Part Four Frequently Asked Questions

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How can we be sure vaccines don't cause long-term problems?

Tracking vaccinated children for many years looking for long-term health conditions would be impractical; and withholding new vaccines from children who would benefit from them while long-term studies were being done would be unethical. A more practical approach is to look at the conditions themselves, and at the factors that cause them. Scientists are already working constantly to identify risk factors that can lead to conditions like cancer, stroke, heart disease, and autoimmune diseases like lupus or rheumatoid arthritis. Thousands of studies have already been done looking at hundreds of potential risk factors. If immunizations were identified as a risk factor in any of these studies, we would immediately know about it. So far, they have not.

We know vaccines' safety record from clinical trials before they were licensed, and from millions of doses administered after they were licensed. And we know there is no plausible biologic reason to believe vaccines would cause any serious long-term effects. Based on more than 50 years of experience with vaccines, we can say that the likelihood that a vaccine will cause unanticipated long-term problems is extremely low.

In addition, every vaccine is continually monitored for safety. If an unexpected problem were detected at any time, it would be dealt with appropriately.

Example: The first vaccine for rotavirus was licensed in 1998. Within a year, monitoring systems (like VAERS) revealed that a type of intestinal blockage called intussusception was occurring in children who got the vaccine slightly more often than it would have been expected to occur by chance. This was too uncommon to have been detected during clinical trials, and was only apparent after millions of children had been vaccinated. Once the problem was detected, the vaccine was immediately taken off the market.

(Two new rotavirus vaccines are now available, neither of which has been associated with intussusception, even after intensive scrutiny.)

If all my child's friends are vaccinated, won't he be protected by herd immunity? Why should I put my child at risk for vaccine reactions if all the other children around him are already immune?

This is like riding in a car pool where everyone contributes each month to pay for gas, repairs to the car, etc.; and one morning a new guy shows up and says, "I think I'll ride along with you. But I'm not going to pay, since you're going downtown anyway and you have an empty seat." If enough people choose to take a free ride on other children's immunity, herd immunity will soon disappear.

Why do children need so many doses of certain vaccines?

Most vaccines require at least 2 doses. With inactivated (killed) vaccines, each dose of vaccine contains a fixed amount of disease antigen (virus or bacteria). Immunity is built in phases with each dose boosting immunity to a protective level. Live vaccines are " different, in that the antigen in the vaccine reproduces and spreads throughout the body. One dose produces satisfactory immunity in most children. But a second dose is given to assure immunity, because not all children respond to the first one.

What is in vaccines?

Vaccines contain several basic types of substances:

1. All vaccines contain disease antigen – in other words a killed or weakened form of the disease germ that the vaccine protects against. Disease antigen is the core of any vaccine; it is the part that produces immunity.

2. Some vaccines contain **adjuvants**. These are substances that help vaccines produce a stronger immune response.

3. Some vaccines come in vials containing multiple doses. Some of these contain a **preservative**, to prevent contamination once the vial has been opened.

4. A **diluent** is a liquid – usually saline or sterile water – used to reconstitute a powdered vaccine.

5. Vaccine antigens are grown on "growth media" that can contain a variety of substances, such as yeast. Other substances, such as formaldehyde, can be used during the production of vaccines. All these substances are removed from the final product, but tiny traces of them, too small to have a clinical effect, can remain.

Aren't some of these substances toxic?

Some vaccine ingredients could be toxic . . . *at much higher doses*. This concerns some parents, but the fact is that any substance – even water – can be toxic given a large enough dose. But at a very low dose, even a highly toxic substance can be safe.

We might not be aware of it, but we are exposed to small amounts of these same "toxic" substances every day. For example:

Mercury: Babies are exposed to mercury in milk, including breast milk. Seafood also contains mercury.

Formaldehyde: Formaldehyde is in automobile exhaust; in household products and furnishings such as carpets, upholstery, cosmetics, paint, and felt-tip markers; and in health products such as antihistamines, cough drops, and mouthwash.

