LESSON #9

RESOURCES

Section 3

HIV and AIDS

Objectives

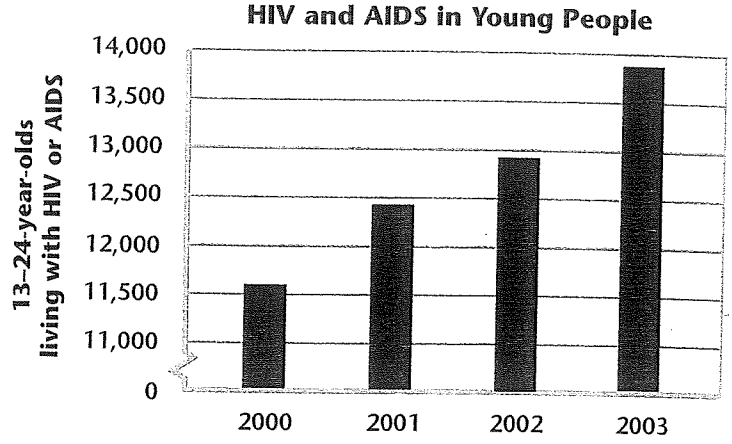
- **Explain** how HIV infection leads to AIDS.
- **Describe** how HIV is transmitted from person to person.
- **Summarize** the state of HIV infection and AIDS throughout the world.

Vocabulary

- HIV
- AIDS
- asymptomatic stage
- opportunistic infection

Warm-Up

Health Stats What health trend does this graph reveal?



WRITING What factors might account for this trend?

HIV Infection

The most serious incurable STI is caused by the human immunodeficiency virus, commonly called **HIV.** As of 2004, 1 million Americans were reported to be living with HIV. And 13- to 24-year-olds account for approximately 13% of HIV cases reported in the United States.

HIV infection can lead to **AIDS,** or acquired immunodeficiency syndrome, which is an often fatal disease of the immune system. **HIV attacks specific cells of the immune system, disabling the body's defenses against other pathogens. When the immune system becomes severely disabled, the infected person has AIDS.**

How HIV Attacks the Immune System Inside the body, HIV infects helper T cells, which stimulate other cells of the immune system to produce antibodies against invading pathogens. Inside a helper T cell, HIV reproduces, killing the cell in the process. The new viruses are released from the cell and move on to destroy other helper T cells.

By counting the number of helper T cells that remain active in the body, the progression of HIV infection can be monitored. The fewer helper T cells, the more advanced the disease. Figure 9 shows how helper T cell counts can be used to monitor the progression of the disease.

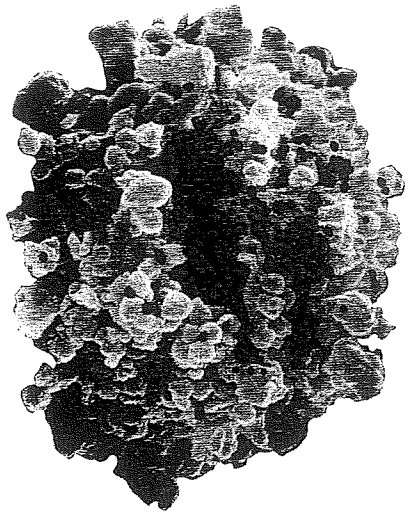
Stages of HIV Infection HIV slowly destroys the immune system. Doctors describe HIV infection as progressing through three stages.

- **Asymptomatic Stage** Soon after exposure to HIV, an infected person may experience flulike symptoms, which usually go away after a few weeks. Many months or years may follow during which the person shows no outward signs of disease. Because of the lack of symptoms, this period is called the **asymptomatic stage.** During this stage, the virus destroys helper T cells. People in the asymptomatic stage can infect others even though they feel fine.

- **Symptomatic Stage** When an HIV-infected person starts to experience symptoms, he or she has entered the symptomatic stage of infection. Symptoms may include weight loss, a persistent fever, diarrhea, or fungal infections. Such symptoms may not appear until 7 to 10 years after infection with HIV.

- **AIDS** The onset of AIDS is usually marked by a very low number of helper T cells in the blood, as shown in Figure 9. At this stage, HIV-infected people are usually experiencing even more severe symptoms than in the symptomatic stage. Because the body's ability to fight disease has been weakened by HIV, they are susceptible to infections that a healthy person's immune system could easily fight off.

