



# COVID-19 Vaccines in People with Cancer

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The [COVID-19 pandemic](#)<sup>1</sup>, caused by the SARS-CoV-2 virus, continues to have a serious impact on many people, including cancer patients, 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](#)<sup>2</sup>.)

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.

**Many expert medical groups recommend that most patients with cancer or a history of cancer should get a COVID-19 vaccine. 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.**

## Is it safe for cancer patients 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](#)<sup>3</sup>.

## Which COVID-19 vaccines are available?

Three COVID-19 vaccines are available in the US.

The [Pfizer-BioNTech vaccine \(Comirnaty\)](#)<sup>4</sup> [is approved](#)<sup>6</sup> by the US Food and Drug Administration (FDA) for people 16 years of age or older. The initial series is given in 2 doses, 3 weeks apart.

The Pfizer-BioNTech vaccine and two other COVID-19 vaccines have received [emergency use authorization \(EUA\)](#)<sup>7</sup> from the FDA for the ages below:

- The [Pfizer-BioNTech vaccine is authorized](#)<sup>8</sup> for people 5 years of age or older. The initial series is given in 2 doses, 3 weeks apart.
- The [Moderna vaccine is authorized](#)<sup>9</sup> for people 18 years of age or older. The initial series is given in 2 doses, 4 weeks apart.
- The [Johnson & Johnson \(Janssen\) vaccine is authorized](#)<sup>10</sup> for people 18 years of age and older. It is initially given as a single injection.

**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 significantly 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.

### **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's the difference between FDA approval and emergency use authorization (EUA)?**

If a vaccine is fully [approved by the FDA](#)<sup>11</sup>, it means that the information on the vaccine and its effects have 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<sup>12</sup>](#), 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 might continue to monitor<sup>13</sup>](#) it for unexpected side effects or for more information that might be helpful to know. For example, it is not yet clear how likely it is that someone who gets one of the vaccines could still spread the virus to others. This is still being studied, as are any possible long-term effects of the vaccines. Researchers are also still trying to determine how long the vaccines will provide protection against the virus.

## 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.)

Most of these events have happened in women between the ages of 18 and 59, and

from 6 to 15 days after getting the vaccine.

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.

People getting the vaccine (and their caregivers) should review the Janssen [Fact Sheet for Recipients and Caregivers](#)<sup>14</sup> to learn more about the possible benefits and risks of the vaccine.

The FDA and CDC recommend that if you have received the Johnson & Johnson vaccine within the past three weeks, you should 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 \(inflammation of the lining outside of the heart\)](#)<sup>15</sup>.

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](#)<sup>16</sup>, the risk was highest in boys 12 to 17 years of age and then 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](#)<sup>17</sup> and the [Pfizer-BioNTech Fact Sheet for Recipients and Caregivers](#)<sup>18</sup> to learn more about the possible benefits and risks of these two vaccines.

### ***Guillain-Barré Syndrome (GBS)***

GBS has occurred in a very small proportion of people who have received the Johnson

& Johnson (Janssen) vaccine. In this syndrome, the body's immune system damages parts of the nervous system. This can lead to muscle weakness and other symptoms.

In most people, symptoms began within 6 weeks after getting the vaccine.

Symptoms of GBS 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](#)<sup>19</sup> to learn more about the possible benefits and risks of the vaccine.

For the latest information, visit the websites of the [FDA](#)<sup>20</sup> and [CDC](#)<sup>21</sup>.

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 the COVID-19 vaccine, it's important to talk with your doctor.

## Should cancer patients and survivors get the vaccine?

**Many expert medical groups recommend that most people with cancer or a history of cancer get the COVID-19 vaccine once it's available to them. This includes [people who have already had COVID-19](#)<sup>22</sup>.**

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 \(chemo\)](#)<sup>23</sup>, [radiation](#)<sup>24</sup>, [stem cell or bone marrow transplant](#)<sup>25</sup>, or [immunotherapy](#)<sup>26</sup> can affect the immune system, which might make the vaccine less effective. People with certain types of cancers, like [leukemias](#)<sup>27</sup> or [lymphomas](#)<sup>28</sup>, can also have weakened immune systems which might



make the vaccine less effective.

Although we don't have specific information yet on how effective the vaccines might be in people being treated for cancer, it's possible that the vaccines might not be as effective in people with [weakened immune systems](#)<sup>29</sup> as compared to people with healthy immune systems. Despite this, experts still recommend that most cancer patients get the vaccine because those with a fragile immune system are at risk for severe COVID-19 disease, so getting even some protection from the vaccine is better than not having any protection. For people with a weakened immune system who are fully vaccinated (at least two weeks past their last dose of vaccine), the CDC also has recommendations on getting an additional dose of COVID-19 vaccine. See "Should I get a COVID-19 vaccine booster?"

