

HIV treatment and an undetectable viral load to prevent HIV transmission

Summary

It is now well known that the use of HIV treatment not only improves the health of people living with HIV but also is 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 achieve and maintain an undetectable viral load, 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); and

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- are likely to have a reduced chance of transmitting HIV to people with whom they share injection drug use equipment; however, there is not enough evidence to conclude that there is no risk. It is recommended that people use new needles and all other equipment every time they use drugs, regardless of their HIV status or viral load, to prevent HIV as well as other harms.

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 amount of virus (also known as the viral load) in the blood and other bodily fluids decreases. Research tells us that as the amount of virus in the body decreases, so does the risk of HIV transmission. When successful treatment lowers the viral load to undetectable levels, this can reduce or even eliminate the risk of HIV transmission.

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

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 fewer than 40 to 50 copies/ml of the virus but some newer tests can detect as few as 20 copies/ml. The virus is still present in very low amounts in the body when the viral load is undetectable.

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

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

- high adherence to 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 because HIV treatment does not protect against STIs.

A person on HIV treatment needs to work with their doctor to determine an appropriate schedule for medical checkups and viral load monitoring.

What is important for this approach to work?

For HIV treatment to provide protection against HIV transmission, a person's viral load needs to become and remain undetectable after they start treatment.

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

A person's viral load needs to remain undetectable for at least six months before they can use this approach as an effective HIV prevention strategy. They must continue to have high adherence to treatment to maintain an undetectable viral load over time. The only way for them to know if their 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. The most common reason why a person's viral load remains detectable is low adherence to their medications, but drug resistance can also occur. 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 they 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 HIV treatment 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 consistent and correct use of HIV treatment to maintain an undetectable viral load is a highly effective strategy to prevent sexual HIV transmission for both heterosexual and same-sex male couples. Evidence from this research shows that when people are on successful treatment and engaged in care they do not transmit HIV through sex.

The first study to show that HIV treatment and an undetectable viral load provide 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 treatment 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 treatment; however, in all eight cases the HIV-positive partner's viral load was detectable, even though they were on treatment. 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, 26 people acquired HIV from a sex partner outside of the primary relationship, showing that in a serodiscordant couple in which the HIV-positive partner is on treatment 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 treatment and an undetectable viral load (defined as <200 copies/ml in this study) prevents sexual HIV transmission in both heterosexual and same-sex male couples in the absence of other forms of HIV prevention (condoms, pre-exposure prophylaxis [PrEP] or post-exposure prophylaxis [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 were many unprotected sex acts (no condoms, PrEP or PEP) when the HIV-positive partner's 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 treatment and had an undetectable viral load. However, 16 new HIV infections (in 15 gay men and one heterosexual person) 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 HIV-positive partner was on treatment and maintained an undetectable viral load (<200 copies/ml in this study) 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 20 to 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 the accuracy of the viral load results and to enable comparisons to be made 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, for optimal treatment outcomes, the goal 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, many participants (roughly 25%) contracted STIs. In 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 STIs do not increase the risk of HIV transmission from people who are on treatment and have an undetectable viral load.

All participants in these studies were engaged in regular healthcare appointments to check their 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 HIV treatment.

The results of these (and earlier) studies provide a strong body of evidence showing that people living with HIV who adhere to their treatment and engage in regular healthcare, with a sustained undetectable viral load, do not transmit HIV sexually. The PARTNER/PARTNER2 and Opposites Attract studies show that this is true even when condoms are not used, and in the presence of other STIs.

How can service providers improve the uptake and correct use of HIV treatment and an undetectable viral load to prevent the sexual transmission of HIV?

Educational and counselling activities for people — whether they have HIV or are at risk for HIV — should include information on the HIV prevention benefits of treatment and an undetectable viral load, along with information on the other highly effective ways to help prevent HIV. These include PrEP, PEP, condoms for sex and new equipment

for using drugs. Encourage clients to choose the combination of strategies that will work most effectively for them as there are multiple approaches to HIV and STI prevention that can be combined in different ways. Discuss how the use of HIV treatment to maintain an undetectable viral load fits into a comprehensive plan for sexual health including regular STI testing and safer sex practices.