Aluminum: The average person takes in an estimated 30 to 50 mg of aluminum every day, mainly from foods, drinking water, and medicines. Not all vaccines contain aluminum, but those that do typically contain about .125 mg to .625 mg per dose, or roughly 1% of that daily average.

One final word – don't believe everything you read about harmful ingredients in vaccines. To debunk just one popular myth, NO vaccine contains, or has ever contained, even a molecule of antifreeze. But if you search the web you can easily find a dozen websites that persist in claiming that they do.

Can a child get a disease even after being vaccinated?

It isn't very common, but it can happen.

About 1% to 5% of the time, depending on the vaccine, a child who is vaccinated fails to develop immunity. If these children are exposed to that disease they could get sick. Sometimes giving an additional vaccine dose will stimulate an immune response in a child who didn't respond to one dose. For example, a single dose of measles vaccine protects about 95% of children, but after two doses almost 100% are immune.

Sometimes a child is exposed to a disease just prior to being vaccinated, and gets sick before the vaccine has time to work.

Sometimes a child gets sick with something that is similar to a disease they have been vaccinated against. This often happens with flu. Many viruses cause symptoms that look like flu, and people even call some of them flu, even though they are really not. Flu vaccine doesn't protect from these viruses.

Can a child actually get the disease from a vaccine?

Almost never. With inactivated (killed) vaccines, it isn't possible. A dead virus or bacteria, or part of a virus or bacteria, can't cause disease.

With live vaccines, some children get what appears to be a mild case of disease (for example what looks like a measles or chickenpox rash but with only a few spots). This isn't harmful, and can actually show that the vaccine is working.

A vaccine causing full-blown disease would be extremely unlikely. One exception was the live oral polio vaccine, which could very rarely mutate and actually cause a case of polio. This was a rare but tragic side effect of this otherwise effective vaccine. Oral polio vaccine is no longer used in the U.S.

Why does the government require children to be vaccinated to attend school?

School immunization laws are not imposed by the federal government, but by the individual states. But that doesn't answer the question, which is often asked by people who see this as a violation of their individual rights.

The mission of a public health system, as its name implies, is to protect the health of the public – that is, everybody. Remember that vaccines protect not only the person being vaccinated but also people around them. Immunization laws exist not only to protect individual children, but to protect *all* children.

If vaccines were not mandatory, fewer people would get their children vaccinated – they would forget; they would put it off; they would feel they couldn't afford it; they wouldn't have time. This would lead to levels of immunity dropping below what are needed for herd immunity (see page 37), which would lead in turn to outbreaks of disease. So mandatory vaccination, while it might not be a perfect solution, is at least a practical solution to a difficult problem.

In a sense, school immunization laws are like traffic laws. We're not allowed to drive as fast as we want on crowded streets or to disobey traffic signals. This could be seen as an imposition on individual rights too. However, these laws are not so much to prevent drivers from harming themselves, which you could argue is their right, but to prevent them from harming others, which is not.

Can children be exempted from school immunization laws?

Under certain circumstances, yes. All states allow medical exemptions, so children who cannot safely receive certain vaccines (like Riley . . . see page 38) are not required to get them. Most states also allow religious exemptions for children whose religion prohibits vaccination. Finally, some states allow philosophic exemptions for people who oppose vaccination on non-religious grounds. To protect themselves and others, unvaccinated students may be prohibited from attending classes if there is an outbreak of a vaccine-preventable disease at their school or in their community.

Vaccines are expensive. Is there a way to reduce the cost?

You can go to a public clinic or health department rather than to a private physician. Vaccinations are generally cheaper there, and may be free except for an administration charge.

There is also a national program called Vaccines for Children (or VFC) that allows qualified families to get free vaccinations for their children at participating doctors' offices. You can learn more about the VFC program at **www.cdc.gov/vaccines/programs/vfc/default.htm**.

Can't so many vaccines overwhelm a child's immune system?

There may not be consensus over exactly how many germs a baby's immune system can handle at a time, but it is considerably more than they will ever get from vaccines. After all, this is the immune system's job. From the day a baby is born, her immune system is busy dealing with the thousands of germs she is exposed to as part of daily life. As one doctor put it, "Worrying about too many vaccines is like worrying about a thimble of water getting you wet when you are swimming in an ocean."

