HIV Vaccines

An Introductory Factsheet

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This fact sheet provides basic information on preventive HIV vaccines. For more basic fact sheets in this series on emerging HIV prevention strategies visit www.avac.org/intro.

What is an HIV vaccine?

Researchers are working to come up with two kinds of vaccines against HIV, the virus that causes AIDS. One kind, a **preventive vaccine**, would help make HIV-negative people less likely to get HIV. It would teach their immune systems (made up of cells that fight disease) to spot HIV right away if it enters the body. It would prepare disease-fighting cells to stop HIV from spreading so it does not have a chance to take hold. No licensed preventive HIV vaccine exists yet.

The other kind is a **therapeutic HIV vaccine**. People living with HIV would use it to help make their immune systems stronger and better able to control the virus. This would make them less likely to get sick. It may also help them to stay well without having to take anti-HIV treatment every day (as they do now). Research on therapeutic vaccines may also help in research on how to cure HIV. No therapeutic HIV vaccine has been proven to work yet.

Resources and links

AVAC (www.avac.org/vaccines)

Global HIV Vaccine Enterprise (www.vaccineenterprise.org)

HIV Vaccine Trials Network (www.hvtn.org)

International AIDS Vaccine Initiative (www.iavi.org)

US MHRP (www.hivresearch.org)

This fact sheet is about research to find preventive vaccines for use by HIV-negative people.

What is happening in HIV vaccine research now?

Vaccine research starts in the lab where scientists develop vaccines they think have promise. These are next tested on animals. Once scientists have enough evidence of promise and safety in animals, a vaccine can move to testing in humans. It starts in small trials with healthy people and, if results show the vaccine is safe and causes good immune responses, it can move to larger trials. The large trials are called Phase IIb or Phase III trials. Thousands of people volunteer to participate in these trials. Without them, it would be impossible to find out if the test vaccine really lowers people's risk of getting HIV. To learn more about how drugs are tested and why people agree to be in trials, please see AVAC's fact sheet, *HIV Prevention Trial Terms: An Advocate's Guide (https://bit.ly/2rv1ZQL)*.

Two HIV vaccine candidates are now in these large trials. One is a Phase III trial called HVTN 702 or *Uhambo*. It will enroll 5,400 South African men and women. *Uhambo* means "a journey" in Xhosa, one of South Africa's official languages. At least 12 clades (also called strains or sub-types) of HIV exist in the world. HVTN 702 is testing a vaccine designed to prevent clade C, the most common HIV clade in Southern Africa.

A second trial is called HPX2008/HVTN 705 or *Imbokodo*, the word for "rock" in isiZulu. In a well-known South African proverb, "rock" refers to women's strength and value in their communities. This Phase IIb trial will enroll 2,600 women in five countries across sub-Saharan Africa. In this region, more women than men are getting HIV. The test vaccine in the *Imbokodo* trial is designed to protect people from more than one clade of HIV.

What are the discoveries in HIV vaccine research so far?

In 2009, a trial in Thailand called RV144 showed that volunteers who got the test vaccine were 31% less likely to get HIV during the trial than those who got the placebo (a fake product that looks just like the one being tested). RV144 provided "proof of concept"—or proof that a vaccine to prevent HIV could really work.

RV144 used a common strategy for HIV vaccines: the vaccine contained harmless bits of material that look like HIV but are not HIV (like a photograph of a ferocious tiger that may scare you but cannot attack you). Volunteers first got a dose (or doses) of a product containing canary pox, a bird virus that is harmless to humans. The canary pox acted as a "vector", which transported the harmless HIV-lookalike bits into the body's cells. These first doses "primed" the immune system, which means they started an initial immune response. The second step used a "boost" dose called AIDSVAX B/E, which also contained harmless HIV-lookalike bits. The boost is meant to build on the primed immune system, which is designed to make a stronger response—one that the body will remember.

The researchers hoped that, if they taught the body to spot fake HIV, it would learn how to spot real HIV right away and be able to fight back if real HIV ever entered the body.

The RV144 vaccine worked for some volunteers—while in the trial and receiving the vaccine, they did not get HIV. Since that trial, researchers have been trying to figure out why the strategy worked in some people and not others. They want to improve it and adapt it for use in other parts of the world. The work of RV144 has led to HVTN 702, the trial described above.

How is antibody research helping us advance HIV vaccine research?

Our antibodies play a big part in fighting off disease. A certain type of antibody, known as broadly neutralizing antibodies (bNAbs), might be very useful to HIV prevention. They are Y-shaped proteins made by B cells (immune cells). They can attach themselves to a certain part of HIV's surface and stop it from infecting healthy cells. "Broadly neutralizing" means that bNAbs can recognize and attach to two or more of the HIV clades that exist around the world.

Currently, people's immune systems do not make bNAbs until after they are infected. Most often, it takes a long time after infection for a person's body to produce bNAbs. Many people never produce them. Scientists sometimes say that, "Today's antibodies can neutralize yesterday's virus." Why are they so late? Antibodies against any pathogen go through a series of changes that make them better and better at finding and blocking a given invader. This "maturation process" can take many months or years. Scientists hope to develop a vaccine that could speed up this process so that these protective antibodies could work as soon as a person is exposed to HIV.

BNAbs are also being studied as "antibody-mediated prevention" using an intervention called "passive immunization". Traditional immunization involves a vaccine that teaches your body to make its own antibodies against an illness. With passive immunization, bNAbs are brought into the body through an infusion, or "drip". Once there, these bNAbs might be able to fight off HIV, but the person does not make their own antibodies. Two large clinical trials testing this idea are going on in the Americas, Europe, and across sub-Saharan Africa. Called the Antibody Mediated Prevention (AMP) Studies, these trials will test the safety and efficacy (effectiveness) of using the VRC01 antibody for HIV prevention.

In addition to VRC01, a growing number of antibodies are going through animal testing and smaller, earlier phase clinical trials. In future trials, researchers hope to test those that are especially strong and longer-lasting, as well as combinations of antibodies. For an ongoing list of bNAbs as they are discovered, visit *www.bnaber.org*.

About AVAC | AVAC is a non-profit organization that uses education, policy analysis, advocacy and a network of global collaborations to accelerate the ethical development and global delivery of new HIV prevention options as part of a comprehensive response to the pandemic. This fact sheet is part of the Women's HIV Prevention series, created to address HIV prevention strategies and the advocacy needed to bring them to reality.