ASAN

AUTISTIC SELF ADVOCACY NETWORK

General Vaccine Info

What you need to know about vaccines

What are vaccines?

A **vaccine** is a shot. It keeps you from getting sick. Doctors give people shots to keep us from being sick.

- There is a shot to keep you from getting chicken pox.
- There is a shot to keep you from getting the measles.
- There is a shot to keep you from getting the flu.
- There is a shot to keep you from getting COVID-19.

Vaccines are also called “immunizations” or “inoculations.”

Some vaccines are not shots. Some vaccines are taken by mouth. Some vaccines are sprays that go up your nose. But most vaccines are shots. In this guide, unless we say otherwise, we mean “shots” when we say “vaccines.”

What diseases are there vaccines for?

There are vaccines for lots of different diseases. Some of the diseases most people in the United States get vaccinated for are:

- Chickenpox
- COVID-19
- Flu
- Measles
- Mumps
- Polio

You get different vaccines at different points in your life. You tend to get more vaccines as a child than as an adult.

Why do we need vaccines?

Vaccines help stop diseases. Each vaccine prevents one disease. (There are some combination vaccines that prevent more than one disease. A combination vaccine is where you get multiple vaccines in one shot.)

Vaccines keep us safe. Diseases that vaccines help stop are bad! You don’t want to get those diseases. Getting vaccinated for those diseases helps keep you safe.

Before we had vaccines, many more people got sick from diseases. A lot more people ended up disabled for their entire lives because of those diseases. A lot more people died because of those diseases. Children especially died a lot more often. Vaccines mean people are less likely to die during childhood. Vaccines save lives!

Vaccines work better when more people get vaccinated. **Herd immunity** is when enough people get vaccinated that a disease can’t spread. When people get vaccinated for a disease, they usually can no longer catch that disease. Then, the disease can’t spread because most people can’t catch it.

Herd immunity protects people who can’t get vaccinated, such as:

- Babies and children who are too young to get vaccinated
- People with certain disabilities

They are protected by the vaccinated people around them.

The number of people that need to get vaccinated in order for herd immunity to work changes. It changes depending on the vaccine and the disease. Some diseases only need about 3 in 10 people to be vaccinated. Other diseases need 9 in 10 people to be vaccinated. Diseases that need more people to be vaccinated are more contagious. That means they can spread more easily to people.

Why should I get vaccinated?

Vaccines lower your chances of getting diseases. Many of these diseases can make people very sick. They can even kill people. Even if you don't get very sick, it is still no fun to be sick.

Vaccines are easier than getting sick. Vaccines can have side effects, but most side effects are mild and go away in a day or two. That is a lot better than being sick for weeks or even months with a disease you could have gotten vaccinated for.

Vaccines protect people around you, even if those people aren't vaccinated. When you are vaccinated for a disease, you usually can't catch that disease anymore. You usually can't pass that disease along to other people. Young children, older people, and people whose bodies can't fight off diseases especially need your vaccine's protection!

Even if you do get a disease you were vaccinated for, your symptoms will probably be more mild. **Breakthrough infections** happen. Breakthrough infections are where you get a disease even though you were vaccinated for it. But if you are vaccinated, your breakthrough infection is probably going to be mild. You won't get as sick as you would if you hadn't gotten the vaccine.

Vaccine immunity is better than natural immunity. **Vaccine immunity** is where you get a vaccine for a disease. Then, your body learns how to fight that disease from the vaccine. **Natural immunity** is where you catch a disease. Then, your body learns how to fight that disease from having the disease. Vaccine immunity and natural immunity both protect you from the disease. But natural immunity means getting sick with the disease. Sometimes, you can get very sick or even die of the disease. Getting natural immunity is a lot less fun than getting a vaccine.

It is also much harder for your body to develop natural immunity to some diseases. For example, the flu changes a lot every year. It changes because the germ that causes it changes a lot. So if you catch the flu one year, you aren't necessarily protected the next year. (This is why we get flu shots every year.) Getting a vaccine, even a yearly vaccine, is easier than getting the flu every year!

How do vaccines work?

Vaccines work by teaching your **immune system** to fight germs. Your immune system is a part of your body. It helps your body fight germs. When you get a germ inside your body, your immune system fights the germ.

Your immune system makes special cells to fight off germs. **Cells** are tiny parts of your body. Your body is made up of cells.

The cells your body makes to fight off germs are called white blood cells. **White blood cells** help your body fight off germs. The white blood cells also make antibodies. Antibodies are even tinier parts of your body. **Antibodies** are not cells.

