



General HIV/AIDS Information

The History of HIV

In the summer of 1981, physicians in San Francisco observed that young, previously healthy homosexual men were developing an unusual type of pneumonia which typically affected patients with damaged or suppressed immune systems. In these patients, they also began to see cases of rare skin tumors called "Kaposi's sarcoma". Previously this tumor had been seen most typically in tropical Africa and in elderly Mediterranean men. Because the disease affected those who at one time were in good health, it came to be known as Acquired Immunodeficiency Syndrome (AIDS).

The Cause of AIDS

In 1983, the cause of AIDS - a virus¹ -- was identified. This virus was initially called HTLV-III as it demonstrated similar features to the other human T-cell lymphotropic viruses, HTLV-I and HTLV-II. However, further study revealed important differences from HTLV-I and HTLV-II, and so the virus was renamed the Human Immunodeficiency Virus (HIV).

Today, two types of HIV have been identified - HIV-1 and HIV-2. Although their structures are slightly different, both cause AIDS and produce an identical clinical picture. HIV-1 is found all over the world, whereas HIV-2 has, to date, been seen mostly in West Africa.

How HIV Causes Disease

Infections are caused by microorganisms, which can be classified into four groups - bacteria, viruses, fungi and protozoa.

The immune system protects the body from infection and is made up of a variety of different cells. The main cells that are affected by HIV are lymphocytes, a type of white blood cell. There are two types of lymphocytes – T-lymphocytes and B-lymphocytes.

¹ **Virus:** a minute infective agent that can only replicate inside living cells.

- T-lymphocytes kill organisms by attacking them directly.
- B-lymphocytes help to destroy organisms by producing substances called antibodies. These antibodies latch on to an infecting organism and stimulate a chemical pathway (called the "complement system") that leads to the destruction of the organism. Alternatively, antibodies may act by enhancing the action of the T-lymphocytes and other cells.

The cells of the immune system work together in a complex manner. A particular type of T-lymphocyte, the T-helper lymphocyte (or CD4 cell) plays an extremely important role in maintaining the proper function of the immune system. For this reason the CD4 cell has been described as the "conductor" of the immune system "orchestra".

HIV infects only cells, which carry a specific receptor on their surface. This is called a CD4 receptor. Only a limited number of types of cells in the body carry the CD4 receptor and are therefore capable of being infected by HIV. These are:

- T-helper lymphocytes (CD4 cells)
- Other blood cells called macrophages and monocytes
- Certain brain cells
- Cells lining the gut (gut mucosa)

HIV infects cells by attaching itself to the outside of the cell via the CD4 receptor. The virus then enters the cell and travels towards the cell nucleus.

HIV contains only a single strand of "genetic material" or ribonucleic acid (RNA) and is therefore only known as an "RNA virus". However, HIV carries a specific enzyme called reverse transcriptase, which is able to convert its single-stranded RNA into a double strand. This double strand is called deoxyribonucleic acid (DNA). The DNA produced by the virus is then able to integrate into the cell chromosomes or DNA of the infected cell.

HIV can remain in a relatively dormant state within the cell for many years. It is thought that the lymph glands act as an important reservoir of HIV infected cells.

Viral activation and subsequent replication (i.e. when the virus begins to multiply) cause the T-helper lymphocytes (CD4 cells) to function inadequately and to slowly reduce in number. This steady suppression of the immune system can be documented in patients by measuring the number of CD4 cells in a blood sample. This is repeated at regular intervals, such as every few months. The CD4 count for healthy individuals ranges between 500 and 2200. Once the CD4 count falls below 200, the patient is at a much greater risk of developing AIDS. It is currently unclear why HIV becomes highly active and undergoes rapid replication after a period of relative dormancy.

In the early stages of HIV infection, within the first few years, the virus is relatively inactive and the T-helper lymphocyte numbers are normal. However, very careful laboratory testing is able to show that these lymphocytes fail to function normally. At this stage of infection, the body is still capable of fighting infections adequately.

In the later stages of HIV infection, usually after several years, the T-helper cells continue to function inadequately and, in addition, are greatly reduced in number. This leads eventually to the development of certain infections and cancers, the stage of HIV infection called AIDS.

Routes of HIV Transmission

Since HIV infects T-helper cells, only body fluids containing these cells may be potentially infectious. The body fluids, which pose the greatest risk for transmitting infection, are:

1. Semen
 2. Female genital secretions (from the cervix and vagina)
 3. Blood
 4. Breast milk
 5. Saliva (virus present at very low levels)
1. About 75% of cases of HIV infection worldwide have resulted from vaginal intercourse. This is the most common mode of transmission of HIV in sub-Saharan Africa. A number of studies have examined the rate of HIV transmission between heterosexual couples. The prevalence, or the number of people with a disease at a single point in time, of HIV infection among female partners of infected men ranges from 15% to 30% in most studies from Europe and the United States. Some studies from Africa have reported higher rates of transmission. This is possibly due to co-existent genital ulcer disease, which acts as a co-factor in assisting transmission. It is proven that the eradication of other STDs greatly reduces the rates of HIV transmission.
 2. Female to male transmission is generally less effective than male to female transmission. A recent large-scale European study reported a female to male transmission rate of 12% compared to a male to female transmission rate of 20%.
 3. Injecting drug users (IDUs) may transfer HIV via contaminated needles and syringes. In some cities, a large proportion of IDUs are infected with HIV (e.g. 40% of IDUs in Edinburgh).

Transmission from infected individuals to caretakers and health care workers (HCWs) is fortunately uncommon. For example, the risk to a HCW of acquiring HIV infection following a needle-stick injury with blood from an infected patient is about 0.3%.

