloudy urine
- Redness, swelling, drainage, or warmth at the site of an injury, surgical wound, or IV such as a [central venous catheter](#)⁷ (VAD), or anywhere on the skin including the genital and rectal areas
- Pain or tenderness in the stomach or abdomen (the belly)
- Stiff neck
- Sinus pain, ear pain, or headache

Fever is especially important because it's often the first sign of an infection in people with cancer. Sometimes, fever is the only sign of an infection. Patients with [neutropenia](#)⁸ may not have other signs or symptoms of an infection, except for fever. You should have a thermometer to check your temperature – you can't rely on how you feel to know when you have a fever. Patients may be told to call their doctor or nurse if they have a fever, or if they have other signs and symptoms of infection. **Don't take medicines to reduce your fever without checking with your doctor first.** Ask your doctor what you should do and when you should call. Be sure you know how to reach your health care team after hours, including nights and weekends.

Key things you need to know

It's important for people with cancer and their families and friends to know these things:

- Your risk for infection
- How long your immune system is likely be weak after treatment
- How to take your temperature the right way, when to check it, and how often to check it
- When to report a fever or other signs and symptoms of infection to the doctor or nurse
- The importance of hand washing and hygiene for the patient and the people they come in contact with
- How to take good care of your mouth and check for sores and signs of infection
- How to clean cuts, scrapes, or other breaks in the skin and keep them clean to help prevent infection
- The importance of cleaning around the anus after each bowel movement, using moist towelettes or baby wipes
- Good care of IVs and [central venous catheters](#)⁹ (CVCs, like ports and PICC lines)
- Where to look for signs of infection (skin, mouth, and CVC sites)
- The importance of good nutrition, a balanced diet, and drinking plenty of fluids
- The importance of sleep and exercise
- The need to take medicines as prescribed
- That the doctor knows about all medicines you're taking (prescription, over-the-counter, vitamins, herbs, and supplements) – keep a list and update it at each doctor visit
- Ways to prevent dryness of the skin and mucous membranes
- The importance of talking with your health care team or doctor before getting vaccinated (immunized) and before getting close to children or adults who have recently had vaccinations.

Review these points with your cancer care team before and during treatment to get the information you need. Double check with them on how you should handle these things and find out if there are any special steps you should take during cancer treatment.

Hyperlinks

1. www.cancer.org/cancer.html
2. www.cancer.org/treatment/treatments-and-side-effects/treatment-

- [types/surgery.html](#)
3. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html
 4. www.cancer.org/treatment/treatments-and-side-effects/planning-managing/tubes-lines-ports-catheters.html
 5. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html
 6. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/fever.html
 7. www.cancer.org/treatment/treatments-and-side-effects/planning-managing/tubes-lines-ports-catheters.html
 8. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html
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Why People with Cancer Are More Likely to Get Infections

People with cancer may have a higher risk of infection because of changes in the immune system that control their body's defense systems. Cancer and cancer treatments can affect the immune system and other body systems in different ways. People with cancer might be more likely to get infections because of:

- The cancer itself
- Certain types of cancer treatment
- Poor nutrition
- Other health problems or medications that aren't related to cancer

Your cancer care team will talk to you about any increased risk for infection you may have, and what can be done to help prevent infection. If the risk is due to cancer treatment, it is usually temporary because the immune system recovers after a period of time, but this depends on your situation. You can learn more in [Watching for and Preventing Infections in People With Cancer](#).

If you have questions about whether you need to take special precautions to prevent infections, it is best to discuss your risk of getting an infection with a doctor who understands your situation and medical history.

How your body protects itself from infection

Your body has many ways to protect itself from infections. It helps to understand how your body normally does this, and how cancer and cancer treatment can change this process. This may help you better understand why infections can develop so quickly and be so serious in people with cancer.

Skin and mucous membranes

The skin is your body's largest organ and an important barrier against infections. It's your first line of defense in protecting internal tissues from harmful germs. When there's a break in your skin, it's easier for germs to get into your body and cause infection.

Mucous membranes, which form the moist, pink lining layer of the mouth, throat, nose, eyelids, urethra, vagina, and digestive system, also act as partial barriers against infection. These membranes normally help protect us from germs in the air we breathe, our environment, and in our food and drink. Cancer treatments (such as chemotherapy, targeted therapy, immunotherapy, radiation therapy, or surgery) and certain procedures (like putting in catheters or IVs, or getting shots) can injure cells in the skin or cause damage to the skin or mucous membranes. This makes it easier for germs to enter the body.

The immune system

If germs get through the skin or mucous membranes, the job of protecting the body shifts to your immune system. Your immune system is a group of cells, tissues, and organs that work together to help find and attack germs that invade the body and cause infections.

White blood cells, a part of the immune system, are the main type of cell responsible for protecting the body against infections. There are different types of white blood cells, and they each have a role in defending the body against infections. Normally, most of our white blood cells are neutrophils. Neutrophils are key infection-fighters and form an important defense against most types of infections. The other types of white blood cells (lymphocyte, monocytes, and macrophages) also help fight infections.

Cancer itself can increase infection risk

Some types of cancer can change the way the immune system blood cells work. For instance, lymphomas ([Hodgkin](#)¹ and [non-Hodgkin](#)²), multiple myeloma, and most types of [leukemia](#)³ start in immune system blood cells. Other types of cancer can also affect

the immune system and its cells. They can change the immune system cells so that cells that once protected your body begin to interfere with the normal way your immune system works. Cancer cells can get into the bone marrow cells where blood cells are made. The cancer cells then compete with the normal bone marrow cells for space and nutrients. If too many normal bone marrow cells are destroyed or pushed out of the bone marrow, the few cells that are left won't be able to make enough white blood cells (WBCs) to help the body fight infection.

Cancer can also damage other parts of the immune system. A tumor that grows on the skin or in mucous membranes can break natural barriers and allow germs to get in. Tumors that are large might reduce blood flow to normal tissues by pressing on them or their blood supply. Tumors in the lungs may block normal mucus drainage, which can lead to infections. And, other types of tissues that have been damaged by cancer can be more prone to infections.

Cancer treatments can increase infection risk

Certain cancer treatments can interfere with the way the immune system works. The damage can be short- or long-term. For example, if a person with cancer has their spleen removed due to cancer, this causes long-term damage because the spleen is part of the immune system. On the other hand, radiation therapy, immunotherapy, and chemotherapy, either alone or in combination can lead to short-term (temporary) immune system damage because they affect immune system blood cells for a fairly short period of time. A bone marrow or stem cell transplant uses very high-dose treatments to kill cancer cells that also damage immune system cells for weeks to months.

Surgery

Any type of major [surgery](#)⁴ can weaken the immune system. Anesthesia (the drugs used to make the patient sleep) may play a role. It might take from 10 days to many months for the immune system to recover completely. Surgery also breaks the skin and can damage mucous membranes and tissue under the skin, causing it to be exposed to germs. The wound caused by surgery (the incision) is a common place for infection. Because surgery is often used to diagnose, stage, or treat people with cancer, it's important to know that surgery can increase the risk of certain infections. Things that raise the risk of infection after surgery include:

- How long the person is in the hospital
- The extent of the surgery (how much cutting was done)
- How long the operation took

- The amount of bleeding during surgery
- The person's nutritional status
- Prior cancer treatment, such as chemotherapy or radiation or medical problems such as diabetes, or heart or lung problems

People with cancer may get antibiotics before and for a short time after having surgery to help protect them from infection.

Chemotherapy

[Chemotherapy](#)⁵ (often called chemo) is the most common cause of a weakened immune system in people getting cancer treatment. Chemotherapy can cause [neutropenia](#)⁶ (a decrease in the number of neutrophils, a type of white blood cell, in your blood). This means your body may not be able to fight infections as well as it should. The effects on the immune system depend on many things, including:

- Which chemo drugs are used
- Chemo dose (how much of each drug is given at once)
- How often chemo is given
- Past cancer treatments
- The person's age (older people are more likely to get infections, with or without cancer)
- The person's nutritional status
- The type of cancer
- How much cancer there is (the stage of the cancer)

Some drugs affect the bone marrow and immune system more than others. After treatment ends, your blood cell counts usually go back to normal over time.

Radiation therapy

[Radiation therapy](#)⁷ can also cause low white blood cell counts, which increases the risk for infections.

Factors in how radiation therapy affects the immune system, include:

- The total radiation dose
- The radiation schedule
- The part of the body being treated with radiation

- How much of the body is treated with radiation
- Whether or not you are receiving chemotherapy in addition to radiation therapy.

Total body irradiation or TBI (where a person's entire body is treated with radiation) is the only type of radiation likely to cause very low white blood cell counts. This type of radiation may be used during a bone marrow or stem cell transplant. Radiation is most often given to just one part of the body, so the whole immune system isn't damaged by it. Still, depending on the dose and the part of the body being treated with radiation, the skin or mucous membranes may be damaged, so you're less able to keep germs out. Today, radiation treatments are most often given over many sessions rather than in one large dose. This helps decrease the amount of skin and tissue damage, immune suppression, and the risk of infections.

Targeted therapy

Some types of [targeted therapy](#)⁸ can affect how the immune system works. They target a certain part of a cancer cell or a certain protein or enzyme that is on the surface of a cancer cell. Finding these targets helps the immune system see the cancer cells easier so it can attack them.

Immunotherapy

[Immunotherapy](#)⁹ is used in certain types of cancer to help the immune system recognize and attack cancer cells. This can be done by giving treatments that help your own immune system work harder or smarter, or by giving you man-made immune system proteins or altered cells that are trained to find and attack cancer cells. Immunotherapy is sometimes used by itself to treat cancer, or used along with or after another type of treatment. These treatments help the body have better immune reactions against cancer cells, but sometimes they change the way the immune system works. Because of this, people who get immunotherapy may be at risk for having a weaker immune system and getting infections.

Stem cell transplant (bone marrow transplant)

[Stem cell transplant](#)¹⁰ (SCT) is the term used to include bone marrow transplant(BMT), peripheral blood stem cell transplant (PBSCT), and umbilical cord blood stem cell transplant(UCBSCT). Stem cell transplants are used to replace bone marrow cells that have been destroyed by cancer or by the chemo and/or radiation used to treat the cancer. These transplants allow doctors to use very high doses of chemo and/or total body irradiation (TBI) to try to kill all the cancer cells in the body.

