

what do we know about HIV superinfection?

what is coinfection/superinfection?

Being infected with more than one strain of HIV is an issue of concern for people living with HIV/AIDS. It has important treatment and prevention implications, and while little is known about coinfection and superinfection, there has been a lot of talk, speculation and misinformation about it in the HIV community. Current discussion often combines these two terms under the general umbrella of **dual infection**.^{1,2} This fact sheet will describe coinfection and superinfection and the effects they might have on HIV+ persons.

Coinfection is being infected at or nearly at the same time with two or more different strains of HIV-1 prior to seroconversion. This means that when a person is initially infected, s/he is infected with two or more types of HIV-1. Coinfection may be more common than superinfection, but no clear reasons are known for why that may be.^{1,2}
Superinfection is being infected with a second strain of HIV after already being infected with HIV-1 from an earlier time and after seroconversion. That means there are two different exposure events. In addition to treatment and prevention issues, superinfection has implications for vaccine development.

Superinfection can only occur when an HIV+ person has unprotected sex or shares injection drug equipment with another HIV+ person. Given recent reports of increasing numbers of STDs and unsafe sexual practices among men who have sex with men (MSM), the potential for increasing cases of superinfection among HIV+ persons who engage in risky behavior must be considered.³

does superinfection occur?

While research is very difficult to conduct, there have been studies that confirm that both coinfection and superinfection do occur.^{2,4-8} Scientists are finding recombined forms of HIV resulting from dual infection more frequently than in the past, suggesting that dual infection could be more common than once thought. The current questions are how often it occurs and how easily it occurs. Of concern also are how the course of the disease within an individual may be affected by superinfection and how this knowledge or concern may affect HIV+ individuals' prevention decisions.

Superinfection has been documented in some instances and not in others. One study looking at 78 newly-infected MSM not on highly active antiretroviral therapy (HAART), reported an annual superinfection rate of 5%.⁹ On the other hand, two studies in San Francisco, CA—one of 718 HIV+ persons on HAART¹⁰ and one of 37 HIV+ active injection drug users who reported sharing drug equipment¹¹—failed to find evidence of superinfection based on a genetic analysis of their virus.

It is possible that there is a short period when superinfection can occur, because the immune system cannot protect against multiple strains. It is not clear, however, how short that period is; estimates vary anywhere between 4 and 32 months after the primary infection. Additionally, it is difficult to detect superinfection events.¹²

how does it affect HIV disease?

Disease progression: Persons dually infected may progress to AIDS faster than those infected with only one HIV strain.² Superinfection may increase viral load and also increase the chance of developing symptoms from HIV more quickly. Superinfection also might reduce the benefit from HAART. The exact clinical outcomes are unknown and, most likely, will vary from person to person.

Immune response: How a person's immune system responds to exposure to multiple strains is unclear. Because superinfection appears to be rare, scientists wonder if it is prevented by the body's own immune response to the initial HIV infection or whether HAART might somehow prevent a second infection.^{2,4-5} We do know that, for some people, the immune response from the first infection is not sufficient to protect them from a second infection.^{1,11} Additionally, in some cases, the superinfecting virus is stronger than the initial virus and can be more harmful, resulting in higher viral loads and lower CD4 counts. This suggests a poorer clinical outcome regardless of treatment options.

Says who?

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how does it affect HIV treatment?

Drug resistance: Transmission of a drug-resistant virus is an additional concern. Having a drug-resistant virus limits the choice of treatments. If someone with a strain that is responding to HAART is superinfected with a drug-resistant strain, it would have serious consequences for treatment and clinical outcome. Simply put, it is more difficult to treat that person medically because fewer medications would be effective against this drug-resistant virus.

Virus recombination: *Having more than one strain can lead to the virus combining to form new strains. This might cause drug resistance and progression of disease (increased viral load and decreased CD4 counts).¹ Additionally, the body's immune system is never able to fully conquer the initial HIV infection and the virus mutates naturally. Even if two people had the same HIV strain initially, it could mutate differently within each of them because of how their body reacts.¹³*

Vaccine: Superinfection may create substantial hurdles to developing an effective HIV vaccine. In one study, immune responses against one strain of HIV did not effectively prevent or control infection with another strain of HIV—even when they were genetically similar.¹⁴ Therefore, creating a vaccine that would protect against infection with additional strains may be difficult.

what does this mean for HIV+ persons?

There is documented evidence that dual infection—whether infection with two strains of HIV at about the same time or one later than another—does occur. It is unclear how often and in what percentage of HIV+ persons this occurs. And, it is not possible to state the exact risk to each individual—there are too many cofactors that affect transmission, such as an individual's immune response and stage of disease, as well as the presence of STDs, amount of virus and route of exposure. **But if somebody is infected with more than one strain, what are the potential consequences?** Dual infection of HIV speeds up the disease processes: viral loads are higher, CD4 counts are lower and progression to AIDS is quicker.^{2,5,9}

In the end, it is important that people have accurate information to make informed choices for themselves and their partners. This is difficult since information about superinfection is complex and confusing. There are documented health risks to individuals which result from superinfection. Additionally, there are public health concerns about creating even more diversity of HIV—which impacts the course of the epidemic, communities, future treatments and vaccines.

To prevent superinfection, the general consensus is that HIV+ persons should continue to use a condom every time they have sex and use safe injecting practices with their HIV+ partners. When weighing these risks, some HIV+ persons may decide that the likelihood of superinfection is minimal and choose to share injection equipment or not use condoms. Others may give a higher priority to the intimacy, pleasure, sexual and emotional satisfaction and connection they get from unprotected behaviors. As a result, they may be less worried about health concerns from superinfection. However, those decisions should be made with complete information about the potential effects on themselves and their partners.

Also, while HIV superinfection might be of minor importance to some, unsafe sexual and injecting practices create other risks to HIV+ persons. Engaging in unprotected sex increases the risk of acquiring and transmitting infections like gonorrhea, syphilis, genital warts and more. In addition, sharing syringes can increase the likelihood of acquiring and transmitting other blood borne diseases like hepatitis C.

Each new infection affects the immune system, as well as HIV progression and transmissibility. Addressing the overall health of HIV+ persons—sexual, physical and emotional—is important; HIV superinfection is just one part of that.

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