About 35 HCWs worldwide have been reported to have acquired HIV from patients. There are some reports of HCWs acquiring HIV via splashes of blood to the mucous membranes (eyes, mouth), and one report of infection of a HCW with eczema on her hands.

In the Europe and the USA, blood transfusion poses virtually no risk of infection since all donations are screened for antibodies to HIV.

4. HIV has been isolated in breast milk and cases of transmission by breast-feeding have been reported. Breast milk is an important source of nutrition and has a protective effect against certain infections in the baby. In developing countries, the risk to the baby's health from not breast-feeding far outweighs the risk of acquiring HIV from breast milk. It is therefore recommended that, in developing countries, HIV positive mothers should continue to breast-feed. However, in developed countries, the risk of HIV transmission outweighs the need to breast-feed and therefore most authorities would advise HIV infected mothers against breast-feeding.

The risk of the infected mother passing on HIV to her baby ranges from 10% to 40%. A large study performed in many centers throughout Europe reported a transmission rate of 14%. The risk may vary according to the stage of disease in the mother. HIV may be transmitted to the baby across the placenta during the pregnancy (in-utero) or during the birth by the mixing of fetal and maternal blood.

Any act, which allows contaminated fluids from an infected individual to enter the body of another individual, may be considered a potential method of viral transmission. However, it should be emphasized that infection by these routes has not been documented to date. These include:

- Ear-piercing
- Rituals involving blood
- Sharing of sex-toys
- Sharing razors
- Tattooing

You must therefore exercise caution in dealing with HIV.

Clinical Features of HIV Infection

Between two and six months after acquiring HIV infection, about 50% of individuals develop a flu-like illness. The blood test for HIV antibodies will become positive at this point - so called seroconversion.

In most cases, HIV progresses very slowly with symptoms developing some years after infection. Most people have no symptoms and remain unaware of their state.

After a variable number of years, some patients will develop painless lymph gland enlargement. This is obvious in some of the children, whose faces have become distinctly swollen in the upper jaw.

After a further variable number of years, some patients develop constitutional symptoms of HIV infection. Symptoms include marked weight loss, lethargy, diarrhea, and severe night sweats. Oral thrush may also be present and cause soreness in the mouth. At this point the patient is moderately immunosuppressed and will usually have a reduced T-helper cell count. Again these symptoms can be readily identified in some of the people you will meet.

The next stage is the development of AIDS. This is diagnosed when an individual develops certain specific life-threatening infections: cancers or nervous-system complications. Although there are strict criteria for making a diagnosis of AIDS, this is not a particularly helpful term and is merely a marker of end-stage immunosuppression. About 50% of infected individuals will develop AIDS after approximately eleven years of infection.

The clinical problems associated with AIDS are the result of:

- Opportunistic infections – Infections that only produce disease in individuals with immunosuppression
- Cancers
- Direct tissue damage – Caused by HIV (e.g. HIV may produce dementia by directly affecting certain brain cells and diarrhea by directly infecting gut mucosal cells).

The clinical features of AIDS will depend upon which body organs or systems are affected.

Clinical Features of End-Stage HIV Disease (AIDS)

Disorders of the digestive system associated with HIV infection include: painful swallowing; abdominal pain; weight loss; diarrhea; and anal and genital ulceration.

Disorders of the nervous system associated with HIV infection include: poor memory; poor concentration; headache; limb weakness; fits; and dementia.

Disorders of the respiratory system associated with HIV infection include: cough and breathlessness.

Skin problems associated with HIV include: cancers, in particular Kaposi's Sarcoma which presents itself as red-purple slightly raised painless blotches; ulcerations, in particular oral or ano-genital herpes; and dermatitis plus other skin rashes. A common skin-disease is the moluscum (small white spots/sores) that many children have on their faces and may also have anally. These are highly contagious, but no volunteer has yet been infected with them. The emergence on more than one area of the body is symptomatic of a suppressed immune system.

In Africa a major killer of AIDS patients is tuberculosis.

Testing for HIV

The most widely used test for detecting the presence of HIV infection is the "HIV antibody test" which measures antibodies against the virus in a blood sample.

These antibodies take about two to three months to appear in the blood after infection, although often they take slightly longer – in some cases up to six months. Because of this delay in producing antibodies, an individual in the first few months of infection can be infectious and yet have a negative blood test. This is called the "window period" and must be taken into account when going for an HIV test.

Viral culture and antigen tests (i.e. detecting the virus itself rather than the antibodies) can also be performed. However, these are more difficult to perform than antibody detection and are less useful than routine testing.

Testing New-Born Babies

When a young baby is tested for HIV using the standard anti-body test, the test results will generally pick up the mother's antibodies, which the child inherited in

the womb. However, during the first six to eighteen months, the child will develop his or her own anti-bodies, and only after several months will the child's own anti-bodies be identified. If the child has not been breast-fed, then his or her chances of being negative are quite high, up to 85%. If the child has been breast-fed, this falls to approximately 70%. The babies who are described as having "turned negative" are then given up for adoption.

Treatment of HIV Infection

Treatment is aimed at the various opportunistic infections, which result from HIV infection. Depending on the microorganism involved, infections will be treated either with antibiotics, anti-viral agents, anti-fungal agents, or anti-protozoal agents.

Various expensive therapies are being used in Europe and America, but due to their very high cost, these are available only to the very wealthiest in Africa, if at all.

As you may be aware, vaccine trials are currently underway. How long it will be before a reliable vaccine is available, and at a cost low enough to be truly available in Africa, is still completely unpredictable.

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