**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 who are fully vaccinated (at least two weeks past their last dose of vaccine), the CDC has guidance on things you can now do (such as not needing to wear a mask or socially distance in many settings), as well as what types of precautions you should still be taking. This guidance is being updated regularly, so check the [CDC website](#)<sup>30</sup> for details. **The CDC guidance may not apply if you have a weakened immune system (such as from cancer or its treatment), so it's important to talk with your health care provider about which precautions you still need to take.**

## **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 main difference between them at this time is that the initial series for the mRNA vaccines is given as two shots over 3 to 4 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?")

These vaccines have been studied in different places and at different times, and there haven't been any studies directly comparing the different vaccines. Because of this, it's not clear if any one of the vaccines is safer or more effective than any of the others. It's also not clear if any of the vaccines is more (or less) effective against some of the new variants of COVID-19 that have appeared in recent months. This is being studied.



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, most major medical organizations haven't recommended getting one type of COVID vaccine over another, either for cancer patients (or survivors) or for other people. Many health experts believe that getting the COVID-19 vaccine, whichever one it is, is most important, rather than waiting to get a specific vaccine.

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. 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.

### **Getting an additional dose of the vaccine**

After getting the initial series, getting another dose of vaccine might help people with a weakened immune system to build up a stronger immune response against the virus that causes COVID-19 (although just how much stronger is still being studied).

### ***Pfizer-BioNTech and Moderna vaccines***

The [CDC recommends a third dose of the mRNA \(Pfizer-BioNTech and Moderna\) vaccines](#)<sup>31</sup> for people with moderately to severely weakened immune systems. This includes, for example, people who have:

- Been getting active cancer treatment (either for solid tumors or cancers of the blood)
- Received a stem cell transplant or [CAR T-cell therapy](#)<sup>32</sup> 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

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 who receive this third dose are also eligible for a **booster dose** (fourth shot) of vaccine, according to the CDC. This should be given at least 6 months after the third dose. (See "Should I get a COVID-19 booster?")

### ***Johnson & Johnson (Janssen) vaccine***

While the CDC does not recommend an additional dose at this time for immunocompromised people who initially received the Johnson & Johnson (Janssen) vaccine, they do recommend getting a **booster shot** at least 2 months after the initial dose. Any of the three available vaccines can be given for this booster dose. (See "Should I get a COVID-19 booster?")

**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?**

Studies have shown that most people who are fully vaccinated (at least two weeks past their last dose of vaccine) 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 a booster dose of vaccine](#)<sup>33</sup> after completing the initial series.

### **Pfizer-BioNTech and Moderna vaccines**

**All people aged 18 and older** who have received both doses of the vaccine should get a booster shot, at least 6 months after the second dose.

As noted in “What if I have a weakened immune system?”, the CDC recommends that **people 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. These people should also get a booster (fourth) shot, which should be at least 6 months after the third 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.

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

No, not necessarily. The CDC allows for [mixing and matching of vaccine doses](#)<sup>34</sup> for booster shots.

**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 who are fully vaccinated (at least two weeks past their last dose of vaccine), the CDC has guidance on things you can now do (such as not needing to wear a mask or socially distance in certain settings), as well as what types of precautions you should still be taking. This guidance is being updated regularly, so check the [CDC website](#)<sup>35</sup> for details. **The CDC guidance may not apply if you have a weakened immune system (such as from cancer or its treatment), so it’s important to talk with your health care provider about which precautions you still need to take.**

### **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’m 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](#)<sup>36</sup> and [CAR T-cell therapy](#)<sup>37</sup> 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 CDC still recommends getting the COVID-19 vaccine. This might include an additional dose of vaccine (depending on how long ago you were treated and if you’re now taking drugs to suppress your immune system), as well as a booster dose. (For more on this, see “What if I have a weakened immune system?” and “Should I get a COVID-19 booster?” above.) Many doctors recommend 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 CDC recommends getting *revaccinated* 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, 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.**

### **Is it OK for cancer caregivers to 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 people who are fully vaccinated (at least two weeks past their last dose of vaccine), the CDC has guidance on things you can now do (such as not needing to wear a mask or socially distance in many settings), as well as what types of precautions you should still be taking. The CDC also has guidance on who [might be eligible for a third dose or booster dose](#)<sup>38</sup> of the vaccines. This guidance is being updated regularly, so check the [CDC website](#)<sup>39</sup> for details. **The CDC guidance may not apply if you have (or are taking care of someone who has) a weakened immune system (such as from cancer or its treatment), so it's important to talk a health care provider about which precautions you still need to take.**

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.

## Should I get the flu vaccine as well?

COVID-19 and influenza (the flu) are caused by different viruses, so getting a vaccine against one of these diseases will NOT protect against the other. Along with talking to their doctor about getting the COVID-19 vaccine, it's very important for [cancer patients talk to their doctor about the benefits and risks of getting the flu shot](#)<sup>40</sup>.

The flu and COVID-19 are both caused by viruses that can spread easily and can cause serious illness in older people, those with weakened immune systems, and others with certain medical conditions. These infections share many of the same symptoms, so it can be hard to tell which one you might have without having specific tests.

