

Supersizing HIV

Welcome to the world of superinfection

by Michael Connidis

The fine balance between our right to have great sex and our responsibility to do so safely is a non-stop juggling act for people living with HIV. Recently, I heard a speaker use the expression “serosorting” in reference to research data involving men who have sex with men.

A study had observed a rise in the incidence of syphilis among subjects with no parallel rise in HIV infection. Upon further investigation, it was apparent that a sorting process was occurring: HIV-positive people were figuring out through direct and indirect means who was HIV-positive and then choosing HIV-positive sex partners. One possible reason for serosorting of sexual partners was that it eliminated the concern of infecting someone with HIV. Although this strategy may seem like a good way to halt the transmission of HIV, it may not be advisable if serosorting opens the door to unprotected sexual pleasures.

When considering the relative risks of our sexual practices, several questions remain unanswered. If a person is already infected with HIV, can they be re-infected with another strain of HIV and if so, how likely is such re-infection to occur, under what conditions, and what effect will dual or multiple infection have on disease progression?

We already know that an individual can be infected with more than one strain or subtype of HIV before seroconversion. This co-transmission of multiple strains occurs before the body has mounted an immune response and produced antibodies. Theoretically, HIV re-infection after seroconversion is possible because the human immune system is not able to conquer the virus and develop full immunity to it. A similar partial immunity occurs with other viruses such as the common cold or influenza viruses. If a person could be re-infected with different strains of HIV, why has so little evidence been gathered to support such a theory?

No longer just a theoretical possibility

Conducting a structured research program to determine if re-infection occurs would be difficult. The first cases of suspected re-infection were observed by mere chance. One case was documented in Canada in 1997 but later disputed. A small number of cases of suspected re-infection were documented several years later. Given the apparently low incidence, some viewed these cases as almost anecdotal. In recent years, research teams in various countries have looked into the question of re-infection. What was once considered theoretically possible has now been established as fact. HIV re-infection does occur and has been renamed. Welcome to the world of HIV superinfection.

Superinfection happens when you are already infected with one strain of HIV to which you have developed antibodies and you then become infected with a second, different strain of the virus. Studies have shown that both superinfection and co-transmission can accelerate disease progression, unrelated to drug resistance. Why this happens is not well understood. In the dance between the genes of the virus and our human genes, our immune system struggles constantly to rebuild itself while fighting the virus.

Having more than one strain of HIV can pose a greater challenge to the immune system, causing greater damage and hastening the onset of AIDS. Infection with multiple strains of HIV may also result from differences in an individual’s immune system, which makes them more vulnerable to infection and less able to control the virus. Currently, no known genetic or immunologic factors can confirm these possible explanations. These factors have already been proposed as an explanation for why disease progression is rapid in some individuals and slower in others.

Evolution of dominant strains of drug-resistant HIV

“Know your enemy” is a great axiom in battle and also applies to HIV. HIV reproduction is continuous, even when you are on

highly active antiretroviral therapy (HAART) and have an undetectable viral load. Over time, one strain of HIV can generate a variety of mutant populations or quasi strains of the original wild-type virus infecting one individual. When two or more strains are present, they are able to recombine, crossing over and sharing their genetic identities and creating a new hybrid form of HIV. These mutant, recombinant hybrids can become the dominant strain.

This capacity to mutate and recombine is reflected in the multitude of HIV types and strains worldwide. With greater diversity comes greater potential for the virus to more effectively reproduce and overcome obstacles at any stage in its life cycle. Will superinfection and subsequent mutations and recombinations of the HIV genome give rise to a form of super-HIV? The emergence of super-HIV is now more probable with the documentation of superinfection with drug-resistant HIV.

Since antiretroviral monotherapies (ARV) began and evolved into the HAART regimens that are the current standard of care, a parallel evolution of ARV drug-resistant strains of HIV has also occurred. The selective pressures of ARV therapies are pushing the virus to diversify to an ever greater degree. The incidence of infection with drug-resistant strains is increasing in newly infected individuals. These drug-resistant strains were once considered less infectious and weaker than wild-type HIV.

This theory has been disproved. Resistant strains are known to persist as the dominant or subdominant population. Studies have shown that individuals with wild-type virus can be superinfected with ARV-resistant HIV and that individuals with ARV-resistant virus can be superinfected with wild-type HIV. Levels of resistance to the different classes of drugs also varies. The longer a particular class of drug has been in use in ARV therapies, the higher the incidence of viral resistance to that class.

HAART may provide protection

At times, there doesn't seem to be much room to maneuver in this game of living with HIV. Still, some things definitely work in your favour. Adhering well to your HAART regimen helps to keep your virus in check, reduces the chance of it becoming resistant to

ARV, and may also reduce the risk of superinfection with another strain. A study of HIV-positive couples on ARV therapy and with high risk for exposure to each other's virus showed no signs of superinfection over a two-year period. Another study that tested stored blood samples from several thousand individuals on ARV showed no evidence of superinfection.

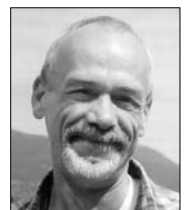
Although these studies suggest that HAART may provide protec-

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tion, the level of protection remains unknown. The real possibility of superinfection that results in rapid disease progression and wipes out the benefits of your HAART regimen is worth keeping in mind.

Using current tools and knowledge, it is impossible to gauge the actual risk of superinfection. Case studies and data indicate that superinfection, like initial infection with HIV, is associated with unprotected, high-risk sexual activity and sharing needles when injecting drugs. Much is still unknown about superinfection, so there is no room for complacency. For reasons we do not know, HIV infection and disease progression varies from person to person, though it may have to do with innate genetic differences between individuals and between the strain(s) of virus.

Living positively means we must consider the available information, learn what we can, and continue the struggle of balancing the confirmed or potential risks to our lives and the lives of those we embrace with the pursuit of what makes our lives worth living. ⊕



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