There are different types of antibodies. Each different type helps fight one kind of germ. There are flu antibodies. These antibodies fight the flu. There are COVID-19 antibodies. These antibodies fight COVID-19.

Your body has to learn how to make different types of antibodies. If you get chicken pox, your body learns how to fight chicken pox. You don't get chicken pox again.

Vaccines teach your body how to make antibodies and fight. When you get a vaccine, your body also makes antibodies. The vaccine teaches your body how to make antibodies. Each vaccine is for a specific type of germ. After the vaccine, your body has antibodies for that type of germ. If you catch that germ later on, your body can fight it easier.

Who should get vaccines?

Everyone should get vaccines. Children need vaccines. Adults need vaccines.

Children usually get a lot more vaccines than adults. This is because a lot of diseases that vaccines stop are especially bad for children. And, it's because we want to vaccinate children as soon as it is safe to do so. Children can get some vaccines the same day they are born!

In rare cases, some people may not get some vaccines. If people are immunocompromised, they may not get certain vaccines. **Immunocompromised** means their body has a very hard time fighting off certain germs. Or, if people are allergic to certain vaccines, they should not get those vaccines. But these cases are rare. Most people should get all the recommended vaccines for their age group.

Vaccines are very safe

Vaccines are very safe. Each year, millions of people get vaccinated. Most people experience mild, if any, side effects from vaccination.

Here are some ways we know vaccines are safe:

- Vaccines go through a lot of testing before most people can get them. We will talk about this testing more in the next section.
- Vaccines have to be approved by the government before most people can get them.
- Vaccines are monitored after they are approved by the government. Monitored means people look very closely to see if the vaccines work. People look very closely to see if the vaccines cause bad side effects. The government collects information on bad side effects the vaccine causes.
- Vaccines contain ingredients that might sound scary. But the vaccines contain tiny amounts of these ingredients. And, the ingredients are safe. The ingredients in the vaccines can't hurt you. We will talk more about one ingredient, thimerosal, in a later section.

Vaccine testing

Vaccines have to go through a lot of testing before most people can get them. If a vaccine doesn't pass this testing, people don't get the vaccine.

Before a vaccine is tested in humans, it needs to be tested in animals. Researchers give the vaccine to an animal that is similar to humans, like monkeys or pigs. Then, the researchers do tests on the animals. The researchers do tests to answer questions like:

- Does the vaccine cause the animals to make antibodies?
- Does the vaccine hurt the animals?
- Does the vaccine protect the animals from the disease?

If the vaccine gets through animal studies, it goes into human studies. There are three phases in human studies: Phase I, Phase II, and Phase III.

In Phase I, researchers give the vaccine to about 20-100 human volunteers. Then the researchers ask questions like:

- Is the vaccine safe?
- Can the vaccine reach the immune system?
- Can the vaccine protect people against the disease it is supposed to?
- Are there any serious side effects?

In Phase II, researchers give the vaccine to several hundred human volunteers. Then the researchers ask questions like:

- Can the vaccine protect people against the disease it is supposed to?
- What is a good dose of the vaccine to give to people?
- What are the most common side effects?

- How do the volunteers' immune systems react to the vaccine?

In Phase II, some of the human volunteers get a **placebo** vaccine. A placebo vaccine is a fake vaccine. It cannot protect you against the disease. The people who get the placebo are still told they got the vaccine. The people who get the placebo are in the **control group**. The people who get the actual vaccine are the **treatment group**. The point of a control group is to make sure the vaccine works. All people think they got the vaccine, so they will all act as if they got the vaccine. But the control group will still be able to get the disease. So, if fewer people from the treatment group get sick than from the control group, the researchers will know the vaccine worked.

In Phase III, the researchers give the vaccine to 300 to 3,000 human volunteers. Then the researchers ask questions like:

- Can the vaccine protect people against the disease it is supposed to?
- How do the treatment group and control group compare?
- Is the vaccine safe?
- What is a good dose of the vaccine to give to people?
- What side effects does the vaccine have?
- What are the possible benefits of the vaccine? What are the possible risks of the vaccine?
- How does the vaccine compare to vaccines that already exist?

Phase III tests also use a placebo vaccine and control groups.

Once a vaccine goes through all the phases of testing, it has to be approved by the government. In the United States, the government agency that approves vaccines is the Food and Drug Administration (FDA). Then, more people can get the vaccine.

I heard there's mercury in some vaccines. Is that safe?

Mercury is a metal. It can make you very sick if you are exposed to certain types of it.

Most vaccines do not contain any types of mercury.

