Scientists Devise Method of Snipping HIV From Immune Cells

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Researchers have created a genetic treatment that, for the first time, has succeeded in removing HIV from infected human cells, providing hope that the technique may be used as part of a treatment, cure or vaccine for the virus. Publishing their findings in the Proceedings of the National Academy of Sciences, researchers devised molecular tools that delete HIV proviral DNA from infected cells.

When HIV infects a human cell, it integrates its DNA into the cell. The new technique takes what's known as a "guide RNA," or gRNA, which hunts down the virus's genetic material, and pairs it with an enzyme called a nuclease that snips DNA out of the cell. The cell's own methods of repairing genes then kick into gear, bringing the loose ends of the spliced genome back together. The result: a virus-free cell.

The process succeeded in removing the virus from various types of immune cells that HIV typically targets, including microglia, macrophages and CD4 cells.

To make sure the gRNA, which was built from 20 nucleotides (the basic building blocks of the genetic code), did not wind up integrated into the cell's genome, the researchers constructed it from sequences that do not appear in the coding sequences of human DNA. This helped avoid any cell DNA damage and mitigated the risk of adverse effects.

"This is one important step on the path toward a permanent cure for [HIV]," study co-lead researcher Kamel Khalili, PhD, professor and chair of the department of neuroscience at Temple University in Philadelphia, said in a release.

The technique might be able to fight other viruses and could be used for an HIV vaccine, since cells that were protected by the combination of the nuclease and gRNA could not be infected.

"It's an exciting discovery, but it's not yet ready to go into the clinic. It's a proof of concept that we're moving in the right direction," study co-lead researcher Wenhui Hu, MD, PhD, associate professor of neuroscience at Temple, said in the release.

A next step is to find a way to deliver the therapy to every infected cell. Also, because of HIV's vast capacity to mutate, therapies may need to be tailored to a person's particular viral gene

sequences.

To read the press release, click here.

To read the study abstract, click here.

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