National Institute of Allergy and Infectious Diseases (/)

HIV Treatment, the Viral Reservoir, and HIV DNA

Antiretroviral therapy stops HIV from replicating (making copies of itself), which benefits the health of the person living with HIV and prevents sexual transmission of the virus. However, effective treatment does not completely eliminate HIV from the body. HIV lies dormant inside a small number of cells in the body, resulting in viral reservoirs. If treatment is stopped, these reservoirs reactivate, HIV begins replicating again, and transmission can occur.

Because antiretroviral therapy does not eradicate viral reservoirs, it does not cure HIV. To keep HIV suppressed in the body, antiretroviral medications must be taken daily as prescribed. To monitor the treatment's effectiveness, people living with HIV should undergo regular viral load testing as directed by their health care teams. A viral load test measures the level of HIV RNA—the virus' genetic material—in blood plasma, and it is an accurate indicator of how well treatment is working.

When HIV infection is untreated, viral load is very high, indicating that HIV is actively replicating and producing new infectious viral particles. For almost everyone who takes antiretroviral therapy daily as prescribed, viral load will drop to a level so low that it is undetectable. Clinical studies have shown that people living with HIV who have achieved and maintained an undetectable viral load for at least six months will not sexually transmit the virus. To learn more about viral load and HIV transmission, see 10 Things to Know About HIV Suppression (https://www.niaid.nih.gov/diseases-conditions/10-things-know-about-hiv-suppression).

Understanding the Presence of HIV RNA and DNA

Researchers are working to better understand how HIV persists in the body in viral reservoirs, with the ultimate goal of developing a cure for HIV (https://www.niaid.nih.gov/diseases-conditions/hiv-cure-research). To identify and define HIV reservoirs, many studies have assessed the presence of HIV RNA and/or DNA, two types of genetic material, in the body's tissues and in other bodily fluids, such as semen. During the HIV replication process (https://www.niaid.nih.gov/diseases-conditions/hiv-replication-cycle), the virus' genetic material (stored within the virus as RNA) is integrated into the DNA of the infected cell. Effective antiretroviral therapy does not eliminate this HIV DNA, also called proviral DNA. Detecting HIV RNA or DNA in tissues and bodily fluids such as semen requires sensitive tests that are only performed in research settings. These are not the same as clinical tests to determine viral load.

Can I Be Infected by HIV RNA or DNA Reportedly Found in the Semen or Testes of a Virally Suppressed Person?

No. Because effective antiretroviral therapy does not eradicate HIV from the body, HIV genetic material is expected to be present in tissues and bodily fluids, even in people who have achieved and maintained an undetectable viral load for years. There is no scientific evidence that detection of such material in the semen or testes of a person who is durably virally suppressed is associated with HIV transmission. Research has clearly demonstrated that staying on treatment and maintaining a durably undetectable viral load results in effectively no risk of sexually transmitting HIV. To learn more, see Treatment as HIV Prevention (https://www.niaid.nih.gov/diseases-conditions/treatment-prevention).

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