

Viral Burden in Genital Secretions Determines Male-to-Female Sexual Transmission of HIV-1: A Probabilistic Empiric Model

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The predominant mode of transmission of HIV worldwide is heterosexual intercourse. Epidemiological and mathematical models have been developed to estimate the likelihood of HIV transmission during a single episode of sexual intercourse. Such models are confounded by the difficulty of collecting appropriate empirical data from discordant couples and from limitations in different kinds of estimation. Epidemiological studies of heterosexual couples provide estimates of per-sex-act HIV-1 transmission of approximately 1 in 1000, although the magnitude of the HIV-1 epidemic would argue that these estimates might be unreasonably low.

The transmission of HIV is ultimately a biological event, which depends upon the infectiousness of the HIV infected index case and the susceptibility of the uninfected partner. Infectiousness is likely determined by the concentration of virus in the genital secretions and by the viral phenotype. We used the concentration of HIV-1 in male genital secretions, the genotype of HIV-1 in male genital secretions, and the number of receptors for HIV-1 in the endocervix to develop a probabilistic model of transmission of HIV-1 from the male to female that correlates biological and epidemiological data. The advantage of this type of model is that empirical data from different, independent sources can be applied.

Our model predicts very limited transmission of HIV-1 when the concentration of HIV-1 in semen is low (as is commonly the case in developed countries and in subjects receiving antiretroviral therapy). Markedly increased efficiency of HIV-1 transmission is expected to occur when the concentration of HIV-1 in semen becomes greater. The results can be used to better understand the distribution of HIV-1 transmission probabilities and to develop better HIV-1 prevention strategies. The results demonstrate that the per-contact transmission probability for transmission of HIV-1 from men to women may be considerably greater in many parts of the world than is estimated in epidemiological studies, which did not take into consideration the seminal concentration of the HIV-1 virus.

Link: <http://www.aidsonline.com/pt/re/aids/fulltext.00002030-200103300-00012.htm;jsessionid=H2pHTQY1r6hBhrDxwbJx1JFQXNn75P29yJL9myRv1cDQQJjQv9mp!-2026113843!181195628!8091!-1>



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