FDA GHANA FOOD AND DRUGS AUTHORITY

Your Well-being, Our Priority.

Top 20 Questions about Vaccination

1. How do vaccines work? Do they work against viruses and bacteria?
2. Why aren't all vaccines 100% effective?
3. Why are there so many vaccines?
4. Is natural immunity better than vaccine acquired immunity?
5. Why do some vaccines require boosters?
6. My child was invited to a chicken pox party. Would it be better for my child to get the chicken pox this way? Why do we vaccinate against a mild disease like chicken pox?
7. Can you get a disease from the vaccine that's supposed to prevent it? And why do some vaccines have live pathogens but others have killed pathogens?
8. Can babies' immune systems handle so many vaccines?
9. Why is there a new flu vaccine every year?
10. What is herd immunity? Is it real? Does it work?
11. Why is allergy to eggs a contraindication to getting some vaccines?
12. Do vaccines cause autism?
13. People say that vaccines are linked to long-term health problems such as multiple sclerosis, diabetes, and autism. Is that true?
14. The vaccine information sheet for my child's recent vaccination listed lots of potential side effects. Why is vaccination recommended if it can cause all of these side effects?
15. Do we do enough safety testing with vaccines?
16. Do vaccines have aborted fetal tissue?

1. **How do vaccines work? Do they work against viruses and bacteria?**

Vaccines work to prime your immune system against future "attacks" by a particular disease. There are vaccines against both viral and bacterial pathogens, or disease-causing agents.

When a pathogen enters your body, your immune system generates antibodies to try to fight it off. Depending on the strength of your immune response and how effectively the antibodies fight off the pathogen, you may or may not get sick.

If you do fall ill, however, some of the antibodies that are created will remain in your body playing watchdog after you're no longer sick. If you're exposed to the same pathogen in the future, the antibodies will "recognize" it and fight it off.

Vaccines work because of this function of the immune system. They're made from a killed, weakened, or partial version of a pathogen. When you get a vaccine, whatever version of the pathogen it contains isn't strong or plentiful enough to make you sick, but it's enough for your immune system to generate antibodies against it. As a result, you gain future immunity against the disease without having gotten sick: if you're exposed to the pathogen again, your immune system will recognize it and be able to fight it off.

Some vaccines against bacteria are made with a form of the bacteria itself. In other cases, they may be made with a modified form of a toxin generated by the bacteria. Tetanus, for example, is not directly caused by the Clostridium tetani bacteria. Instead, its symptoms are primarily caused by tetanospasmin, a toxin generated by that bacterium. Some bacterial vaccines are therefore made with a weakened or inactivated version of the toxin that actually produces symptoms of illness. This weakened or inactivated toxin is called a toxoid. A tetanus immunization, for example, is made with tetanospasmin toxoid.

2. **Why aren't all vaccines 100% effective?**

Vaccines are designed to generate an immune response that will protect the vaccinated individual during future exposures to the disease. Individual immune systems, however, are different enough that in some cases, a person's immune system will not generate an adequate response. As a result, he or she will not be effectively protected after immunization.

That said, the effectiveness of most vaccines is high. After receiving the second dose of the MMR vaccine (measles, mumps and rubella) or the standalone measles vaccine, 99.7% of vaccinated individuals are immune to measles. The inactivated polio vaccine offers 99% effectiveness after three doses. The varicella (chickenpox) vaccine is between 85% and 90% effective in preventing all varicella infections, but 100% effective in preventing moderate and severe chicken pox.

3. **Why are there so many vaccines?**

Currently, the U.S. childhood vaccination schedule for children between birth and six years of age recommends immunizations for 14 different diseases. Some parents worry that this number seems high, particularly since some of the diseases being vaccinated against are now extremely rare in the United States.

Each disease for which vaccinations are recommended, however, can causes serious illness or death in unvaccinated populations, and might quickly begin to appear again if vaccination rates dropped. The United States has seen mumps outbreaks in recent years since vaccination rates have dropped, with severe complications and hospitalizations required for some patients. And before the introduction of the Hib (Haemophilus Influenzae Type b) vaccine, Hib meningitis affected more than 12,000 American children annually, killing 600 and leaving many others with seizures, deafness, and developmental disabilities. After introduction of the vaccine, the number of deaths from Hib dropped to fewer than 10 per year.

