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# In heterosexuals, transmitted HIV strains often resemble original infecting virus

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A new study has found that even though HIV diversifies widely within infected individuals over time, the virus strains that ultimately are passed on through heterosexual transmission often resemble the strain of virus that originally infected the transmitting partner. Learning the characteristics of these preferentially transmitted HIV strains may help advance HIV prevention efforts, particularly with regard to an HIV vaccine, according to the scientists who conducted the study. The research was led by Andrew D. Redd, Ph.D., staff scientist, and Thomas C. Quinn, M.D., senior investigator, both in the Laboratory of Immunoregulation of the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health.

Dr. Redd and colleagues examined particular genetic sequences of HIV in blood samples collected between 1994 and 2002 from hundreds of HIV-infected heterosexuals participating in the Rakai Community Cohort Study in Rakai District, Uganda. The scientists found a significant increase in population-wide HIV genetic diversity among infected individuals during the 8-year period, yet the amount of genetic change was significantly greater within individuals than across the population as a whole. To explain this phenomenon, the scientists hypothesized that the genetic diversity of HIV at the population level was limited because only certain strains of the virus within each person were responsible for subsequent sexual transmissions.

To test this hypothesis, the scientists examined the genetic relatedness of HIV strains in 31 couples where heterosexual transmission occurred.

Through three increasingly comprehensive analyses, they compared HIV strains in the transmitting partner at points before and around the estimated time of HIV transmission with the strain in the newly infected partner around the time of transmission. In 22 of the couples, or 71 percent of those studied, the virus strains in the blood of the newly infected partner were more closely related to those found in the blood of the transmitting partner at the earliest available time point than to strains present around the time of transmission. According to Dr. Redd, this finding demonstrates that in the heterosexual transmission of HIV, the frequent natural selection of viral strains from early in the infection of the transmitting partner reduces viral diversity at the population level.

Moreover, in four couples, the newly acquired strain was highly similar or identical to specific variants found in the transmitting partner at both the earliest time point and the time of transmission. The scientists hypothesize that these highly transmissible HIV strains from early infection were sustained in the blood at low levels or sequestered in certain cells for transmission at a later time.

Related research by other scientists shows that HIV strains found in infected individuals during the early stages of infection have diversified little from the strain that caused infection. Thus, the fact that these early HIV strains somehow are maintained or persist at low levels for transmission later suggests they may have an evolutionary advantage at crossing the genital barrier and causing infection, compared with HIV strains that predominate later in infection, according to Dr. Redd.

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**More information:** AD Redd et al. Previously transmitted HIV-1 viral strains are preferentially transmitted during subsequent sexual transmission. *Journal of Infectious Diseases* DOI 10.1093/infdis/jis503 (2012).

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