Some flu vaccines contain very small amounts of thimerosal, a type of mercury. Thimerosal is not the type of mercury that can hurt you. And, there is very, very little thimerosal in the flu vaccines that contain it. You are exposed to much more mercury by eating foods like fish.

Can vaccines cause diseases?

Vaccines almost never cause the disease they are trying to prevent. There are two kinds of vaccination: killed vaccines and live attenuated vaccines. **Killed vaccines** are made from tiny pieces taken from the germ that causes the disease. **Live attenuated vaccines** are made from a very weak form of the germ that causes the disease. You cannot get sick from a killed vaccine. It is possible to get sick from a live attenuated vaccine, but it is very, very unlikely. If you do get sick from a live attenuated vaccine, you will usually have a much milder form of the disease.

I felt sick after getting a vaccine. Is that normal?

It is normal to feel a little sick after you get a vaccine. Common side effects of getting vaccinated are:

- On the arm where you got the shot
  - Pain
  - Redness
  - Swelling

- Throughout your body
  - Tiredness
  - Headache
  - Muscle pain
  - Chills
  - Fever
  - Nausea

Most vaccine side effects are very mild. Most side effects go away in a day or two. Talk to your doctor if you have side effects you are worried about.

There are more serious side effects, but these side effects are very rare.

For example: Guillain-Barré syndrome is a serious side effect of flu vaccination. Guillain-Barré syndrome can cause muscle weakness. It can cause people to not be able to move their limbs. But Guillain-Barré syndrome is very, very rare. Guillain-Barré syndrome only happens in about 2 cases per 1 million people vaccinated for flu. And, you are more likely to get Guillain-Barré syndrome if you aren't vaccinated and catch the flu!

I haven't heard of some of the diseases we have vaccines for. Do I still need to get vaccinated?

Yes. You might not have heard of diseases we have vaccines for. Those diseases are very rare now. The diseases are rare because of vaccines. Because so many people get vaccinated, hardly anyone gets sick with the diseases now.

There are some diseases that are coming back now because people aren't getting vaccinated as much. This is because some people say that vaccines are dangerous. These people are **wrong**. Vaccines are safe. But people who say vaccines are dangerous have convinced a lot of people not to get vaccinated. This isn't okay!

For example, measles was almost completely wiped out in the United States in 2000. But now, because fewer people are getting vaccinated for measles, the disease is coming back. This is a bad thing! We want measles to go away forever. The only way we will do that is by vaccinating people for measles.

Why do some vaccines need multiple shots?

There are many different types of vaccines. Each vaccine protects against one type of germ. Some vaccines need 2 or more shots to work well. If you only get one of these shots, the vaccine won't work as well.

Here are some vaccines that need more than one shot to work correctly:

- The pneumonia vaccine needs 4 shots
- The measles vaccine needs 2 shots
- The chickenpox vaccine needs 2 shots
- Some COVID-19 vaccines need 2 shots.
- The HPV vaccine needs 3 shots. HPV is a germ that can cause cancer.

You might not remember getting a lot of these vaccines. People usually get these vaccines when they are children. You usually get a lot of vaccines as a child. You usually don't get as many vaccines as an adult. It is okay not to remember what vaccines you got as a child. Just know that a lot of vaccines need 2 or more shots to work best.

What are boosters? Why do some vaccines need them?

Vaccines teach your body how to fight a germ. They are very good at teaching your body to fight that germ. But sometimes your body starts to forget after a while.

When that happens, it helps to get a reminder. A booster is like a reminder for your body. A **booster** is another shot. It is more vaccine for the same germ as before. It reminds your body how to recognize that germ. It reminds your body how to stop that germ.

With some vaccines, your body forgets how to fight off the germ after a while. That is okay. It is natural. We don't know how to make vaccines that last forever. But we know that boosters can help remind your body how to fight a germ.

I am an adult. What vaccines do I need?

You need a flu shot every year. This will help protect you from the flu.

You should get vaccinated for COVID-19 and get a booster.

Talk to your doctor about what other vaccines you need. Different adults need different vaccines. What vaccines you need depends on your age. It depends on what vaccines you got as a child. It depends on if you have certain disabilities or illnesses.

You can also fill out the Adult Vaccine Quiz. That is a tool that asks you questions about yourself. It asks how old you are. It asks if you have had certain vaccines. It asks if you have certain disabilities or illnesses. Then, it gives you a list of vaccines you might need to get. You can take that list of vaccines to your doctor.

I didn't get vaccinated as a child. What should I do?

Talk to your doctor. Your doctor will tell you which vaccines you should get.

Your doctor may want to do a blood test. The blood test will tell them whether you have immunity to different diseases. You can get immunity to a disease from:

- Having that disease.
- Getting vaccinated for that disease.

