



HIV Vaccines

An Introductory Factsheet

April 2020

This factsheet 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. One kind, a **preventive vaccine**, would reduce HIV risk in people who are HIV negative. It would teach their immune systems to recognize the virus right away (for example, during sex), and block it from causing an infection. No preventive HIV vaccine exists yet.

A therapeutic HIV vaccine is also being pursued. People living with HIV would take a therapeutic vaccine to strengthen their immune systems for better control the virus. This kind of vaccine could, in theory, help people control the virus without anti-retroviral drugs (ART), or be used as a supplement to ART regimens. Research on therapeutic vaccines may also inform research on how to cure HIV. No therapeutic HIV vaccine has been proven to work yet.

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. Next, the candidate vaccines are tested on animals. If it shows evidence of safety and potential efficacy in animals, it moves on to testing in humans. This starts in small trials and, if results show the vaccine is safe and causes beneficial immune responses, it moves on to larger trials. The last stages of the process involve efficacy trials, named Phase IIb or Phase III trials. Thousands of volunteers participate. Without them, it would be impossible to learn if the vaccine lowers people's risk of getting HIV. To learn more about how HIV prevention trials work, download AVAC's fact sheet, [HIV Prevention Trial Terms: An Advocate's Guide](#).

There are currently several large-scale efficacy trials testing various vaccine candidates against HIV. One is a Phase IIb/III trial called [HVTN 702 or Uhambo](#), that enrolled 5,407 South African men and women. At least 12 clades (different types) of HIV exist in the world. HVTN 702 was testing a vaccine candidate designed to prevent Clade C, the most common HIV clade in Southern Africa. Unfortunately, this vaccine was not found to reduce risk.

The second trial is called [HPX2008/HVTN 705 or Imbokodo](#), and is a Phase IIb trial that enrolled 2,600 women in five countries across sub-Saharan Africa. In this region, more women than men are becoming newly infected with HIV. The vaccine regimen being tested in the *Imbokodo* trial is known as a mosaic vaccine. It is designed to protect against multiple types of global HIV clades. The results of the study are expected in late 2022.

The third trial is called HVTN 706/HPX3002 or *Mosaico*, a Phase III trial enrolling 3800 men who have sex with men (MSM) and transgender people in Argentina, Brazil, Italy, Mexico, Peru, Poland, Spain, and the United States. *Mosaico* is testing a mosaic vaccine regimen that is very similar to the regimen being studied in *Imbokodo* but differs slightly.

Mosaico includes an additional ingredient, a protein, aimed at Clade B. The hope is that this additional protein will help this vaccine work in other regions of the world such as North America and Europe where the Clade B strain of HIV is found. If the vaccine regimen used in *Mosaico* is successful in offering some protection against getting HIV, it will result in a safe and effective vaccine that will be suitable for global populations at risk of HIV acquisition. The study is expected to come to an end in late 2023.

Resources and links

AVAC (www.avac.org/vaccines)

Global HIV Vaccine Enterprise
(www.iasociety.org/Global-HIV-Vaccine-Enterprise)

HIV Vaccine Trials Network
(www.hvtn.org)

International AIDS Vaccine Initiative
(www.iavi.org)

US MHRP (www.hivresearch.org)

NIH-NIAID (www.niaid.nih.gov)

A fourth vaccine trial program, known as [PrEPVacc](#), has started to gather data on HIV risk and other demographic data, in preparation for a Phase III clinical trial. The clinical trial was expected to begin in early 2020. This date is now expected to be delayed to 2021 because of the COVID-19 pandemic. It will enroll 1,688 men and women from general and key population groups in four countries in East and Southern Africa. The trial will be testing a combination of experimental HIV vaccines and oral PrEP at the same time.

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. The RV144 results showed that the vaccine was protective against some exposures to HIV. Since that trial, researchers identified some of the immune responses that might have led to protection. They also came up with adjustments that they thought would improve it and adapted it for use in other parts of the world. The outcome was the *Uhambo* trial (HVTN 702) described above, which used further refined versions of the components found in the RV144 vaccine strategy.

On February 3, 2020, the HVTN 702 protocol leadership for *Uhambo* stopped vaccinations early because data showed the vaccine did not prevent HIV acquisition. It neither increased or decreased the risk of acquiring HIV. The vaccine was safe but not effective. Although vaccinations were stopped, participant follow-up continues and will continue for a year. Participants' safety will be closely monitored during the follow-up period, and researchers hope to learn and understand why the vaccines did not work to prevent HIV infection. Participants will also continue to receive HIV counseling and HIV testing during the follow-up period.

Stoppage of vaccinations in *Uhambo* was informed by the recommendations of an independent body known as the Data and Safety Monitoring Board (DSMB), which reviews all data regularly to ensure the safety of participants and determine if the study should continue.

How is antibody research helping us advance HIV vaccine research?

Antibodies play a big part in fighting off disease. Certain types of antibody, known as [broadly neutralizing antibodies \(bNAbs\)](#), might be very useful to HIV prevention (and treatment and cure, too). They are Y-shaped proteins made by B cells, which are part of the immune system. They can attach themselves to a certain part of HIV's surface and stop the virus from infecting healthy cells. "Broadly neutralizing" means that this type of antibody can recognize and attach to multiple HIV clades that exist around the world.

It often takes a long time after HIV infection for a person's body to produce bNAbs, and many people never produce them. Scientists sometimes say that, "today's antibodies can neutralize yesterday's virus." 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 for "antibody-mediated prevention" using a method called "passive immunization". Traditional immunization involves a vaccine that teaches your body to make its own antibodies against a disease-causing agent. 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 for a period of time. Two large clinical trials testing this idea are ongoing in the Americas, Europe, and across sub-Saharan Africa. Called the Antibody Mediated Prevention (AMP) Studies, these trials are testing the safety and efficacy of using an antibody known as VRC01 for HIV prevention.

A growing number of antibodies are going through animal testing and smaller, early-phase clinical trials. In future trials, researchers hope to test those that are especially strong and long-lasting, as well as combinations of antibodies. They will also test other ways of introducing bNAbs to the body, such as with an injection. 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.