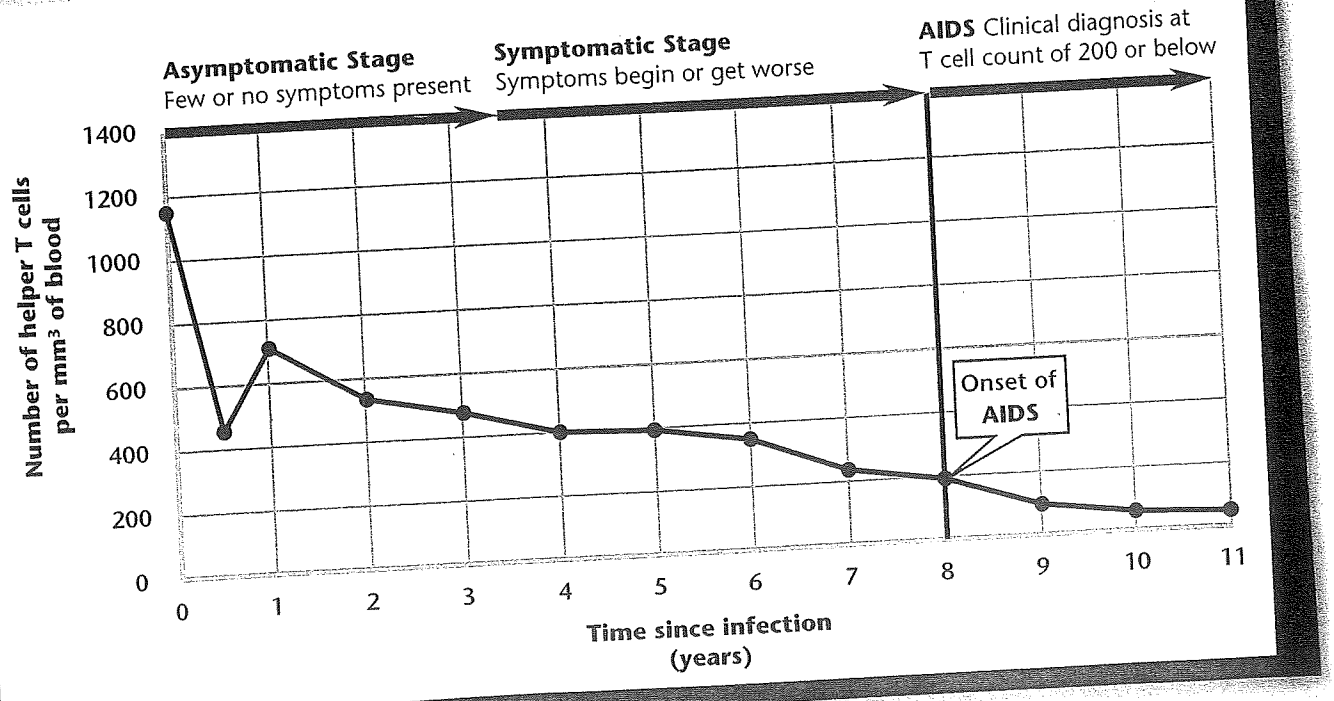
Connect to YOUR LIFE **Can you assume that someone who looks healthy is not infected with HIV? Explain.**



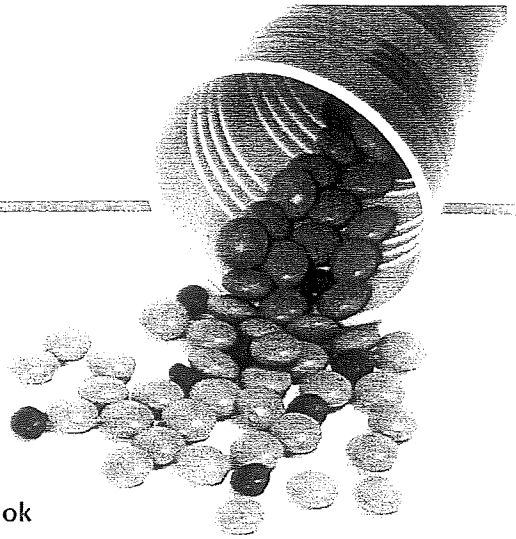
▲ HIV viruses (red) emerging from a human helper T cell

FIGURE 9 The number of helper T cells in the blood decreases as HIV infects and destroys more cells. **Reading Graphs** Describe how T cell counts change over time in a person infected with HIV.

T Cell Count and HIV Infection



Hands-On Activity



How Quickly Can HIV Spread?

Materials

cups
chocolate candies
cinnamon candies

Try This

1. Your teacher will give you a cup filled with small candies. Do not look inside the cup.
2. Walk around the room until your teacher tells you to stop. At that point, pair up with the student closest to you.
3. Pour a few of the candies from your cup into your partner's cup. Your partner should also pour some candies into your cup.
4. Repeat steps 2 and 3 two more times.
5. Look at the candies in your cup. If you have a cinnamon candy, you have been "infected" with HIV.

Think and Discuss

1. How many people in your class ended up with a cinnamon candy (HIV) in their cup? Would it surprise you to learn that only one person was infected to begin with?
2. Suppose that each person you exchanged candies with represents a sexual partner. How many people other than you did each of your partners exchange candies with? What does this suggest about having multiple sexual partners and the chances of getting infected with HIV or another STI?

Opportunistic Infections The infections that attack a person with a weakened immune system are called **opportunistic infections.** AIDS is characterized by the appearance of one or more opportunistic infections. These opportunistic infections include tuberculosis, fungal infections, and a lung disease called pneumocystis carinii pneumonia (noo moh SIS tis kuh RY nee eye). Certain types of cancer are also more common in people with AIDS, including cancer of the cervix and Kaposi's sarcoma (kuh POH seez sahr KOH muh), a kind of skin cancer.

People living with AIDS often experience severe weight loss. As the disease progresses, the virus may attack the brain and nervous system, causing blindness, depression, and mental deterioration. Death is usually caused by an opportunistic infection.

Connect to YOUR LIFE Would you spend time with a friend who is HIV-positive if you were sick with the flu? Explain.

Transmission of HIV

People with HIV are infectious whether or not they have any symptoms of disease. **Individuals infected with HIV can pass the virus on to someone else through the exchange of blood, semen, vaginal secretions, or breast milk.**

Risky Behaviors There are four main ways that HIV spreads from person to person.