Each vaccine on the schedule continues to be recommended because of the risks posed by wild infection.

4. **Is natural immunity better than vaccine-acquired immunity?**

In some cases, natural immunity is longer-lasting than the immunity gained from vaccination. The risks of natural infection, however, outweigh the risks of immunization for every recommended vaccine. For example, wild measles infection causes encephalitis (inflammation of the brain) for one in 1,000 infected individuals. Overall, measles infection kills two of every 1,000 infected individuals. In contrast, the combination MMR (measles, mumps and rubella) vaccine results in a severe allergic reaction only once in every million vaccinated individuals, while preventing measles infection. The benefits of vaccine-acquired immunity extraordinarily outweigh the serious risks of natural infection.

Additionally, the Hib (Haemophilus influenzae type b) and tetanus vaccines actually provide more effective immunity than natural infection.

5. **Why do some vaccines require boosters?**

It’s not completely understood why the length of acquired immunity varies with different vaccines. Some offer lifelong immunity with only one dose, while others require boosters in order to maintain immunity. Recent research has suggested that the

persistence of immunity against a particular disease may depend on the speed with which that disease typically progresses through the body. If a disease progresses very rapidly, the immune system's memory response (that is, the "watchdog antibodies" generated after a previous infection or vaccination) may not be able to respond quickly enough to prevent infection—unless they've been "reminded" about the disease fairly recently and are already watching for it. Boosters serve as a "reminder" to your immune system.

Research is continuing on the persistence of immunity generated by vaccines.

6. **My child was invited to a chickenpox party. Would it be better for my child to get the chickenpox this way? Why do we vaccinate against a mild disease like chickenpox?**

The idea of "pox parties" is generally tied to the perception of chickenpox as a harmless illness. Before the varicella vaccine became available, however, chickenpox infections required 10,000 hospitalizations and caused more than 100 deaths each year in the United States. Exposing a child to wild chickenpox puts him at risk for a severe case of the disease.

Even uncomplicated cases of chickenpox cause children to miss a week or more of school, with a caregiver missing work to care for the sick child.[1] Natural infection also means a risk of infecting others: while successful vaccination protects a child against chickenpox without this risk, children who are infected with chickenpox naturally are contagious. They can spread the disease to other people—not just other children, but also adults, who have a higher risk of complications from the disease.

Meanwhile, vaccination for chickenpox typically prevents future infection with the disease. In the rare cases where individuals do not develop adequate protection from vaccination to prevent future infection, chickenpox infection is typically mild, results in fewer symptoms, and ends more quickly than natural infection. (People with this mild form are contagious, however, and should take care not to expose others to the virus.)

7. **Can you get a disease from the vaccine that's supposed to prevent it? And why do some vaccines have live pathogens but others have killed pathogens?**

Vaccines that are made with killed versions of pathogens—or with only a part of the pathogen—are not able to cause illness. When a person receives these vaccines, it is impossible for him or her to become ill with the disease.

Live, attenuated (or weakened) vaccines are theoretically capable of causing illness: because they can still replicate (though not well), mutation is possible, which can result in a virulent form of the pathogen. However, they are designed with this in mind, and attenuated to minimize this possibility. Reversion to virulent form is a problem with some forms of the oral polio vaccine (OPV), which is why only the inactivated form (IPV) is now used in the United States.

It is important to note that attenuated vaccines can cause serious problems for individuals with weakened immune systems, such as cancer patients. These individuals may receive a killed form of the vaccine if one is available. If not, their doctors may recommend against vaccination. In such cases, individuals rely on herd immunity for protection.

As to why some vaccines contain live pathogens and others contain killed pathogens, the reasons vary by illness. However, generally speaking, live, attenuated vaccines generate longer-lasting immunity than killed vaccines. Thus, killed vaccines are more likely to require boosters to maintain immunity. Killed vaccines, however, also tend to be more stable for storage purposes, and can't cause illness. The medical community must weigh these trade-offs in deciding which approach to use against a particular disease.

