

# HIV Preventive Vaccine

## What is a Vaccine?

A vaccine is a substance that stimulates the body's immune response; the goal of vaccination is to prevent or control an infection. There are several different types of vaccines. The types of vaccines that are being studied to prevent HIV/AIDS are subunit vaccines, recombinant vector vaccines, and DNA vaccines. These vaccines contain only some of the many substances that HIV needs to make more copies of itself; the vaccines themselves cannot cause HIV or AIDS.

A given HIV vaccine may be used either alone or in combination with another HIV vaccine. One approach to HIV vaccination is called the prime-boost strategy, which combines two different types of HIV vaccines.

## Subunit Vaccines

Subunit vaccines, also known as "component" vaccines, contain only individual proteins or peptides from HIV, rather than the whole virus. Instead of collecting protein or peptide components from the virus itself, they are made in the laboratory using genetic engineering techniques. Most HIV subunit vaccines are based on laboratory-made forms of the HIV envelope proteins that coat the outside of the virus. These envelope proteins can prompt the body to produce an anti-HIV immune response.

Another type of subunit vaccine is called a virus-like particle vaccine (also known as a VLP or pseudovirion vaccine). Virus-like particles are non-infectious HIV look-alikes that contain one or more, but not all, HIV proteins.

## Recombinant Vector Vaccines

Recombinant vector vaccines are based on microorganisms such as viruses or bacteria that do not cause disease in humans or have been weakened so as not to cause disease. The viruses or bacteria are used

as vectors, or carriers, to deliver harmless HIV genes into the cells of the body. The body produces proteins from the HIV genes and these proteins stimulate an anti-HIV immune response.

Some of the viral vectors being studied for HIV vaccines include ALVAC (a canarypox virus), MVA (a cowpox variant), and ADV5 (adenovirus 5). A modified version of the bacterium *Salmonella typhi* is also being studied as a vector for HIV vaccines. Most of the recombinant vector vaccines for HIV deliver several HIV genes.

## DNA Vaccines

DNA vaccines introduce pieces of laboratory-made HIV DNA into the body. Unlike recombinant vector vaccines, DNA vaccines do not rely on a viral or bacterial vector. Instead, "naked" DNA containing HIV genes is injected directly into the body. Cells take up this DNA and use it to produce HIV proteins. The proteins trigger the body to produce an anti-HIV immune response.

## Prime Boost Strategies

A prime-boost strategy is one approach to HIV vaccination. In this approach, administration of one type of HIV vaccine (such as a recombinant vector vaccine) is followed by a second type of HIV vaccine (such as a subunit vaccine). The goal of this approach is to stimulate different kinds of immune responses and enhance the body's overall immune response to HIV.

## For more information:

<http://www.niaid.nih.gov/daids/vaccine/>  
<http://www.vrc.nih.gov/VRC/>