In the process of killing the cancer cells, the blood-forming stem cells of the patient's normal bone marrow are also killed. Because of this, stem cells (either from the blood or bone marrow) are removed from the patient and saved before the high-dose chemo is given. Or, stem cells may be taken from a donor or banked umbilical cord blood. Once the cancer cells are killed, the saved or donated stem cells are given to the patient so that blood cells can be made and the immune system rebuilt. High-dose chemo used with TBI causes more severe immune weakness that lasts for a longer time. It can also damage the skin and mucous membranes and make them less able to keep germs out of the body. This increases the risk of infection.

Poor nutrition and infection risk

All cells need nutrients to grow and work. Lack of vitamins, minerals, calories, and protein can weaken your immune system and make it less able to find and destroy germs. This means people who are poorly nourished (malnourished) are more likely to develop infections. People who are malnourished either do not take in enough calories and nutrients, or the body can't use the food it takes in. Either way, it can weaken your immune system.

People with cancer often need extra calories and protein to support their immune system cells and other tissues. For example, recovery from surgery increases the body's need for nutrients.

People with cancer might be poorly nourished for many reasons:

- The cancer itself can make it hard to eat or digest food. This is common in people with cancers of the digestive system, mouth, or throat.
- Cancer treatments, like radiation therapy and chemotherapy, can cause nausea and a loss of appetite.
- Cancer cells use up nutrients, leaving less to meet the needs of normal, healthy tissues.

People with cancer often need help from dietitians or doctors to get enough calories and nutrients. Dietary supplements, tube feedings, or even intravenous (IV, through a vein) feedings may be needed to help in some cases.

It's important to know that avoiding or eating certain kinds of foods will not affect white blood cell counts (one reason your immune function may not be normal). However, your doctor might have you meet with a dietitian to plan what you should eat and to get help managing eating problems. Nutrition counseling should include the importance of getting enough calories, protein, and vitamins. This is tailored to each person's food

intake and nutrition problems.

Learn more about what to eat during cancer treatment in [Nutrition for the Person With Cancer](#)¹¹.

Low white blood cell counts and infection risk

Certain cancer treatments (such as chemotherapy, radiation therapy, surgery, stem cell or bone marrow transplant, or steroids) or the cancer itself can suppress or weaken the immune system. These treatments can [lower the number of white blood cells](#) (WBCs) and other immune system cells. Treatment can also cause these cells to not work as well as they should. This is called immunosuppression. It's much easier to get an infection when there aren't enough WBCs to destroy germs, especially the type of WBCs called neutrophils.

Neutrophils are a very important defense against most types of infection. When looking at your risk of getting an infection, doctors look at the number of neutrophils you have. A low neutrophil count is called [neutropenia](#)¹². The doctor may say you are neutropenic.

Hyperlinks

1. www.cancer.org/cancer/hodgkin-lymphoma.html
2. www.cancer.org/cancer/non-hodgkin-lymphoma.html
3. www.cancer.org/cancer/leukemia.html
4. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/surgery.html
5. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html
6. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html
7. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html
8. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/targeted-therapy.html
9. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html
10. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html
11. www.cancer.org/treatment/survivorship-during-and-after-

[treatment/coping/nutrition.html](#)

12. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html

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Managing and Treating Infections

People with cancer can be at risk for different types of infections. These infections differ in their risk factors, the symptoms they cause, how they are treated, and the chance of curing the infection. If you have an infection, your doctor will need to assess you to find out:

- The part of your body affected
- The type of germ causing the infection

Your signs and symptoms (for instance, where you have pain, redness, and/or swelling)

help your doctor know what tests are needed to find the cause of the infection. The results of certain [tests](#)¹ (such as x-rays, CT scans, or lab tests done on body fluids) help pinpoint where the infection is and the type of germ causing it.

Common sites of infection in people with cancer include:

- The skin and mucous membranes (soft linings, like inside the mouth, vagina, and intestines)
- The digestive system (mouth, esophagus [swallowing tube], stomach, and intestines)
- The lungs and breathing passages (sinuses and throat)
- The urinary system (bladder and kidneys)
- The nervous system (brain and spinal cord)
- The skin and tissue around a [central venous catheter](#)² (CVC). A CVC is a tube or catheter put in a vein that is used to draw blood and give IV drugs or fluids.

Identifying the cause of the infection

Germs can be bacteria, viruses, fungi, parasites and other organisms. Many kinds of germs normally live on the skin, in the intestines, or in the environment. These germs usually do not cause problems in people with normal defenses and healthy immune systems. But if the normal defense barriers and immune system are weak, the germs can get in the body, grow, and cause damage.

These infections are often called **opportunistic infections**, because the germs use the opportunity of a patient's weakened defenses to cause illness.

Knowing the exact type of germ that's causing an infection helps doctors choose the best treatment. Different drugs are used to treat each of the main types of germs – bacteria, viruses, fungi, and parasites. And even among the main types of germs, different types are treated with different drugs. This means an antibiotic that can kill one type of germ might have no effect on another type of germ. And some germs become resistant to certain antibiotics so sometimes more than one type of treatment is needed to kill the germ that's causing an infection.

Lab tests identify what germs may be causing your infection. Some lab tests can also tell your doctor what medication your infection will best respond to. If you have symptoms that point to a certain area of infection, samples will be taken to check for germs in that area. For example, sputum samples may be taken if you have a cough or

are short of breath.

Urine samples may be taken if you have blood in your urine or feel pain while passing urine. Sometimes, if a person has a very [low white blood cell count](#)³ and a fever, blood and urine samples will be taken before other symptoms start. Your health care team will let you know what lab tests you may need and what samples will need to be collected.

Your doctor may use different tests for different kinds of germs. You may hear your cancer care team mention a gram stain test, viral antigen tests to test for viruses, or genetic tests that test for certain germs by testing their genetic make-up. A common test used in patients who have very low white blood cell count (neutropenia) and fever is a **culture and sensitivity test**. The culture is done first, followed by the sensitivity test. For the culture, samples from the suspected site of infection are collected and put in the lab to grow. Sometimes, bacteria, and fungi may take at least a few days before they can be seen. Viruses may take a few weeks to grow. Once enough germs have grown, they are tested and identified. After bacteria or fungi has been cultured, a sensitivity test may be done on the cultured sample. This will help show the best medication to kill the germ causing a certain infection

Drugs used for treating infections in people with cancer

Because infections in people with cancer can quickly get worse, sometimes treatment is started before the lab results come back. Often broad-spectrum antibiotics are started right away. A broad-spectrum antibiotic will treat different bacteria at the same time. Treatment may be changed after the lab tests have identified the exact germ and which drug will work best to treat it. Doctors know which germs tend to infect certain body parts of people with cancer. So they can often make an educated guess at which germs are most likely causing a patient's infection. Educated guesses are very important because it can take many days to get the results of tests that show the exact type of germ causing an infection and which drug will best stop or kill it.

Infections in cancer patients are often treated according to the germ that is causing them. Anti-infectives are drugs used to prevent or treat infections, for example:

- Antibiotics (sometimes more than one at the same time) are used to treat bacterial infections
- Anti-fungal drugs are used to treat fungal infections
- Anti-viral drugs are used to treat viral infections
- Anti-protozoal drugs to treat protozoal infections

Anti-infectives are often given to patients when an infection is suspected or after an infection has been identified to treat the infection. Other times, they may be given to patients who have known risk for a particular germ before they get an infection to prevent the infection.

For patients with a suspected infection; after a physical exam, lab tests, cultures, and sometimes even imaging studies or special procedures will be done. This will help the doctor find out exactly where the infection is and help figure out which germ may be causing it. Then anti-infectives (which can be antibiotics, anti-viral, anti-fungal, or anti-protozoal drugs) are started quickly. After the exact germ is identified, the same anti-infective may be continued, or new ones may be started if the tests show others would work better or if another type of germ is identified.

Only bacterial infections are described below. If you have a different kind of infection, talk to your doctor for more information about it and its treatment.

Bacterial infections

When treating bacterial infections in people with weak immune systems, an antibiotic that will treat many different bacteria are often chosen first, especially if doctors aren't yet sure what's causing the infection. These are called **broad-spectrum antibiotics**. Often, more than one antibiotic is used at the same time.

Drug-resistant germs: Even in serious situations, overuse of antibiotics must be avoided because this can make some bacteria resistant to these drugs. Such germs are called drug resistant because they no longer respond to the antibiotics that killed them in the past. Germs change and adapt all the time. For example, some strains of *Staphylococcus* (staph) have become resistant to certain antibiotics. These strains get special names. Staph that's resistant to methicillin is called **methicillin-resistant staph aureus**, or **multi-drug-resistant staph aureus**. This is often shortened to the initials **MRSA**. There are newer drugs that can still work against some of these hard-to-kill germs. To avoid spreading drug-resistant bacteria to other patients, health care workers often wear disposable gowns and gloves when caring for people known to have these infections.

Treating infections in cancer patients

Fever, swelling, pain, and other signs of infection in a person known to have a weak immune system are treated as medical emergencies. In the past, people with cancer were almost always put in the hospital to treat infections, and some still are. But many patients can take their antibiotics at home as pills or liquids. Those who need

intravenous (IV) antibiotics may be able to get them in infusion clinics, doctor's offices, or even at home. If this happens, talk to your cancer care team to learn where you can receive treatment.

For the first few days, patients should be assessed daily to see if the infection is getting better and to see if they are having any side effects. The doctor might also want you to have lab tests often during treatment. If the patient still has a fever during treatment, they should be assessed daily by their cancer care team. Anti-infectives may be changed or new ones may be started when the final culture or other test results come in. The culture results should tell the doctor which germ is causing the infection.

If the patient doesn't get better, an infectious disease specialist may be called in. These are doctors who specialize in treating infections. This doctor may recommend extra testing and different treatments.

In some cases, injections of drugs called CSFs (colony-stimulating factors) may be given to stimulate the bone marrow to produce more white blood cells (WBC) so the body can better fight the infection. Examples of CSFs include filgrastim (Neupogen), tbo-filgrastim (Granix), and pegfilgrastim (Neulasta).

Each type of infection is treated with different drugs and for different lengths of time. If you have any questions about the drugs you are given or why you're taking them, talk with your doctor or nurse.

