A study by the OHSU Vaccine & Gene Therapy Institute published today shows promising results for a malaria vaccine given to monkeys.

Researchers used a cytomegalovirus-based platform they developed and are also using to test vaccines for HIV and tuberculosis. The CMV platform reduced the malaria-causing parasite’s release from the liver into the blood of infected rhesus macaques by 75 percent to 80 percent, according to the study published in the journal PLOS One.

“What it shows is how versatile the platform is,” said Klaus Frueh, senior scientist at the institute and lead author of the study. “We’ve now shown you can protect against viruses for HIV and TB and now the malaria parasite. This work is still somewhat preliminary or exploratory, so it’s a first step toward using CMV vectors in vaccine development, but it’s promising.”

Malaria is a difficult pathogen to counteract, as it is a “very sophisticated parasite that has developed to circumvent immunity,” Frueh said. Spread by mosquitoes, it causes high fevers, chills and flu-like symptoms and can be fatal. The vast majority of infections occur in Africa. In 2016, 216 million people were infected and 445,000 died of malaria.

CMV is a weakened form of a common herpes virus that infects most people without causing disease. Frueh and his team weave minute amounts of the target pathogen into CMV. Those who receive it produce memory T-cells that search for and destroy the pathogen-infected cells.

The CMV-based vaccine could potentially offer lifetime immunity, rather than the short-lived effectiveness of current vaccines. One widely used vaccine Mosquirix has been shown to reduce
malaria transmission only in children, in whom it is most often fatal, by 39 percent four years after it was given, but by only 4.4 percent after seven years.

In Frueh’s study, an immune response was no longer detectable a year after infection in the livers of the control group of monkeys. But when the malaria antigens were placed in the CMV vaccine, it kept stimulating the immune response a year later.

Frueh said the results are promising but show “there’s a lot of room for improvement here.” Typical protection rates for vaccines against viruses are 90 percent.

“The first step is showing we had an effect and it could suppress the release of malaria parasites by 80 percent,” he said. “You need 100 percent.”

The team used four different proteins made by the parasite to develop two different version of the vaccine and are in the process of testing additional malaria proteins.

San Francisco-based Vir Biotechnology Inc. licensed the vaccine platform and plans to lead a human clinical trial for a CMV-based HIV vaccine this year.

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