If you have immunity to a disease already, you may not need to be vaccinated for that disease.

You can get most childhood vaccines if you are an adult and did not get them as a child. Your doctor will be able to tell you more about which vaccines you need and when.

Vaccine misinformation

There is a lot of bad information about vaccines on the Internet. Bad information is also called **misinformation**. It can be hard to tell if information is good or bad.

Sometimes, people lie about vaccines. People might lie about vaccines because it gets them attention or money. Or they might lie because they heard the lie from a source they trust. Or they might lie because the misinformation confirms what they already think. Not everyone who lies about vaccines is doing it on purpose.

Here are some questions you can ask yourself if you're trying to figure out if a piece of information about vaccines is misinformation:

- Where does this information come from? Does it come from a source I can trust, like a doctor?
    - When you look at information online, look at the website it comes from. Websites ending in .gov are government websites. Websites ending in .edu are websites from colleges and universities. These are usually good websites to get vaccine information from. Websites ending in .org or .com can also be good. But you should look at these websites a little closer.
- Who wrote this information? Was it a doctor or another health care provider?
    - Good vaccine information should be written by someone who knows a lot about vaccines. Websites with good vaccine information should tell you who wrote the information on their website.

- Is the website trying to sell me something?
    - Be careful if the website is advertising something you can buy. Some websites with vaccine misinformation try to sell you “alternatives” to vaccines. These alternatives are fake. They do not work. They cannot protect you from disease. If a website is trying to sell you something, look out for vaccine misinformation.
- What is the original source of the information?
    - Vaccine information online usually comes from another source. These sources can be things like research studies or books. Or, a website might quote a doctor or other health care professional that the website interviewed.
- When was the information published?
    - Information about vaccines can change quickly. This is because we are always learning more about how vaccines work. So, you want to make sure that the vaccine information you are looking at is pretty current. The information on the website shouldn’t be more than a few years old. Look for words like “last updated,” “last reviewed,” or “last published” on the website. Those words should show up next to a date that tells you how old the information was.

Vaccines do not cause autism.

Vaccines **do not** cause autism. People who say vaccines cause autism are lying.

There was one study that said vaccines cause autism. That was a lie. This study was made up. The study was retracted, which means the journal who published the study said it was wrong. The main author of the study lost his medical license, which means he is no longer a doctor.

We know vaccines do not cause autism. We have many studies showing that vaccines do not cause autism. One study looked at over 650,000 children. That study showed that there is no link between vaccines and autism.

Many autistic children start showing autistic traits around the time they get vaccinated. But just because two things happen around the same time does not mean one thing causes the other.

For example: One morning, John decides to skip drinking a glass of milk with breakfast. Later, when he is out riding his bike, he crashes. John thinks “I crashed my bike because I skipped drinking milk with breakfast.” But just because the two things happened close together does not mean one caused the other.

Two vaccine success stories: Smallpox and Polio

Smallpox

Smallpox was a very bad disease. It killed many people. It made people very sick. It could leave people disabled for the rest of their lives. Smallpox was the first disease we made a vaccine for.

Before we had the smallpox vaccine, people tried **variolation**. Smallpox causes pus-filled sores on people’s bodies. Variolation is when you take some pus from a person sick with smallpox. Then you put it into a cut on a healthy person. This lets the healthy person catch a milder form of smallpox. Variolation probably started in Asia or Africa. We know that people used variolation in China, India, Egypt, Turkey, and West Africa.

In the 1770s, a man named Edward Jenner noticed that women who milked cows did not get smallpox. The women told him it was because they got cowpox from the cows. Cowpox is a similar disease to smallpox, but much milder. The women told Edward Jenner that getting cowpox protected them from getting smallpox.

Edward Jenner tried an experiment. He took cowpox pus from a sore of someone sick with cowpox. Then, he put the pus in a cut on a healthy person. Next, he variolated the person to try and give them smallpox. But the variolation did not work. The person did not get smallpox. The person was protected from smallpox because they had gotten cowpox. Edward Jenner had done the first vaccination.

Smallpox vaccination spread around the world. The vaccine changed over time. It changed into a shot with a standard dose, just like vaccinations today.

In 1950, the **World Health Organization (WHO)** said they wanted to **eradicate**, or get rid of, smallpox completely. The WHO is a group that helps fight diseases all around the world. The WHO worked all over the world to get people vaccinated for smallpox. It took about 20 years but the world worked together to eradicate smallpox. That means nobody gets smallpox anymore. It is like the disease does not exist.

