HIV treatment and an undetectable viral load to prevent HIV transmission

FACT SHEET

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Summary

It is now well known that the use of HIV treatment not only improves the health of people living with HIV, but is also a highly effective strategy to prevent HIV transmission. This is because HIV treatment can reduce the amount of virus (viral load) in the blood and other bodily fluids (such as semen and vaginal and rectal fluids) to undetectable levels. To become and remain undetectable, people living with HIV need to take their HIV treatment as prescribed. In addition to taking HIV medications, regular medical visits are important to monitor viral load to make sure it stays undetectable, and to receive other medical support.

Evidence shows that people living with HIV who are on treatment, engaged in care, and have an ongoing undetectable viral load:

- do not transmit HIV to their sexual partners;
- do not transmit HIV to their baby during pregnancy and delivery (if they maintain an undetectable viral load throughout pregnancy and childbirth);
- have a greatly reduced chance of transmitting HIV through breastfeeding; however, breastfeeding is not recommended in Canada (exclusive formula feeding is the current recommendation);

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- have a greatly reduced chance of transmitting HIV to people they share injection drug use equipment with (but there is currently not enough evidence to conclude that there is no risk).

How does HIV treatment and an undetectable viral load work to prevent HIV transmission?

HIV treatment, also called antiretroviral therapy (ART), works by controlling the replication of HIV in the body – that is, it reduces HIV's ability to make copies of itself. When HIV replication is controlled, the viral load in the blood and bodily fluids decreases. Research tells us that as the viral load decreases, so does the risk of HIV transmission. When successful treatment lowers the viral load to undetectable levels, this can greatly reduce or eliminate the risk of HIV transmission.

ART usually consists of a combination of three antiretroviral drugs taken daily. Newer HIV treatments are safer, simpler and more effective than when ART was first introduced. The power of ART today is so profound that many people who start effective treatment soon after becoming HIV positive will have a near normal life span.

For most people the virus becomes so well controlled that within three to six months of starting treatment the amount of virus in their blood becomes undetectable by routinely used tests. Most viral load tests used in Canada cannot detect HIV in the blood if there are less than 40 to 50 copies of the virus per ml. However, the virus is still present at very low amounts in the body when the viral load is undetectable.

What is involved in the consistent and correct use of ART and an undetectable viral load for HIV prevention?

The consistent and correct use of ART to maintain an undetectable viral load includes:

- high adherence to ART medications, to achieve and maintain an undetectable viral load
- regular medical appointments to monitor viral load and receive adherence support, if needed

Regular testing and treatment for sexually transmitted infections (STIs) is also important since this strategy does not protect against STIs.

A person on ART needs to work with their doctor to determine an appropriate schedule for medical check-ups and viral load monitoring.

What is important for this approach to work?

After starting treatment the viral load needs to become and remain undetectable for this approach to provide protection.

When a person first begins treatment, it usually takes three to six months for the viral load to become undetectable. Most people will eventually have an undetectable viral load if they have a drug combination that is effective against their strain of HIV and take it as prescribed by their doctor.

The viral load should remain undetectable for at least six months before depending on this approach as an effective HIV prevention strategy. A person must continue to have high adherence to treatment to maintain an undetectable viral load over time. The only way to know if the viral load remains undetectable over the long term is to have regular viral load tests.

However, not everyone's viral load becomes and remains undetectable on treatment. This most commonly happens when someone has low adherence to medications, but it can also occur due to drug resistance. When treatment fails, a person won't know that their viral load is detectable until they get another viral load test. Depending on the reason the treatment failed, a person may require a change in treatment, or may benefit from adherence counselling, to bring their viral load back down to undetectable levels. The best options for moving forward should be discussed with a doctor.

How well does the use of ART to maintain an undetectable viral load prevent the sexual transmission of HIV?

Research conducted in serodiscordant couples (where one partner is HIV positive and the other is HIV negative) shows that, when used consistently and correctly, the use of ART to maintain an undetectable viral load is a highly effective strategy to prevent the sexual transmission of HIV for both heterosexual and same-sex male couples. Evidence from this research shows that when people are on successful ART and engaged in care they do not transmit HIV through sex.

The first study to show that ART and an undetectable viral load has a major prevention benefit in serodiscordant heterosexual couples was the randomized controlled trial known as HPTN 052. In the final analysis, which included 1,763 serodiscordant heterosexual couples (half of whom were followed for over five and a half years), no HIV transmissions occurred between couples in the study when the HIV-positive partner was on ART and had an undetectable viral load (defined as <400 copies/ml in this study). In total, eight transmissions occurred between couples while the HIV-positive partner was on ART; however, in all eight cases the viral load was detectable, despite being on ART. Four transmissions occurred in the first three months after the HIV-positive partner started treatment, before the viral load was undetectable. The other four happened when treatment failed to maintain the viral load at undetectable levels. In addition to these eight transmissions, there were 26 people who acquired HIV infection from a sex partner outside of the primary relationship, showing that in a serodiscordant couple in which the HIV-positive partner is on ART with an undetectable viral load, the main risk of HIV transmission comes from outside the relationship.

