Intro to POLIO

Imagine a tiny germ, so small you can't see it, called the poliovirus. This tiny bug can cause a disease called poliomyelitis, or polio for short. Polio is a sickness that can be very serious, especially for young children, mostly those under five years old. The worst thing polio can do is cause people to become paralyzed, meaning they can't move parts of their body anymore, and this can last forever.

A long time ago, before we had good ways to stop it, polio was a huge problem all over the world. It made a lot of people, especially kids, very sick and disabled. People were really scared of it. You might have heard stories or seen old pictures of kids with leg braces or even in big machines that helped them breathe. That was often because of polio.

So, what exactly is this poliovirus? It's a type of germ that likes to live in our guts. There are actually three main kinds, or "serotypes," of this virus: we call them PV1, PV2, and PV3. If you get sick from one kind, you don't automatically become safe from the other two. They are like three different bad guys.

How does this virus spread? Mostly through poop. Sounds gross, right? But if someone who has the virus doesn't wash their hands well after using the toilet, tiny bits of the virus can get onto their hands. Then, if they touch food or water that other people eat or drink, those people can swallow the virus and get sick. This is called the "fecal-oral route." The virus grows inside the person's intestines and then can sometimes travel to their nervous system.

When someone gets infected with the poliovirus, it can take anywhere from about a week to even a month for them to start feeling sick, if they feel sick at all. This waiting time is called the "incubation period."

Here's the tricky part: most people who get the poliovirus, maybe as many as 7 out of 10, don't even show any signs of being sick! They have the virus in their body, and they can even spread it to others without knowing.

For those who do get sick, it can be like having the flu. They might get a fever, feel really tired, have a headache, throw up, and their neck might feel stiff. Their arms and legs might also hurt. This is called "non-paralytic polio" because it doesn't cause paralysis.

But in a small number of people, less than 1 out of every 100 who get the virus, something much worse happens: they get "paralytic polio." This is when their muscles become weak, and they can suddenly lose the ability to move parts of their body. This usually happens in their legs or arms, and it can happen very quickly. This paralysis is often not the same on both sides of the body – one leg might be much weaker than the other.

Even if people recover from the initial polio illness, sometimes, many years later, they can develop a new set of problems called "post-polio syndrome," or PPS. This can happen to about 1 in 4 to 2 in 5 people who had polio. They might start feeling new muscle pain, weakness, or even get paralyzed again in muscles that weren't affected before, or in muscles that had recovered. They can also feel very tired.

So, how do doctors know if someone has polio? They usually look at the person's symptoms and then take samples, like their poop, or sometimes a swab from their throat, or even fluid from around their brain and spinal cord (this is called cerebrospinal fluid). They test these samples to see if they can find the poliovirus. It's really important to find out quickly if it's polio, especially if there's an outbreak, so they can try to stop it from spreading further.

Sadly, there's no medicine that can kill the poliovirus or cure polio once someone has it. Doctors can only try to help manage the symptoms. This means giving medicine for pain, doing physiotherapy to try and keep the muscles as strong and flexible as possible, and if someone has trouble breathing because their breathing muscles are weak, they might need to be put on a machine called a ventilator to help them breathe.

The best way to deal with polio is to stop people from getting it in the first place, and that's where vaccines come in. A vaccine is like a training tool for your body's defense system. It shows your body what the virus looks like so that if the real virus ever tries to attack, your body knows how to fight it off.

There are two main types of polio vaccines. The first one is called the "inactivated poliovirus vaccine," or IPV. It was developed by a scientist named Jonas Salk in 1955. This vaccine contains a poliovirus that has been killed, so it can't make you sick. You get it as a shot. It's very good at protecting you from getting the paralyzed form of polio, but it's not as good at stopping the virus from growing in your gut.

The second type of polio vaccine is the activated, or "oral poliovirus vaccine," or OPV. It was developed by another scientist, Albert Sabin, in the 1960s. This vaccine contains a live poliovirus that has been weakened so it usually doesn't make you sick. You get it as drops in your mouth. OPV is great because it not only protects you from getting sick but it also helps your body fight off the virus in your intestines, which means it can help stop the virus from spreading to other people. However, because it uses a live virus, in very rare cases, this weakened virus can change and become strong again, and then it can cause paralysis.

Because of this very rare risk with OPV, scientists have developed a newer type of oral polio vaccine called the "novel oral poliovirus vaccine type 2," or nOPV2. This new vaccine has been made in a way that makes it much less likely to change back into a harmful form.

Because polio was such a big problem, countries around the world decided to work together to try and get rid of it completely. This big effort is called the "Global Polio Eradication Initiative," or GPEI. It started in 1988, and lots of important organizations like the World Health Organization (WHO), Rotary International, the Centers for Disease Control and Prevention (CDC), UNICEF, and later the Bill & Melinda Gates Foundation and Gavi joined in.

Thanks to all this hard work, they have been incredibly successful! They have managed to reduce the number of polio cases worldwide by more than 99%! That's a huge achievement. Right now, the wild (natural) poliovirus is only still regularly found in two countries: Afghanistan and Pakistan. But even in these places, it's a big challenge to stop it completely because of things like war, unstable governments, and difficulties in reaching all the children who need to be vaccinated. Sometimes, people also hesitate to get vaccinated because they don't trust the vaccines or the people giving them.

One of the challenges in getting rid of polio completely is something called "vaccine-derived poliovirus," or VDPV. We talked a little bit about how the live virus in OPV can sometimes change. In rare cases, if not enough people are vaccinated in a community, this changed virus can start spreading and can even cause paralysis, just like the wild virus. These outbreaks of VDPV happen in areas where lots of people haven't been vaccinated.

To try and stop this from happening, countries have switched from using a type of OPV that protected against all three types of polio (trivalent OPV) to one that only protects against types 1 and 3 (bivalent OPV). This is because wild poliovirus type 2 has already been wiped out worldwide. They are also using the new, safer nOPV2 vaccine to deal with outbreaks caused by type 2 VDPV.

To make sure polio isn't spreading, even if people don't look sick, health organizations do something called "environmental surveillance." This means they test sewage (the stuff that goes down the drains) to see if they can find the poliovirus. If they find it, it means the virus is likely in that community. They also keep a close eye on any children who suddenly develop weakness or paralysis, which is called "acute flaccid paralysis" (AFP) surveillance. If they find a lot of these cases, they investigate to see if it could be polio. There's also a big network of laboratories around the world that help test samples and track the virus.

Women play a super important role in trying to get rid of polio. In many communities, especially where cultural rules might make it difficult for men to go into people's homes, women health workers are the ones who go door-to-door to give children the polio vaccine. They build trust with families and make sure the kids get protected. They also help to teach people about why getting vaccinated is so important. When women are empowered with information and can talk to their communities about vaccines, it helps more people accept them.

The big goal of the World Health Organization is to completely wipe out polio around the world by 2026. But even if they succeed in stopping the wild virus, they will still need to keep a close watch to make sure it doesn't come back, maybe from a changed vaccine virus. They also need to make sure that all children everywhere continue to get vaccinated so that these kinds of outbreaks don't happen. Getting rid of polio for good would be a huge win for the health of children everywhere and would show that when the world works together, we can overcome even very tough diseases.