New Strategy Could Eradicate Latent HIV-Infected Cells

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Researchers report that they have taken the first step toward killing cells that are latently infected with HIV—cells that serve as a reservoir of persistent HIV reproduction and that current antiretroviral (ARV) drugs can't reach. Their findings have been accepted by the open-access journal *AIDS Research and Therapy*.

Combination ARV therapy is incredibly potent. Numerous studies have shown that the therapies in widest use today can suppress all but the tiniest amount of HIV. However, the miniscule amount of HIV that remains—likely coming from reservoirs, such as resting CD4 cells, that aren't always reached by ARV therapy—can completely reseed the body with virus as soon as a person stops taking his or her treatment.

Those resting cells have snippets of HIV DNA integrated into their own DNA, but they aren't actively making new virus. Unfortunately, ARVs don't affect cells that aren't actively reproducing, and the amount of HIV DNA in the CD4s is so small that it doesn't trigger the cell's natural self-protection mechanism, which causes cells to self-destruct when their DNA gets altered too much.

Now, a group of Israeli researchers believes they have developed a method for getting to those latent cells and killing them. The group, led by Abraham Loyter, PhD, of Hebrew University in Jerusalem, is looking at ways to force the virus to integrate in multiple places in the cell's DNA, triggering the cell's chemical panic button and causing it to kill itself, a process called apoptosis.

Loyter and his colleagues developed two chemicals—dubbed INS and INrs peptides—that can prompt this process and combined them with an experimental protease inhibitor. The group then treated HIV-infected human immune cells for two weeks with the compounds, which they called the "mix." Loyter's group then allowed the remaining cells to grow out for an additional two weeks. HIV DNA levels were measured at three time points: before treatment with the mix, after two weeks of treatment, and then again two weeks after treatment was stopped.

Loyter's team found that the "mix" worked as they'd hoped. After two weeks of treatment with the combination, no HIV DNA could be found, and this remained the case for an additional two weeks after the last dose of the treatment was added to the cells. The authors caution it is possible that some residual integrated HIV DNA was still present in the cells. Nevertheless, their results are encouraging.

“Stimulation of viral integration by the INS and INrs peptides, combined with the prevention of virion production by the protease inhibitor, not only resulted in blocking of HIV-1 infection but also in extermination of the infected cells by invoking apoptosis,” the authors concluded.

“Whilst this research is promising, a major caveat with these studies is that they are preliminary,” Loyter cautioned. “So far these experiments have only been shown to ‘cure’ HIV from small dishes of cultured cells in the authors’ laboratory, but the findings are an exciting development in the quest to eradicate this devastating global pandemic.”

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