Defective HIV DNA May Still Prompt HIV-Related Proteins

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Even when their virus is fully suppressed by antiretroviral (ARV) treatment, HIV-positive people may have defective HIV DNA in their cells that can give rise to HIV-related proteins. These proteins in turn my help spur harmful persistent activation of the immune system. Publishing their findings in the journal PNAS, researchers created and studied multiple copies of nearly complete HIV proviral DNA and cell-associated HIV RNA.

HIV carries its genetic code in RNA, which it inserts into human cells. The RNA is then translated into DNA and encoded into the DNA of the cell. The cell then makes new RNA strands, which later emerge from the cell as new copies of HIV.

Proviral DNA is the genetic material of a virus that has been integrated into a cell's DNA. Cell-associated HIV RNA is the RNA copies produced by the viral DNA in a cell's genome.

Effective ARV treatment does not eliminate proviral HIV DNA from cells. At least in theory, the proviral DNA could still give rise to new copies of HIV during treatment. However, 95 percent or more of HIV proviruses cannot create intact viruses because of flaws in the reproduction process. Because of this fact, researchers have come to conceive of the proviruses as a biological dead-end.

In this new study, researchers detected copies of HIV RNA that corresponded to defective HIV proviruses. This suggested that the defective provirus had given rise to HIV RNA. The researchers then found that such RNA could itself give rise to intact HIV-related proteins (but not an actual intact virus).

The development of such proteins could help explain why people on suppressive HIV treatment have persistently activated immune systems. According to the study authors, the phenomenon identified in the study "may affect scientists' understanding of the long-term effects of HIV infection and what a cure would require." More research on this topic is needed.

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

To read the study abstract, click here.