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Confused about HIV transmission statistics ^[1]

Hi Alice,

I have searched through your extensive HIV database (it's a great resource), but I still have some questions.

1. In one of the answers, you say: "A study published in 1994 in *The New England Journal of Medicine* looked at 256 heterosexual mixed status couples. Of the 124 couples that consistently used condoms, none of the HIV-negative partners were infected. Among the 121 couples that did not consistently use condoms, 12 (about 10 percent) of the HIV-negative partners became infected. Additional studies found similar results." How is it possible that only 10 percent of the unprotected sexual activity between + and - people resulted in transmission?

2. Similarly in [Sex with prostitute — HIV?](#) ^[2], you say: "With HIV, a single act of unprotected vaginal or rectal intercourse MAY be sufficient for transmission. But, it is believed that in the vast majority of cases, repeated exposure to the virus through multiple acts of intercourse is necessary for transmission to take place." How does the "repetition" affect the likelihood? I mean, doesn't the virus kind of "jump" to the other side whenever it has a chance?

And my third question is: does pre-cum have significant concentrations of HIV?

Thanks for your help,
Concerned

Answer

Dear Concerned,

HIV is such a complex virus that it's easy to get confused when all the numbers are thrown about. Telling people to always wear condoms during intercourse if they don't know their partner's HIV status or are half of a sero-discordant couple (when one partner is HIV-positive and the other is HIV-negative) is a successful prevention strategy. At the same time, this message can also give the impression that HIV is a strong and effective virus that will infect people at every opportunity. While HIV is a devastating virus that continues to infect and kill millions worldwide, it, ironically, isn't that effective or strong compared to other viruses.

The common perception that HIV will "'jump' to the other side as soon as it has a chance" isn't completely accurate. The actual chance of becoming infected with HIV during a single sexual experience — even with a partner who is known to be HIV-positive — is rather low: one study put the chance for a woman becoming infected by an HIV-positive male through vaginal sex at 1 in 1000. Because of the difficulties involved in studying how effective HIV is at infecting someone, the numbers vary among studies.

The chance of infection increases with repeated acts of intercourse (more exposure to the virus), yet the risk of transmission in any one sexual episode differs. For instance, transmission is more likely when there is an increased amount of virus in genital fluids or blood (a high viral load) than when the viral load is lower. Also, studies have shown that infection rates are generally higher for male-to-male transmission and needle sharing (anywhere from 1 in 1000 to 1 in 10) but lower for female-to-male transmission. The virus is more likely to be transmitted during certain sex acts where mucous membranes are more easily broken (e.g., anal sex) than during other sex acts where the mucous membranes are more likely to remain intact. Keep in mind that most of these studies took place in North America and Europe and focused on HIV-1. There are different strains of HIV in the world, and transmission may vary between the different strains.

As for the specific study cited in [Dating someone who's HIV-positive](#) [3], remember that one group's condom use was *inconsistent but not nonexistent*. It's possible that only about ten percent of this group of study participants were infected with HIV because there was *some* condom use. Check out the number of participants who got HIV while practicing consistent condom use: zero.

It's good to understand that while HIV does hang out in body fluids (e.g., blood, semen, vaginal secretions, cervical secretions, breast milk, pre-cum, saliva, and tears), the average concentration of virus in each type of fluid varies greatly. It is theoretically possible that infection could follow exposure to all body fluids, but studies show that only certain fluids — blood, breast milk, semen, and vaginal and cervical secretions — contain a high enough concentration of HIV to be infectious. Note that the small drops of fluid that may come out of the penis during sexual arousal, and before ejaculation (a.k.a. pre-cum), often contain HIV, but the concentration of HIV in pre-cum is usually not high enough to pose a significant risk of infection.

Also, the concentration of HIV in all body fluids varies throughout the cycle of infection and illness. Most studies that look at sexual transmission of HIV show that the risk of infection is related to the concentration of the virus in genital fluids. HIV concentrations in fluids such as semen and vaginal fluids increase during key periods that scientists have long suspected as being responsible for more instances of transmission: during primary infection (right after being infected), during the late stages of HIV disease, and in the presence of certain other sexually

transmitted infections (STIs). These factors can all increase the risk of transmission for any one sexual episode.

Another factor that might equally influence risk is the HIV-negative partner's susceptibility to HIV infection. For currently undetermined reasons, some individuals show acquired immunity. On the other hand, certain STIs and other infections in the HIV-negative partner can cause trauma to the mucous membranes of the genital tracts, which may increase the risk of HIV transmission.

While it might take repeated exposures to HIV before someone becomes infected, that doesn't mean that HIV infects over time or needs to "wear the system down" before transmission can take place. It just means that the transmission rate of HIV is not 100 percent; a person having sex with an HIV-positive individual might get the virus after one sexual episode, after two, after ten, a hundred, or possibly never. Scientists still don't understand everything about the mechanisms of HIV infection, but worldwide research continues.

For more information about HIV/AIDS, visit the [STI's](#) [4] section in the *Go Ask Alice!* [Sexual & Reproductive Health](#) [5] archive or check out the related questions.

Alice!

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