

Rectal microbes influence effectiveness of HIV vaccine

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Microbes living in the rectum could make a difference to the effectiveness of experimental HIV vaccines, according to researchers at UC Davis. A vaccine similar to HVTN 111 given to rhesus macaques induced stronger local antibody responses in animals with higher levels of *Lactobacillus* or *Clostridia* bacteria in the rectum. The findings suggest that the microbiome could make a difference especially with vaccines that do not produce particularly strong responses overall. Photo shows rhesus macaques at the California National Primate Research Center at UC Davis. Credit: CNPRC photo.

Microbes living in the rectum could make a difference to the effectiveness of experimental HIV vaccines, according to researchers at the University of California, Davis. The work is published Dec. 11 in the journal *mSphere*.

Evidence from human and animal studies with other vaccines suggests that *Lactobacillus* supplements can boost production of antibodies, while treatment with antibiotics can hamper beneficial immune responses, said Smita Iyer, assistant professor at the UC Davis Center for Immunology and Infectious Diseases and School of Veterinary Medicine.

Iyer, graduate student Sonny Elizaldi and colleagues wanted to know if [microbes](#) living in the rectum and vagina—sites of HIV transmission—interacted with an experimental HIV vaccine similar to the HVTN 111 vaccine currently in early stage clinical trials in humans.

HVTN 111 includes two doses of HIV DNA snippets and a final boost with an HIV protein, all given through the skin. A [vaccine](#) that produces antibodies at the mucosal membranes where infection takes place is thought to be important in preventing HIV infection, Iyer said.

The team studied vaginal and rectal microbes from Rhesus macaques before and after they were vaccinated. They found that vaginal microbes did not show much difference before and after vaccination. However, rectal microbes did show changes, with Bacteroidetes-type [bacteria](#), especially *Prevotella*, decreasing after vaccination.

Lactobacillus bacteria and better immune response

The common gut bacteria *Lactobacillus* and *Clostridia* did not change with vaccination, but the amounts of these microbes in the rectum did

correlate with the immune response. Animals with high levels of either *Lactobacillus* or *Clostridia* made more antibodies to the HIV proteins gp120 and gp140, the researchers found. *Prevotella* bacteria showed the opposite pattern: High levels of *Prevotella* were correlated with weaker immune responses.

It's not clear what the mechanism could be for some bacteria to boost local immune responses in a specific site in the body, Iyer said. However, targeting these bacteria could be important to get the best possible performance out of vaccines that do not induce a particularly strong [immune response](#), as is the case with HIV.

The microbiome could also be an important but overlooked factor to consider when evaluating vaccines in humans or animals, she said.

More information: Sonny R. Elizaldi et al, Rectal Microbiome Composition Correlates with Humoral Immunity to HIV-1 in Vaccinated Rhesus Macaques, *mSphere* (2019). [DOI: 10.1128/mSphere.00824-19](https://doi.org/10.1128/mSphere.00824-19)

Provided by UC Davis

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