How do vaccines work?

When a person is exposed to a disease-causing germ, the immune system attempts to mount a defense against it. When the defense is successful, immunity results. When the defense is not successful, an encounter with the bacteria or virus can result in disease and its consequences. In the process of developing immunity, the body produces substances known as antibodies against a specific germ and creates a “memory” of this experience that can be called upon for protection, when needed, many months or years later. The next time the person encounters that germ, the antibodies that circulate in the bloodstream prevent it from causing disease, or decrease the disease's severity, and eliminate the germ from the body.

This is why a child who has had measles, for example, is unlikely to develop the disease again. The immune system has memory. The next time the child encounters the measles virus, the antibodies created during the previous infection are ready to neutralize and destroy the virus before it has a chance to cause sickness again. Medical experts estimate that the immune system can recognize and effectively combat hundreds of thousands, if not millions, of different organisms.

A vaccine works in a similar way. However, instead of suffering the natural infection and risking its consequences in order to develop this protective immunity, a vaccine creates a similar immune protection without the recipient experiencing the disease. Regardless of the way that a vaccine is made—whether it contains an inactivated (killed) germ, a greatly weakened form of the germ, or a purified component of the virus or bacteria—it engages the immune system to create immunity to prepare to fight off an infection whenever it is encountered.

Do vaccines “use up” or overload the immune system in infants or children?

No. Infants and children are bombarded with germs every day in the air they breathe and the food they eat, but their immune systems are able to handle these exposures. Vaccination does not overburden a child’s immune system; rather, it strengthens even the young infant’s developing immune system.

- The vaccines that are recommended for all children use only a small portion of the immune system’s “memory.” In fact, in an article published in 2002, scientists estimated that based on the immune system’s capacity to respond, a child could theoretically get 10,000 vaccines in one day and still not “use up” his or her immune response or ability to respond.

- The same study found that although more vaccines are recommended for children today than in the past, children are actually exposed to fewer antigens (the substances that produce an immune response) in vaccines than ever before due to advances in chemistry and vaccine production technology.
Do vaccines weaken the immune system?

Vaccines strengthen, not weaken, the immune system. This is true even for newborn infants. On the other hand, a natural infection clearly can weaken a child’s immune system, making it harder to resist a second infection. For example, a previously healthy child with chickenpox (varicella) may become infected with dangerous (flesh-eating) bacteria, resulting in an infection severe enough to require hospitalization or even cause death. Similarly, a child with measles infection is more likely to develop middle ear infections or pneumonia if exposed to these bacteria.

In 2002, the Institute of Medicine (IOM), a prestigious medical research organization that provides objective, timely, and authoritative health information to the government and the public, reviewed all available information and determined that the numerous immunizations that children receive do not increase the risk for immune dysfunction. Specifically, receiving numerous vaccines does not cause disease (e.g., diabetes) or increase the chance that children get serious infections (e.g., ear infections, pneumonia, meningitis).²

Sources:

Recommended books and Web sites on this topic:
American Academy of Pediatrics Web site (www.aap.org)
Centers for Disease Control and Prevention, National immunization Program Web site (www.cdc.gov/nip)