

Transmission and Progression of HIV/AIDS

Transmission

HIV can be transmitted in three ways: sexual transmission, mother-to-child transmission, and blood-to-blood transmission.

Sexual

The most common method of HIV transmission is sexual transmission. Because semen, vaginal fluid, blood, and pre-ejaculate can all transmit HIV, unprotected sex puts one at a high risk for HIV transmission. Potential points of entry for HIV into the body are the vagina, the tip of the penis, anus, and any open cuts or sores. There are three methods for preventing sexual transmission of HIV:

The first and most effective is abstinence from any form of penetrative sex.

The second way to prevent sexual transmission of HIV is to be in a monogamous relationship with an HIV-negative partner. This option requires that both partners be tested for HIV and remain faithful to each other.

The third way to prevent sexual transmission of HIV is through correct and consistent usage of latex or polyurethane condoms. Sheepskin condoms do not protect against HIV transmission. Both male (latex) and female (polyurethane) condoms are highly effective at preventing HIV transmission, but should never be used at the same time, as friction during sexual intercourse can degrade the material of both condoms.

Condoms are only effective when used correctly:

Condoms should never be used past their expiration date, as the latex may have degraded.

Heat can degrade the latex, so condoms should not be stored in cars or exposed to direct sunlight.

Condoms should be checked for an "air bubble" before being removed from the packaging to ensure that the condom has not been punctured.

Condoms should only be used once and should be removed after intercourse.

Male condoms should be placed on an erect penis, never a flacid one.

Oil-based lubricants can degrade the latex of male condoms, so water-based lubricants should be used if using latex condoms.

Safe-sex practices should be utilized to prevent HIV transmission. People tend to think about this in the context of sero-discordant couples, meaning that one partner is HIV-positive and the other is not. It may be intuitive to assume that if two partners are both HIV-positive, they would not need to worry about safe sex practices in the context of that relationship. The reality, however, is that there is more than one strain of HIV, and if an HIV-positive individual becomes infected with a different strain, his or her health can deteriorate more rapidly. Additionally, re-infection with the same strain of HIV can increase the viral load in one's body and speed up the progression of the disease. For these reasons, safe-sex practices are encouraged, even if both partners already know they are living with HIV. It is highly important to know one's own HIV status, as well as that of one's sexual partner(s).

AIDS knows no boundaries, and age is no exception. A study published in 2007 in the *New England Journal of Medicine* concluded that 53 percent of people ages 64-75 are sexually active. People over age 50 account for 21 percent of HIV/AIDS cases in Michigan and 31 percent of those

in New York City. According to the Centers for Disease Control and Prevention, older adults represent 10 percent of new AIDS cases in the U.S. and 14 percent of all U.S. AIDS cases.

Mother-to-Child Transmission

HIV can also be transmitted from mother to child. Maternal HIV transmission often does not occur in the womb, but rather, during the birthing process or during breast feeding. Because the placenta effectively separates the maternal and fetal blood supplies, HIV transmission in utero is rare and usually involves a tear in the placenta. During the birthing process, the baby's delicate, thin skin can easily be damaged, allowing HIV transmission to occur from contact with maternal blood and/or vaginal fluid. HIV-positive women may have C-sections to greatly reduce the chance of HIV transmission to their child. Additionally, the mother may be given a specific regimen of anti-retroviral drugs to reduce her viral load prior to childbirth. All babies born to HIV-positive mothers may receive anti-retroviral treatment shortly after birth until their HIV status and treatment plan can be determined.