Did you know? The word “vaccination” comes from “vacca,” which is Latin for “cow.” This is because the first smallpox vaccine used pus from cowpox sores.

Polio

Polio is a very bad disease. It can make people very sick. Some people who get polio are **paralyzed** by polio. Paralyzed means they can’t move their bodies easily or at all. People who were paralyzed by polio might need to use wheelchairs to help them move. They might need help from a machine to breathe.

Polio spreads very quickly between people. There is no cure for polio. So, the best thing to do is vaccinate people against polio.

In the 1950s, there were many, many cases of polio in the world. But there was no polio vaccine. Two different researchers invented different polio vaccines. One researcher was named Jonas Salk. The other researcher was named Albert Sabin.

Jonas Salk’s polio vaccine was tested in the United States. The Salk vaccine is given by giving someone a shot. It is also called the **injectable polio vaccine (IPV)**.

Albert Sabin’s polio vaccine was tested in the Soviet Union. The Sabin vaccine is given by mouth. Often, it is given on a sugar cube for someone to eat. The Sabin vaccine is also called the **oral polio vaccine (OPV)**.

The IPV and the OPV are both still used in polio vaccination today. Since the 1950s, polio vaccination has spread around the world. Today, the Americas, Europe, and parts of Asia have eradicated polio. We are still working on eradicating polio in other parts of the world.

To Learn More

NOTE: Many of these resources are made for parents whose children are getting vaccinated. All the information in them applies to adult vaccines as well.

- New Jersey Southern Regional Governmental Public Health Partnership: The Truth About Vaccines: Protecting Your Child Against Serious Disease: https://www.nj.gov/health/lh/documents/vaccine_myth_brochure.pdf
- Centers for Disease Control and Prevention (CDC): Common Questions About Vaccines: https://www.cdc.gov/vaccines/parents/FAQs.html
- American Academy of Pediatrics (AAP): Countering Vaccine Hesitancy: https://publications.aap.org/pediatrics/article/138/3/e20162146/52702/Countering-Vaccine-Hesitancy
- The College of Physicians of Philadelphia: History of Vaccines: https://historyofvaccines.org/
- CDC: Autism and Vaccines: https://www.cdc.gov/vaccinesafety/concerns/autism.html
- Annals of Internal Medicine: Measles, Mumps, Rubella Vaccination and Autism: A Nationwide Cohort Study: https://www.acpjournals.org/doi/10.7326/M18-2101 (This study looked at over 650,000 children. It found no link between autism and vaccines.)
- GSK: Clinical trial phases: https://www.gsk.com/en-gb/research-and-development/trials-in-people/clinical-trial-phases/
- Food and Drug Administration (FDA): The Drug Development Process: Step 3: Clinical Research: https://www.fda.gov/patients/drug-development-process/step-3-clinical-research
- Sabin Vaccine Institute: Intro to Vaccine R&D – Pre-Clinical Studies: https://www.sabin.org/updates/blog/intro-vaccine-rd-%E2%80%93-pre-clinical-studies

- CDC: The Journey of Your Child's Vaccine: https://www.cdc.gov/vaccines/parents/infographics/journey-of-child-vaccine.html
- MedlinePlus: Vaccines (immunizations): https://medlineplus.gov/ency/article/002024.htm
- CDC: Vaccine Schedule (for children): https://www.cdc.gov/vaccines/parents/schedules/index.html
- CDC: The Adult Vaccine Assessment Tool: https://www2.cdc.gov/nip/adultimmsched/
- CDC: There Are Vaccines You Need as an Adult: https://www.cdc.gov/vaccines/adults/index.html
- CDC: 3 Important Reasons For Adults to Get Vaccinated: https://www.cdc.gov/vaccines/hcp/adults/downloads/fs-three-reasons.pdf
- CDC: Finding Credible Vaccine Information: https://www.cdc.gov/vaccines/vac-gen/evalwebs.htm
- CDC: The Journey of Your Child's Vaccine: https://www.cdc.gov/vaccines/parents/infographics/journey-of-child-vaccine.html
- Vaccine Information You Need: Evaluating Online Health Information: https://vaccineinformation.org/internet-immunization-info/
- Vaccine Information You Need: Trusted Sources of Vaccine Information: https://vaccineinformation.org/trusted-sources/
- UCSF Health: Evaluating Health Information: https://www.ucsfhealth.org/education/evaluating-health-information
- The Arc of King County: Misinformation about COVID-19: A Plain Language Guide: https://www.youtube.com/watch?v=Yh9DlXA2pso (This video is about COVID-19 misinformation. But a lot of the information in it can apply to other diseases and vaccines, too.)