Getting to the bottom of it: Anal sex, rectal fluid, and HIV transmission

By James Wilton

Anal sex is a common practice among men who have sex with men, heterosexual men and women, and transgender individuals and is a known risk factor for HIV infection and transmission. Therefore, it is important that education on HIV prevention includes accurate information on the fluids that can transmit HIV through this type of sex. If one of these fluids is excluded from prevention messaging, it could lead a client to underestimate their risk of HIV transmission. While there is no doubt that semen, pre-ejaculate (pre-cum), and blood can contribute to the risk of HIV transmission through anal sex; it seems there is less clarity among frontline service providers on whether rectal fluid should also be included on this list.

This article looks at what rectal fluid is, whether or not it can contain and transmit HIV, and the implications for prevention education.

What is rectal fluid?

Rectal fluid is the mucus that lines the rectum. Mucus is a slippery secretion produced by certain parts of our body known as the mucous membranes. These membranes are located at the entrances into the body and line the internal passages of many of our organs, including the gastrointestinal tract (mouth, intestines and rectum), the vagina and cervix, and the foreskin and urethra.

Mucus has several functions. A major function is to protect the mucous membranes from germs (bacteria and viruses). It does this by “trapping” germs and preventing them from coming into contact with the membranes. Mucus also contains substances that can – to some extent – kill germs.

For some membranes, mucus also acts as a lubricant that prevents friction and tearing of the mucous membrane tissue when objects pass through them. For example, mucus in the vagina reduces friction during sexual intercourse and mucus in the gastrointestinal tract (including the rectum) facilitates the passage of food and feces. Mucus in the rectum also helps reduce friction during anal intercourse.

Does rectal fluid contain HIV?

In an HIV-positive person, the mucous membranes throughout the body can contain a lot of HIV. This is because these membranes are rich in immune cells, which are the cells that HIV likes to infect and replicate within. Since so much HIV replication can occur at the mucous membranes, the virus is able to enter the mucus that the membranes produce. As a result, mucus produced by an HIV-positive person can contain HIV (although the virus can be present in varying amounts), which can potentially be transmitted to someone else.

The mucous membranes of the rectum, and the mucus they produce (rectal fluid), are no exception. Several studies...
show that HIV can be found in the rectal fluid of a person living with HIV.\textsuperscript{2,3,4,5,6} In fact, one study of 64 HIV-positive men (of which about half were on antiretroviral therapy) found that, overall, the average amount of virus in their rectal fluid was higher than in their semen and blood.\textsuperscript{4}

Why might rectal fluid contain more HIV than other bodily fluids? It turns out that the majority of the immune cells in the body – including the cells that are a major target for HIV – are located in the mucous membranes of the gastrointestinal tract, which includes the rectum.\textsuperscript{7} There are a lot of immune cells in the gastrointestinal tract because it has a very large surface area. Also, a large number of immune cells are needed to help to protect the gut from the “foreign” germs in our food and to control the growth of the “friendly” germs living in our gut.

The high concentration of immune cells means that the majority of HIV replication in someone with HIV may be happening in the gastrointestinal tract, including the rectum.\textsuperscript{8,9,10} This may explain why so much HIV can be found in the rectal fluid.

**Implications for HIV transmission and prevention**

Anal sex is a common practice among men who have sex with men, heterosexual men and women, and transgender individuals and is a known risk factor for HIV infection and transmission.\textsuperscript{11,12,13,14} In a recent nationally representative survey of almost 6,000 men and women in the United States (of which the majority were heterosexual), approximately 20% of women between the ages of 18 to 39 reported engaging in anal sex in the past year, as did approximately 25% of men between the ages of 25 to 49.\textsuperscript{15}

**HIV transmission**

Rectal fluid has implications for HIV transmission through anal sex when the HIV-negative person is the insertive partner (that is, inserts their penis into a partner’s anus). Research show that this type of anal sex can carry a significant risk of HIV transmission. In fact, the \textit{average} risk of HIV infection through a single act of condomless insertive anal sex with an HIV-positive partner is slightly higher than through vaginal sex but much lower than if the HIV-negative person takes the \textit{receptive} role during anal sex.\textsuperscript{16,17}

Rectal fluid undoubtedly contributes to the risk of HIV transmission through anal sex where the insertive partner is HIV negative. We know that for HIV transmission to be possible, a fluid that contains HIV must come into contact with specific parts of the body that are vulnerable to HIV infection. If an HIV-negative person has insertive anal sex with an HIV-positive partner, rectal fluid containing HIV can come into contact with the urethra and/or the penis foreskin. Both the urethra and foreskin are vulnerable to HIV infection.

Rectal fluid may not be the only fluid involved in the risk of HIV transmission during this type of sex. If the lining of the rectum has been damaged in some way, blood may also be present in the rectum. In such circumstances, blood containing HIV can come into contact with the foreskin and urethra and also contribute to the risk of HIV transmission. However, rectal fluid is always present in the rectum (unlike blood) and, therefore, likely plays a greater role in the risk of HIV transmission.

**HIV prevention**

Several strategies can reduce the risk of HIV transmission through anal sex (where the insertive partner is HIV-negative), including condoms, post-exposure prophylaxis (PEP), pre-exposure prophylaxis (PrEP), antiretroviral therapy (ART), and (potentially) penile circumcision.