Finally, HIV-positive mothers must weigh the pros and cons of breast feeding compared to using formula, taking into account both the importance of maternal antibodies as well as the potential for HIV transmission from breast milk. An HIV-positive woman who receives no treatment or instruction about reducing the risk of HIV transmission to her infant has a 40 percent chance of passing the virus to her child; this number is reduced to 4 percent when preventative measures mentioned above are taken. For this reason, all pregnant women are encouraged to be tested for HIV so that they may make informed choices. Because the mouth itself is not a "door" or suitable entry point for HIV to infect the body, breast feeding carries a much lower rate of transmission until the baby begins teething. During the teething process, cuts in the gums increase the risk of transmission. Some HIV-positive women choose to breast feed until their child begins teething, and then switch to formula. This is a very personal choice and there are no easy answers. It should be noted, however, that animal milk and formula are more likely to cause minor irritation and small cuts in the esophagus and stomach lining than is breast milk. Those cuts can then become possible sites of HIV infection if breast milk is subsequently given. For this reason, HIV-positive women are generally encouraged not to repeatedly switch back and forth between breast milk and alternatives.

Blood-to-Blood Transmission

The third and final way for HIV to be transmitted is through blood-to-blood contact. This includes sharing needles for intravenous drug use, tattoos, or any other purpose. It also includes ritual scarring or group circumcision practices common in some cultures. A blood transfusion in a country that does not screen the blood supply for HIV would also put one at risk for HIV infection. Needle exchange programs, while controversial, can reduce the transmission of HIV and other blood-borne diseases. In communities in which ritual scarring or group circumcision is an important part of the culture, these practices can be done with multiple blades or by sterilizing the blade between individuals to eliminate the potential for HIV transmission. Blood bank supplies in the U.S. are screened for HIV, preventing the opportunity for transmission in this manner. This is true for many countries, but it would be prudent to be aware of the health practices of any country you plan to visit. It's always a good idea to request to see sterile instruments unwrapped in front of you for any medical procedure, and if you plan to travel to a country whose health care system you are cautious of, packing your own sterile instruments should the need arise, may be a good suggestion.

Progression

Let's examine the stages of HIV progression in an untreated individual.

The **first stage** of HIV progression is primary infection. This starts at the time of infection and lasts for a few weeks. During this time, the person's immune system has not yet been able to launch an attack against the virus that is replicating throughout their body. The individual may be asymptomatic or may have flu-like symptoms, but would typically not recognize this as potentially being due

to HIV. During this time, the person's immune system marker, CD4² cells, would be low and viral load¹ (HIV) would be high.

The **second stage** is called the quiet period because the individual is asymptomatic. This stage may last for many years. If one were to measure CD4 count, it would be higher than in initial infection stage and the viral load would be lower. The length of the quiet period varies greatly from one individual to the next, but can be lengthened by following some general healthy lifestyle guidelines that increase the immune system's ability to fight infection. These tips include drinking plenty of clean water, exercising regularly, eating a balanced diet, getting adequate amounts of sleep, avoiding HIV re-infection as well as other infections, and quickly seeking medical treatment for any illnesses that do arise. Other factors that may lengthen the quiet period and improve overall health include maintaining a positive outlook on life and having a strong social network of individuals one can turn to for support.

The **third stage** is early HIV disease. The viral load has started to increase while CD4 count has begun to decrease. The individual shows signs of minor infections that are frequent and commonly experiences general weakness, headache, weight loss, diarrhea, and various skin diseases.

The **final stage** is full-blown AIDS. During this time, the individual's CD4 count is below 200 and/or the individual has contracted at least one opportunistic infection, such as tuberculosis, Kaposi's sarcoma, herpes zoster, oral thrush, or pneumocystis carinii pneumonia (PCP).

It is important to note that HIV can be transmitted during all four stages, which is why even people who feel healthy should be tested.

Antiretroviral drugs, discussed further in a later section, slow the process of disease transmission by assisting the immune system in fighting the virus.

¹Viral load is a measure of the quantity of a virus in the blood stream, expressed in viral copies per milliliter of blood.

²CD4 cells are a specific type of T cell, which is a type of lymphocyte or white blood cell. Because HIV destroys CD4 cells specifically, measuring an HIV-positive individual's CD4 cell count is an effective way to track the progression of HIV/AIDS in his or her body.