



# FACT SHEET

Office of  
Communications  
and Public Liaison

National Institute of Allergy and Infectious Diseases

National Institutes of Health

## HIV Infection and AIDS

AIDS – acquired immune deficiency syndrome – was first reported in the United States in 1981 and has since become a major worldwide epidemic. AIDS is caused by the human immunodeficiency virus (HIV). By killing or impairing cells of the immune system, HIV progressively destroys the body's ability to fight infections and certain cancers. Individuals diagnosed with AIDS are susceptible to life-threatening diseases called opportunistic infections, which are caused by microbes that usually do not cause illness in healthy people.

More than 600,000 cases of AIDS have been reported in the United States since 1981, and as many as 900,000 Americans may be infected with HIV. The epidemic is growing most rapidly among minority populations and is a leading killer of African-American males. According to the U.S. Centers for Disease Control and Prevention (CDC), the prevalence of AIDS is six times higher in African-Americans and three times higher among Hispanics than among whites.

### Transmission

HIV is spread most commonly by sexual contact with an infected partner. The virus can enter the body through the lining of the vagina, vulva, penis, rectum or mouth during sex.

HIV also is spread through contact with infected blood. Prior to the screening of blood for evidence of HIV infection and before the introduction in 1985 of heat-treating techniques to destroy HIV in blood products, HIV was transmitted through transfusions of contaminated blood or blood components. Today, because of blood screening and heat treatment, the risk of acquiring HIV from such transfusions is extremely small.

HIV frequently is spread among injection drug users by the sharing of needles or syringes contaminated with minute quantities of blood of someone infected with the virus. However, transmission from patient to health-care worker or vice-versa via accidental sticks with contaminated needles or other medical instruments is rare.

Women can transmit HIV to their fetuses during pregnancy or birth. Approximately one-quarter to one-third of all untreated pregnant women infected with HIV will pass the infection to their babies. HIV also can be spread to babies through the breast milk of mothers infected with the virus. If the drug AZT is taken during pregnancy, the chance of transmitting HIV to the

baby is reduced significantly. If AZT treatment of mothers is combined with cesarean sectioning to deliver infants, infection rates can be reduced to 1 percent.

Although researchers have detected HIV in the saliva of infected individuals, no evidence exists that the virus is spread by contact with saliva. Laboratory studies reveal that saliva has natural compounds that inhibit the infectiousness of HIV. Studies of people infected with HIV have found no evidence that the virus is spread to others through saliva such as by kissing. No one knows, however, the risk of infection from so-called "deep" kissing, involving the exchange of large amounts of saliva, or by oral intercourse. Scientists also have found no evidence that HIV is spread through sweat, tears, urine or feces.

Studies of families of HIV-infected people have shown clearly that HIV is not spread through casual contact such as the sharing of food utensils, towels and bedding, swimming pools, telephones or toilet seats. HIV is not spread by biting insects such as mosquitoes or bedbugs.

HIV can infect anyone who practices risky behaviors such as:

- sharing drug needles or syringes;
- having sexual contact without using a latex male condom with an infected person or with someone whose HIV status is unknown.

Having another sexually transmitted disease such as syphilis, herpes, chlamydial infection, gonorrhea or bacterial vaginosis appears to make someone more susceptible to acquiring HIV infection during sex with an infected partner.

## Early Symptoms

Many people do not develop any symptoms when they first become infected with HIV. Some people, however, have a flu-like illness within a month or two after exposure to the virus. They may have fever, headache, malaise and enlarged lymph nodes (organs of the immune system easily felt in the neck and groin). These symptoms usually disappear within a week to a month and are often mistaken for those of another viral infection. People are very infectious during this period, and HIV is present in large quantities in genital secretions.

More persistent or severe symptoms may not surface for a decade or more after HIV first enters the body in adults, or within two years in children born with HIV infection. This period of "asymptomatic" infection is highly variable. Some people may begin to have symptoms in as soon as a few months, whereas others may be symptom-free for more than 10 years. During the asymptomatic period, however, HIV is actively multiplying, infecting and killing cells of the immune system. HIV's effect is seen most obviously in a decline in the blood levels of CD4+ T cells (also called T4 cells) – the immune system's key infection fighters. The virus initially disables or destroys these cells without causing symptoms.

As the immune system deteriorates, a variety of complications begins to surface. One of the first such symptoms experienced by many people infected with HIV is large lymph nodes or "swollen glands" that may be enlarged for more than three months. Other symptoms often experienced months to years before the onset of AIDS include a lack of energy, weight loss, frequent fevers and sweats, persistent or frequent yeast infections (oral or vaginal), persistent skin rashes or flaky skin, pelvic inflammatory disease that does not respond to treatment, or short-term memory loss.