There are mothers who say that their babies developed autism after receiving their shots. If the shots didn't cause the autism, how do you explain this?

A parent's desire to know exactly why something as serious as autism has struck her child is very strong. The fact is, science has not yet determined exactly what causes autism. But parents can be reluctant to accept a "we don't know" answer when vaccines offer an easy and fairly plausible alternative.

Nevertheless, there *are* explanations.

First, remember the discussion about DTP vaccine and SIDS on page 35? The same explanation applies to vaccines and autism. Autism is usually diagnosed during the same age range when children are getting their routine shots. Naturally, if enough children develop autism during these ages, sometimes it will be noticed within a day or two after a vaccination visit. Even if it happens several hundred times, this is a tiny number compared with the millions of children who get vaccines every year and don't develop autism afterward.

Also, it is a very common logical error to assume that because one event directly follows another, it must have been caused by it. We laugh at the old folk belief that the rooster's crowing makes the sun come up, but the reasoning is exactly the same. The difference is that the idea of a rooster causing the sun to rise is ridiculous, while the idea that vaccines can cause autism sort of makes sense. But that doesn't make the argument any more valid. For the theory that vaccines cause autism to make logical sense, someone would have to show that children who get vaccinated are more likely to develop autism than children who don't. And no one has done that.

Why do you use vague language like, "Available data suggest that there is no association between vaccines and autism . . . ?" Why can't you just say, "Vaccines don't cause autism!" If your statements didn't sound so wishy-washy, they would be more believable.

It would be nice to simply say that vaccines don't cause autism, but it wouldn't be good science. A basic principle of science is that *you can't prove that something is not true*. We all believe that if you let go of an apple it will drop to the ground. But that belief is based on the observation that it has always happened that way in the past. It doesn't *prove* that the next time you try it, the apple might not fly up into the air instead.

So to say that vaccines don't cause autism would be scientifically dishonest, regardless of how sure we are that they don't.

What we *can* say is that at least a dozen rigorous scientific studies – designed to detect a connection between vaccines and autism – have been published in reputable, peer-reviewed journals; and these studies have overwhelmingly *failed to show any connection between vaccines and autism*. The Institute of Medicine, an independent, objective "advisor to the nation" on health, reviewed these studies, and concluded that there is no plausible evidence that vaccines cause autism. But they went farther than that. They advised that money that could be used to fund more studies on vaccines and autism would be better spent on areas of autism research more likely to be productive.

This isn't exactly saying, "Vaccines don't cause autism," but it is about as close as any group of scientists is likely to come to it.

How do you explain the increase in the number of children with autism, and the fact that the increase corresponded with an increase in the number of vaccinations children get?

The rise in the number of autism cases can be explained, at least in large part, by the fact that autism is being recognized and diagnosed much more often than it used to be, and that many conditions that used to go by other names are now being called autism, or autism spectrum disorder. The number of autism cases may actually be rising, but much of the apparent increase can be accounted for by the fact that we simply recognize it more often.

As for the correspondence between the rise in autism and the increase in the number of vaccinations, remember . . . just because one event preceded another, it doesn't mean it caused it. No one has proven that vaccines cause autism, and in fact virtually all reliable evidence says that they don't.

While there is evidence that genetics plays an important role in the development of autism, that doesn't necessarily rule out the possibility that environmental factors could play a role too. But even if this is true, why would it have to be vaccines? Many things in our society were changing at the same time more vaccines were being developed, from the amount of fast foods and processed foods we eat, to the amount of television we watch, to the amounts of industrial pollution we're exposed to, to other drugs and medicines we take, to chemicals in the clothes we wear and the homes we live in, to the amount of time we spend talking on cell phones – and that's just a few. You could list just as many more.

The theory that vaccines cause autism has been extensively tested, and has come up short. Maybe the Institute of Medicine is right, and it's time to devote more time and money looking into other, more promising, theories into the causes of autism.