Results from a large two-phase observational study known as PARTNER/PARTNER2 showed that ART and an undetectable viral load (defined as <200 copies/ml in this study) prevents the sexual transmission of HIV in both heterosexual and same-sex male couples in the absence of other forms of HIV prevention (condoms, PrEP or PEP).

The first phase of the study included heterosexual and same-sex male couples, and the second phase continued with only same-sex male couples. In this study there was a large number of unprotected sex acts (no condoms, PrEP or PEP) when the viral load was undetectable – approximately 36,000 among heterosexual couples and 76,000 among same-sex male couples enrolled in the study. By the end of the study, there were no HIV transmissions between couples in the study when the HIV-positive partner was on ART and had an undetectable viral load. However, there were 16 new HIV infections (15 gay men and one heterosexual person) that were transmitted from a sex partner outside of the relationship.

An observational study similar to PARTNER, called Opposites Attract, also found no HIV transmissions between serodiscordant same-sex male couples when the partner was on treatment and maintained an undetectable viral load (<200 copies/ml) despite approximately 16,800 condomless anal sex acts. In this study, three of the HIV-negative partners got HIV from a partner outside of the relationship.

In the PARTNER/PARTNER2 and Opposites Attract studies an undetectable viral load was defined as less than 200 copies/ml. This is higher than the level for undetectable viral load defined by tests commonly used in Canada (less than 40 or 50 copies/ml). There were no transmissions in the two studies when the viral load was less than 200 copies/ml (however, the vast majority of participants did in fact have a viral load of less than 50 copies/ml). The studies used a higher cut off to ensure accuracy of the viral load results and to enable comparison between research studies. Also, a higher cut off can capture minor viral load "blips" (a temporary viral load increase above 50 copies/ml on one viral load test that returns to undetectable on the subsequent test). This is important as it helped to determine whether viral load blips create a risk for HIV transmission. The results of these studies show that if a person experiences a blip this does not increase their risk for HIV transmission. However, the goal for optimal treatment outcomes for an individual living with HIV in Canada is a viral load of less than 50 copies/ml, because when the viral load is low but stays above 50 copies/ml this creates a risk for drug resistance and viral rebound that can lead to treatment failure. In both the

PARTNER/PARTNER2 and Opposites Attract studies, there was a high incidence of STIs in participants (roughly 25%). Between the two studies, no HIV transmissions occurred when the HIV-positive or HIV-negative partner had an STI. In PARTNER/PARTNER2 alone, there were 6,090 instances of condomless sex when an STI was present. This indicates that an undetectable viral load prevents HIV transmission even in the presence of other STIs.

All participants in these studies were engaged in regular healthcare appointments to check viral load, test for STIs, and receive adherence and prevention counselling. They were also treated for STIs when needed. These comprehensive supports are an important part of regular follow-up care while on ART.

The results of these (and earlier) studies provide a strong body of evidence showing that people living with HIV who are adherent to ART and engaged in regular healthcare, with a sustained undetectable viral load, do not transmit HIV sexually. The PARTNER and Opposites Attract studies show that this is true even when condoms are not used, and in the presence of other STIs.

How well does the use of ART to maintain an undetectable viral load prevent HIV transmission to a baby during pregnancy and birth?

Without treatment, there is a 15% to 30% chance that a baby born to a person living with HIV will get HIV during pregnancy or delivery. However, taking HIV treatment is the most effective way to reduce transmission to the baby. In fact, research has shown that if a pregnant person starts HIV treatment prior to pregnancy and maintains an undetectable viral load throughout pregnancy and delivery, they do not transmit HIV to their baby. A short course of HIV medications are also given to the infant to prevent HIV transmission.

One of the major studies that showed the impact of treatment on preventing HIV transmission to a newborn was a French cohort study conducted between 2000 and 2001. This study found that no HIV transmissions occurred among 2,651 infants born to cisgender women who were on treatment before they conceived and throughout their pregnancy, and who had an undetectable viral load at delivery. However, if treatment is not taken for the entire duration of pregnancy or if an undetectable viral load is not maintained, there is still a risk of HIV transmission to the infant during pregnancy and/or delivery.

HIV testing is important for people who are pregnant or considering becoming pregnant. People who test positive should begin HIV treatment as soon as possible to reduce or eliminate the risk of passing HIV to their babies. Likewise, people living with HIV who wish to become pregnant should consult with an HIV specialist as soon as possible, preferably before conception, to determine a suitable treatment regimen for pregnancy.

How well does the use of ART to maintain an undetectable viral load prevent HIV transmission to a baby during breastfeeding?