- **Sexual Contact** HIV can be transmitted through any form of sexual contact that involves contact with an infected person's body fluids, including vaginal, oral, and anal sex. Infected fluids can enter a person's bloodstream through sores or tiny cuts in the lining of the mouth, vagina, rectum, or opening of the penis.
- **Shared Needles** HIV can be transmitted through shared needles or syringes that are contaminated with the blood of an infected person. Therefore, sharing needles for tattoos or body piercings and injecting illegal drugs put you at risk for HIV infection.
- **Contact With Blood** HIV can be transmitted if a person has an open cut or sore that comes into contact with the blood or blood parts of an infected person. Avoid all contact with others' blood.
- **Mother to Baby** HIV can pass from an infected mother to her child, either during pregnancy, birth, or breast-feeding. Certain drugs can decrease the chances of transmission during pregnancy, and the doctor might deliver the baby by cesarean section to reduce the risk of transmission during birth. In addition, mothers infected with HIV should not breast-feed their babies.

Go Online HEALTH LINKS

For: Updates on AIDS
Visit: www.SciLinks.org/health
Web Code: ctn-7223

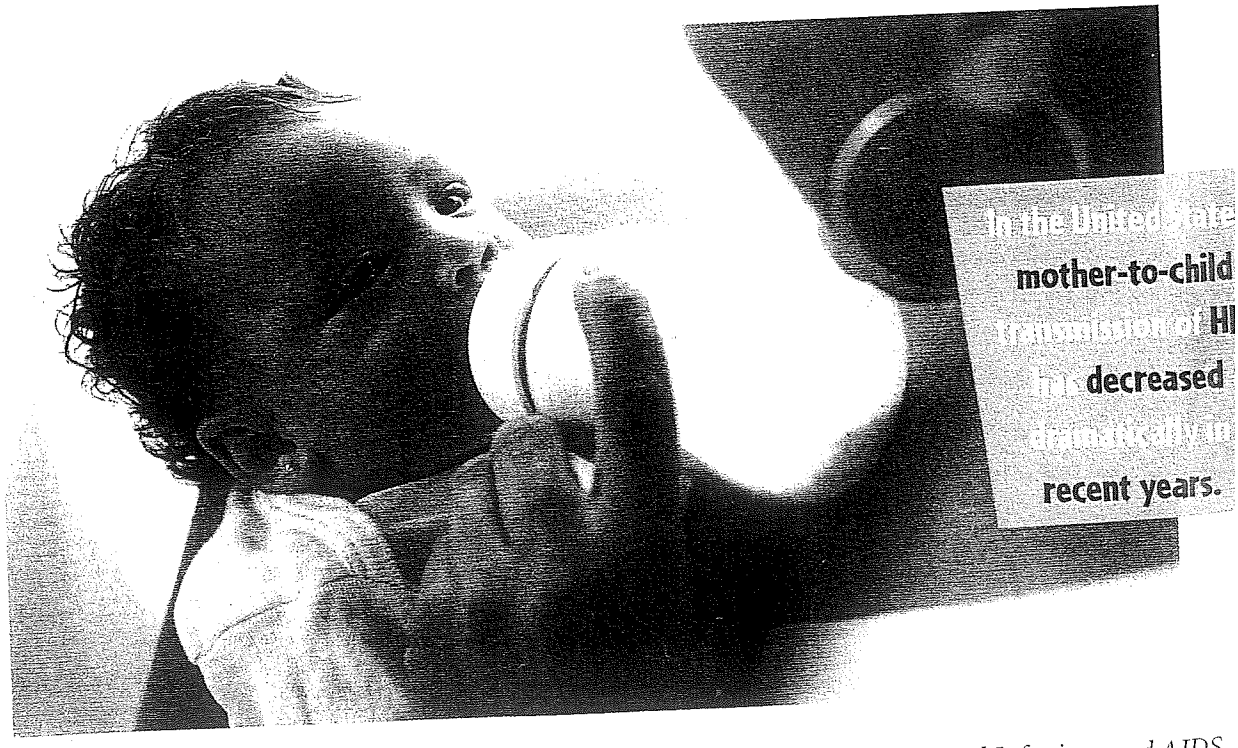


FIGURE 10 It is safer for an HIV positive mother to bottle-feed, rather than breast-feed, her baby

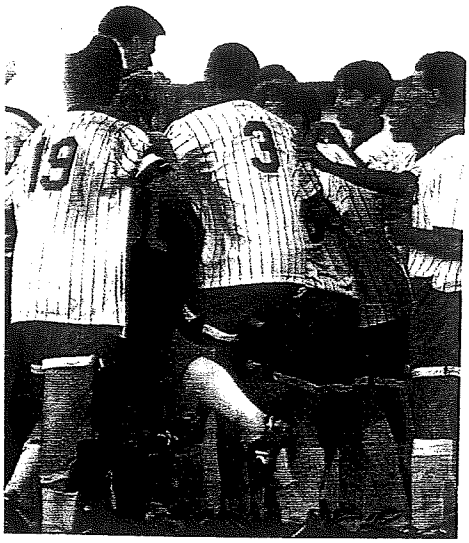


FIGURE 11 Playing contact sports such as rugby does not put you at risk for HIV infection.

Safe Behaviors HIV is not transmitted by casual contact. You cannot get HIV by going to classes or eating lunch with an infected person. You cannot get HIV by holding hands or hugging an infected person. Families who live with an infected person are not at risk of contracting HIV unless they engage in high-risk behaviors. Small amounts of HIV occur in saliva, tears, and perspiration. However, the amounts are so small that infection from contact with these fluids is unlikely.

