Introduction to HIV/AIDS

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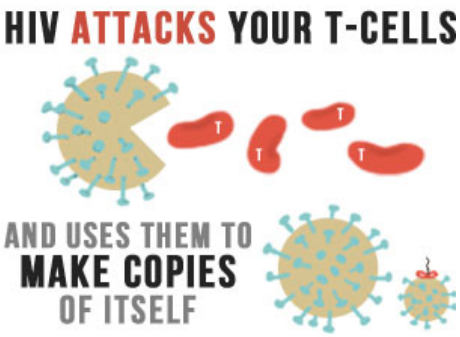
I. What are HIV and AIDS?

The Human Immunodeficiency Virus (HIV) is a virus that infects human immune cells, especially $CD4^+$ T cells. HIV uses these cells as host and reproduces itself in these cells. After several cycles of replication, a huge number of viruses will break out of the cell and continue infecting other cells in our body, resulting in the death of the host cell. In an advanced stage of the infection, the count of $CD4^+$ T cells as well as other cells declines to such a critical level that one of our most important immune responses, cell-mediated immunity, is down, resulting in the Acquired Immunodeficiency Syndrome, which is known as AIDS. In other words, AIDS patients do not have a strong enough immune system to fight against other infections, which means even a cold could kill them.

II. How does HIV harm our bodies?



The immune system, consisting of several kinds of different cells, is like the guard to our body. These immune cells protect us from all kinds of infections. Once our immune system is compromised, we no longer have the ability to fight against bacteria or viruses. Thus, HIV or AIDS do not kill us but destroy the guard that protects us, allowing other bacteria and viruses to replicate unchecked in our respiratory system, circulatory system, nervous system, etc.

(Source: wheelerschool.libguides.com)

Tumor cells form in every person's body every day. The reason that most of us do not have cancer so far is that our immune system finds these tumor cells and kills them. Once our immune system is down, the risks of getting cancer

increase.

To summarize, HIV destroys the immune system, which will not directly kill a person but put the person in an extremely dangerous situation in which any minor infection could cause death. People with AIDS also have higher risks of getting cancer.

All the harm mentioned above is based on one fact, that the person infected with HIV does not get any treatment. Currently, we have a successful therapies that can stop the reproduction of HIV inside the body, which prevents it from harming our immune system. (See How is HIV treated)

III. How is HIV transmitted?

Scientists and doctors, spending decades and trillions of dollars around the world, still cannot cure HIV. This leads to a misbelief that HIV is one of the toughest viruses in the world. However, it is actually not a very good survivor outside the body. In other words, the possibility of environmental transmission is remote. That is to say, casual contact like sharing bathtubs, towels, dishes and even beds, shaking hands or hugging with HIV positive people will not get someone infected with HIV. So please don't be afraid to smile to them and hug them :)

According to current research, HIV can only be transmitted by certain bodily fluids: blood, rectal and vaginal fluids, semen, pre-seminal fluid, and breast milk. In order to be infected by HIV, one of these fluids must come into contact with damaged tissue, the mucous membrane (found inside the rectum, vagina, penis, or mouth) or become directly exposed to the bloodstream.

In the United States:

1. The most common ways HIV is transmitted

a. Having anal or vaginal sex with someone who has HIV without protections like condoms or taking medicines to prevent or treat HIV.

    - Having vaginal or anal sex with someone who has HIV but has achieved viral suppression (HIV undetectable, See How is HIV treated) are very unlikely to be transmitted but risks still exist.

b. Sharing needles or syringes with someone who has HIV.

(Source: www.doc-advice.com)

2. Less common ways HIV is transmitted

a. Mother-to-child during pregnancy, birth, or breastfeeding. However, doctors have successfully helped many HIV positive/undetectable women to give birth without transmitting the virus to their babies.

b. Accidentally being stuck with an HIV-contaminated needle or other sharp objects. This is a risk for people working in health care field.