The risk of transmitting HIV through breastfeeding while on treatment and maintaining an undetectable viral load is very low, but not zero. A systematic review of HIV transmission in breastfed infants of cisgender women on treatment found that the risk of transmission after birth was 1% after six months of breastfeeding, rising to almost 3% after one year. However, within these studies, the women were on treatment for varying amounts of time and did not continue treatment beyond six months after giving birth. The systematic review did not account for adherence nor viral load, which means we do not know how many of the women had a detectable viral load at the time of transmission, despite taking HIV treatment.

There is very limited research on the impact of treatment and an undetectable viral load on HIV transmission during breastfeeding. A study in Tanzania between 2013 and 2016 found two HIV transmissions among 177 infants who were breastfed by cisgender women who started treatment before the infant was born. However, in both cases the women had a detectable viral load. No transmissions occurred in the context of treatment and an undetectable viral load.

The PROMISE study, conducted in Africa and India, provided treatment to 2,431 breastfeeding

cisgender women or their newborn infants. Among the 1,219 cisgender women receiving treatment, seven infants acquired HIV by 12 months (for an HIV transmission rate of 0.57%). Only two of these cases were among women who had an undetectable viral load. Another study found two cases of HIV transmission among breastfeeding women who appeared to have an undetectable viral load at the time of transmission. However, in all of the above cases low adherence to treatment is suspected.

Canadian guidelines continue to recommend that HIV-positive parents exclusively feed their babies formula to eliminate the possibility of transmission. However, due to the evidence showing minimal risk, and the available supports in high-resource countries like Canada, there is a growing movement to support people with HIV who wish to breastfeed, and to help them do so as safely as possible. This includes: offering unbiased information on the risk of HIV transmission through breastfeeding; providing increased viral load monitoring and adherence support; and providing prophylactic treatment for infants born to people living with HIV.

How well does the use of ART to maintain an undetectable viral load prevent HIV transmission through injection drug use?

An HIV-positive person who is engaged in care, on ART and has a sustained undetectable viral load is also considerably less likely to pass HIV through injection drug use. The available research suggests that this strategy is effective at preventing HIV transmission among people who inject drugs; however, there is not enough evidence to conclude that there is no risk.

Two ecological studies from Vancouver and Baltimore reported on reductions in new HIV infections over time and found an association with a reduction in the community viral load of people who inject drugs. Although it is likely that increased uptake of ART is partly responsible for the observed decline in the number of new infections, it is difficult to know how much of this change can be attributed to an increase in harm reduction services that also occurred during this period.

A cohort study in India among 14,481 people who inject drugs and 12,022 men who have sex with men found a clear correlation between estimated HIV incidence and both community-level treatment coverage and viral suppression. This study found significant correlations at the community level, but since it was not designed to look at individual risk of transmission, no estimate of effectiveness was available.

Is the use of ART to maintain an undetectable viral load intended to be used as a replacement for condoms and other HIV prevention strategies?

Although the use of ART to maintain an undetectable viral load works regardless of whether condoms or PrEP are used, everyone should be able to choose a prevention strategy that works best for them. This strategy is one of several highly effective options for preventing sexual HIV transmission; however, it does not offer protection against STIs (such as herpes, chlamydia, gonorrhea or syphilis). Condoms are the only effective strategy to help prevent STIs.

For people who inject drugs, other prevention programs and strategies (such as the distribution and use of new injecting equipment) are important to help prevent HIV transmission, and to prevent other blood-borne infections such as hepatitis C.

Resources

CATIE resources

CATIE statement on the use of antiretroviral treatment (ART) as a highly effective strategy to maintain an undetectable viral load to prevent the sexual transmission of HIV

Undetectable viral load and HIV sexual transmission

The Power of Undetectable: What you need to know about HIV treatment as prevention

Negligible Risk: Updated results from two studies continue to show that antiretroviral treatment and an undetectable viral load is a highly effective HIV prevention strategy – *CATIE News*

Views from the front lines: Pregnancy and infant feeding – *Prevention in Focus*

Guidelines, position papers and consensus statements

Canadian Consensus Statement on the health and prevention benefits of HIV antiretroviral medications and HIV testing – CTAC, CATIE, positivelite.com

Expert consensus statement on the science of HIV in the context of criminal law (2018) – *Journal of the International AIDS Society*

Risk of sexual transmission of HIV from a person with HIV who has an undetectable viral load: Messaging Primer & Consensus Statement – Prevention Access Campaign

Community Consensus Statement on access to HIV treatment and its use for prevention – AVAC, EATG, MSMGF, GNP+, HIV i-Base, the International HIV/AIDS Alliance, ITPC, NAM/aidsmap

Expert Consensus: Viral Load and Risk of HIV Transmission – Institut National de Santé Publique du Quebec (INSPQ)

Consolidated guidelines on HIV prevention, diagnosis, treatment and care for key populations – World Health Organization (WHO)

Human immunodeficiency virus (HIV) Sexual Transmission Risk with Bacterial Sexually Transmitted Infection (STI) Co-infection – Public Health Ontario

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Decisions about particular medical treatments should always be made in consultation with a qualified medical practitioner knowledgeable about HIV- and hepatitis C-related illness and the treatments in question.

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