Some people develop frequent and severe herpes infections that cause mouth, genital or anal sores, or a painful nerve disease known as shingles. Children may have delayed development or failure to thrive.

## AIDS

The term AIDS applies to the most advanced stages of HIV infection. Official criteria for the definition of AIDS are developed by the CDC in Atlanta, Ga., which is responsible for tracking the spread of AIDS in the United States.

In 1993, CDC revised its definition of AIDS to include all HIV-infected people who have fewer than 200 CD4+ T cells. (Healthy adults usually have CD4+ T-cell counts of 1,000 or more.) In addition, the definition includes 26 clinical conditions that affect people with advanced HIV disease. Most AIDS-defining conditions are opportunistic infections, which rarely cause harm in healthy individuals. In people with AIDS, however, these infections are often severe and sometimes fatal because the immune system is so ravaged by HIV that the body cannot fight off certain bacteria, viruses and other microbes.

Opportunistic infections common in people with AIDS cause such symptoms as coughing, shortness of breath, seizures, mental symptoms such as confusion and forgetfulness, severe and persistent diarrhea, fever, vision loss, severe headaches, weight loss, extreme fatigue, nausea, vomiting, lack of coordination, coma, abdominal cramps, or difficult or painful swallowing.

Although children with AIDS are susceptible to the same opportunistic infections as adults with the disease, they also experience severe forms of the bacterial infections to which children are especially prone, such as conjunctivitis (pink eye), ear infections and tonsillitis.

People with AIDS are particularly prone to developing various cancers, especially those caused by viruses such as Kaposi's sarcoma and cervical cancer, or cancers of the immune system known as lymphomas. These cancers are usually more aggressive and difficult to treat in people with AIDS. Hallmarks of Kaposi's sarcoma in light-skinned people are round brown, reddish or purple spots that develop in the skin or in the mouth. In dark-skinned people, the spots are more pigmented.

During the course of HIV infection, most people experience a gradual decline in the number of CD4+ T cells, although some individuals may have abrupt and

dramatic drops in their CD4+ T-cell counts. A person with CD4+ T cells above 200 may experience some of the early symptoms of HIV disease. Others may have no symptoms even though their CD4+ T-cell count is below 200.

Many people are so debilitated by the symptoms of AIDS that they are unable to hold steady employment or do household chores. Other people with AIDS may experience phases of intense life-threatening illness followed by phases of normal functioning.

A small number of people (less than 5%) initially infected with HIV 10 or more years ago have not developed symptoms of AIDS. Scientists are trying to determine what factors may account for their lack of progression to AIDS, such as particular characteristics of their immune systems, or whether they were infected with a less aggressive strain of the virus or if their genetic make-up may protect them from the effects of HIV. Scientists hope that understanding the body's natural method of control may lead to ideas for protective HIV vaccines and use of vaccines to prevent disease progression.

## Diagnosis

Because early HIV infection often causes no symptoms, it is primarily detected by testing a person's blood for the presence of antibodies (disease-fighting proteins) to HIV. HIV antibodies generally do not reach detectable levels until one to three months following infection and may take as long as six months to be generated in quantities large enough to show up in standard blood tests. HIV testing may also be performed on saliva and urine samples, in addition to blood samples.

People exposed to HIV should be tested for HIV infection as soon as they are likely to develop antibodies to the virus. Such early testing will enable them to receive appropriate treatment at a time when they are most able to combat HIV and prevent the emergence of certain opportunistic infections (see **Treatment** below). Early testing also alerts HIV-infected people to avoid high-risk behaviors that could spread HIV to others.

HIV testing is done in most doctors' offices or health clinics and should be accompanied by counseling. Individuals can be tested anonymously at many sites if they have particular concerns about confidentiality. In addition, blood samples for anonymous HIV testing may now be collected at home. Home-based test kits are available by telephone order or over the counter at pharmacies.

Two different types of antibody tests, ELISA and Western Blot, are used to diagnose HIV infection. If a person is highly likely to be infected with HIV and yet both tests are negative, a doctor may test for the presence of HIV itself in the blood. The person also may be told to repeat antibody testing at a later date, when antibodies to HIV are more likely to have developed.

Babies born to mothers infected with HIV may or may not be infected with the

virus, but all carry their mothers' antibodies to HIV for several months. If these babies lack symptoms, a definitive diagnosis of HIV infection using standard antibody tests cannot be made until after 15 months of age. By then, babies are unlikely to still carry their mothers' antibodies and will have produced their own, if they are infected. New technologies to detect HIV itself are being used to more accurately determine HIV infection in infants between ages 3 months and 15 months. A number of blood tests are being evaluated to determine if they can diagnose HIV infection in babies younger than 3 months.