Hyperlinks

1. www.cancer.org/treatment/understanding-your-diagnosis/tests/understanding-your-lab-test-results.html
2. www.cancer.org/treatment/treatments-and-side-effects/planning-managing/tubes-lines-ports-catheters.html
3. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html

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Watching for and Preventing Infections

Cancer and cancer treatments can weaken the immune system. The immune system is a complex system the body uses to resist infection by germs, such as bacteria or viruses.

When the immune system is weakened, there is a higher risk for infection. Because of this, infection is a common complication of cancer and cancer treatment and certain types can be life-threatening if not found and treated early.

If you're getting treatment for cancer, your cancer care team will talk to you about any increased risk for infection you may have, and what can be done to help prevent infection. Usually the risk is temporary because the immune system recovers after a period of time, but each person is different.

For cancer patients who finished treatment a few years ago or longer, their immune systems have most likely recovered. But this depends a lot on the type of cancer you had, the type of treatment you received, and other medical problems you might have that can affect your immune system.

Different cancer treatments can affect people in different ways. Each patient's immune system responds to, and recovers from, treatment differently. The US Centers for Disease Control and Prevention (CDC) provides [guidance for cancer patients, caregivers, and their health care teams about how to prevent infection](#)¹.

Patients with cancer, those in active treatment, and those who have finished any type of treatment may need to take special precautions to prevent infections from viruses and bacteria. They can look at the CDC information and talk to their cancer care team to find out if special precautions are needed, such as if they need to limit or avoid social activities or wear any protective equipment (masks, gloves, etc.).

If you are getting any type of treatment for cancer or previously had cancer that was treated with surgery, radiation therapy, chemotherapy, targeted therapy, immunotherapy, hormone therapy, stem cell or bone marrow transplant, or have used any other types of treatments, it is best to discuss your risk of getting an infection with a doctor who understands your situation and medical history.

Preventing infections in people with cancer

Here are some things you can do that might help prevent infection and illness when your immune system is weak due to cancer and/or cancer treatment:

- Wash your hands often with soap and warm water. Be sure to wash your hands before eating and before touching your face or mucous membranes (eyes, nose, mouth, etc.).
- Wash your hands after using the bathroom, blowing your nose, coughing, or sneezing.
- Wash your hands after touching animals, collecting trash, or taking out garbage.
- Wash your hands after visiting a public place or touching items used by others.
- Carry an alcohol-based hand sanitizer to clean your hands when you're out.
- Use moist cleaning wipes to clean surfaces and things that you touch, such as door handles, ATM or credit card keypads, and any items that are used by other people.
- Avoid large crowds of people such as at schools, travel, shopping, social events, and public gatherings. If you have to be around a crowd, it's a good idea to wear a mask.
- Stay away from anyone with a fever, the flu, or other infection.
- Get your [flu shot](#) every fall. Encourage other members of your household to get it, too. **DO NOT** get the nasal mist flu vaccine. Ask your doctor if you should get any other vaccinations, such as the pneumococcal vaccine to prevent pneumonia, or Hepatitis B vaccine to prevent Hepatitis B.
- If your cancer care team has told you that you have a weakened immune system and that you are at high risk for infection, you might be advised to stay away from children and limit visitors during the respiratory virus season.

- Bathe every day. Be sure to wash your feet, groin, armpits, and other moist, sweaty areas.
- After bathing, look for redness, swelling, and/or soreness where any tubes or catheters go into your body.
- Wear gloves when you garden and wash up afterward.
- Brush your teeth twice each day using a soft toothbrush. Ask your doctor or nurse if it's OK to gently floss your teeth or use a water flosser. Tell them if your gums bleed. Your doctor or nurse may give you a special mouthwash to help clean your mouth. Do not use alcohol-based mouthwashes.
- Keep your groin and anal areas clean. Use soft moist tissues such as disposable baby wipes or bathroom towelettes after using the toilet and anytime you notice irritation or itching. Tell your doctor about any bleeding, redness, or swelling (lumps) in this area.
- Do not get manicures or pedicures at salons or spas (you can use your own personal and well-cleaned tools at home). Do not use false nails or nail tips.
- Do not wade, play, or swim in ponds, lakes, rivers, or water parks.
- Do not get into hot tubs.
- Wear shoes all the time – in the hospital, outdoors, and at home. This helps you avoid injury and keep germs off your feet.
- Use an electric shaver instead of a razor to avoid cuts and nicks. Do not share shavers.
- If you cut or scrape your skin, clean the area right away with soap and warm water. Cover the area with a clean bandage to protect it. If the bandage gets wet or dirty, clean the area and put on a new bandage. Tell your doctor if you notice redness, swelling, pain, or tenderness.
- Prevent [constipation](#)² and straining to move your bowels by drinking the recommended amount of fluid each day.. Exercising each day can help, too. Ask your doctor how much fluid you should drink daily and if it is safe for you to exercise. Let your doctor or nurse know if you are having bowel problems. If needed, your doctor may give you a bowel softener medicine. Do not put anything in your rectum, including enemas, thermometers, and suppositories.
- Women should not use tampons, vaginal suppositories, or douche.
- Use water-based lubricants during sex to avoid injury or abrasion of the skin and mucous membranes. Use latex or plastic condoms to reduce the risk of sexually transmitted infections.
- Do not keep fresh flowers or live plants in your bedroom.
- Do not clean up droppings from [your pets](#). Do not clean bird cages, litter boxes, or fish or turtle tanks. Have someone else do this for you.

- Do not touch soil that may contain feces of animals or people.
- Do not change diapers, but if you do, wash your hands very well afterward.
- If you use disposable gloves to avoid touching things like soil or waste, wash your hands after you take off the gloves. (Gloves can have tiny holes that you can't see.)
- Stay away from all standing water, for example, in vases, denture cups, and soap dishes. If you store your dentures in a cup, wash the cup and change the water with each use.
- Use hot water or a dishwasher to clean your dishes.
- Do not share bath towels or drinking glasses with anyone, including family members.
- Stay away from chicken coops, caves, and any place where dust from the ground is being blown into the air, such as construction sites.
- Talk with your doctor or nurse if you are planning any travel during this time.

Be aware of and watch for signs and symptoms of infection. Talk to your doctor about what you should watch for and what you need to report right away.

Food safety tips for the person with cancer

Infections can be picked up from food and drinks. So, food safety is very important when your immune system is weaker than normal. Talk to your cancer care team about whether you need to follow a special diet during your cancer treatment. Wash your hands before handling any food products. Make sure all meat products (this may include chicken, beef, and other meat products) are cooked thoroughly to kill any bacteria that may be present.

Fresh fruits and vegetables can have germs on the outside which can cause illness. Some doctors tell their patients who have weak immune systems not to eat any fresh fruits or vegetables to help lower the risk of infection. Others allow their patients to eat fresh fruits and vegetables as long as they are washed thoroughly first. It's important to know that even when the outer part of a fruit (such as the peel or rind) isn't eaten, it still needs to be washed before it's peeled. If it isn't, germs can get on the part that is eaten when the peel or rind is cut. It may also be a good idea to avoid certain foods that have been linked to outbreaks before, such as raw vegetable sprouts, fresh salsa, and berries. Be careful eating at salad bars, as they have been sometimes associated with certain bacterial infections.

Talk with your doctor about any dietary questions or concerns you may have, or ask to talk with a registered dietitian. For more detailed information about safely handling foods, see [Food Safety During Cancer Treatment](#)³

Drugs given to prevent infections during cancer treatment

Sometimes, doctors prescribe medicines when a person's immune system is very weak – even though there's no sign of infection. The drugs are given to help keep you from getting an infection.

Preventive drugs

Anti-bacterial, anti-viral, and/or anti-fungal drugs may be used to help prevent infection. You may hear this called **prophylactic antibiotic** use, or just **prophylaxis**. Prophylaxis is only used when there's a very high risk of getting infections (the immune system is very weak). You might also be given antibiotics if you are taking other medicines that can weaken your immune system, such as a long course of steroids or certain [chemotherapy](#)⁴ drugs.

The preventive drugs are stopped when your immune system is no longer so weak (often some time after the immune-weakening drugs are stopped). Using antibiotics in this way does not prevent all infections. That means it's still important to use the same precautions as when you aren't taking preventive drugs, and be sure to tell your doctor about any new signs of infection.

Growth factor drugs

Growth factors are proteins your body makes to help your blood cells grow. They are also known as **colony-stimulating factors** (CSFs) or **myeloid growth factors**. Growth factors stimulate the bone marrow to produce more white blood cells to help the body fight infection. You can be given injections of man-made CSFs. They are most often used after chemo to help prevent infection. Your doctor also may give you a CSF if your immune system is weak and you have a serious infection that's getting worse even though you're getting treatment.

Common CSF drugs used today include filgrastim (Neupogen[®]), pegfilgrastim (Neulasta[®]), and tbo-filgrastim (Granix[®]).

Growth factors can have side effects in some people, but they can reduce the risk of infection in the patients who need them. Talk to your cancer care team about the risks and benefits of CSFs. Talk to your cancer care team about what side effects you might experience while using CSFs and what you can do to manage the side effects.

Watching for infection in cancer patients

Many cancer treatments and cancers can cause changes in your blood counts. A low white blood cell (WBC) count can put you at higher risk of infection. You may hear this called [neutropenia](#)⁵, or be told that you are neutropenic.

The WBC count measures your body's ability to fight infection. When your WBC count is low, you'll need to watch for signs of infection so that you can get treatment right away.

Symptoms of infection to look for

- [Fever](#)⁶ (a higher than normal body temperature). Your doctor will tell you what temperature to consider a fever. Sometimes, a fever is the only sign of an infection.
- Any new area of redness, tenderness, or swelling
- Pus or yellowish discharge from an injury or other location
- New cough or shortness of breath
- New abdominal (belly) pain
- Shaking chills that may be followed by sweating
- Burning or pain when passing urine
- Sore throat
- Sores or white patches in the mouth

What the patient can do

- Check your temperature by mouth (or under your armpit if you can't keep a thermometer in your mouth).
- Keep a working thermometer within easy reach and make sure you and your caregivers know how to use it.
- Talk to your cancer care team about what to do if you have a fever. Ask if you should take medications like acetaminophen (Tylenol) for a fever.
- Keep the cancer care team's contact information with you at all times. Make sure you know when to call, and what number to call during and after regular office hours.
- If you have to go to the emergency room or urgent care, let the team taking care of you know that you are a cancer patient who recently received cancer treatment.
- Take antibiotics or other medicine as prescribed.
- Drink fluids, but don't force more than you can tolerate.
- Avoid anything that can cause cuts, scrapes, or other breaks in the skin.
- Wash your hands after using the bathroom or visiting public places. Use hand

- sanitizer when you don't have soap and water.
- Avoid crowds, and don't visit with people who have infections, coughs, or fevers. If you have to be around any of these groups of people, it's a good idea to wear a mask.
- If you eat raw foods, wash them carefully and peel them to avoid germs.
- Brush your teeth twice a day. Ask your doctor or nurse if it is safe for you to floss.

