Gene-editing technique opens door for HIV vaccine

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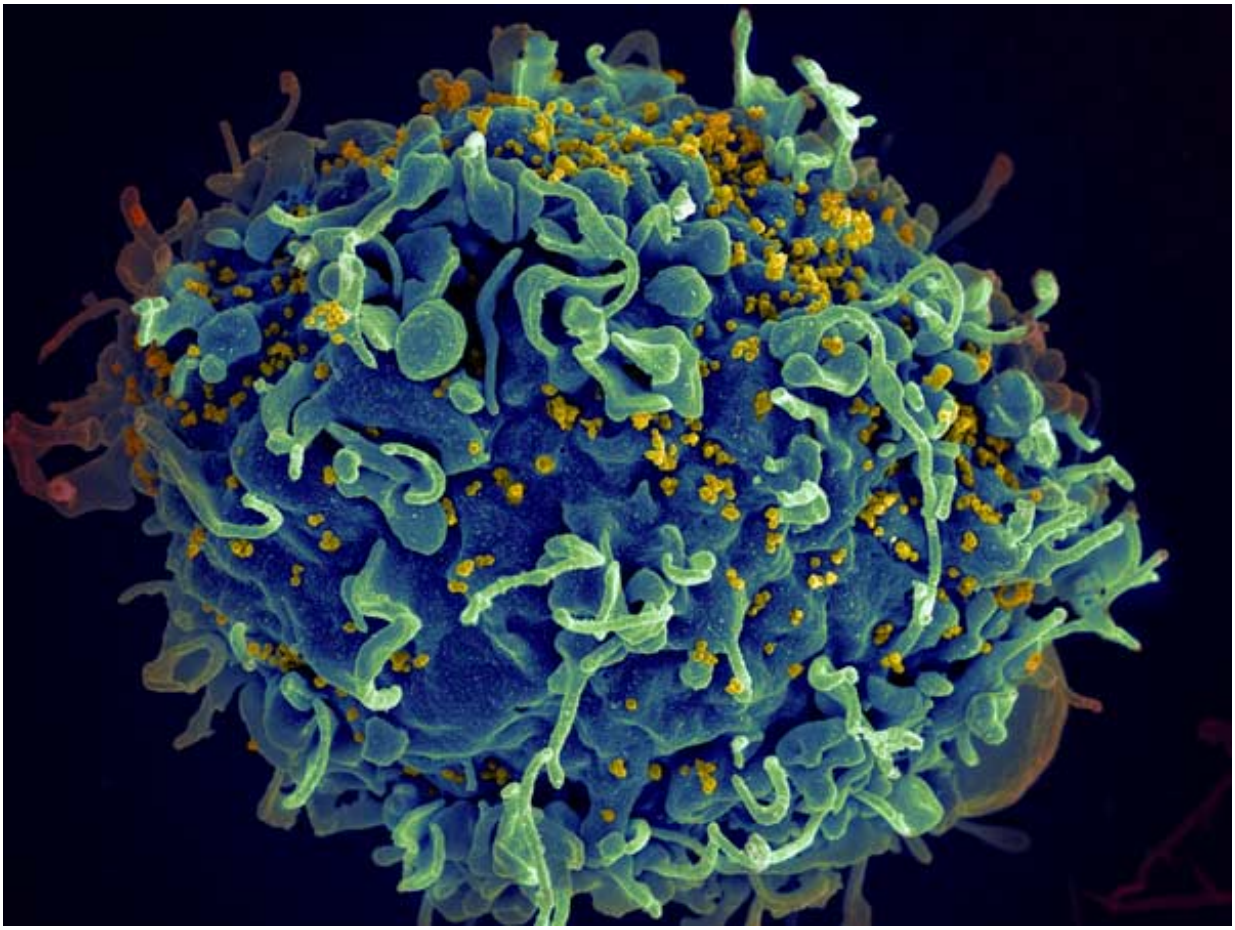

HIV (yellow) infecting a human immune cell. Credit: Seth Pincus, Elizabeth Fischer and Austin Athman, National Institute of Allergy and Infectious Diseases, National Institutes of Health

The human body cannot naturally defend itself against HIV—not usually, at least. But in very rare cases, infected individuals generate broadly neutralizing antibodies, or bNAbs, that fight the virus. Now, Rockefeller scientists have devised a way to grant this HIV-fighting power to otherwise average immune cells.

Michel C. Nussenzweig, whose work on bNAbs has produced new HIV treatments showing promise in early clinical trials, has now set his sights on a second goal: immunization against the virus.

In a recent study, described in the *Journal of Experimental Medicine*, Nussenzweig and his colleagues used CRISPR-Cas9 gene editing technology to modify B cells, a type of white blood cell that secretes antibodies. Specifically, the researchers engineered mouse B cells to make human bNAbs on their own. Cells altered in this way, the researchers found, produced antibody levels sufficient to protect the animals against HIV—suggesting that this technique could eventually be used as an immunization tool.

While this research is still in an early stage, it demonstrates the feasibility of enhancing immune response via gene editing. Importantly, the technique does not affect germline cells and therefore evades the ethical concerns sometimes raised by CRISPR interventions. If realized, this novel approach to immunization could be useful not only against HIV, but against any disease that is sensitive to a specific antibody.

More information: Harald Hartweger et al. HIV-specific humoral immune responses by CRISPR/Cas9-edited B cells, *The Journal of Experimental Medicine* (2019). DOI: 10.1084/jem.20190287

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