Education and counselling on the use of this HIV prevention strategy should include a discussion about the large body of evidence showing that people on HIV treatment who maintain an undetectable viral load do not transmit HIV through sex. Education should also include the factors necessary for maximizing the effectiveness of this strategy. Emphasize the following:

- Adherence to ART is essential for the achievement and maintenance of an undetectable viral load.
- It usually takes three to six months on treatment to achieve an undetectable viral load.
- Maintenance of a sustained undetectable viral load for at least six months is necessary for this approach to be effective.
- Regular medical visits are required for ongoing care and viral load monitoring. Regular viral load testing is the only way to know that an undetectable viral load is reached and sustained.

You can also lead or support efforts to improve awareness of the use of HIV treatment to maintain an undetectable viral load as a prevention approach among a range of service providers in your area including doctors, nurses, pharmacists and non-clinical staff at community-based organizations.

For people living with HIV, it's important to facilitate and support the use of HIV treatment to maintain an undetectable viral load as a prevention strategy. This can include supporting people to start treatment. Treatment guidelines now recommend that HIV treatment be offered to all people living with HIV as soon as they test positive. This recommendation is based on the health benefits of starting treatment early for people living with HIV, although an important secondary benefit is HIV

prevention. A person's decision to start treatment should be well-informed. HIV treatment requires a lifelong commitment to daily pill-taking and regular visits with a healthcare provider. Each person has the right to decide whether to take treatment based on their own assessment of what is best for their health and well-being. Help link HIV-positive clients to HIV care if they are not already in care. Facilitating informed decision-making may require providing services that support a client's relationship with their doctor.

While starting HIV treatment is a choice, it is important to recognize that broader social, economic and structural factors (such as racism, homelessness and poverty) create health inequities by affecting people's ability to access and engage with treatment, care and support services. Service providers can help to address these barriers. People who are on HIV treatment may need to be provided with or linked to supports that can help address other health and social issues they are dealing with, such as depression, substance use disorders or housing instability. They may also benefit from other supports to overcome barriers and successfully adopt this strategy — such as medication adherence support, health navigation and/or outreach services.

Encourage and support clients to communicate openly with their sex partner(s). Clients may need support to disclose their HIV status to a sex partner. Consider couples-based counselling for people in relationships (whether monogamous or not). If a client is in a serodiscordant relationship, important discussion topics for the couple may include whether there are sexual partners outside the relationship, and the results of viral load monitoring and STI tests. Educating HIV-negative clients about HIV viral load and what it means to be undetectable may give them a better understanding of the concept of treatment as prevention.

Finally, be prepared to discuss the legal issues around HIV disclosure. Canadian law requires that people tell their sex partners that they have HIV in certain circumstances. However, the law and its application are evolving. For the most up-to-date information on when people with HIV have a legal duty to disclose their HIV status, contact the [HIV Legal Network](#).

How well does the use of HIV treatment 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. 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 before conception and maintains an undetectable viral load throughout pregnancy and delivery, they do not transmit HIV to their baby. A short course of HIV medications is also given to the infant to prevent HIV transmission.

For the last three decades, a growing body of evidence has shown that babies are much less likely to be born with HIV if the pregnant parent is on treatment. A study of the French Perinatal Cohort, conducted between 2000 and 2011, is the largest study to show the impact of treatment on preventing HIV transmission to a newborn. 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, who had an undetectable viral load at delivery and who did not breastfeed.

The French study also showed that starting HIV treatment as soon as possible in pregnancy dramatically lowers the chance of transmission. In the study, there was a 0.4% chance of passing HIV to a baby if treatment was started in the first trimester, a 0.9% chance if treatment was started in the second trimester and a 2.2% chance if treatment was started in the third trimester. Viral load was not taken into account in this analysis.

It is important that people who are pregnant or considering becoming pregnant get tested for HIV. 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 HIV treatment to maintain an undetectable viral load prevent HIV transmission to a baby during breastfeeding?

Without HIV treatment, the risk for HIV transmission through breastfeeding is estimated to be roughly 15%. The rates of HIV transmission through breastfeeding for people who are taking HIV treatment are much lower. 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, in 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 or for viral load, which means that even though the women were taking HIV treatment we do not know how many of them had a detectable viral load at the time of transmission.

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%). 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 these cases low adherence to treatment was suspected.

Canadian guidelines continue to recommend that HIV-positive parents exclusively feed their babies formula to eliminate the possibility of transmission.

However, because of 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. In Canada, three babies were supported to breastfeed when their mothers had undetectable viral loads and both the mothers and infants received HIV medications. None of the babies contracted HIV.

How can service providers improve the uptake and correct use of HIV treatment and an undetectable viral load to help prevent perinatal HIV transmission?