8. **Can babies' immune systems handle so many vaccines?**

Yes. Studies demonstrate that infants' immune systems can handle receiving many vaccines at once—more than the number currently recommended. The immunization schedule is based on infants' ability to generate immune responses, as well as when they are at risk of certain illnesses. For example, the immunity passed from mother to child at birth is only temporary, and typically does not include immunity against polio, hepatitis B, Haemophilus influenzae type b, and other diseases that can be prevented by vaccination.

9. **Why is there a new flu vaccine every year?**

Unlike most vaccines, which contain the most common strains of a given pathogen (if more than one exists) and are rarely changed, the seasonal flu vaccine changes frequently, though one or more of the flu strains in the vaccine may be retained from one year to the next. This is because the strains of influenza viruses that circulate are constantly changing. Each year, researchers choose viruses for the vaccine based on which ones are likely to be circulating over the course of the coming flu season, thus providing protection against the most prevalent strains. So when you get a seasonal flu vaccine, you're usually not getting another "dose" of the same flu vaccine you were given before. Instead, you're usually getting protection against a whole new batch of flu viruses.

10. **What is herd immunity? Is it real? Does it work?**

Herd immunity, also known as community immunity, refers to the protection offered to everyone in a community by high vaccination rates. With enough people immunized against a given disease, it's difficult for the disease to gain a foothold in the community. This offers some protection to those who are unable to receive vaccinations—including newborns and individuals with chronic illnesses—by reducing the likelihood of an outbreak that could expose them to the disease.

11. **Why is allergy to eggs a contraindication to getting some vaccines?**

Some vaccines, including the majority of vaccines against influenza, are cultured in chicken eggs. During the process of creating the vaccine, the majority of the egg protein is removed, but there is some concern that these vaccines might generate an allergic reaction in individuals with an egg allergy.

A recent report found that the majority of children with egg allergies who were given a flu shot had no adverse reactions; about 5% of children in the studied group developed relatively minor reactions such as hives, the majority of which resolved without treatment. Additional research is underway to study this issue further.

In most cases, only people with a severe (life-threatening) allergy to eggs are recommended against receiving egg-based vaccines. Your doctor can provide specific information.

12. **Do vaccines cause autism?**

No. Vaccines do not cause autism. This possibility was publicized after a 1998 paper by a British physician who claimed to have found evidence that the MMR (measles, mumps and rubella) vaccine was linked to autism. The potential link has been thoroughly explored; study after study has found no such link, and the original 1998 study has been formally withdrawn by *The Lancet,* which had originally published it. Studies were also done regarding the possibility of a link between the preservative thimerosal, which is used in some vaccines, and autism; again, no such link was found.

It's likely that this misconception persists because of the coincidence of timing between early childhood vaccinations and the first appearance of symptoms of autism.

13. **People say that vaccines are linked to long-term health problems such as multiple sclerosis, diabetes, and autism. Is that true?**

All vaccines have possible side effects. Most, however, are mild and temporary. Adverse effects from vaccines are monitored thoroughly via multiple reporting systems, and there is no evidence from these systems to support these claims.

14. **The vaccine information sheet for my child's recent vaccination listed lots of potential side effects. Why is vaccination recommended if it can cause all of these side effects?**

Every vaccine has potential side effects. Typically they are very mild: soreness at the injection site (for a vaccine delivered via a shot), headaches, and low-grade fevers are examples of common vaccine side effects. Serious side effects are possible, however, including severe allergic reactions. However, the occurrence of these side effects is extremely rare. (Your doctor can explain the risks for individual vaccines in detail; more information is also available from the Centers for Disease Control and Prevention.)

When considering possible side effects from vaccination, it's important to do so in context. While some possible side effects are serious, they are extremely rare. It's important to remember is that choosing not to vaccinate also has serious risks.

Vaccines protect against potentially fatal infectious diseases; avoiding vaccination raises the risk of contracting those diseases and spreading them to others.