What caregivers can do

- Keep a working thermometer within easy reach and make sure the patient and the caregivers know how to use it.
- Watch for shaking chills, and check the patient's temperature after the shaking stops.
- Check the patient's temperature using a thermometer in the patient's mouth or under the armpit. (Do not take a rectal temperature.)
- Encourage visitors who have diarrhea, fever, cough, or the flu to visit the patient only by phone until they are well.
- Offer extra fluids.
- Help the patient take medicines on schedule.
- Keep the cancer care team's contact information with you at all times. Make sure you know when to call, and what number to call during and after regular office hours.
- If you have to take the patient to the emergency room or urgent care, let the team there know that this is a cancer patient who recently received treatment.

Call the health care team if the patient

- Has a fever
- Has shaking chills
- Feels or seems "different"
- Cannot take in fluids

Hyperlinks

1. www.cdc.gov/cancer/preventinfections/

2. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/stool-or-urine-changes/constipation.html
3. www.cancer.org/treatment/survivorship-during-and-after-treatment/coping/nutrition/weak-immune-system.html
4. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html
5. www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/neutropenia.html
6. [/content/cancer/en/treatment/treatments-and-side-effects/physical-side-effects/fever.html](http://content.cancer/en/treatment/treatments-and-side-effects/physical-side-effects/fever.html)

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Caring for Pets During Cancer Treatment

Is it safe to keep my pet while I'm being treated for cancer?

Caring for certain pets might increase your risk of getting an infection. Not all pets pose the same risks, and not all cancer treatments do, either. If you have pets, tell your cancer care team about them and your routines for caring for them. You can find out what might not be safe during cancer treatment. It's also a good idea to visit your pet's veterinarian to find out what kinds of illness might be passed from your pet during times when your immune system is weak.

It's best to avoid some types of pets while you're getting cancer treatment (see below). There's also a big difference between taking in a sick stray and keeping your healthy pet during cancer treatment. Strays often carry more germs and might not be up to date on vaccines.

Pets that live inside the home and are well-cared for are much less likely to cause problems if precautions are used. Still, pets can sometimes pick up germs that don't make them sick, but if a person with a weak immune system gets some of these germs, they can become ill.

How can you get an infection from a pet?

Bites and scratches

It's best if you can avoid bites and scratches while you are getting cancer treatment. If your pet plays rough, you may have to call a halt to that until your immune system recovers.

- Get your dog or cat's claws trimmed often so that you're less likely to be scratched.

- Scratches should be cleaned and covered until they heal.
- If any redness, swelling, or pus forms around a scratch, call your doctor right away.
- If your pet bites and breaks the skin, call your doctor. All bites carry the risk of infection and can require hospitalization even in people with normal immune systems. It's likely you'd need antibiotics and maybe other treatment, depending on the location and severity of the bite. Cat bites are especially likely to become infected, because their long narrow teeth can make deep puncture wounds that are hard to clean.

Feces and urine

A number of illnesses can be spread via pet droppings, and a few spread through urine.

- Keep litter boxes away from food preparation areas and places where people eat.
- Have someone else remove waste from the litter box or bird cage every day and discard it safely.
- If a pet has an accident inside, it's best to get someone else to clean it up and the area should be disinfected.
- If you must do the clean-up, wear disposable waterproof gloves and wash your hands afterward.

Licking, saliva, and vomit

A few illnesses can be transmitted by saliva, so it's best not to let your pet lick open cuts or near your mouth.

- Wash with soap and water if you get pet saliva on your skin.
- Any vomit should be cleaned up by someone else if possible, while wearing waterproof disposable gloves.

Touch

Some germs can be picked up by touching or petting the animal. That's why washing your hands after pet contact is important.

Protecting your health during cancer treatment

Here are some tips that can help keep you safe during cancer treatment.

- Avoid very close contact, such as kissing, snuggling, or sleeping with your pet in the same bed.
- Visit your veterinarian so your pet(s) can be checked for any diseases that might cause infection and get medications to prevent infections from heartworms, fleas, or ticks.
- Make sure your pet(s) are up to date with their vaccinations. Ask your vet whether any vaccines are “live,” and check with your cancer team before live vaccines are given.
- Have your cat(s) tested for feline leukemia (FeLV) and feline immunodeficiency (FIV) viruses. Even though these viruses can’t infect humans, they affect the cat’s immune system and put them at risk of other infections that can infect humans.
- Bring your pet(s) to a veterinarian if you suspect they are sick.
- Keep your pets and their sleeping areas clean.
- Feed pets only high-quality commercial canned or dry food, or well-cooked table food. Never let them have old or spoiled food, raw meat or its juices.
- Wear waterproof disposable gloves if you must clean the fish tank, bird cage, cat litter box, or to pick up dog droppings.
- Bird cage liners should be cleaned every day.
- Don’t handle the outside of your gloves after you use them. Remove gloves by pulling off from the inside surface at the cuff, then discard them.
- Wash your hands after petting, caring for, touching, feeding, or cleaning up after pets (even if you wore gloves).
- Wash your hands before taking medicines and handling food, dishes, or other things in the kitchen.
- Ask others to clean fish tanks and cages of birds or other pets.
- Avoid contact with animals you don’t know, especially strays or those that look sick.
- Avoid contact with reptiles, their cages or terraria, and objects from their cages.
- Wear gloves when gardening to avoid contact with animal droppings.
- Keep your pets, like cats and dogs indoors as much as possible to minimize exposure to other pets and animals, such as birds and rodents.
- Make sure you have someone who can take care of your pets and their living quarters if you get too sick or have to be in the hospital. Keep written instructions for feeding, cleaning, medicines, toileting, and veterinary contacts ready if needed.
- Getting a new pet during cancer treatment isn’t usually recommended. But if a family chooses to adopt a pet, a healthy older dog or cat would probably pose less risk than those under a year old. The animal should be checked by a veterinarian

before it's brought home. Puppies and kittens can pose higher risks than older pets. They're also more likely to play rough, bite, or have in-home "accidents" that must be cleaned up.

- If your pet has a runny nose, cough, weight loss, vomiting, or diarrhea, see a veterinarian right away. He could have an infection that can be passed on to you. A person with a weak immune system might be at higher risk of getting an illness from their pet when it's sick.
- Keep your pet away from animal waste, garbage, and other "found treats".
- Don't let your pet drink from the toilet or standing water outside.
- Don't allow your pet to visit with sick pets or wild or stray animals.
- Watch for signs of rats or mice in your home, and take measures to control them. Don't allow your pet to hunt them; keep pets away from any infested areas. After rodents are gone, the area should be thoroughly disinfected using a bleach mixture.

Keeping pets healthy

Be sure that the vet prescribes medicines to prevent heartworms, and use flea and tick prevention for dogs and cats. Pets and their sleeping areas will also need to be kept clean. You might need help with your pets' care during some parts of your cancer treatment – it's good to line up a helper or two before you start treatment.

Help your pet avoid infections

- Keep your dog inside except for brief outings to use the toilet and walks on the leash in places where they won't meet other animals.
- Cats should also be kept inside – those that go out are likely to hunt birds and small rodents. This is a common way cats get a parasitic infection called toxoplasmosis. It doesn't often make the cat sick, but it can seriously sicken or even kill someone with weakened immunity.
- Keep your pet from visiting with "outside" pets of unknown health. It's best not to board your pet in a kennel if you can avoid it.
- Dog parks and pet stores that allow pets inside are other places where pets can pick up new infections.

Pets you shouldn't be around during cancer treatment

Reptiles

People with weak immune systems (especially those getting a [stem cell transplant](#)¹ or bone marrow transplant) should not keep reptiles. Snakes, turtles, lizards, and iguanas are very common carriers of salmonella, which can be lethal in people with very weak immune function. This germ can live for some time on surfaces and objects that the animal touched. Because a person doesn't have to handle the reptile to be exposed to this germ, it can be hard to avoid it.

Chickens and ducks

People with very weak immune systems, especially those who are having stem cell transplants, should not have or come in contact with ducklings and chicks. Even as adults, chickens and ducks have a high risk of salmonella or campylobacter infection.

Rodents and pocket pets

Hamsters, gerbils, mice, guinea pigs, and ferrets often carry salmonella even when they look healthy. These and other germs can infect humans, causing diarrhea, skin infections, and other illness. If they're exposed to wild rodents or sick animals, they can share viruses that cause serious illnesses in humans. For these reasons, they may not be good choices for someone getting cancer treatment.

If you choose to keep pets like these, they should stay inside and away from other animals that may have infections. Habitats should not be kept in children's rooms. Cages, toys, food and water bowls should be cleaned outside, and kept away from eating and food areas. Use the precautions above when petting, feeding, cleaning cages, or handling their toys. Keep ferret vaccines up to date.

Other exotic pets

Animals that normally live in the wild are not recommended for people with weak immune systems. They can carry rare but serious diseases. Monkeys, chinchillas, primates, and other exotic pets may also be more likely to bite.

Children with cancer and pets

Children tend to be at higher risk for infection from pets than adults, because they're more likely to crawl on the floor with the pet and put things in their mouths. Some pets that are fine for adults can pose more of a hazard to children. It's best to avoid getting a

new pet if your child has a weak immune system. This is even more important if the child might be getting a bone marrow or stem cell transplant.

All of the information about pets and adults with cancer also applies to pets in a household where a child has cancer. When kids are too young to follow the precautions, they shouldn't interact with pets. Even older children might need your help.