People who live with or care for someone at high risk of getting the flu should also get the flu vaccine.

The overlap of this year's flu season on top of the COVID-19 pandemic could also put a burden on healthcare systems, so getting the flu vaccine could help lessen this.

The CDC has more information on the [differences between COVID-19 and the flu](#)<sup>41</sup>, as well as [more information about getting the flu vaccine](#)<sup>42</sup>.

## 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 \(CDC\)](#)<sup>43</sup>
- [US Food and Drug Administration \(FDA\)](#)<sup>44</sup>

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](#)<sup>45</sup>.)

## Hyperlinks

1. [www.cancer.org/about-us/what-we-do/coronavirus-covid-19-and-cancer.html](http://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](http://www.cancer.org/latest-news/common-questions-about-the-new-coronavirus-outbreak.html)
3. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/infections/vaccination-during-cancer-treatment.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/infections/vaccination-during-cancer-treatment.html)
4. [www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-](http://www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-)

[vaccine](#)

5. [www.fda.gov/vaccines-blood-biologics/comirnaty](http://www.fda.gov/vaccines-blood-biologics/comirnaty)
6. [www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-vaccine](http://www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-vaccine)
7. [www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization](http://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization)
8. <http://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/pfizer-biontech-covid-19-vaccine>
9. <http://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/moderna-covid-19-vaccine>
10. <http://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/janssen-covid-19-vaccine>
11. [www.fda.gov/drugs/development-approval-process-drugs#:~:text=FDA%20approval%20of%20a%20drug%20means%20that%20dat a,takes%20place%20within%20a%20structured%20framework%20that%20inclu des%3A](http://www.fda.gov/drugs/development-approval-process-drugs#:~:text=FDA%20approval%20of%20a%20drug%20means%20that%20dat a,takes%20place%20within%20a%20structured%20framework%20that%20inclu des%3A)
12. [www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization#:~:text=The%20Emergency%20Use%20Authorization%20%28EUA%29%20authority%20allows%20FDA,medical%20countermeasures%20%28MC Ms%29%20needed%20during%20public%20health%20emergencies.](http://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization#:~:text=The%20Emergency%20Use%20Authorization%20%28EUA%29%20authority%20allows%20FDA,medical%20countermeasures%20%28MC Ms%29%20needed%20during%20public%20health%20emergencies.)
13. [www.fda.gov/drugs/guidance-compliance-regulatory-information/surveillance](http://www.fda.gov/drugs/guidance-compliance-regulatory-information/surveillance)
14. [www.fda.gov/media/146305/download](http://www.fda.gov/media/146305/download)
15. [www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-june-25-2021](http://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-june-25-2021)
16. [www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-vaccine](http://www.fda.gov/news-events/press-announcements/fda-approves-first-covid-19-vaccine)
17. [www.fda.gov/media/144638/download](http://www.fda.gov/media/144638/download)
18. [www.fda.gov/media/144414/download](http://www.fda.gov/media/144414/download)
19. [www.fda.gov/media/146305/download](http://www.fda.gov/media/146305/download)
20. [www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines](http://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines)
21. [www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html)
22. [www.cdc.gov/coronavirus/2019-ncov/vaccines/prepare-for-vaccination.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/prepare-for-vaccination.html)
23. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/chemotherapy.html)
24. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/radiation.html)



25. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html)
26. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy.html)
27. [www.cancer.org/cancer/leukemia.html](http://www.cancer.org/cancer/leukemia.html)
28. [www.cancer.org/cancer/lymphoma.html](http://www.cancer.org/cancer/lymphoma.html)
29. [www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/underlying-conditions.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/underlying-conditions.html)
30. [www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html)
31. [www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/recommendations/immuno.html)
32. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy/car-t-cell1.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy/car-t-cell1.html)
33. [www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/booster-shot.html)
34. [www.cdc.gov/media/releases/2021/p1021-covid-booster.html](http://www.cdc.gov/media/releases/2021/p1021-covid-booster.html)
35. [www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html)
36. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/stem-cell-transplant.html)
37. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy/car-t-cell1.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/immunotherapy/car-t-cell1.html)
38. [www.cdc.gov/media/releases/2021/s1129-booster-recommendations.html](http://www.cdc.gov/media/releases/2021/s1129-booster-recommendations.html)
39. [www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated.html)
40. [www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/infections/vaccination-during-cancer-treatment.html](http://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/low-blood-counts/infections/vaccination-during-cancer-treatment.html)
41. [www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html](http://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html)
42. [www.cdc.gov/flu/season/faq-flu-season-2021-2022.htm](http://www.cdc.gov/flu/season/faq-flu-season-2021-2022.htm)
43. [www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html](http://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html)
44. [www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines](http://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines)
45. <http://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html>

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### Written by

The American Cancer Society medical and editorial content team  
([www.cancer.org/cancer/acs-medical-content-and-news-staff.html](http://www.cancer.org/cancer/acs-medical-content-and-news-staff.html))

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medical writing.

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