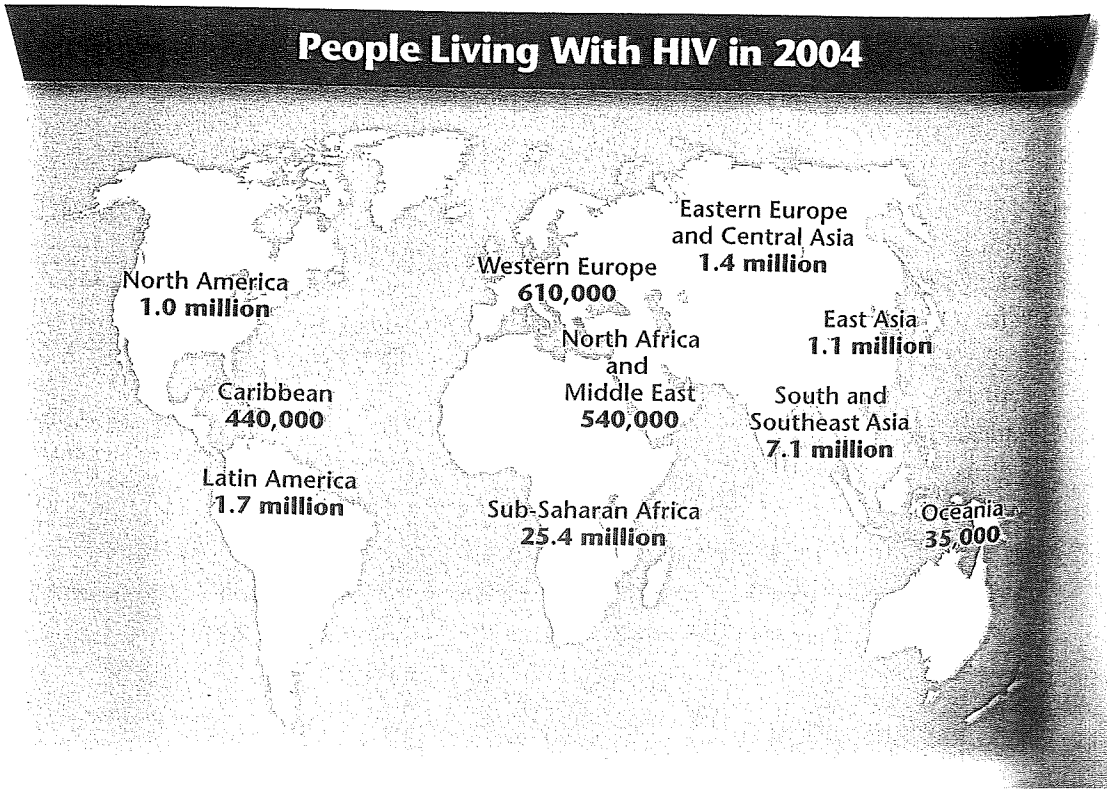
The Safety of Donated Blood The risk of getting HIV from blood transfusions is extremely small. Since 1985, all of the blood collected in the United States has been tested for the presence of HIV. Blood that tests positive for HIV antibodies is discarded. Potential donors are interviewed and are not allowed to give blood if they have engaged in behaviors that place them at risk for HIV infection.

A Global Problem

Figure 12 shows the global distribution of HIV infections. **With approximately 40 million people infected around the world, HIV and AIDS represent a global health problem.**

- **Africa** Sub-Saharan Africa accounts for more than half of all global infections. Some estimates indicate that, if infections continue to rise at the current rate, 80 million Africans may die from AIDS by 2025.
- **Asia** HIV infections are also increasing in certain parts of Asia. For example, researchers estimate that over 5 million people are living with HIV and AIDS in India.

FIGURE 12 The global distribution of HIV infections is uneven. **Sequencing** List the areas of the world from greatest number of infected people to smallest number of infected people. What position does North America have on the list?



High-Risk Groups In all areas of the world, HIV is spreading among people who share needles to inject drugs and people who engage in high-risk sexual behaviors. In many countries, young women represent the majority of new HIV infections. In sub-Saharan Africa, for example, 75% of young people infected with HIV are female. The higher infection rates in women are often due to a lack of information about how to protect themselves or, in some cases, a lack of power to protect themselves.

Education and Prevention Several international organizations are working to lessen the toll that HIV and AIDS are taking on populations all over the world. The World Health Organization and the Joint United Nations Programme on HIV/AIDS monitor the situation and recommend steps for stemming the epidemic in different countries.

The main goal of international organizations is HIV education. Making people in high-risk countries aware of how to protect themselves from HIV infection is a huge step toward prevention. Because treatment can be very expensive and inaccessible for the people at highest risk, much effort is put toward preventing HIV infection in the first place.

In addition to prevention education, international organizations coordinate treatment efforts for people already living with HIV and AIDS. Efforts are being made to provide medicine to millions of infected people in countries most affected by HIV and AIDS.