Please see the [CATIE Statement on the use of antiretroviral treatment \(ART\) to maintain an undetectable viral load as a highly effective strategy to prevent perinatal transmission of HIV](#).

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

The limited available research suggests that being on HIV treatment and maintaining an undetectable viral load is effective at helping to prevent HIV transmission among people who inject drugs; however, people who use drugs can get HIV through sex and through sharing drug use equipment. While we know that maintaining an undetectable viral load will prevent HIV transmission through sex, we don't know how much it reduces the chance of passing HIV through shared drug use equipment. The best way to prevent passing HIV through drug use is to use new needles and other equipment every time. People who use drugs need access to enough new equipment to be able to do this consistently and to avoid having to share with others.

The three major studies looking at sexual HIV transmission (HPTN 052, PARTNER and Opposites Attract) did not systematically recruit people who inject drugs, they did not ask whether participants were sharing injection equipment and they did not provide any analysis related to participants who reported using drugs.

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 HIV treatment 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.

Resources

CATIE resources

[U=U: A guide for service providers](#)

[The Power of Undetectable: How HIV Treatment Prevents Transmission](#)

[HIV Treatment to Prevent HIV - video](#)

[CATIE Statement on the use of antiretroviral treatment \(ART\) to maintain an undetectable viral load as a highly effective strategy to prevent perinatal transmission of HIV](#)

[Getting to undetectable: Population differences in Canada – Prevention in Focus](#)

Guidelines, position papers and consensus statements

[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](#)

[Expert Consensus: Viral Load and the Risk of HIV Transmission – Institut National de Santé Publique du Québec \(INSPQ\)](#)

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

References

1. Cohen MS, Chen YQ, McCauley M et al. Prevention of HIV-1 infection with early antiretroviral therapy. *New England Journal of Medicine*. 2011 Aug 11;365(6):493–505.
2. Cohen MS, Chen YQ, McCauley M et al. Antiretroviral therapy for the prevention of HIV-1 transmission. *New England Journal of Medicine*. 2016;375(9):830–839. Available from: <http://www.nejm.org/doi/pdf/10.1056/NEJMoa1600693>
3. Eshleman SH, Hudelson SE, Redd AD et al. Treatment as prevention: characterization of partner infections in the HIV Prevention Trials Network 052 trial. *Journal of Acquired Immune Deficiency Syndromes*. 2017 Jan 1;74(1):112–116.
4. Rodger AJ, Cambiano V, Bruun T et al. Sexual activity without condoms and risk of HIV transmission in serodifferent couples when the HIV-positive partner is using suppressive antiretroviral therapy. *Journal of the American Medical Association*. 2016;316(2):171–181. Available from: <http://jama.jamanetwork.com/article.aspx?articleid=2533066>
5. Rodger AJ, Cambiano V, Bruun T et al. Risk of HIV transmission through condomless sex in serodifferent gay couples with the HIV-positive partner taking suppressive antiretroviral therapy (PARTNER): final results of a multicentre, prospective, observational study. *The Lancet*. 2019 May 2; 393(10189):2428–2438.
6. Bavinton BR, Pinto AN, Phanuphak N et al. Viral suppression and HIV transmission in serodiscordant male couples: an international, prospective, observational, cohort study. *Lancet HIV*. 2018 Aug;5(8):e438–e447.
7. Baeten JM, Kahle E, Lingappa JR et al. Genital HIV-1 RNA predicts risk of heterosexual HIV-1 transmission. *Science Translational Medicine*. 2011 Apr 6;3(77):77ra29.
8. Reynolds S, Makumbi F, Nakigozi G et al. HIV-1 transmission among HIV-1 discordant couples before and after the introduction of antiretroviral therapy. *AIDS*. 2011;25: 473–477.

