

Questions & Answers

What is a vaccine?

A vaccine is a substance that is introduced into the body to prevent infection or to control disease due to a certain pathogen (any disease-causing organism, such as a virus, bacteria or parasite); the vaccine 'teaches' the body how to defend itself against a pathogen by creating an immune response. Vaccines can be introduced in different ways, such as injection into the muscle (intramuscular) or into or under the skin (intra-dermal or subcutaneous); by application to the skin (transdermal); by application to the inside of the nose (nasal); or by being swallowed (oral).

In general, vaccines are given to healthy individuals who may have a chance of being exposed to the pathogen in the future. Currently available vaccines save millions of lives each year. A few examples are polio, tetanus and measles vaccines, but there are many others. Many vaccines are designed to be given to infants, but vaccines can also be given to adults.

What is an AIDS vaccine?

An AIDS vaccine is a substance given (most likely by injection) to people who are not infected with HIV, to prevent them from becoming infected if they are exposed to the virus in the future. There is a chance that a preventive AIDS vaccine might control development of AIDS in people who are already infected with HIV.

Is an AIDS vaccine currently available?

Right now, no HIV/AIDS vaccine is available. Many possible vaccine candidates are being developed in laboratories and tested in clinical trials.

Why do scientists believe a preventive AIDS vaccine is possible?

Researchers know that the immune systems of some individuals have some natural ability to prevent infection with HIV. In other individuals, the immune system appears to control the progression of the disease. Experimental vaccines against simian immunodeficiency virus (SIV), a close cousin of HIV that infects monkeys, have been shown to prevent AIDS in these animals. Together, these findings support the scientific potential for a vaccine to prevent AIDS in humans. Currently there are more than 30 potential vaccines in clinical trials in humans, and many others are in earlier stages of research.

Are vaccines 100% effective in preventing disease?

No vaccine is 100% effective. In fact, most vaccines are between 70% and 95% effective in protecting those vaccinated against the targeted disease. This is the concept of partial efficacy. 100% effectiveness is not necessary when public health programmes achieve significant levels of immunization in a community. Successful mass vaccination programmes create so-called herd immunity. If enough people

in a community are vaccinated with an effective vaccine, there are statistically fewer chances for an infectious disease to be transmitted, thus lowering the risk of infection for people who have not been vaccinated or individuals for whom the vaccine is not effective. For purposes of any vaccine candidate, including an AIDS vaccine, the importance of partial efficacy is a question of practicality. IAVI estimates that a vaccine with even 30% efficacy could have benefits, depending on the characteristics of the HIV/AIDS epidemic in certain populations and/or regions.

How would an AIDS vaccine work?

An effective AIDS vaccine would teach the body to recognize the human immunodeficiency virus (HIV) that causes AIDS and provoke an immune response that would defend against the virus if it entered the body. The information on how to defeat the virus would become part of the immune system's memory; the immune system would be prepared to fight back every time it encounters the virus.

What is the difference between a preventive and a therapeutic AIDS vaccine?

In common language, 'vaccine' typically refers to preventive vaccine. A preventive vaccine is designed for individuals who are not infected with the targeted disease, for example, HIV. The vaccine would either prevent the individual from becoming infected when exposed to the virus, or if infection occurs, in the case of HIV, stop the disease from progressing as quickly to AIDS. A therapeutic vaccine would be designed to reduce the impact of HIV/AIDS in individuals already infected with the disease.

When will we have an AIDS vaccine?

Science is unpredictable. Today, the field is testing two vaccine candidates in advanced-stage clinical trials, and we will have critical information on these candidates over the coming years.

Development of any new vaccine normally is a long and complicated scientific research process. It usually takes 10 to 15 years and US\$100 to US\$200 million to develop and test a vaccine, and for every success there are many leads that provide valuable scientific insights but prove to be ineffective. Developing a vaccine to prevent HIV/AIDS is particularly challenging. HIV is one of the most complicated viruses ever identified. HIV targets and destroys the very immune system that a vaccine traditionally triggers. And the genetic instability of HIV is daunting: millions of viruses are constantly produced and their mutation rates are spectacular. The immune system is presented with an endless stream of new versions of the virus that it is unable to recognize and control.

There are other scientific challenges to AIDS vaccine development, including the lack of a fully adequate model for early testing of candidates in animals. There is the question of what will be the most effective approach or combination of approaches for eliciting an immune response to HIV. And finally, it is yet unknown whether a single universal vaccine can create immunity against the different subtypes, or clades, of the HIV virus, or if a different vaccine must be developed against each clade.



Besides scientific hurdles, there is also an investment challenge. The United Nations repeatedly has criticized the lack of adequate global financial and political support for curbing the HIV/AIDS epidemic, including support for vaccine research. It has been difficult to persuade vaccine developers in the private sector to invest in HIV/AIDS vaccine research. The primary markets for a vaccine would be in the poorest countries in the world—where risks of doing business are high and return on investment relatively low.