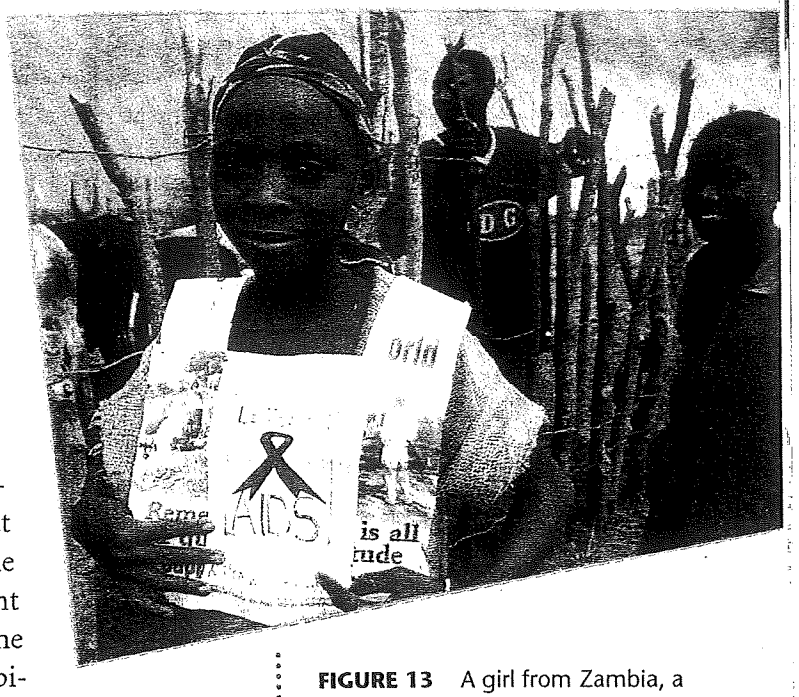


FIGURE 13 A girl from Zambia, a country in Africa, holds a sign she made for World AIDS Day.

Section 3 Review

Key Ideas and Vocabulary

1. Explain how HIV affects the immune system and how it eventually leads to AIDS.
2. What is meant by an **opportunistic infection**? Give an example.
3. What are four ways that HIV can be transmitted from an infected person to an uninfected person? List three ways HIV is *not* transmitted.
4. Which region of the world accounts for the majority of HIV infections?

Critical Thinking

5. **Making Judgments** Should teens in the United States be concerned about the global AIDS problem? Why or why not?
6. **Evaluating** HIV is more common in poorer countries than in wealthier countries. Why do you think this might be the case?

Health at School

AIDS Awareness Plan an AIDS Awareness Day at your school. Divide your class into groups to make posters about different aspects of HIV and AIDS. For example, one poster could focus on how HIV is transmitted. Another poster could focus on the status of the AIDS epidemic. Display your posters at school to help educate other students. **WRITING**

Section 4

Protecting Yourself From HIV and AIDS

Objectives

- **Identify** three behaviors that can prevent the spread of HIV.
- **Describe** how a person gets tested for HIV.
- **Describe** the goal of HIV treatment.

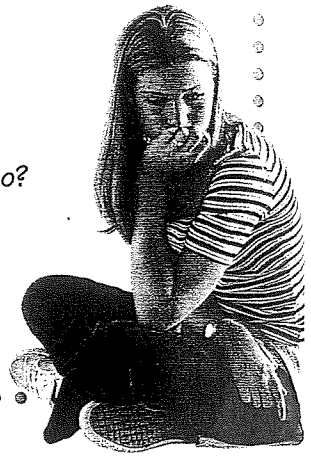
Vocabulary

- universal precautions
- HIV-positive
- viral load

Warm-Up

Dear Advice Line,

Lately my boyfriend has been asking me to have sex. I really like him, but I'm not ready for that. Plus I'm not sure he's telling me everything about his past. What should I do?



WRITING Write a response to this teen, encouraging her to choose abstinence. What would you tell her about the risk of becoming infected with HIV and other STIs?

Preventing HIV Infection

At present there is no cure for HIV or AIDS. But, the good news is that you can choose behaviors that will help you avoid this very serious disease. **You can protect yourself from HIV by practicing abstinence, avoiding drugs, and avoiding contact with others' blood and body fluids.**

Practice Abstinence Just like with other STIs, the best way to avoid HIV and AIDS is sexual abstinence. It is much easier to be abstinent if you choose friends who have also decided to be abstinent. Going out with groups of responsible friends can reduce the pressure you may feel to engage in sexual behavior.

Avoid Drugs Avoiding drug use is also extremely important for reducing the risk of HIV infection. People who share contaminated needles to inject themselves with drugs are at a high risk for contracting HIV. People who have sex with drug abusers are also at high risk. Do not inject illegal drugs, and avoid sexual contact with anyone who uses illegal drugs.

Using alcohol or other drugs can impair a person's judgment. People with impaired judgment are more likely to engage in behaviors that place them at risk. To guard against infection, you need to be able to think clearly so you can make healthy decisions.

Connect to YOUR LIFE How can your choice of friends help you avoid risky behaviors?

