Routes of HIV transmission? [1]

Dear Alice,

I have a specific question about the HIV virus that a friend asked me; I want to make sure to give her the correct answer. She thinks that the virus can only be transmitted from bloodstream to bloodstream, that is, only infected blood in contact with another’s blood can infect another person. I thought that the virus can also be absorbed through skin tissue? body fluids can thus infect another person as long as they are in contact with tissues (vaginal, anal, etc.) that can easily absorb body fluids. Is this correct? Does HIV have to come in contact with a cut or bloodstream, or can it be absorbed by one's skin through certain tissues?

Thank you Alice,
Soon to be informed

Answer

Dear Soon to be informed,

Kudos to you for doing some research for your friend! Since the discovery of HIV, there has been much confusion and misinformation about how the virus is transmitted. First, there are four bodily fluids that contain enough concentration of the virus to transmit it. They are:

- Blood
- Semen and pre-seminal fluid
- Vaginal and cervical secretions
- Breast milk

HIV acts on the immune system, killing off T cells, a specific type of cell that is integral to immune system functioning. These four fluids have high concentrations of antibodies, the cells that fight off infection. The virus can be found in very small amounts in tears and saliva, but is not present in high enough concentrations to actually transmit the virus. And HIV is not present in the sweat of HIV positive people. But knowing the relevant fluids tells us little about routes of transmission.

First, there are a few ways that HIV cannot be transmitted. There have been no reported cases of transmission via contact with the various surfaces (e.g., toilet seats, kitchen utensils, door knobs), through the air, closed-mouth kissing, or via insect bites [2]. Open mouth or "French" kissing has very rarely resulted in successful transmission. When transmission does occur with this type of kissing, it's due to contact with blood (i.e., open sores or cuts in mouth),
rather than saliva. There have been a few cases of transmission as a result of a human bite, but these are also exceedingly rare (there have been many cases of bites by an infected person that did not result in transmission—especially if the skin was not broken).

So how can it be transmitted? The virus can indeed be absorbed through certain tissues, as you suggested to your friend. Specifically, it can be transmitted if any of the four fluids above that are infected with the virus come into contact with the blood stream OR mucous membranes of another person. Mucous membranes can be found lining the:

- Eyes
- Mouth
- Nose
- Rectum
- Urethra
- Vagina

So, knowing the fluids and the routes of transmission gives us some insight into the activities that can transmit the virus.

**Vaginal or anal intercourse.** HIV can be transmitted sexually, even if no tearing occurs during sex. This is because semen and vaginal secretions can be absorbed by the rectal tissue, vaginal tissue, or into the urethra of either partner (regardless of gender) because they are mucous membranes. It cannot be transmitted through the surface of "regular" skin, like that found on your hands, but if any of those four fluids from an HIV positive person gets on your skin, it’s still recommended to wash immediately because you may have small "micro" tears that allow entry into the blood stream.

**Oral sex involving the vagina, penis, or anus.** If there is any blood present in the mouth of the person giving oral sex (e.g., bleeding gums and open sores) this blood could transmit HIV to the receptive partner. Additionally, blood or sexual fluids present on the genitals or in the anus of the receptive partner could transmit HIV to the person performing oral sex. Though the level of risk is not fully understood, most health care providers agree that risk of contracting HIV via oral sex is significantly less than risk of transmission via intercourse.

**From mother to fetus or infant.** HIV can be transmitted from a pregnant woman to the fetus during fetal development or during labor and delivery. However, being HIV positive is not a guarantee that the virus will be transmitted to the fetus. Without any preventative measures, there is a one in four chance that the virus will be transmitted from an HIV positive pregnant woman the newborn. However, there are a number of treatments that can reduce this risk even further. HIV can also be transmitted via a mother to a breastfeeding infant.

**Transmission via eyes and nose.** There are a few known cases of blood from an HIV positive person getting into the eyes, nose, or mouth of emergency workers and causing transmission, but these cases are rare. The risk for HIV transmission from skin or mucous-membrane exposure is extremely rare and has only been documented a few times.

**Sharing needles.** As you and your friend are both already aware, contact of any of the four fluids with blood stream presents risk of HIV infection. This can happen with the sharing of needles from intravenous drug use.

**Re-infection.** It is worth mentioning that being HIV positive does not protect one from
becoming re-infected with a different strain of the virus, which can severely disrupt an effective treatment plan.

For more information about HIV transmission, prevention, and treatment, check out AIDS.gov [6] and the Centers for Disease Control and Prevention (CDC) [7] website.

Alice!
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