



AIDS VACCINES

WHAT IS A VACCINE?

The body's immune system normally reacts to anything it recognizes as foreign and tries to eliminate it. A vaccine is a substance that helps the immune system respond to a specific germ. A vaccine can prevent an infection. However, no vaccine is 100% effective. Most vaccines in the US are between 70 and 95% effective.

Vaccines can help individuals by protecting them against a disease or by helping them fight the disease. For a community, vaccines can lower the overall infection rate and help stop the spread of a disease. See fact sheet 207 for more information on vaccinations that can help people with HIV prevent some common diseases.

HOW DOES A VACCINE WORK?

A healthy immune system fights anything it thinks is foreign. It produces proteins called antibodies. These proteins lock onto the invading germs and prevent them from infecting cells.

These antibodies keep the germ from multiplying. Once the threat of infection is over, the immune system produces special memory cells that remember how to fight the specific germ.

Most vaccines are used to prevent infections. However, others help your body fight an infection that you already have. These are called "therapeutic vaccines." See fact sheet 480 for more information on therapeutic vaccines and HIV.

Some vaccines are made up of weakened germ cells. These are called "live vaccines." They can give you a mild case of disease, but then your immune system kicks in to protect you against a severe case. Other "killed" or "inactivated" vaccines don't use a living germ. You don't get the disease, but your body can still build up its defenses.

Vaccines can have side effects. With live vaccines, you might get a mild case of the disease you are fighting. With inactivated vaccines, you could have pain, redness, and swelling where you got the shot. You might also briefly feel weakness, fatigue, or nausea.

WHAT'S DIFFERENT ABOUT AIDS VACCINES?

All of the proposed AIDS vaccines use copies of parts of HIV to produce an

immune reaction. They cannot cause HIV infection or AIDS.

However, anyone who takes an AIDS vaccine should make antibodies to HIV. People who take part in a study of a proposed AIDS vaccine might test positive for HIV even if they are not infected. If you are in a vaccine trial, you should only have HIV tests at your trial site.

HOW ARE AIDS VACCINES TESTED?

Vaccines start with a researcher's idea about how to fight HIV. This idea is tested in the laboratory and then in animals.

If it is successful in these early studies, a vaccine "candidate" can then be tested in humans. Human testing takes place in three phases designed to measure three things:

1. Is it safe?
2. Does it produce an immune response? (A bodily defense reaction that recognizes invading substances such as bacteria or a virus.)
3. Does it prevent HIV infection?

No vaccine provides 100% protection against infection. So any vaccine is only partially effective. Although that may sound like a problem, vaccines are actually powerful tools for preventing disease. They bring enormous benefits to individuals and communities. For example, if a vaccine can be given to an entire community and reduce the infection rate by 40%, it will have a major impact on the overall number of new infections.

This is a very different situation from measuring the success of an antiretroviral treatment in a group of people already infected. We are used to seeing success rates of 80% or more in achieving an undetectable viral load.

Vaccine testing takes many years. For example, Scientists have been working for over 126 years to find a malaria vaccine. It took over 100 years of work to develop a vaccine for typhoid. Polio vaccine took 46 years. The measles vaccine was one of the fastest. It took 9 years to develop.

HOW CLOSE ARE WE TO AN AIDS VACCINE?

In late 2007, two large trials of an AIDS vaccine were stopped. These were the Step and the Phambili trials. The vaccine failed to

prevent HIV infection, and it might actually have increased the risk of HIV infection for some people who were vaccinated.

Developing an AIDS vaccine is extremely difficult. We don't yet know how to measure immune protection against HIV. In the latest trials, it seems that the substance used to spread the pieces of HIV throughout the body may have damaged the immune response in some people. New ways have to be found to measure the immune response to HIV, and to produce it. There are still many vaccine candidates being developed in the lab, and in human clinical trials.

WHAT ABOUT PEOPLE WHO ARE ALREADY INFECTED?

Most vaccines are designed to prevent infection. However, some vaccines might also help people who are already HIV-positive. These are called **therapeutic vaccines**. A good therapeutic vaccine would strengthen the body's immune response against HIV. We still have to identify ways to measure the immune response against HIV. Dermavir is a therapeutic vaccine that is currently being studied in humans. See fact sheet 480 for information on other immune boosters.

WHAT ELSE IS BEING STUDIED?

Some researchers believe that taking anti-HIV medications might prevent HIV infection. This approach is called Pre-exposure prophylaxis, or PrEP. Prophylaxis means prevention. There are several large studies of PrEP underway now.

Microbicides might be another way to prevent HIV infection. These are substances that could be used by women to prevent HIV infection during vaginal sex. They might also be used by men before anal sex. Several microbicides are currently being tested.

NEXT STEPS

Experts agree that a safe and effective AIDS vaccine would be a vital way to help deal with the global epidemic. It would work along with effective antiretroviral drugs that treat existing HIV infection.

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