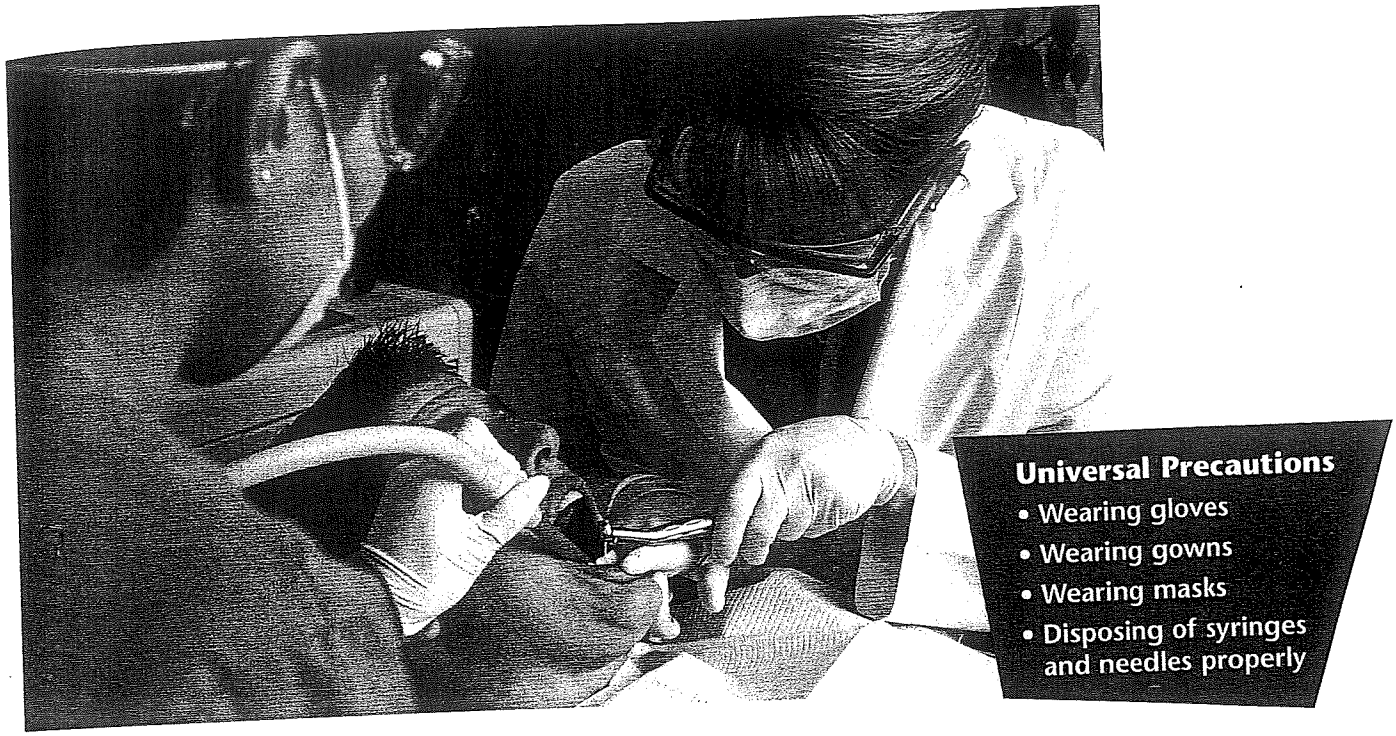


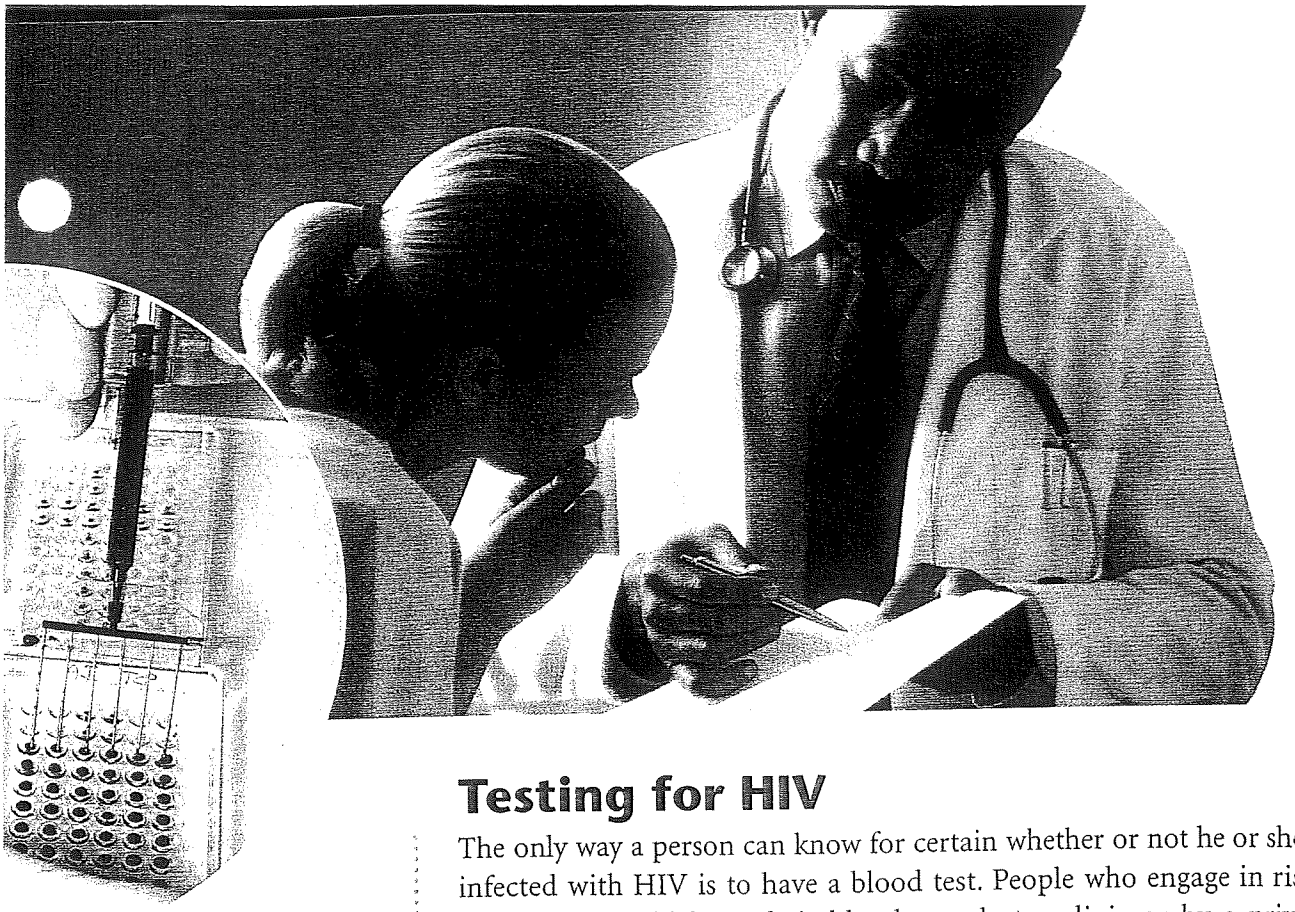
FIGURE 14 Healthcare providers protect themselves and their patients by following universal precautions.

