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New strategy proposed for designing antibody-based HIV vaccine

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WHAT: Most vaccines that protect against viruses generate infection-fighting proteins called antibodies that either block infection or help eliminate the virus before it can cause disease. Attempts to create a vaccine that induces antibodies that prevent HIV infection or disease, however, have so far been unsuccessful. But several recent studies suggest promising new research directions for the development of an antibody-based HIV vaccine, according to John R. Mascola, M.D., deputy director of the Vaccine Research Center at the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, and colleagues.

These studies demonstrate that, contrary to widespread belief, it is not uncommon for people infected with HIV to naturally make antibodies that can neutralize a variety of HIV strains. These antibodies do not protect people from the virus because they arise years after HIV infection is established. However, if a vaccine could prime the body to make these broadly neutralizing antibodies before exposure to HIV, they could potentially prevent infection or hold the virus at bay until an army of immune cells assembles to limit viral replication.

Based on these findings, Dr. Mascola and colleagues recommend a research strategy that uses naturally occurring, broadly neutralizing anti-HIV antibodies for the ultimate design of an antibody-based HIV vaccine.

Key aspects of this strategy include

- Obtaining new broadly neutralizing antibodies to HIV to expand the pool available for scientists to study
- Identifying regions on the surface of HIV that are vulnerable to broadly neutralizing antibodies and determining the atomic-level crystal structure of those regions
- Understanding how broadly neutralizing antibodies to HIV evolve and persist
- Clarifying the structural differences between anti-HIV antibodies that do and do not have neutralizing properties
- Determining what quantity of broadly neutralizing antibodies an HIV vaccine must elicit to be effective
- Learning how anti-HIV neutralizing antibodies and HIV surface proteins evolve in response to one another in people who eventually produce a powerful neutralizing antibody response to the virus
- Clarifying how HIV surface proteins are presented to the immune cells that produce broadly neutralizing antibodies to HIV
- Determining what immune-system conditions promote the production of broadly neutralizing anti-HIV antibodies

Source: NIH/National Institute of Allergy and Infectious Diseases (news : web)