15. **Do we do enough safety testing with vaccines?**

Vaccines are tested repeatedly before being approved, and continue to be monitored for adverse reactions after their release. See our article on vaccine testing and safety for more information and details about this topic.

16. **Do vaccines have aborted fetal tissue?**

No. The rubella vaccine virus that is included in the MMR (measles, mumps and rubella) shot is cultured using human cell lines. The vaccine material is carefully separated from the cells in which is was grown before being used.

Some of these cell lines were generated from fetal tissue that was obtained in the 1960s from legal abortions. No new fetal tissue is required to generate rubella vaccine.

17. **Isn't it true that better hygiene and nutrition were responsible for decreases in deaths and disease rates, rather than vaccines?**

Improved hygiene and nutrition, among other factors, can certainly lower the incidence of some diseases. Data documenting the number of cases of a disease before and after the introduction of a vaccine, however, demonstrate that vaccines are overwhelmingly responsible for the largest drops in disease rates. Measles cases, for example, numbered anywhere from 300,000 to 800,000 a year in the United States between 1950 and 1963, when a newly licensed measles vaccine went into widespread use. By 1965, U.S. measles cases were beginning a dramatic drop. In 1968 about 22,000 cases were reported (a drop of 97.25% from the height of 800,000 cases in just three years); by 1998, the number of cases averaged about 100 per year or less. A similar post-vaccination drop occurred with most diseases for which vaccines are available.

Perhaps the best evidence that vaccines, and not hygiene and nutrition, are responsible for the sharp drop in disease and death rates is chickenpox. If hygiene and nutrition alone were enough to prevent infectious diseases, chickenpox rates would have dropped long before the introduction of the varicella vaccine, which was not available until the mid-1990s. Instead, the number of chickenpox cases in the United States in the early 1990s, before the vaccine was introduced in 1995, was about four million a year. By 2004, the disease incidence had dropped by about 85%.

18. **Why can't we eradicate other diseases, as we did with smallpox?**

In theory, nearly any infectious disease for which an effective vaccine exists should be eradicable. With sufficient vaccination levels and coordination between public health organizations, a disease can be prevented from gaining a foothold anywhere; eventually, without anyone to infect, it must die off. (A notable exception is tetanus,

which is infectious but not contagious: it's caused by a bacterium commonly found in animal feces, among other places. Thus, tetanus could not be eradicated without completely removing the *Clostridium tetani* bacterium from the planet.)

Smallpox is unusual, however, in the set of characteristics that made it susceptible to eradication. Unlike many other infectious diseases, smallpox has no animal reservoir. That is, it can't "hide" in an animal population and re-emerge to infect humans, while some diseases can do just that (yellow fever, for example, can infect some primates; if a mosquito then bites an infected primate, it can transmit the virus back to humans).

Another obstacle to eradication for many infectious diseases is visibility. People with smallpox were highly visible: the smallpox rash was easily recognizable, so that new cases could be detected quickly. Vaccination efforts could be focused based on the location of the cases and potential exposure to other individuals. Polio, by contrast, causes no visible symptoms in about 90% of the people it infects. As a result, tracking the spread of the polio virus is extremely difficult, which makes it a difficult eradication target.

Perhaps most importantly, smallpox patients generally did not reach their highest level of infectivity (that is, their ability to infect others) until after the appearance of the smallpox rash. As a result, quick action to quarantine infected individuals upon the eruption of the rash usually left enough time to vaccinate anyone who had already been exposed, and prevent additional exposures. Many infectious diseases do not allow for this kind of reaction time. Measles patients, for example, can become infectious up to four days before the appearance of the measles rash. As a result, they can pass the virus on to many, many other people before anyone even knows that they are infected.

Many people still think eradication is possible for certain diseases. Efforts are ongoing to eradicate polio and Guinea worm disease (Dracunculiasis), with both having been eliminated in many regions, but remaining endemic in several countries. Meanwhile, the Carter Center International Task Force for Disease Eradication has declared additional diseases as potentially eradicable: lymphatic filariasis (Elephantiasis), mumps, pork tapeworm, and yaws.