Avoid Contact With Blood or Body Fluids Never share any personal items that may have blood or other body fluids on them. For example, razors, syringes, and piercing or tattoo needles should never be shared. In addition, mothers who are infected with HIV should not breast-feed their babies because the virus can be transmitted through breast milk.

Healthcare providers often come into contact with the blood and body fluids of patients. To reduce the risk of HIV transmission, doctors, nurses, dentists, dental hygienists, and other healthcare providers practice **universal precautions,** as listed in Figure 14.

Sexual Fidelity in Marriage For people in a long-term sexual relationship such as marriage, it is important to practice sexual fidelity. Sexual fidelity is practiced when both partners agree to have sexual contact only with one another. If both partners are uninfected, sexual fidelity eliminates the risk of getting HIV or another STI. If either partner has practiced risky behaviors in the past, he or she should be tested for HIV and other STIs.

Barrier Protection For people who are sexually active, but not in a long-term relationship they are sure is uninfected, the only way to reduce the risk of HIV infection is to use a condom during every sexual encounter. The condom must be made out of latex or polyurethane, be free of tears, and be used in accordance with the directions on the package. Condoms serve as a physical barrier against HIV and some other pathogens that cause STIs. It is important to know that condoms are not 100% effective in preventing the transmission of HIV. Abstinence is the best way to protect yourself from HIV and other STIs.



IGI 15 A blood test can eve. a person is infected with HIV. Getting an HIV-positive result can be frightening and depressing. Therefore, it is important that HIV-positive individuals receive counseling to help them deal with the emotional impacts of their infection.

Testing for HIV

The only way a person can know for certain whether or not he or she is infected with HIV is to have a blood test. People who engage in risky behaviors should have their blood tested at a clinic or by a private physician. The names of clinics that provide confidential HIV testing are available from each state's department of public health or from the Centers for Disease Control and Prevention. People who think they may have been exposed to HIV should practice abstinence to avoid spreading the virus.

In an HIV test, a person's blood is tested for antibodies to HIV. If antibodies are detected, a second test is done to verify the result. A person who is diagnosed as being infected with HIV is said to be **HIV-positive.**

An HIV-Positive Diagnosis If a person is diagnosed as HIV-positive, he or she needs to notify all previous sexual partners so that they can also be tested. Early diagnosis is important to prevent the spread of the disease and to start treatment as soon as possible.

It is difficult to cope with an HIV-positive diagnosis. For this reason, it is recommended that individuals receive counseling from a healthcare professional before being tested. People who learn they are HIV-positive should receive additional counseling.

Reasons for Follow-Up Testing If an HIV infection is recent, a blood test may not be accurate. This is because there is a lapse between the time of infection and the time when antibodies show up in a person's blood. Antibodies usually show up within three months after infection. So even if no antibodies are detected in the person's first blood test, he or she should avoid all high-risk behaviors and be tested again in three months.

Connect to YOUR LIFE How could you convince someone of the importance of follow-up testing?

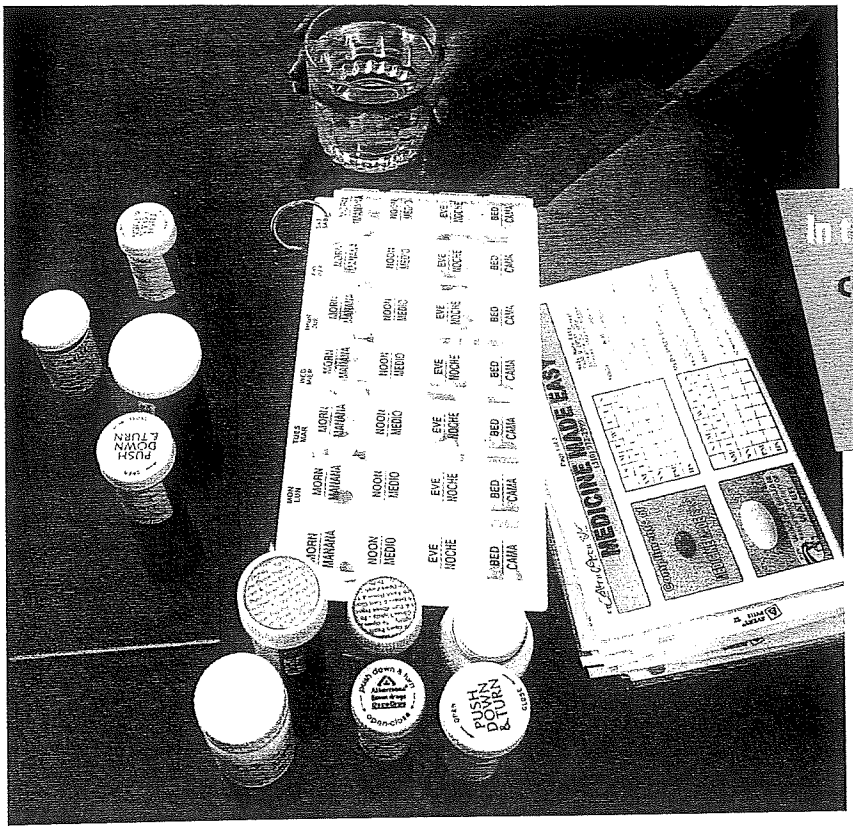


FIGURE 16 A common treatment regimen requires an HIV-positive person to take many pills each day. If the person misses too many doses, the virus may develop resistance to the medication.