- Adults should supervise the time a child spends with pets.
- Don't allow kissing, food sharing, or rough play.
- With smaller kids, don't let them put the pet's toys or their own fingers in their mouths. Be sure the child's hands are washed thoroughly afterward, and again before eating, drinking, or taking medicines.
- Be sure your child's cancer team knows about your pet and ask them if there are any special precautions you need to take.
- Keep your child away from strays, wild animals, petting zoos, and other people's pets.

If you have questions, be sure to talk with your child's doctor. You can also check with your pet's veterinarian about diseases your child could pick up.

Hyperlinks

1. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html

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Vaccinations and Flu Shots for People with Cancer

Should people with cancer get any vaccines?

It's generally recommended that vaccines not be given during [chemo](#)¹ or [radiation](#)² treatments – the only exception to this is the flu shot. This is mainly because vaccines need an immune system response to work, and you may not get an adequate response during cancer treatment.

The immune system is a group of cells, tissues, and organs that work together to resist [infection](#) by germs, such as bacteria or viruses. Cancer and cancer treatment can weaken a person's immune system so that it won't work as well as it should. It's important to know which vaccines are safe for people with weak immune systems. Before receiving any vaccines, talk to your doctor about your cancer, cancer treatment, risk factors for the vaccine-preventable disease, whether you need the vaccine, and the best time for you to get it.

Vaccines, which are also called immunizations or vaccinations, are used to help a person's immune system recognize and fight certain infections or diseases.

Live versus inactivated vaccines

For people with cancer: It's important to remember there is a difference between a vaccine with a live virus and one with an inactive virus. It's also important that people with cancer who might have a weak immune system talk to their doctor about whether they can get vaccines. In general, anyone with a weak immune system should **not** get any vaccines that contain **live** virus. There are a few vaccines that contain live viruses, which can sometimes cause infections in people with weak immune systems that can

become life-threatening. Your doctor can help guide you about which vaccines are safe while your immune system is weak. Be sure to also talk to your doctor before anyone you spend a lot of time with (such as your children or other household members) gets any vaccines.

For family and caregivers of people who have cancer: If you live with or spend a lot of time with a person who has cancer and might have a weakened immune system, it's important to talk to the doctor if you, your child, or your loved one is due for a vaccination of any kind. Usually, most age-appropriate vaccines can be given, but there are some exceptions.

COVID-19 vaccines

Vaccines that can help protect against COVID-19 are now becoming available. To learn more about these vaccines, see [COVID-19 Vaccines in People with Cancer](#).

Flu shots

The Centers for Disease Control and Prevention (CDC) recommends everyone 6 months and older get a flu vaccine each year, although there are some rare exceptions. Every year, the CDC gives updates about what's important to know for the upcoming flu season and the vaccine that's available to help prevent the flu. You can read common questions and answers about [getting a flu vaccine this season](#)³.

The flu shot is a vaccine that is given to reduce your risk of getting influenza (a viral infection often called "the flu"). In patients with cancer and weakened immune systems, it's important to prevent the flu because it can be serious and sometimes life-threatening. It is recommended that cancer patients get the flu shot that has an inactive (dead) flu virus every year. The vaccine is needed every year because research has shown there is usually a different kind of flu virus expected each year, so the vaccines are a little different each year to help be as effective as possible. Your cancer care team will tell you when the best time to receive the flu vaccine is depending on your cancer type and treatment.

The nasal mist version of the flu vaccine contains a weakened version of the live virus. **People with cancer should not get the nasal mist flu vaccine.** Family members of a person with cancer can safely get the nasal spray (at least in some flu seasons) unless the patient has a severely weak immune system and/or is being cared for in a germ-protected area. For example, household members should not get the nasal mist vaccine if a family member has recently had a stem cell or bone marrow transplant.

It is recommended that people who live with or care for a person at high risk for flu-related problems get the flu vaccine, too. This means that if you're being treated for cancer, your family members, caregivers, and children age 6 months and older living at home should get the flu shot. Talk to your doctor for more information or if you have questions about your specific situation.

MMR (Measles-Mumps-Rubella) vaccine

This vaccine is used to protect people from 3 viral diseases: measles, mumps, and rubella.

People who have weak immune systems should not get the MMR vaccine because it contains live virus. But it's safe for other household members to get it. If needed, your doctor may consider giving you the vaccine before cancer treatment starts. Talk to your doctor for more information or if you have questions about your situation.

After exposure to measles: If the person being treated for cancer is exposed to someone with measles, let the doctor know right away. Sometimes, medications can be given to help fight the measles infection before it starts.

Talk to your doctor about your risk, and if you need to receive the MMR vaccine.

Pneumococcus (pneumococcal pneumonia) vaccine

This vaccine can help people with weak immune systems fight off certain lung, blood, or brain infections caused by certain bacteria. Your doctor may recommend one or more doses of the pneumococcal vaccine, depending on your age and health. In cases where patients are having their spleen removed, this vaccine may be given before surgery or sometimes after the surgery. Ask your doctor if you need to receive the pneumococcal vaccine and when you need to get it.

Meningococcal vaccines

This vaccine helps prevent meningococcal disease, which can cause meningitis or other infections. This vaccine should not be given during cancer treatment. It may be offered before treatment, or after the patient's immune system has recovered. In cases where a patient is having the spleen removed, this vaccine may be given before surgery. Talk to your doctor to see if and when you may need to receive the meningococcal vaccine.

Polio vaccine

This vaccine is used to prevent polio, a viral infection linked to severe illness and physical disability. Since the vaccine came out in 1955, polio has become rare in the US.

Children who have weak immune systems, as well as their siblings and others who live with them, only should get **inactivated** polio virus vaccines. Most doctors in the United States use only the inactivated polio vaccine, but you should ask to be sure. The older oral polio virus vaccine (which is taken by mouth) contains a live virus. People who get the live virus vaccine can pass the virus on to people with weak immune systems.

Varicella (chickenpox) vaccine

This vaccine is intended to prevent chickenpox in people who have never had it.

This is a **live** virus vaccine. It should not be given to people with weak immune systems, or to people with [leukemia](#)⁴, [lymphoma](#)⁵, or any cancer of the bone marrow or lymphatic system unless it's treated and under control. It's OK for household members of the person with weak immunity to get the varicella vaccine. Talk to your doctor for more information or if you have questions.

If you're exposed to chickenpox: A person with weak immunity who has been around someone with chickenpox should call the doctor right away.

Shingles (varicella zoster) vaccine

This vaccine is given to adults age 50 and older who have had chickenpox or shingles in the past to help prevent shingles or make symptoms of shingles less severe.

If you have a weak immune system from cancer or cancer treatment, talk to your doctor about chicken pox and shingles vaccine options and whether one of these vaccines might be right for you. Also, tell your doctor if you know you have been exposed to chickenpox or shingles.

Hyperlinks

1. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html
2. www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html
3. www.cdc.gov/flu/season/faq-flu-season-2021-2022.htm

4. www.cancer.org/cancer/leukemia.html
5. www.cancer.org/cancer/lymphoma.html

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Questions to Ask Your Health Care

Team About COVID-19

The current COVID-19 pandemic has been very concerning for many people, especially for people with cancer, cancer survivors, and their families and caregivers.

Where to find answers

You can find updated information and answers from the American Cancer Society about [COVID-19 and cancer](#)¹, including:

- Answers to [common questions people have about COVID-19](#)²
- Why [infections in people with cancer](#) can be a concern
- If [people with cancer should get the COVID-19 vaccine](#)
- Ways to [manage stress and emotions](#)³ during this time
- Tips for [staying healthy while stuck at home](#)⁴
- How [telehealth \(telemedicine\)](#)⁵ might be a way to get medical care
- Hints to help [caregivers who have COVID-19 concerns](#)⁶

You may have questions that you haven't found answers to about how COVID-19 might affect you. Each person's cancer, treatment, and situation can be different, so the answers might not be the same for everyone. There are many questions you might need to ask your health care team to get the answers you're looking for.

What to ask your health care team

Here are some questions people with cancer or cancer survivors might want to ask their health care team about COVID-19.

For all people with cancer or a history of cancer, and people facing a possible cancer diagnosis:

- In my situation, how can I lower my risk of getting COVID-19?
- Am I at higher risk of serious illness if I do get COVID-19? Why or why not?
- Is the COVID-19 vaccine safe for me?
- Should I get the COVID-19 vaccine now, or should I wait?
- Should I get any additional COVID-19 vaccine shots and/or boosters? If so, when?

- Do I still need to take steps to lower my risk of getting COVID even if I've had the vaccine? If so, what would these be?
- What symptoms of COVID-19 should I watch for?
- What should I do if I have symptoms of COVID-19?
- Should I get tested for COVID-19?
- If I test positive for COVID-19, what will happen?
- If I get sick from COVID-19, will it affect the outlook (prognosis) of my cancer?
- If I test negative for COVID-19, what should I do if I still don't feel well?
- If I test negative for COVID-19, can I still get infected later?
- Will this pandemic delay or affect my care in any way?
- Is telehealth available so I can get care virtually or be seen by a doctor online?

For people getting ready to have exams, tests, or surgery for cancer:

- Will having this procedure put me at a higher risk of getting COVID-19? Why or why not?
- Will having this procedure put me at higher risk of serious illness if I do get COVID? Why or why not?
- Do I need to have the procedure now, or could we safely delay it? If so, for how long?
- Is there a chance the hospital or facility will cancel my procedure? What are my options if it's canceled? Can I have the procedure somewhere else?
- Do I need a COVID-19 test before I can get my procedure?
- Should I get the COVID-19 vaccine before my procedure is done?
- Should I get any additional COVID-19 vaccine shots and/or boosters? If so, when?
- Do I still need to take steps to lower my risk of getting COVID even if I've had the vaccine? If so, what would these be?
- Can I bring a family member or friend with me? Can people visit me?
- Is telehealth available so I can get care virtually or be seen by a doctor online?
- Will the pandemic delay getting any results from the procedure?

For people getting ready to start cancer treatment:

- Will my treatment put me at a higher risk of getting COVID-19? Why or why not?
- Will my treatment put me at higher risk of serious illness if I do get COVID? Why or why not?