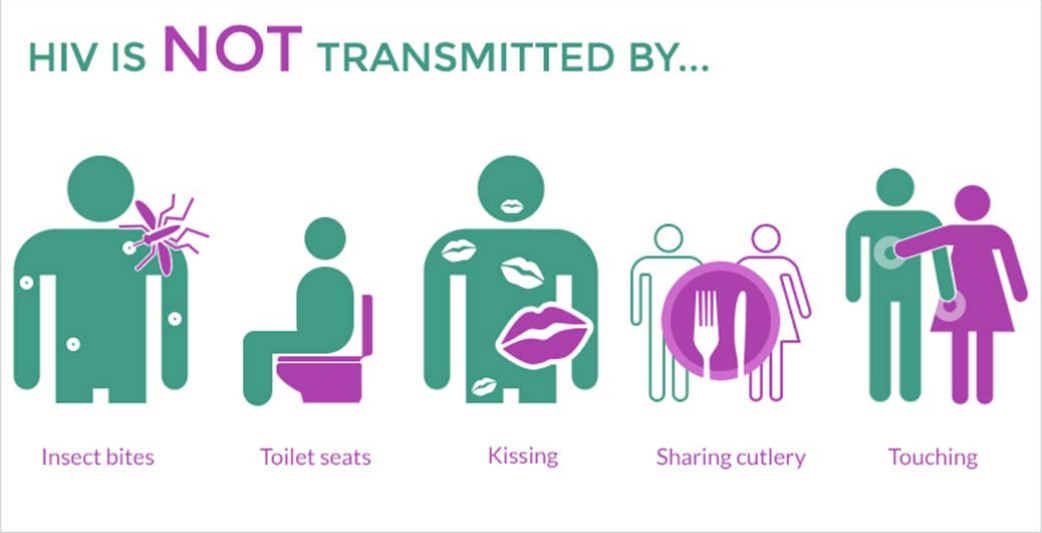
3. Extremely rare ways HIV is transmitted

   a. Oral sex. HIV is very unlikely to transmit through oral sex even without any protection. However, theoretically if a person who has HIV ejaculates in his partner's mouth the infection is possible, if his partner has sores or bleeding gums.

   b. Medical service. In very rare cases receiving blood transfusions, organ transplants could cause the infection.

   c. Contact between broken skin, open wounds, etc. There are no risks of getting infected by contacting HIV-contaminated body fluids or objects with skin unless you have any open wounds or your skin is broken.

   d. Deep-open mouth kissing. If both individuals involved in the contact have sores or bleeding gums in their mouth there could be a small chance of transmission. However, HIV is not spread through saliva. In most of the cases kissing HIV positive people will not cause infection.



(Source: www.avert.org)

IV. How is HIV diagnosed?

Remember: Having a fever, cough, rash, or any other symptoms within several days after sexual activities does not necessarily mean that you are infected with HIV! On the other hand, being infected with HIV could show no symptoms for first few years. Thus it's important not to panic when you suspect being infected as well as to seek for help after possible exposure whether you have any symptoms or not.

Then how do we diagnose HIV infection?

After being infected with HIV, the human body will gradually start immune response and producing antibodies, attempting to kill the invading virus. Antibodies are a special kind of protein produced by our immune cells. Each kind of antibody can interact with one or several specific antigens, which include bacteria, virus, and any kind of substance origins out of the body. That is to say, the anti-HIV antibody will only be produced and released when the body is infected by HIV. Thus, we can diagnose HIV infection by detecting these special anti-HIV antibodies.

Several rapid tests can be used to test blood or oral fluid samples and results can be obtained in 30 minutes. To avoid false negative results these tests are designed to be highly sensitive that could cause false positive results. Thus, any positive rapid test results need to be confirmed with a follow-up test.

