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Big boost: New drug raises hope for an HIV vaccine

Scientists have developed a novel drug candidate that may lead to a potent and universally effective HIV vaccine. Researchers found that the new drug candidate blocks every strain of HIV-1, HIV-2 and SIV (simian immunodeficiency virus) that has been isolated from humans or rhesus macaques, including the hardest-to-stop variants. It also protects against muchhigher doses of virus than occur in most human transmission and does so for at least eight months after injection.

"Our compound is the broadest and most potent entry inhibitor described so far," said Michael Farzan, from the Florida campus of The Scripps Research Institute (TSRI). When HIV infects a cell, it targets the CD4 lymphocyte, an integral part of the body's immune system. HIV fuses with the cell and inserts its own genetic material and transforms the host cell into a HIV manufacturing site.

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The new study builds on previous discoveries by the Farzan laboratory, which show that a co-receptor called CCR5 contains unusual modifications in its critical HIVbinding region, and that proteins based on this region can be used to prevent infection.

Farzan and his team devel oped the new drug candidate so that it binds to two sites on the surface of the virus simultaneously, preventing entry of HIV into the host cell.
"When antibodies try to mimic the receptor, they touch a lot of other parts of the viral envelope that HIV can change with ease," said TSRI Research Associate Matthew Gardner, the first author of the study with Lisa M Kattenhorn of Harvard Medical School.

The team also leveraged preexisting technology in designing a delivery vehicle an engineered adeno-associated virus, a small, relatively innocuous virus that causes no disease. Once injected into muscle tissue, like HIV itself, the vehicle turns those cells into "factories" that could produce enough of the new protective protein to last for years, perhaps decades, Farzan said.