- Should I get the COVID-19 vaccine before I start treatment?
- Could the treatment alter how well the vaccine works for me?
- Should I get any additional COVID-19 vaccine shots and/or boosters? If so, when?
- Do I still need to take steps to lower my risk of getting COVID even if I've had the vaccine? If so, what would these be?
- Do I need to start treatment now, or is it safe to wait? How long is it OK to wait?
- Is there a chance the treatment center will cancel my scheduled treatment? What are my options if it's canceled? Is there another center where I can get treatment?
- Can I bring a family member or friend with me to treatment?
- Can I go to work?
- What about people who will be taking care of me? Should they get the COVID vaccine and/or take other steps to lower their risk? Can they go to work?
- Can I visit friends and relatives? Can they visit me?
- Are there any special precautions I should take after treatment begins?
- Is telehealth available so I can get care virtually or be seen by a doctor online?
- Can I get care, treatment, or bloodwork at home?

For people currently getting cancer treatment:

- Does my treatment put me at higher risk of getting COVID-19? Why or why not?
- Does the treatment put me at higher risk of serious illness if I do get COVID? Why or why not?
- Can I get the COVID-19 vaccine while I am getting treatment?
- Could the treatment alter how well the vaccine works for me?
- Should I get any additional COVID-19 vaccine shots and/or boosters? If so, when?
- Do I still need to take steps to lower my risk of getting COVID even if I've had the vaccine? If so, what would these be?
- If I get sick or have to go to the hospital from COVID-19, how might my cancer treatment be affected?
- Do I need to wear a mask at home when I'm around my family and other people?
- How much do I need to stay at home? Can I run errands like going to the store?
- Can I go to work?
- What about people who are taking care of me? Should they get the COVID vaccine and/or take other steps to lower their risk? Can they go to work?
- Can I visit friends and relatives? Can they visit me? if so, how can we do it safely?
- Do I need a COVID-19 test before I can get each treatment?
- Are there medicines I can take during treatment to lessen my risk of getting COVID,

- or of getting seriously ill from COVID?
- What precautions do I need to take when I come in for treatment or check-ups?
- Can I bring a family member or friend with me to treatment or check-ups?
- Should I continue treatment or keep my appointments if I have symptoms of COVID-19?
- Is there a chance the treatment center will cancel my scheduled treatment? What are my options if it's canceled? Is there another center where I can get treatment?
- Can I get care, treatment, or bloodwork at home?
- Is telehealth available so I can get care virtually or be seen by a doctor online?
- What might happen if I miss a treatment?

For people who are not currently getting treatment or who have finished treatment:

- Am I at higher risk of getting COVID-19? Why or why not?
- Am I at higher risk of serious illness if I do get COVID? Why or why not?
- If I get sick from COVID-19, could it affect the outlook (prognosis) of my cancer?
- Should I get the COVID-19 vaccine? Is the COVID-19 vaccine safe for people who have finished cancer treatment?
- Will the cancer or the treatment(s) I've had affect how well the vaccine works for me?
- Should I get any additional COVID-19 vaccine shots and/or boosters? If so, when?
- Do I still need to take steps to lower my risk of getting COVID even if I've had the vaccine? If so, what would these be?
- How much do I need to stay at home? Can I run errands like going to the store?
- Can I go to work?
- What about people who are taking care of me? Should they get the COVID vaccine or take other steps to lower their risk? Can they go to work?
- Can I wait to go in for follow-up tests or appointments until a later time?
- Should I delay my upcoming check-up or follow-up test?
- Is there a chance my upcoming check-up or follow-up test will be canceled? What will happen if it's canceled? Can I reschedule it or get it somewhere else?
- Is telehealth available so I can get care virtually or be seen by a doctor online?
- Will the pandemic delay any test results?

Hyperlinks

1. www.cancer.org/about-us/what-we-do/coronavirus-covid-19-and-cancer.html
2. www.cancer.org/latest-news/common-questions-about-the-new-coronavirus-outbreak.html
3. www.cancer.org/latest-news/nurture-your-emotional-health.html
4. www.cancer.org/latest-news/tips-for-staying-healthy-while-stuck-at-home.html
5. www.cancer.org/latest-news/medicare-expands-telehealth-to-help-seniors-stay-home.html
6. www.cancer.org/latest-news/cancer-caregiving-during-the-coronavirus-outbreak.html

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COVID-19 Vaccines in People with Cancer

On this page

- [Is it safe for people with cancer to get any type of vaccine?](#)
- [Which COVID-19 vaccines are available?](#)
- [What is the difference between FDA approval and emergency use authorization \(EUA\)?](#)
- [What are the side effects of the vaccines?](#)
- [Can COVID-19 vaccines cause cancer or make cancer grow?](#)
- [Should cancer patients and survivors get the vaccine?](#)
- [Should people with cancer get a specific COVID-19 vaccine?](#)
- [What if I have a weakened immune system?](#)
- [Should I get a COVID-19 vaccine booster or boosters?](#)
- [Do I still need to take precautions if I get the COVID-19 vaccine?](#)
- [What if I have breast cancer or a history of breast cancer?](#)
- [Could the vaccine cause issues if I am getting a mammogram?](#)
- [What if a stem cell transplant or CAR T-cell therapy is or was part of my cancer treatment?](#)
- [Should cancer caregivers and close contacts get the vaccine?](#)
- [Where can I get more information about COVID-19 vaccines?](#)

The [COVID-19 pandemic](#)¹, caused by the SARS-CoV-2 virus, continues to have a serious impact on many people, including people with cancer, their families, and caregivers. (To learn more about COVID-19 and how it might affect cancer patients and caregivers, see [Common Questions About the COVID-19 Outbreak](#)².)

Vaccines (also called immunizations or vaccinations) are used to help a person's immune system recognize and protect the body against certain infections. Vaccines are available to help protect against COVID-19. Here we'll discuss some of the questions people with cancer (or with a history of cancer) might have about the COVID-19 vaccines.

The American Cancer Society (ACS) supports the [National Comprehensive Cancer Network \(NCCN\)* recommendation](#)³ that all people with cancer should be fully vaccinated against COVID-19. Since the situation for every person is different, it is best to discuss the risks and benefits of getting the COVID-19 vaccine with your cancer doctor, who can advise you.

(*The National Comprehensive Cancer Network is an alliance of many of the nation's leading cancer centers that provide detailed guidelines on cancer treatment and cancer care.)

Is it safe for people with cancer to get any type of vaccine?

People with cancer (or with a history of cancer) can get some vaccines, but this depends on many factors, such as the type of vaccine, the type of cancer a person has (had), if they are still being treated for cancer, and if their immune system is working properly. Because of this, **it's best to talk with your doctor before getting any type of vaccine**. To learn more, see [Vaccinations and Flu Shots for People with Cancer](#).

Which COVID-19 vaccines are available?

Three COVID-19 vaccines are available in the US.

Two of the vaccines are approved by the US Food and Drug Administration (FDA):

- The [Pfizer-BioNTech vaccine \(Comirnaty\)](#)⁴ is approved⁵ by the FDA for people 12 years of age or older. The initial series is given in 2 doses, 3 to 8 weeks apart.*
- The [Moderna vaccine \(Spikevax\)](#) is approved⁶ by the FDA for people 18 years of age or older. The initial series is given in 2 doses, 4 to 8 weeks apart.*

In addition, some COVID-19 vaccines have received [emergency use authorization \(EUA\)](#)⁷ from the FDA for the ages below:

- The [Pfizer-BioNTech vaccine is authorized](#)⁸ for people 6 months of age or older. The initial series is given in 2 doses, 3 to 8 weeks apart for ages 5 and older. For people ages 6 months to 4 years, the initial series is given in 3 doses: the first and second doses 3 to 8 weeks apart, and the third dose at least 8 weeks after the second dose.*
- The [Moderna vaccine is authorized](#)⁹ for people 6 months of age or older. The initial series is given in 2 doses, 4 to 8 weeks apart.*
- The [Johnson & Johnson \(Janssen\) vaccine is authorized](#)¹⁰ for people 18 years of age and older who can't get or don't want to get one of the other COVID-19 vaccines. It is initially given as a single injection.

*This is the [recommended dosing schedule](#)¹¹ for the general public. For people with weakened immune systems, which includes many people with cancer, the number of doses in the initial series and the interval between them might be different. To learn more, see “What if I have a weakened immune system?”.

Additional COVID-19 vaccine doses (including boosters): Additional doses of the COVID-19 vaccines have now been authorized. For more on this, see “What if I have a weakened immune system?” and “Should I get a COVID-19 vaccine booster?”

All three of these vaccines have been found to lower the risk of being infected with COVID-19. They have also been shown to be very effective at lowering the risk of having severe disease, being hospitalized, or dying from COVID-19 if you are infected. But keep in mind that since no vaccine is 100% effective, some people who are fully vaccinated (at least 2 weeks after the last dose of the initial series) might still become infected with COVID-19 and get sick. This is called a **breakthrough infection**.

How do these vaccines work?

The Pfizer-BioNTech and Moderna vaccines contain messenger RNA (mRNA), which is a type of genetic material. After a person receives the vaccine, the mRNA enters cells in the body and tells them to make copies of the COVID-19 virus's “spike” protein (the protein that normally helps the virus infect human cells). This doesn't cause disease, but it does help teach the immune system to act against the virus if the body is exposed to it in the future.

The Johnson & Johnson (Janssen) vaccine contains an adenovirus (a type of virus that is different from the coronavirus that causes COVID-19), which has been changed in the lab so that it contains the gene (piece of DNA) for the COVID-19 virus's spike protein. Once the adenovirus enters cells in the body, this gene tells the cells to make copies of the spike protein. This triggers the immune system to recognize and attack the COVID-19 virus if the body is exposed to it in the future. The adenovirus in this vaccine is not a live virus because it has been changed so that it can no longer reproduce in the body (nor can it cause disease).

You cannot get COVID-19 from any of these vaccines, as they do not contain the virus that causes COVID-19.

Some vaccines for other diseases contain changed versions of the live viruses that cause the diseases. These live viruses don't cause problems in people with normal immune systems. But they might not be safe for people with weakened immune systems, so live virus vaccines typically are not recommended for cancer patients. However, the **COVID-19 vaccines available in the US do not contain these types of live viruses**.

For more on these vaccines, see "Should people with cancer get a specific COVID vaccine?"

What is the difference between FDA approval and emergency use authorization (EUA)?

If a vaccine is fully [approved by the FDA](#)¹², it means that the information on the vaccine and its effects has been thoroughly reviewed, and the FDA has determined that the benefits outweigh the known and possible risks for the people it is meant to help.