The HIV-negative insertive partner can use condoms, PEP or PrEP to reduce the risk of HIV infection through anal sex. Condoms are a barrier that can prevent the penis from coming into contact with HIV in the rectum,\textsuperscript{18,19} while PEP and PrEP can reduce the risk of infection if an exposure to HIV occurs.\textsuperscript{20,21} All of these strategies are highly effective at reducing the risk of HIV infection if used consistently and correctly.

Circumcision (the removal of the foreskin) of someone who is HIV negative may be able to reduce the risk of them becoming infected through insertive anal sex with an HIV-positive partner. Some research suggests circumcision can reduce the risk for HIV-negative gay men who primarily take the insertive role during anal sex. However, the
extent of the reduction in transmission of HIV transmission, if any, is unclear and requires further research. The effect of circumcision on HIV transmission during anal sex with a female partner has not been researched among heterosexual men.

The use of ART by someone with HIV can significantly reduce the risk of transmitting HIV to others, Successful ART lowers the amount of virus (also known as viral load) in the bodily fluids, including the rectal fluid, to undetectable levels and research shows this can dramatically reduce the risk of HIV transmission. The viral load in the blood of a person living with HIV is monitored as part of their routine clinical care.

Although the risk of HIV transmission is significantly lowered when the viral load is undetectable in the blood, the risk may not be eliminated. Undetectable does not mean that there is no virus, only that the amount of virus is below the limits that tests can detect. Therefore, HIV transmission may still be possible because there is still virus present. Also, it is possible for people who have an undetectable viral load in the blood to sometimes have detectable (although lowered) levels of virus in their rectal fluid. However, this appears to occur infrequently (although rectal fluid has been studied less than semen and vaginal fluid) and it is unclear how significant it is in terms of HIV transmission.

The exact risk of HIV transmission through anal sex (where the HIV-negative person is the insertive partner) when the blood viral load of the partner is undetectable is not known and has not been well studied. However, a preliminary analysis of an ongoing study observed that, when the blood viral load was undetectable, no HIV transmissions occurred among stable serodiscordant gay male couples who engaged in approximately 11,000 condomless anal sex acts (where the HIV-negative person was the insertive partner). An estimated six to 12 infections would have been expected if the HIV-positive partners in this study were not on ART and had a detectable viral load. Therefore, although this does not mean the risk is zero, it does show that ART definitely reduces the risk of HIV transmission through this type of anal sex; ongoing analysis from this study will show us more clearly exactly how large this reduction is.

Factors that cause inflammation in the rectum of a person with HIV may increase the viral load in the rectal fluid (but not in the blood) and subsequently increase the risk of HIV transmission to an HIV-negative insertive partner. Rectal trauma, friction and sexually transmitted infections (STIs) - such as gonorrhea, chlamydia, herpes, and syphilis - can all cause rectal inflammation. Promisingly, a recent study found that rectal gonorrhea and chlamydia did not increase the rectal fluid viral load among a small group of people with HIV on ART. This suggests that ART may reduce the ability of STIs to increase rectal viral load and HIV transmission risk.

Key messages

It is important that HIV prevention messaging includes rectal fluid as one of the fluids that can contain and transmit HIV. If rectal fluid is excluded, it could lead an HIV-negative person who is the insertive partner during anal sex to underestimate their risk of HIV infection; or a person with HIV who is the receptive partner during anal sex to underestimate their risk of transmitting HIV.

There are several key messages that can be given to clients about the risk of HIV transmission through anal sex (where the HIV-negative person inserts their penis into an HIV-positive partner’s anus):

- Rectal fluid can contain a high concentration of HIV and, if it comes into contact with a partner’s penis, can lead to HIV transmission.
- HIV transmission through this type of anal sex does not require blood to be present in the HIV-positive partner’s rectum.
- Inflammation in the rectum, caused by STIs or tearing, may increase the amount of virus in the rectal fluid and increase the risk of HIV transmission. Minimizing rectal inflammation through the use of lubricants (lubes) and management of STIs (regular STI testing and, if needed, treatment for STIs) may prevent increases in rectal fluid viral load.
- Lowering the viral load in the blood and rectal fluid through successful antiretroviral treatment can substantially decrease the risk of HIV transmission.
- Condoms, in combination with lube, are highly effective in preventing the risk of HIV transmission if used consistently and correctly. Condoms can also significantly reduce the risk of STI transmission.
• Post-exposure prophylaxis and pre-exposure prophylaxis are both highly effective options for HIV-negative people to reduce their risk of HIV infection. PEP needs to be accessed as soon as possible, but within 72 hours, after an exposure and taken daily for 28 days. PrEP needs to be taken daily, on an ongoing basis. Adherence to daily pill-taking is important for both to be effective.

• Penile circumcision may reduce the risk of HIV infection for HIV-negative gay men who primarily engage in insertive anal sex, but it is unclear how much it reduces HIV transmission risk.

References

**HIV viral load, HIV treatment and sexual HIV transmission** – CATIE Fact sheet

**Sex from A-Z Cards: Information for Young Gay and Bisexual Men** – AIDS Committee of Toronto (ACT)

### References


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