

# Myocarditis/Pericarditis and mRNA Vaccines

## What are mRNA vaccines?

The Pfizer and Moderna vaccines are both messenger RNA (mRNA) vaccines. The strand of polynucleotides, that is mRNA, is taken up in cells. The cell then processes the mRNA to make proteins. Once the proteins are produced, the immune system will recognize them and make a response against them to create immunity. In COVID-19 mRNA vaccines, the protein produced is the COVID-19 spike protein. It's also important to know that our bodies naturally create mRNA every day to make other proteins to help our bodies survive, proteins like hormones, antibodies, cellular components, structural proteins to repair muscle tissue and skin, receptors, and much more. mRNA vaccines do not alter human DNA.

## What is myocarditis and pericarditis?

Myocarditis is inflammation of the heart muscle. Pericarditis is inflammation of the outer lining of the heart. Both can have a variety of causes, including viruses like COVID-19. Inflammation is the body's immune system response to infection or another trigger. Vaccine-induced myocarditis is [milder](#) than that caused by natural infection.

## What are the symptoms of myocarditis and pericarditis?

Symptoms of myocarditis and pericarditis include chest pain, shortness of breath or an abnormal heartbeat (fast, fluttering or pounding). Symptoms may vary depending on severity of inflammation. **Seek medical care if you or your child have symptoms of these conditions, especially after viral infection or if it is within one week after COVID-19 vaccination.**

**North Dakota Department of Health and Human Services**

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## What causes myocarditis and pericarditis?

Myocarditis and pericarditis are most commonly caused by bacterial or viral infections, including COVID-19. Noninfectious causes of myocarditis and pericarditis include toxins, hypersensitivity to medications or immunological syndromes. In rare cases, some patients have developed myocarditis after receiving an mRNA COVID-19 vaccine.

## How common is myocarditis after COVID-19 vaccination?

The risk of myocarditis is rare and primarily observed in adolescent and young adult males, within the first week after receiving the second dose or booster dose of an mRNA COVID-19 vaccine. There have been [131 cases](#) of myocarditis among individuals 5 years of age and older after receiving the previously recommended COVID-19 booster, reported as of August 20, 2022. In the Vaccine Safety Data Link [incidence of myocarditis](#) following the 2023-2024 and 2024-2025 COVID-19 vaccine has been very low, 5 per million and 2 per million respectively. This was out of over 123,362,627 doses administered. Myocarditis is more common in males than females. CDC continues to investigate cases of myocarditis and pericarditis reported to the [Vaccine Adverse Event Reporting System](#) (VAERS). They are actively monitoring for these events in the [Vaccine Safety Datalink \(VSD\)](#).

## How common is myocarditis after COVID-19 infection?

It is important to note that rates of myocarditis associated with COVID-19 infection are greater than the rates of myocarditis following a COVID-19 vaccine - meaning, you are at a higher risk of developing myocarditis if you contract the COVID-19 virus compared to the risk you have for developing myocarditis after receiving the COVID-19 vaccine.

In one [study](#), the rate of myocarditis in those between the ages of 12-17 years old after infection was 876 cases per one million infected. Another [study](#) found that people with COVID-19 infection were 16 times more likely to have myocarditis than those not infected.

Risk of myocarditis following COVID-19 vaccination in children younger than 12 years of age is low, particularly for those aged 6 months to 5 years. There have been [no confirmed myocarditis cases](#) in children aged less than 5 years in either the VSD or VAERS. Additionally, analysis of the VSD has demonstrated [no statistical signals](#) for myocarditis in children.

## What can I do to lower my risk of myocarditis following COVID-19 vaccination?

Those concerned about the risk of myocarditis following COVID-19 vaccination should speak with their health care provider about alternative vaccination schedule options. Individuals may space out the time interval between dose 1 and dose 2 of their primary series by up to 8 weeks in order to lower their small risk of developing myocarditis/pericarditis following vaccination.

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For those who qualify, a 3-week interval between the first and second doses of Pfizer COVID-19 vaccine and a 4-week interval between the first and second doses of Moderna COVID-19 vaccine continue to be recommended for those who are moderately to severely immunocompromised.

### What are the long-term effects of myocarditis?

Most people with myocarditis and pericarditis recover quickly after their myocarditis/pericarditis event. Hospitalizations are typically short, and these patients have responded well to conservative and supportive treatment. [One study](#) indicated myocarditis/pericarditis patients had a median hospital stay of just 1 day.

CDC is actively [investigating](#) reports of people developing myocarditis after receiving an mRNA COVID-19 vaccine (Pfizer-BioNTech or Moderna). [Surveys of individuals](#) 12-29 years of age with myocarditis and their health care providers showed that 90% of individuals fully recovered by at least 1 year after myocarditis onset. There were no known deaths or cardiac transplants from vaccine-induced myocarditis. Understanding long-term health effects is critically important to explaining the risks and benefits of COVID-19 vaccination to the public and informing clinical guidance.

### I received the Johnson & Johnson COVID-19 vaccine. Am I at a greater risk of myocarditis?

There has been no pattern of myocarditis/pericarditis observed after receipt of the Janssen COVID-19 vaccine (Johnson & Johnson).

### I received the Novavax COVID-19 vaccine. Am I at a greater risk of myocarditis?

There is the potential risk for myocarditis/pericarditis following vaccination with the Novavax COVID-19 vaccine. During the placebo-controlled phase of Novavax's vaccine clinical trials for their previously recommended formulation, there were three reports of myocarditis among trial participants. Two of these cases were among those vaccinated with Novavax's vaccine and one case was among those vaccinated with the placebo. Researchers concluded that these events occurred within background reporting rates of myocarditis in the population. Additionally, over 1,072,074 doses of Novavax have been administered worldwide as of June 30, 2022. There have only been 68 potential reports of myocarditis identified. Novavax will be continuously monitored for safety post-authorization within many agencies in the United States and around the world.

### Should I still get myself or my child vaccinated for COVID-19?

Yes. Experts, including CDC, the American Academy of Pediatrics, and the American Academy of Family Physicians, continue to recommend everyone 6 months of age and older speak to their health care provider about receiving COVID-19 vaccine. The benefits of vaccination far outweigh

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the risk of myocarditis and pericarditis. Vaccination has been shown to prevent COVID-19 disease, hospitalization, and death. Furthermore, myocarditis **after COVID-19 disease** occurs at a **higher rate** than **after COVID-19 vaccination**. If you have concerns about COVID-19 vaccination, talk with a health care provider.

### Where can I get more information?

If you have concerns about myocarditis/pericarditis following mRNA COVID-19 vaccination, please visit with a health care provider and visit the [CDC website](#) for more information.

### Where can I go to get a COVID-19 vaccine?

Information on COVID-19 vaccine providers and clinics near you can be found on the HHS [immunization locator](#).

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