Follow-up diagnostic tests either look for antibodies or look for the virus itself. A positive result of follow-up diagnostic is a diagnosis of HIV infection

The window period is a period during which people infected with HIV will test negative in rapid tests. Currently, with 4^{th} generation immunoassay tests, the window period is four weeks. Thus, a negative result obtained four weeks after the possible exposure can be considered as a confirmatory negative

result.

There are many clinics and organizations providing both confidential and anonymous HIV rapid tests at low or no cost. According to the CDC, more than 1 in 5 Asians living with HIV do not know they have it. It's important to know if you have HIV as soon as possible. You can find these testing locations at https://www.aids.gov/hiv-aids-basics/prevention/hiv-testing/hiv-test-locations/

V. How is HIV treated?

HIV cannot be cured yet. But there are medicines that can efficiently control the virus, making HIV infection a chronic disease, just like diabetes or high blood pressure. As a matter of fact, living with HIV is much easier than living with diabetes or high blood pressure today.

The treatment with HIV medicines is called antiretroviral therapy or ART. The therapy uses a combination of medicines to prevent HIV from multiplying, which reduces the amount of HIV in the body. The amount of HIV in blood is known as viral load. Decreasing viral load gives the body's immune system time to recover from being overwhelmed by HIV and regain its ability to fight off other infections and cancers.

There are six classes of HIV medicines including over 25 approved drugs. Some of these drugs are available in combination, meaning all-in-one pill. All of these medicines from different classes can prevent HIV from multiplying by working at different stages of the HIV lifecycle. HIV medicines can cause some side-effects and may not be suitable for some people with special medical conditions. Be sure to inform your healthcare provider all your health conditions when considering starting treatment.

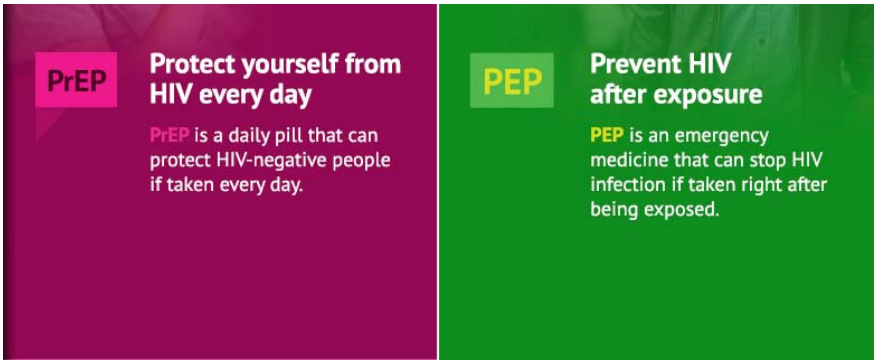
VI. Safer sex tips

(Source: www.fda.gov)

a. Know your status. People may even observe no symptoms for the first few years after HIV infection. Once they start to feel symptoms, they may have already progressed to full-blown AIDS and could already be in a very dangerous condition. Regular testing is recommended to all sexually active people. Knowing your own status is being responsible for both yourself and your partners.

b. Use condoms. Condoms are one of the best protections you can have during an intercourse. No HIV infections with the appropriate use of condoms have been reported so far.

c. Know about PEP/ Ask your doctor about PrEP.



(Source: www.hivsupport.co.za)

Post-exposure prophylaxis (PEP) can help prevent you from being infected with HIV if taken within three days after exposure. So if you suspect being exposed, don't hesitate and ask a doctor about PEP right away.

Pre-exposure prophylaxis (PrEP) is a medicine that prevents people from being infected with HIV if taken every day regularly. PrEP is a very powerful prevention tool, with which you will not be infected even if you have unprotected vaginal or anal sex with someone who has HIV or use HIV-contaminated needles or syringes for injection dugs.

VII. See also

1. The U.S. Department of Health & Human Services: https://www.aids.gov
2. Centers for Disease Control and Prevention: http://www.cdc.gov/hiv/
3. Ryan White HIV/AIDS program: http://hab.hrsa.gov/abouthab/aboutprogram.html