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.

**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, known 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.)

**Key Question**

- How do these antibodies get made in the body?
- Do these antibodies protect—and can they lead to vaccine candidates?
- How do we design immunogens that prompt the body to make these antibodies?
- Can we develop a vaccine or gene transfer strategies to prompt the human immune system to make these antibodies?
- What other antibodies have been identified that show promise for HIV prevention?