AIDS VACCINE SCIENCE FOR BUSY ADVOCATES

Antibody Research

MAY 2017

HIV ANTIBODY ESSENTIALS

There's been tremendous progress in identifying broadly neutralizing antibodies (bNAbs) that effectively block many different strains of HIV from infecting human cells. Hundreds of these antibodies have been discovered in recent years. Neutralizing antibodies have been isolated from HIV-positive individuals whose immune systems produce them naturally. Scientists are now testing whether direct transfer of the most potent antibodies could prevent, treat, or even be part of a cure for HIV when infused directly into the blood stream. A small study using one of these potent antibodies found that virus levels dropped significantly among participants living with HIV, an effect that lasted one month after only one dose.

Developing a vaccine that elicits bNAbs would be an unprecedented scientific achievement, but candidates for human testing are many years away. Significant advances will only be made if funding is sustained, candidates are tested, and collaboration and innovation continues.

GLOSSARY

Affinity maturation

The process by which antibodies, a core part of the body's immune response, transform from a "naïve" state into a highly efficient defense against a specific pathogen or invader.

Broadly neutralizing antibodies to HIV (bNAbs)

Y-shaped protein produced by B cells (immune cells) that binds to a specific part of HIV's surface, rendering it harmless; bNAbs neutralize many different types of HIV in lab tests.

Gene transfer

An approach that uses vectors to deliver genes into the body, usually by injection. These genes then begin to produce specific substances. In the case of HIV research, the hope is to use gene transfer to create a supply of broadly neutralizing antibodies against HIV.

Immunogen

The fragment or portion of a pathogen that is used in a vaccine to teach the body how to defend itself against infection.

Passive immunization

Transfer of pre-made antibodies to an individual (versus immunization with a vaccine that teaches the body to make the antibody itself).

AVAC
Global Advocacy for HIV Prevention
HIV Vaccine Awareness Day
MAY 2017

ANTIBODY RESEARCH

Progress on a powerful immune response

Scientists have mapped the shape and structure of **bNAbs** and identified the points of contact and binding between the antibody and the virus. Understanding the shape of the binding sites for bNAbs is key to vaccine development. Scientists are encouraged that many bNAbs attach to a relatively small, conserved portion of the virus, knows as the *envelope trimer*. This narrows the target area for vaccine development.

It takes time for antibodies to mature into powerful proteins that effectively block pathogens such as HIV. Scientists studying the **affinity maturation** pathway have defined key steps, and mapped the evolution of bNAbs in HIV-positive individuals. This information can eventually be used to identify **immunogens** and design vaccines that induce potent bNAbs. Researchers are also looking at **gene transfer** approaches that deliver genes by injection that can make bNAbs.

Right now, it's not clear how to generate these bNAbs with a candidate vaccine—and work towards this goal is ongoing. Advocates can help by supporting sustained funding for and coordinated planning within the field. (See the *Busy Advocates* fact sheet on **passive immunization** trials.)

2010 - 2016

KEY QUESTION

How do these antibodies get made in the body?

KEY QUESTION

Do these antibodies protect – and can they lead to vaccine candidates?

KEY QUESTION

Can we show large-scale efficacy of antibodies in HIV-negative and HIV-positive people through passive immunization?

KEY QUESTION

How do we design immunogens that prompt the body to make these antibodies?

KEY QUESTION

Can we develop a vaccine or gene transfer strategies to prompt the human immune system to make these antibodies?

2017 and beyond

KEY QUESTION

What other antibodies have been identified that show promise for HIV prevention?