Treatment for HIV and AIDS

Although there is no cure for HIV infection and AIDS, some treatments can add many years to a patient's life. The sooner a person begins treatment, the more effective it can be in slowing the progress of the disease.

The Goal of Treatment **The main goal of HIV treatment is to keep the person's immune system functioning as close to normal as possible.** To achieve this goal, the treatment must

- keep the person's **viral load**—the number of virus particles circulating in the body—as low as possible, and
- keep the person's T cell count as high as possible.

If both of these goals are achieved, the patient's immune system is more capable of fighting off opportunistic infections. Remember that current treatments do not rid the body of HIV. They try to stop HIV from destroying the immune system.

Combination Drug Therapy The most common treatment for HIV infection today is known as Highly Active AntiRetroviral Therapy, or HAART. HAART uses a combination of drugs to reduce the viral load in the blood. Multiple drugs are necessary to prevent the virus from reproducing inside helper T cells. A doctor prescribes a combination of drugs that is right for each individual patient.

Some drawbacks to HAART are its complicated dosage schedules, its cost, and its side effects, which can include liver and kidney damage. Furthermore, if a person is not consistent about taking the drugs exactly as prescribed, drug resistance can develop quickly.

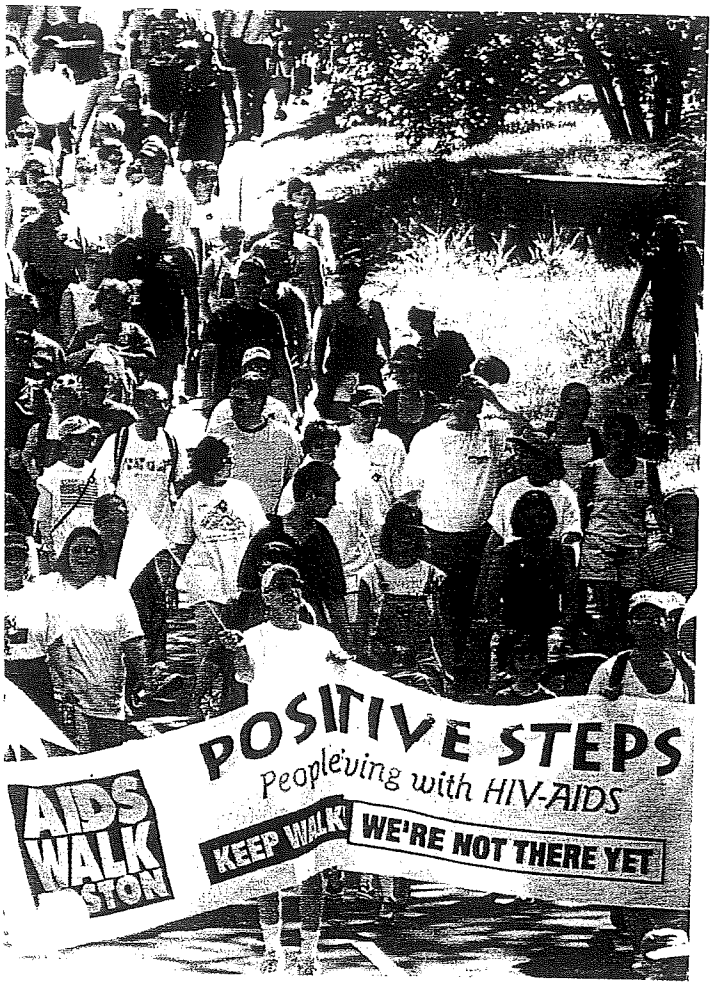


FIGURE 17 Every year, thousands of people participate in walks to help raise money for AIDS research and education.

Living With HIV People who are HIV-positive must take extra care to practice healthful behaviors. Eating right, exercising, and getting plenty of sleep are especially important for people who are HIV-positive. Regular visits to the doctor are also important for monitoring a patient's health and the effectiveness of HIV treatment.

When they are healthy, HIV-positive people can carry on with their careers and other activities. But they do have to avoid high-risk behaviors that put them at risk for infecting someone else. And because HIV compromises the immune system, they should stay away from anyone who has an infectious disease.

The Need for Support As with any serious disease, people who are HIV-positive as well as their loved ones need a lot of support to help them deal with their distress and anxiety. Support may include counseling, healthcare services, and financial assistance.

HIV-positive individuals should be treated with compassion. They also should be allowed to live their lives with dignity. Because HIV cannot be transmitted by casual contact, such as hugging or shaking hands, no one needs to be fearful of working or going to school with someone who is HIV-positive.

Section 4 Review

Key Ideas and Vocabulary

1. What are three behaviors that can help you avoid HIV infection?
2. What does an HIV test involve?
3. What does **HIV-positive** mean?
4. What is the main goal of HIV treatment? How is that goal achieved?

Critical Thinking

5. **Evaluating** Depression can be a serious problem in people who are HIV-positive. What do you think some ways to help people deal with the mental and emotional effects of this disease?

Health at School

HIV Prevention Some schools introduce HIV prevention education in grades six to eight. Find out if you or a group of classmates could prepare a program to help educate these younger students about protecting themselves from HIV infection. Then, develop an outline for your program. **WRITING**

6. **Relating Cause and Effect** Doctors recommend that people who are HIV-positive should stay as healthy as possible, eating well, getting enough sleep, and avoiding exposure to anyone with an infectious disease. Why do doctors recommend this?