

HIV, as you probably know, is something you don't want to catch. It gradually destroys a vital part of the immune system so that your body can no longer fight off even infections that are usually very mild.

These days, the virus can be kept under control for a long while using cocktails of antiviral drugs, but this therapy can be expensive and unpleasant and must be taken for the rest of your life, or else the disease will recur.

Now, scientists publishing in *Virus Research* this month have developed a potential treatment that may be a step toward actually curing someone of HIV... using another virus.

In order to do this, the scientists needed a virus that could target infected cells. So they took a type of virus called lentivirus, related to HIV, and engineered it so that it could bind specifically to cells that were already infected with HIV, in which HIV put one of its own proteins on the cell's surface. When they tested it, very few cells that did not express the HIV proteins were infected with the lentivirus, while many of those that did show the proteins were.

The cells they used were a common cell line for research, derived from human kidneys, but HIV naturally infects human T cells, so the researchers tested their lentiviral vector with infected T cells too, and it worked with good specificity.

Finally, in order for the lentivirus therapy to actually help treat HIV, the scientists engineered the virus with a suicide gene. The way this works is that the lentivirus will target a cell already infected with HIV, infect that cell, and produce a product from the suicide gene. This product is an enzyme that converts a drug precursor, ganciclovir, into a toxic compound that destroys the infected cell. When they tested it, more than 30% of their experimental HIV-infected cells were destroyed, while cells treated with either lentivirus or ganciclovir were left untouched.

So the way this works is the lentivirus goes in and infects only the cells that are infected with HIV, and then the patient takes some ganciclovir, which kills only the cells infected with lentivirus. That way, HIV-infected cells are destroyed before they can produce many more infectious HIV particles, while innocent bystander cells are unharmed, so this treatment should have few side effects. And there is little chance of the lentivirus itself going out of control, because the ganciclovir will prevent it from replicating itself too.

This is a promising potential therapy for treatment and preventions of AIDS, but it has some issues to work out before it can be used in humans.

This study was all on cell lines, *in vitro*, in the lab, not on humans or even animals, so it's possible there may be some serious issues with the treatment when actually used in people. There will need to be a lot more testing to make sure it's safe.

Another issue is whether HIV could develop resistance to the treatment. Seems like it might not be that unlikely, so this therapy might need some tweaking to prevent it.

It would also be nice if the specificity could be improved a bit, though it isn't bad now.

Hopefully this ends up becoming a useful treatment though!