In an [EUA](#)¹³, the FDA allows the use of a vaccine or drug during a time of emergency, such as the current COVID-19 pandemic, when the available evidence shows the potential benefits outweigh the potential risks. Drugs and vaccines that have been given an EUA continue to be studied in clinical trials. An EUA is not the same as a full FDA approval, which requires a more thorough review of safety and effectiveness.

Even after a drug or vaccine has been given full approval, the [FDA will continue to monitor](#)¹⁴ it for unexpected side effects or for more information that might be helpful to know.

What are the side effects of the vaccines?

Common side effects that have been reported after getting the vaccines include:

- **Pain, redness, or swelling at the injection site**
- **Feeling tired**
- **Headache**
- **Fever**
- **Chills**
- **Muscle and joint pain**
- **Nausea**

For the vaccines that require two shots as part of the initial series, the side effects might be a little stronger after the second shot compared to what you might have had after the first injection. In general, the side effects tend to go away within a few days.

Swollen/tender lymph nodes

Some people might have swelling or tenderness of the lymph nodes under the arm in which they got the injection. This is often a normal response by the body's immune system, which is getting ready to fight a future COVID-19 infection.

A swollen lymph node under the arm might cause concern, since this can also be a sign of breast cancer (as well as some other cancers - see below). The time it takes for the lymph nodes to shrink back down after the vaccine may be a few days to a few weeks, although this is still being studied. If you notice swollen or tender lymph nodes that do not go away after a few weeks (or if they continue to get bigger), contact your doctor to discuss the next steps.

Screening mammograms: See "Could the vaccine cause issues if I'm getting a mammogram?" for more information about COVID-19 vaccines and mammograms.

For those who have breast cancer or a history of breast cancer: See "What if I have breast cancer or a history of breast cancer?" for more information about which arm to consider getting the injection in.

For those with any type of cancer or a history of cancer: Many types of cancer can spread to nearby lymph nodes (and some types of cancer can start in the lymph nodes). This can cause the nodes to become enlarged. Because the COVID vaccines can also cause lymph nodes to become enlarged, it's important to talk to your health care team if you are scheduled to get an imaging test (such as an MRI or CT scan) in the weeks after getting a COVID vaccine. In some cases, your doctors might advise that you delay the imaging test if possible, so that any swollen lymph nodes that result from the

vaccine aren't confused for cancer. If you do have a scan done soon after getting the vaccine, it's important to make sure that your health care team is aware you got the vaccine, so they can take this into account when looking at the scans.

Serious and long-term side effects of COVID-19 vaccines

A few uncommon but possibly serious safety concerns have been reported for the vaccines so far.

Allergic reactions to the vaccine

In very rare cases, people have had serious allergic reactions after getting one of the vaccines. This seems to be more likely in people who have had serious allergic reactions before.

Blood clots

Very rarely, people who have received the **Johnson & Johnson (Janssen) vaccine** have developed serious blood clots in the brain, lungs, abdomen (belly), legs, or other parts of the body, along with low blood platelet counts. (Platelets are cells that normally help in blood clotting.)

The FDA and the US Centers for Disease Control and Prevention (CDC) have reviewed the data on these incidents and have determined that the vaccine's known and potential benefits outweigh its known and potential risks in people 18 years of age and older. However, because of the increased risk of blood clots, the FDA has limited the authorization of this vaccine to people who can't get or don't want to get one of the other COVID vaccines.

People getting this vaccine (and their caregivers) should review the Janssen [Fact Sheet for Recipients and Caregivers](#)¹⁵ to learn more about the possible benefits and risks of the vaccine.

The FDA and CDC recommend that you contact your health care provider right away if you have possible symptoms of a blood clot, such as a severe or constant headache, blurred vision, seizures, abdominal (belly) pain, leg pain or swelling, chest pain, or shortness of breath. You should also contact your health care provider if you have symptoms that might be from a low platelet count, such as new or easy bruising, or tiny purple or red spots on the skin that might look like a rash.

Inflammation of the heart

A small proportion of people who have received the **Pfizer-BioNTech and Moderna vaccines** have developed [myocarditis \(inflammation of the heart muscle\) or pericarditis \(inflammation of the lining outside of the heart\)](#)¹⁶.

In most cases, the symptoms started a few days after the second vaccine dose and were more likely to happen in adolescents and young adults. For people who received the [Pfizer-BioNTech vaccine](#)¹⁷, the risk was highest in boys 12 to 17 years of age and in men under the age of 40.

If you receive either the Pfizer-BioNTech or Moderna vaccine and start to have chest pain, shortness of breath, or feelings of having a fast-beating, fluttering, or pounding heart, the FDA and CDC recommend getting medical attention right away.

People getting these vaccines (and their caregivers) should review the [Moderna Fact Sheet for Recipients and Caregivers](#)¹⁸ and the [Pfizer-BioNTech Fact Sheet for Recipients and Caregivers](#)¹⁹ to learn more about the possible benefits and risks of these two vaccines.

Guillain-Barré Syndrome (GBS)

GBS has occurred in a very small portion of people who have received the **Johnson & Johnson (Janssen) vaccine**. In this syndrome, the body's immune system damages parts of the nervous system.

In most people, symptoms of GBS begin within 6 weeks after getting the vaccine. They can include:

- Weakness or tingling, especially in the legs or arms, that gets worse and/or spreads to other parts of the body
- Trouble walking
- Trouble with facial movements, including speaking, chewing, or swallowing
- Double vision or having trouble moving the eyes
- Problems with bladder control or bowel function

The FDA advises you to get medical attention right away if you develop any of these symptoms after getting the Janssen vaccine.

People getting this vaccine (and their caregivers) should review the [Janssen Fact Sheet for Recipients and Caregivers](#)²⁰ to learn more about the possible benefits and risks of the vaccine.

For the latest information, visit the websites of the [FDA](#)²¹ and [CDC](#)²².

All of these COVID-19 vaccines are still fairly new, so possible long-term side effects are still being studied, and it's possible that the guidance about the different vaccines might change. If you have concerns about getting one of these COVID-19 vaccines, it's important to talk with your doctor.

Can COVID-19 vaccines cause cancer or make cancer grow?

[There is no information that](#)²³[suggests that COVID-19 vaccines cause cancer.](#)²⁴ There is also no information that suggests these vaccines can make cancer grow or recur (come back).

Should cancer patients and survivors get the vaccine?

The ACS supports the [NCCN recommendation](#)²⁵ that all people with cancer should be fully vaccinated as soon as they can with the COVID-19 primary vaccine series, plus additional booster doses. This includes [people who have already had COVID-19](#)²⁶.

The main concern about getting the vaccine is not whether it's safe for people with cancer, but about how effective it will be, especially in people with weakened immune systems. Some cancer treatments like [chemotherapy \(chemo\)](#)²⁷, [radiation](#)²⁸, [stem cell or bone marrow transplant](#)²⁹, or [immunotherapy](#)³⁰ can affect the immune system, which might make the vaccine less effective. People with certain types of cancers, like [leukemias](#)³¹ or [lymphomas](#)³², can also have weakened immune systems which might make the vaccine less effective.

Although doctors are still learning about how effective the vaccines are in people being treated for cancer, it appears that the vaccines might not be as effective in people with [weakened immune systems](#)³³ as compared to people with healthy immune systems. Given this, **the NCCN recommends that people with cancer who have a weakened immune system should get 3 doses of one of the mRNA COVID-19 vaccines as the primary series, plus an additional 2 booster doses (for a total of 5 shots).**

For people with cancer who do *not* have a weakened immune system, the NCCN recommends 2 doses of an mRNA COVID-19 vaccine or one dose of the Janssen vaccine, plus an additional booster dose.

Read more below about getting additional doses of the COVID-19 vaccine as well as booster doses. See "What if I have a weakened immune system?" and "Should I get a

COVID-19 vaccine booster or boosters?”

Since the situation for every person is different, it is best to discuss the risks and benefits of getting one of the COVID-19 vaccines with your cancer doctor. They can advise you and tell you when you should receive it.

For people with cancer who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive measures.

Should people with cancer get a specific COVID-19 vaccine?

As mentioned in “Which COVID-19 vaccines are available?”, the Pfizer-BioNTech and Moderna vaccines are mRNA vaccines, while the Johnson & Johnson (Janssen) vaccine is an adenovirus vaccine. The other main difference between them is that the initial series for the mRNA vaccines is given as two shots over 3 to 8 weeks, while the adenovirus vaccine is initially given as a single shot. (Additional shots are also recommended for some people – see “What if I have a weakened immune system?” and “Should I get a COVID-19 vaccine booster?”)

All three of the vaccines have been shown to be effective at lowering the risk of getting COVID-19, as well as the risk of severe illness, being hospitalized, or dying from the disease if you are infected.

At this time, the FDA has restricted the authorization of the Johnson & Johnson (Janssen) vaccine to certain people aged 18 or older, and the [CDC prefers that people get one of the mRNA \(Pfizer-BioNTech or Moderna\) vaccines](#)³⁴ over the Johnson & Johnson (Janssen) vaccine. The mRNA vaccines are more readily available and don't appear to have the rare side effect of blood clots (see “What are the side effects of the vaccines?”). For people who can't or don't want to get an mRNA vaccine, the CDC stresses that getting any COVID-19 vaccine, including the Johnson & Johnson vaccine, is better than being unvaccinated.

As new information about the different COVID-19 vaccines becomes available, it's possible that the guidance about the different vaccines might change. For this reason, **it's important to talk with your cancer doctor about getting the vaccine.**

What if I have a weakened immune system?

Getting the COVID-19 vaccine

As noted above in “Should cancer patients and survivors get the vaccine?”, the COVID-19 vaccines might not be as effective in people with weakened immune systems. This includes, for example, people who have:

- Been getting active cancer treatment (either for solid tumors or cancers of the blood) or have received cancer treatment in the past year
- Blood cancers but are not getting active cancer therapy
- Received a stem cell transplant or CAR T-cell therapy within the last 2 years or are taking medicine to suppress the immune system
- Been getting active treatment with high-dose corticosteroids or other drugs that may suppress the immune response

Despite this, experts still recommend that those with a weakened immune system get the vaccine because they are at higher risk for severe COVID-19 disease, and because getting even some protection from the vaccine is better than having none.

