Resting Immune Cells May Harbor HIV for Decades

Such latently infected cells remain under the radar of antiretroviral treatment, which only works on replicating cells.

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The unreplicating, or latently, infected cells that are a major component of the HIV reservoir may harbor virus for many years, even decades, despite effective antiretroviral (ARV) treatment.

Publishing their findings in the Proceeding of the National Academy of Sciences, researchers in British Columbia have used a novel genetic-analysis process to map the evolution of HIV within individuals. With this map in hand, they were able to then estimate the lifespan of latently infected cells, which skirt the effects of ARVs because such treatment only works on replicating cells.

The existence of such latently infected cells is the reason HIV treatment must be maintained for life. Without ARVs, such cells may spring into action at any time and start churning out new copies of the virus, ultimately raising an individual's viral load.

The British Columbian researchers have at their disposal a rich trove for their research: stored blood samples drawn from the local HIV population over time. Originally taken for viral load and drug resistance testing, these samples date as far back as 1996.

HIV rapidly evolves, even within a single person's body. Seeking to chart such evolution, the investigators used a method known as molecular phylogenetics to reconstruct the family tree of strains of the virus within individuals. They used as their reference virus in blood samples taken over time before such people started ARVs, as well as genetically sequenced, latently infected virus drawn from individuals for up to 10 years after they started HIV treatment.

The population of viruses integrated into the latently infected immune cells belonged to many points on the viral family tree, stretching back through the years. In other words, the virus that infected these cells did so at many different points in time, as indicated by their different evolutionary states, which were in a sense frozen in amber when HIV entered a cell, keeping the virus in a latent state. The oldest such virus dated back more than 20 years, meaning that latently infected cells may live even that long.

In one particularly notable case, an individual had what's known as a viral blip while on successful

ARV treatment—a short, relatively low rise in viral load that quickly returned to an undetectable state. The viruses found during the blip were highly genetically diverse, belonging to a 20-year span on the individual's viral family tree. This finding suggested that virus in the person's latent reservoir had spontaneously reactivated, and that the reservoir itself was robust in size.

The study authors concluded that their findings provide a rich new way of understanding how HIV persists in the body, one that will be valuable for future cure research.

For a POZ feature article on the current state of HIV cure research, click here.

To read a press release about the study, click here.

To read the study, click here.

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