

HIV Vaccines

What are HIV vaccines?

The goal of an eventual preventive HIV vaccine is similar to other preventive vaccines; to protect against infectious agents such as viruses. A vaccine is a substance that is introduced into the body to prevent infection or to control disease due to a certain pathogen (such as HIV). The vaccine teaches the body how to defend itself against a pathogen by creating an immune response.

Currently there is no available vaccine to protect against HIV infection.

An effective vaccine could stop the spread of HIV by protecting people from becoming infected with the virus. Another way a vaccine could work is to modify the course of HIV infection, so that even if it were not successful in preventing infection, it would slow the disease progression so that the vaccinated person would develop AIDS more slowly or perhaps not at all.

Why are HIV vaccines needed?

HIV vaccines are among new prevention technologies being developed to prevent the spread of HIV. History tells us that vaccines are highly powerful and cost-effective tools in fighting infectious diseases, with the ability to end major viral epidemics following broad immunisation programmes.

According to UNAIDS, every region of the world has been affected by HIV, with sub-Saharan Africa among the hardest hit. Of the 33 million people worldwide living with HIV, 22 million are in sub-Saharan Africa.

Though essential, traditional educational and behavioural approaches to HIV prevention will not suffice to bring the pandemic under control. And while the expansion of treatment programs remains important, such efforts alone will not turn the tide of the pandemic. Governments and

global health agencies would be hard pressed to reach everyone in need of antiretroviral therapy. Even today, for every two people who receive life-saving antiretroviral treatment, another five are newly infected. While there will never be a single solution to HIV and AIDS, we know from history that no major viral epidemic has ever been defeated without a vaccine.

How will HIV vaccines work?

Because of the way HIV infection occurs, developing a vaccine to prevent infection is complex. Most existing vaccines are called 'preventive' vaccines; they are designed for individuals who have not been infected already. After introducing a small piece, or a non-harmful version, of a virus or bacteria into the body (called a 'foreign antigen') the body is encouraged to develop an immune response. This response is remembered by the immune system and enables it to fight against potential infection if the real pathogen is later reintroduced to the body.

However, given that no one has ever cleared HIV from their system and that the virus weakens the very immune system that is needed to fight the virus, developing a vaccine against HIV is especially challenging. What's more, we cannot apply proven methods in vaccine development (the use of whole-killed or weakened viruses), given the safety concerns associated with HIV. In addition, HIV mutates frequently adding further complexities to developing an effective vaccine. But encouraging results from an efficacy trial conducted in Thailand have shown for the first time that an HIV vaccine can prevent infection from HIV in humans.

Get involved

NAT (National AIDS Trust) is the lead UK partner of the International AIDS Vaccine Initiative. If you would like further information about the development of HIV vaccines or want to get involved in working to ensure that vaccines become a reality, please contact: policyandcampaigns@nat.org.uk

In addition, the organisations listed overleaf can provide up to date information about global, regional and national HIV vaccine efforts.

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Factsheet 5: HIV vaccines

There are a number of HIV vaccine strategies that are in development. These include DNA vaccines which contain copies of single or multiple genes found in HIV that trigger an immune response, and vector vaccines which use a similar strategy to DNA vaccines except that they are delivered by a weakened or harmless bacteria or virus called a 'vector'. These methods ensure that people who receive the vaccine are not at risk of becoming infected with HIV.

How would an HIV vaccine be delivered?

Vaccines may be delivered by injection, orally, or applied to the skin or to the inside of the nose. It is unlikely that HIV vaccines will be 100 per cent effective. It is, however, important to note that no existing vaccine developed to combat other diseases is 100 per cent effective. But even an HIV vaccine with 50 per cent efficacy given to 30 per cent of the population would avert 5.6 million new infections in low and middle income countries between 2015 and 2030 (roughly 24 per cent of the infections that would otherwise occur).

When would an HIV vaccine be available?

Development of any new vaccine normally is a long and complicated scientific research process. It can take several decades to develop and test a vaccine, and for every success there are many failed attempts. But even these provide leads and valuable scientific insights.

There are currently around 30 different HIV vaccines in different phases of clinical testing, with a series of novel vaccine candidates being developed in laboratories. Efforts are concentrated in both developed and developing countries so that a safe and effective vaccine could ideally be used globally in efforts to halt the spread of HIV.

What is needed to make an HIV vaccine a reality?

There has been significant scientific progress on the path towards developing a safe and effective vaccine. But a number of factors need to be addressed to help HIV vaccines become a reality.

These include:

- Sufficient resources and expertise to stimulate innovation in vaccine discovery and design.
- Sustained political and community support across the world, and particularly in countries where trials are being or may be conducted.
- Long-term financial commitments from donors to fund both discovery and clinical research, together with innovative financing mechanisms to accelerate research and development.
- Established regulatory and licensing arrangements and a clear understanding of user-acceptability.
- Identification of potential barriers to delivery and user uptake of an eventual vaccine.
- Continued commitment to maintain capacity and infrastructures in developing countries – including by training health professionals – to ensure that when products are available they reach the people that need them most.

Sources of information

NAT (National AIDS Trust)

www.nat.org.uk

NAT is the UK's leading charity dedicated to transforming society's response to HIV. Policy and advocacy on HIV vaccines forms an important part of NAT's work. NAT is the lead UK partner of the International AIDS Vaccine Initiative.

International AIDS Vaccine Initiative

www.iavi.org

The International AIDS Vaccine Initiative is a non-profit product development partnership (PDP) working to accelerate the development of a vaccine to prevent HIV infection and AIDS.

AIDS Vaccine Advocacy Coalition

www.avac.org

AVAC is an international, non-profit organisation that uses education, policy analysis, advocacy and community mobilisation to accelerate the ethical development and eventual global delivery of HIV vaccines and other new prevention options as part of a comprehensive response to the pandemic.

HIV Vaccine Trials Network

www.hvtn.org

HVTN is an international collaboration of scientists and educators searching for an effective and safe HIV vaccine. HVTN's mission is to facilitate the process of testing preventive vaccines against HIV.