As noted in “Which COVID-19 vaccines are available?”, three COVID-19 vaccines are available in the United States at this time. These include:

- The **Pfizer-BioNTech** vaccine, which can be used in people 6 months of age or older. For people with weakened immune systems, the initial series is given in 2 doses, 3 weeks apart. People 6 months to 4 years old have 3 doses as their initial series, and the third dose is given at least 8 weeks after the second dose.
- The **Moderna** vaccine, which can be used in people 6 months of age or older. For people with weakened immune systems, the initial series is given in 2 doses, 4 weeks apart.
- The **Johnson & Johnson (Janssen)** vaccine, which can be used in people 18 years of age and older who can't get or don't want to get one of the other COVID vaccines. It is initially given as a single injection.

At this time, the CDC prefers that people get one of the mRNA (Pfizer-BioNTech or Moderna) vaccines over the Johnson & Johnson (Janssen) vaccine.

Getting additional doses of the vaccine

After getting the initial series, [getting another dose of vaccine might help people with a weakened immune system](#)³⁵ to build up a stronger immune response against the virus

that causes COVID-19.

Pfizer-BioNTech and Moderna vaccines

For people with moderately to severely weakened immune systems, the CDC recommends a **third dose** of an mRNA vaccine (the Pfizer-BioNTech vaccine for people 5 years of age and older, or the Moderna vaccine for people 18 years of age and older).

The third dose of vaccine should be given at least 4 weeks after the second dose. Whenever possible, the same mRNA vaccine should be used for the third dose, according to the CDC. If the same vaccine isn't available (or if it isn't known which mRNA vaccine a person got), then either mRNA vaccine may be given for the third dose.

People 5 years of age and older who receive this third dose should also get a **booster dose (fourth shot)** of vaccine, according to the CDC. This should be given at least 3 months after the third dose.

People 12 years of age and older should also get a **second booster dose (fifth shot)** at least 4 months after the first booster dose, according to the CDC. (See "Should I get a COVID-19 booster?")

Johnson & Johnson (Janssen) vaccine

For immunocompromised people who initially received the Johnson & Johnson (Janssen) vaccine, the CDC recommends getting an additional dose (**second shot**) using one of the mRNA vaccines, at least 4 weeks after the first dose.

A **booster dose (third shot)** is recommended at least 2 months after the second dose. Any of the three available vaccines can be given for this booster dose, but the mRNA vaccines are preferred. People should also get a **second booster dose (fourth shot)** using one of the mRNA vaccines, at least 4 months after the first booster dose. (See "Should I get a COVID-19 booster?")

Can other medicines lower risk as well?

For people with moderately to severely weakened immune systems (see above), the FDA has also authorized a combination of the monoclonal antibodies **tixagevimab and cilgavimab (Evusheld)** to help lower the risk of COVID-19 infection. For more information, see "Can other medicines lower the risk of COVID-19 infection?" in

[Common Questions About the COVID-19 Outbreak](#)³⁶.

If you are concerned about your risk of COVID-19 even after being fully vaccinated, it's important to talk to your doctor about your immune status and if you should get additional doses of the vaccine, as well as what else you can do to help lower your risk of infection.

Should I get a COVID-19 vaccine booster or boosters?

Studies have shown that most people who are fully vaccinated (at least two weeks past the last dose of their initial series) are well protected from severe disease and death from COVID-19, including the variants that are now in the US. However, some research has found that the vaccines might become less effective over time.

Because of this, the CDC has [recommendations about getting booster doses](#)³⁷ of vaccine after completing the initial series.

Pfizer-BioNTech and Moderna vaccines

All people aged 18 and older who have received both doses of either vaccine should get a booster shot. This should be at least 5 months after the second dose of the vaccine.

People aged 5 to 17 who have received both doses of the Pfizer-BioNTech vaccine should get a booster shot, at least 5 months after the second dose.

People aged 50 and older should also get a *second* booster shot of either the Pfizer-BioNTech or Moderna vaccine, at least 4 months after the first booster dose.

For people with weakened immune systems

As noted in “What if I have a weakened immune system?”, it is recommended that **people with cancer with a weakened immune system** who initially got one of the mRNA (Pfizer-BioNTech or Moderna) vaccines get a third dose of vaccine, at least 4 weeks after the second dose. People 5 years of age and older should also get a booster dose (fourth shot), which should be at least 3 months after the third dose. People 12 years of age and older should also get a *second* booster dose (fifth shot) at least 4 months after the first booster dose.

Johnson & Johnson (Janssen) vaccine

The CDC recommends that **all people 18 years of age or older** who received the Johnson & Johnson (Janssen) vaccine get a booster shot at least 2 months after their initial dose.

People who received the Johnson & Johnson vaccine for both their initial shot *and* their booster shot may also choose to get a second booster dose with one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose, for a total of 3 doses.

People 50 years of age and older should also get a second booster (third shot) with one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose.

For people with weakened immune systems

As noted in “What if I have a weakened immune system?”, the CDC recommends that **people with a weakened immune system** who initially got the Johnson & Johnson (Janssen) vaccine get a second dose of vaccine, at least 4 weeks after the first dose. These people should also get a booster dose (third shot), which should be at least 2 months after the second dose, as well as a second booster dose (fourth shot) using one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose.

Do I have to get the same vaccine for my booster dose?

No, not necessarily. For people 18 years of age or older, the CDC allows for mixing and matching of vaccine doses for booster shots. (People aged 12 to 17 who initially got the Pfizer-BioNTech vaccine are advised to get the same vaccine for the booster.) For people who received the Johnson & Johnson (Janssen) vaccine as their first dose, the CDC recommends that an mRNA vaccine be the preferred vaccine as their booster shot (or as their second booster shot, if they got the Johnson & Johnson vaccine for both their first and booster shot).

If you are concerned about your risk of COVID-19 even after being fully vaccinated, it’s important to talk to your doctor about whether you should get additional doses of the vaccine, as well as what else you can do to help lower your risk of infection.

Do I still need to take precautions if I get the COVID-19 vaccine?

The COVID-19 vaccines are still being studied, as there are things we don’t yet know

about them. For example, researchers are still trying to determine how long the COVID-19 vaccines will help protect against the virus. And while the vaccines can clearly lower the risk of getting serious disease from COVID, it's not yet clear how well they can prevent the spread of the virus to others.

For people with cancer who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive measures.

What if I have breast cancer or a history of breast cancer?

Some people who get a COVID-19 vaccine might have swollen lymph nodes under the arm in which the injection was given (see “What are the side effects of the vaccines?” above). Because a swollen lymph node under the arm can also be a sign of breast cancer spread, most doctors recommend that people with breast cancer or a history of breast cancer get the injection in the arm on the opposite side of your breast cancer. For example, if your breast cancer/breast surgery was in the left breast, it is probably best to get the injection in the right arm. If you have had surgery on both breasts, it's best to talk with your doctor about the best place on your body to get the injection.

Swollen lymph nodes after a vaccine injection might also have an effect on your mammogram results. (See next question.)

Could the vaccine cause issues if I am getting a mammogram?

Getting a COVID-19 vaccine might result in swollen lymph nodes under the arm in which the injection was given. (See “What are the side effects of the vaccines?” above.)

Swollen lymph nodes under the arm might show up on a mammogram done to screen for breast cancer, which could cause concern and might lead to the need for further tests.

If you're scheduled for a mammogram soon after you get a COVID-19 vaccine, it's important to tell your doctor when and in which arm you received the injection. Based on your situation, they can discuss with you if you should change your mammogram appointment. **Do not delay your mammogram without speaking to your doctor first.**

What if a stem cell transplant or CAR T-cell therapy is or was part of

my cancer treatment?

[Stem cell transplants](#)³⁸ and [CAR T-cell therapy](#)³⁹ are types of cancer treatment that can have major effects on the body's immune system. This can increase your risk of serious infections (including from COVID-19).

If you've **already received one of these cancer treatments** in the past, the NCCN recommends getting the COVID-19 vaccine. This includes 3 primary doses, as well as 2 additional booster doses. (For more on this, see "What if I have a weakened immune system?" and "Should I get a COVID-19 booster?" above.) NCCN also recommends waiting at least 3 months after these cancer treatments before getting the vaccine, to give the body's immune system a chance to recover.

If you've already gotten the COVID-19 vaccine and **are now getting (or are going to get) one of these cancer treatments**, the NCCN recommends getting *revaccinated* with 3 primary doses, as well as 2 additional booster doses, at least 3 months after treatment. This is because the immune system needs to relearn how to protect the body against COVID-19.

If you're getting (or have gotten) one of these cancer treatments, it's important to talk to your doctor about your immune status, when you should get the vaccine, as well as what else you can do to help lower your risk of infection.

Should cancer caregivers and close contacts get the vaccine?

Yes. In fact, getting the vaccine can help lower the risk that the person you're caring for might get COVID-19.

Some vaccines for other diseases contain changed versions of the live viruses that cause the diseases. These types of live virus vaccines typically are not recommended for cancer caregivers because they might have unwanted effects on cancer patients. However, the available COVID-19 vaccines do not contain these types of live viruses, so getting one of these vaccines does not put you at risk for passing COVID-19 on to the person you're caring for.

It's important to know that if you do get a COVID-19 vaccine and are later exposed to the virus, it's not yet clear if the vaccine will prevent you from infecting someone else (even if you don't get sick).

For caregivers or close contacts who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social

distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive measures. The CDC also has guidance on who [might be eligible for a third dose or booster dose](#)⁴⁰ of the vaccines. This guidance is being updated regularly, so check the [CDC website](#)⁴¹ for details.

People getting the vaccine might not feel well for a few days after each shot, so it might make sense to have someone else available to help with caregiving during this time.

Where can I get more information about COVID-19 vaccines?

The CDC and FDA have more information about COVID-19 vaccines, including the different types of vaccines and the known possible risks and benefits of each one.

- [US Centers for Disease Control and Prevention \(CDC\)](#)⁴²
- [US Food and Drug Administration \(FDA\)](#)⁴³

For more information about COVID-19 vaccine availability in your area, contact your state or local health department. (The CDC offers [links to state health departments](#)⁴⁴.)

Hyperlinks

1. www.cancer.org/about-us/what-we-do/coronavirus-covid-19-and-cancer.html
2. www.cancer.org/latest-news/common-questions-about-the-new-coronavirus-outbreak.html
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