## Treatment

When AIDS first surfaced in the United States, no drugs were available to combat the underlying immune deficiency and few treatments existed for the opportunistic diseases that resulted. Over the past 10 years, however, therapies have been developed to fight both HIV infection and its associated infections and cancers.

The Food and Drug Administration has approved a number of drugs for the treatment of HIV infection. The first group of drugs used to treat HIV infection, called nucleoside analog reverse transcriptase inhibitors (NRTIs), interrupt an early stage of virus replication. Included in this class of drugs are zidovudine (also known as AZT), zalcitabine (ddC), didanosine (ddI), stavudine (D4T), lamivudine (3TC) and abacavir succinate. These drugs may slow the spread of HIV in the body and delay the onset of opportunistic infections. Importantly, they do not prevent transmission of HIV to other individuals. Non-nucleoside reverse transcriptase inhibitors (NNRTIs) such as delavirdine, nevirapine and efavirenz are also available for use in combination with other antiretroviral drugs.

A third class of anti-HIV drugs, called protease inhibitors, interrupts virus replication at a later step in its life cycle. They include ritonavir, saquinavir, indinavir and nelfinavir. Because HIV can become resistant to each class of drugs, combination treatment using both is necessary to effectively suppress the virus.

Currently available antiretroviral drugs do not cure people of HIV infection or AIDS, however, and they all have side effects that can be severe. AZT may cause a depletion of red or white blood cells, especially when taken in the later stages of the disease. If the loss of blood cells is severe, treatment with AZT must be stopped. DdI can cause an inflammation of the pancreas and painful nerve damage.

The most common side effects associated with protease inhibitors include nausea, diarrhea and other gastrointestinal symptoms. In addition, protease inhibitors can interact with other drugs resulting in serious side effects. Investigators also recently have reported cases of abnormal redistribution of body fat among some individuals receiving protease inhibitors.

A number of drugs are available to help treat opportunistic infections to which

people with HIV are especially prone. These drugs include foscarnet and ganciclovir, used to treat cytomegalovirus eye infections, fluconazole to treat yeast and other fungal infections, and TMP/SMX or pentamidine to treat *Pneumocystis carinii* pneumonia (PCP).

In addition to antiretroviral therapy, adults with HIV whose CD4+ T-cell counts drop below 200 are given treatment to prevent the occurrence of PCP, which is one of the most common and deadly opportunistic infections associated with HIV. Children are given PCP preventive therapy when their CD4+ T-cell counts drop to levels considered below normal for their age group. Regardless of their CD4+ T-cell counts, HIV-infected children and adults who have survived an episode of PCP are given drugs for the rest of their lives to prevent a recurrence of the pneumonia.

HIV-infected individuals who develop Kaposi's sarcoma or other cancers are treated with radiation, chemotherapy or injections of alpha interferon, a genetically engineered naturally occurring protein.

## Prevention

Since no vaccine for HIV is available, the only way to prevent infection by the virus is to avoid behaviors that put a person at risk of infection, such as sharing needles and having unprotected sex.

Because many people infected with HIV have no symptoms, there is no way of knowing with certainty whether a sexual partner is infected unless he or she has been repeatedly tested for the virus or has not engaged in any risky behavior. CDC recommends that people either abstain from sex or protect themselves by using male latex condoms whenever having oral, anal or vaginal sex. Only male condoms made of latex should be used, and water-based lubricants should be used with latex condoms.

Although some laboratory evidence shows that spermicides can kill HIV organisms, in clinical trials, researchers have not found that these products can prevent HIV.

The risk of HIV transmission from a pregnant woman to her fetus is significantly reduced if she takes AZT during pregnancy, labor and delivery, and her baby takes it for the first six weeks of life.

## Research

NIAID-supported investigators are conducting an abundance of research on HIV infection, including the development and testing of HIV vaccines and new therapies for the disease and some of its associated conditions. More than a dozen HIV vaccines are being tested in people, and many drugs for HIV infection or AIDS-associated opportunistic infections are either in development or being tested. Researchers also are investigating exactly how HIV damages the immune system. This research is suggesting new and more effective targets for drugs and vaccines. NIAID-supported investigators also continue to

document how the disease progresses in different people.

For information about studies of new HIV therapies, call the AIDS Clinical Trials Information Service:

**1-800-TRIALS-A**  
**1-800-243-7012 (TDD/Deaf Access)**

For federally approved treatment guidelines on HIV/AIDS, call the HIV/AIDS Treatment Information Service:

**1-800-HIV-0440**  
**1-800-243-7012 (TDD/Deaf Access)**

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