19. **Is the polio vaccine linked to HIV?**

In the 1990s, certain critics began to blame the testing of a live, weakened polio vaccine in Africa in the 1950s for the spread of acquired immune deficiency syndrome (AIDS). Those behind the accusation argued that chimpanzee cells were used to create the vaccine, and that those cells had been contaminated with a virus that sometimes affects chimps: simian immunodeficiency virus, or SIV. When the vaccine was given to children in Africa, they argued, SIV mutated to become human immunodeficiency virus, or HIV, which causes AIDS.

The accusations, however, were demonstrably false for a variety of reasons. Most notably, the weakened polio vaccine was not made with chimpanzee cells, but with

monkey cells. The vaccine was later tested using a technique that can detect viral DNA (the PCR technique, or polymerase chain reaction); it did not contain SIV or HIV.

Researchers at the University of Birmingham in Alabama demonstrated in 2006 that while HIV was in fact a derivative of SIV, chimpanzees in Cameroon that had been infected with SIV in the 1930s were the most likely source of the AIDS epidemic—decades before the weakened polio vaccine was tested in Africa.

20. **Is the polio vaccine linked with cancer?**

The polio vaccines developed by Jonas Salk and Albert Sabin in the mid-20th century were made with monkey cells. Years later, microbiologist Maurice Hilleman found a monkey virus in both vaccines—the 40th monkey virus to be discovered, which he called Simian Virus 40 (SV40). (Salk's killed vaccine, which had been treated with formaldehyde, had very small amounts of the virus; Sabin's live vaccine was heavily contaminated.) Worried about the potential effects the virus could have on humans, Hilleman injected it into hamsters, finding that nearly all of them developed massive cancerous tumors. But the initial panic this caused gave way in the face of future studies.

First, hamsters that ingested SV40 instead of being injected with it didn't get cancer. Sabin's live vaccine (which contained more SV40 than Salk's) was given orally. Additional studies showed that children who were given Sabin's vaccine did not develop antibodies to SV40; it simply passed through their digestive system, never causing infection.

That left only Salk's vaccine, which contained very little SV40, but was given by injection. Studies performed eight years, fifteen years, and thirty years after SV40-contaminated vaccines had been given to children found that they had the same cancer incidence as unvaccinated groups. No credible evidence suggests that SV40 has ever caused cancer in humans.

Sources

Gever, J. AAAAI: Egg allergy no bar to flu shot. *MedPage Today.* (2010) Accessed 01/25/2018.

Carroll-Pankhurst, C., Engels, E.A., Strickler, H.D., Goedert, J.J., Wagner, J., Mortimer Jr, E.A. Thirty-five year mortality following receipt of SV40-contaminated polio vaccine during the neonatal period. *British Journal of Cancer*. 2001 Nov;85(9):1295. Accessed 01/25/2018.

The Carter Center. Disease considered as candidates for global eradication by the International Task Force for Disease Eradication. (20 KB PDF) Accessed 01/25/2018.

Centers for Disease Control and Prevention. Prevention and control of Influenza with vaccines: Recommendations of the Advisory Committee on Immunization Practices, United States, 2015-16 Influenza Season. Accessed 01/25/2018.

CDC. Varicella (Chickenpox) Vaccine Q&A. Accessed 01/25/2018.

Sharp, P.M., Hahn, B.H. The evolution of HIV-1 and the origin of AIDS. *Philosophical Transactions of the Royal Society of London. Biological Sciences*. 2010 Aug 27;365(1552):2487-94. Accessed 01/25/2018.

Worobey, M., Santiago, M.L., Keele, B.F., Ndjango, J.B., Joy, J.B., Labama, B.L., Dhed'a, B.D., Rambaut, A., Sharp, P.M., Shaw, G.M., Hahn, B.H. Origin of AIDS: contaminated polio vaccine theory refuted. *Nature.* 2004 Apr 22;428(6985):820-.

SOURCE - https://vaccinateyourfamily.org/why-vaccinate/vaccine-benefits/