9. Melo MG, Santos BR, Lira RD et al. Sexual transmission of HIV-1 among serodiscordant couples in Porto Alegre, Southern Brazil. *Sexually Transmitted Diseases*. 2008;35:912–915.
10. Donnell D, Baeten J, Kiarie J et al. Heterosexual HIV-1 transmission after initiation of antiretroviral therapy: a prospective cohort analysis. *Lancet*. 2010 Jun 12;375(9731):2092–2098.
11. Ward H, Rönn M. The contribution of STIs to the sexual transmission of HIV. *Current Opinion in HIV and AIDS*. 2010 Jul;5(4):305–310.
12. Townsend CL, Cortina-Borja M, Peckham CS et al. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. *AIDS*. 2008 May 11;22(8):973–81.
13. Townsend CL, Byrne L, Cortina-Borja M et al. Earlier initiation of ART and further decline in mother-to-child HIV transmission rates, 2000-2011. *AIDS*. 2014 Apr 24;28(7):1049–57.
14. Garcia PM, Kalish LA, Pitt J et al. Maternal levels of plasma human immunodeficiency virus type 1 RNA and the risk of perinatal transmission. *New England Journal of Medicine*. 1999 Aug 5; 341(6):394–402.
15. Bispo S, Chikhungu L, Rollins N et al. Postnatal HIV transmission in breastfed infants of HIV-infected women on ART: a systematic review and meta-analysis. *Journal of the International AIDS Society*. 2017 Feb 20;20(1):1–8.
16. Mandelbrot L, Tubiana R, Le Chenadec J et al. No perinatal HIV-1 transmission from women with effective antiretroviral therapy starting before conception. *Clinical Infectious Diseases*. 2015;61(11):1715–1725.
17. Nduati R, John G, Mbori-Ngacha D et al. Effect of breastfeeding and formula feeding on transmission of HIV-1: a randomized clinical trial. *Journal of the American Medical Association*. 2000 Mar 1;283(9):1167–74.
18. Luoga E, Vanobberghen F, Bircher R et al. No HIV transmission from virally suppressed mothers during breastfeeding in rural Tanzania. *Journal of Acquired Immune Deficiency Syndromes*. 2018;79(1):e17–e20.
19. Flynn PM, Taha TE, Cababasay M et al. Prevention of HIV-1 transmission through breastfeeding: efficacy and safety of maternal antiretroviral therapy versus infant nevirapine prophylaxis for duration of breastfeeding in HIV-1-infected women with high CD4 count (IMPAACT PROMISE): a randomized, open label, clinical trial. *Journal of Acquired Immune Deficiency Syndromes*. 2018;77(4):383–392.
20. Shapiro RL, Hughes MD, Ogwu A et al. Antiretroviral regimens in pregnancy and breast-feeding in Botswana. *New England Journal of Medicine*. 17 June 2010;362(24):2282–2294.
21. Palombi L, Pirillo MF, Andreotti M et al. Antiretroviral prophylaxis for breastfeeding transmission in Malawi: drug concentrations, virological efficacy and safety. *Antiviral Therapy*. 2012;17(8):1511–1519.
22. Kahlert C, Aebi-Popp K, Bernasconi E et al. Is breastfeeding an equipoise option in effectively treated HIV-infected mothers in a high-income setting? *Swiss Medical Weekly*. 2018 Jul 23;148:w14648. Available from: <https://smw.ch/article/doi/smw.2018.14648>
23. Nashid N, Khan S, Loutfy M. Breastfeeding by women living with Human Immunodeficiency Virus in a resource-rich setting: a case series of maternal and infant management and outcomes. *Journal of the Pediatric Infectious Disease Society*. 2019; *in-press*.
24. Wood E, Milloy MJ, Montaner JS. HIV treatment as prevention among injection drug users. *Current Opinion in HIV and AIDS*. 2012 Mar;7(2):151–156.
25. Wood E, Kerr T, Marshall BDL et al. Longitudinal community plasmas HIV-1 RNA concentrations and incidence of HIV-1 among injecting drug users: prospective cohort study. *British Medical Journal*. 2009 16 May 16:338(7704):1191–1194.
26. Fraser H, Mukandavire C, Martin NK et al. HIV treatment as prevention among people who inject drugs – a re-evaluation of the evidence. *International Journal of Epidemiology*. 2017 Apr 1;46(2):466–478.
27. Kirk G, Galai N, Astemborski J et al. Decline in community viral load strongly associated with declining HIV incidence among IDU. In: *Proceedings of the 18th Conference on Retroviruses and Opportunistic Infections*, Boston, Massachusetts, February 27 to March 2, 2011.
28. Solomon SS, Mehta SH, McFall AM et al. Community viral load, antiretroviral therapy coverage, and HIV incidence in India: a cross sectional, comparative study. *The Lancet HIV*. 2016;3(4):e183–e190.
29. Nolan S, Milloy MJ, Zhang R. Adherence and plasma HIV RNA response to antiretroviral therapy among HIV-seropositive injection drug users in a Canadian setting. *AIDS Care*. 2011; 23(8):980–987.

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Disclaimer

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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