HIV and AIDS

The Science Inside
HIV and AIDS: The Science Inside

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There is a strong link between HIV and AIDS, but they are not the same thing. HIV (human immunodeficiency virus) is a virus that affects the immune system, the body’s way of fighting off sickness. By killing or damaging cells of the body’s immune system, HIV slowly destroys the body’s ability to fight infections and certain cancers. AIDS (acquired immune deficiency syndrome) is the disease that results from this breakdown of the immune system.

Since the 1980s, HIV and AIDS have harmed the health of many people and caused others to suffer greatly. AIDS has killed millions of people all over the world and has left many more fighting for their lives. In the United States alone, more than 885,000 cases of AIDS have been reported through December 2003. The number of people in the United States who have died from complications associated with HIV/AIDS is greater than 500,000, including more than 5,000 children. The AIDS epidemic is growing rapidly among minority groups; AIDS is one of the leading killers of African-American men ages 25 to 44.

Although scientists have learned a great deal about what causes AIDS and about how to treat it, there still is no cure for AIDS. The good news is that, unlike some other diseases, HIV infection and AIDS are easy to prevent. HIV/AIDS prevention starts with you. Many diseases are transmitted to people through the air or by casual contact. HIV, in contrast, is most often spread by people having unprotected sex.
with an infected partner. The virus also is spread by injecting drugs with needles or syringes that may be contaminated with very small quantities of HIV-infected blood. HIV-infected mothers can pass the virus on to their babies during pregnancy or birth and sometimes through breastfeeding. You can take precautions to avoid getting the virus. Abstinence (not having sex), being faithful to one partner when you do decide to have sex, and using condoms are important ways to prevent getting HIV. Not injecting drugs, particularly with shared needles or syringes, is another important way to avoid getting HIV/AIDS. Those who do become infected with HIV, however, can make lifestyle changes to help slow the progression toward AIDS. Even once AIDS has developed, a combination of treatment and lifestyle changes can help infected people live longer.

This book presents a brief history of AIDS and HIV; what they are; who is most at risk for getting HIV and AIDS; how HIV is spread; and what may happen to those infected, such as the health problems people get from having HIV/AIDS. We will also go into more detail about how HIV and AIDS can be prevented and managed and then discuss some of the research currently in the works to prevent the disease.

With knowledge about HIV and AIDS, you can make sure that you don’t get the disease. You can also educate your family and friends so that they don’t get it either. We also want to show you how scientific research is working to discover the causes of, and treatments for, diseases. However, not just scientists make important contributions to medical research: We want you to see how you can take a vital part in scientific research that can help you, your family, your community, and the world.
A brief history
The first recorded case of HIV infection dates back to 1959. A man living in the Democratic Republic of Congo in Africa provided a blood sample that later tested positive for the virus. (This is called being “HIV positive.”) It is still not known how he became infected. Tests done on the blood sample show that HIV might have come from a single source in the late 1940s or early 1950s.

In the United States, HIV and AIDS appeared in the mid- to late 1970s. Between 1979 and 1981, doctors in Los Angeles and New York reported finding higher rates of illnesses among homosexual male patients. These illnesses included certain types of pneumonia and cancer. Until this time, these conditions were rare in people with healthy immune systems. Illnesses such as a type of cancer known as Kaposi’s sarcoma also started to appear in men who had been quite healthy. In 1982, physicians used the term “acquired immune deficiency syndrome” to refer to such cases. The same year, the Centers for Disease Control and Prevention (CDC) started to track these cases.

By 1983, scientists were able to identify the virus that caused the disease. They eventually called it the human immunodeficiency virus, or HIV-1. In 1986, HIV-2 was identified as the virus that caused AIDS in people who lived in West Africa. Scientists suspected even then that HIV-2 had been present in that region for decades. In the United States, most infected people have HIV-1; there are very few cases of HIV-2 infection in this country.
Although the two strains of the virus differ, both HIV-1 and HIV-2 can lead to AIDS.

The AIDS epidemic is growing worse every year.

**Viruses and the immune system**

How does the HIV virus attack a person’s immune system? This section will describe how a healthy immune system works, what a virus is, how it spreads, and how HIV is different from other viruses.

Every day of our lives we come into contact with a large variety of tiny organisms called microbes that can cause disease. When harmful microbes, or pathogens, enter the body, they can multiply and cause disease. This is called infection.

Your body’s defenses can usually fight off these harmful invaders, but sometimes germs multiply faster than the body can handle—and you get sick. Most of the time we do not get sick from an infection, and when we do, the illness is usually short lived. The reason we are able to fight off these microbes is because of our body’s natural defenses, which together are known as the immune system. This system manages to get rid of most incoming pathogens, often without us even realizing we have been infected.

Your body’s defenses against pathogens include your skin, mucous membranes in your nose and throat, tears, the tiny hairs in your nose, bleeding, peeing, and sweating. These defenses either block harmful microbes from entering your body or wash them away. If the microbes succeed in entering your bloodstream, your immune system takes over the fight. Germs entering the bloodstream are attacked by white blood cells that gobble up and dissolve any foreign microbes. Our bodies also produce antibodies that attack specific diseases. For example, if you have already had chicken pox, then your body’s chicken pox antibodies will protect you from catching that disease again. If your doctor gives you a vaccine for a particular disease, it helps your body create antibodies against that disease.
The way that the body’s immune system works is not completely understood. Scientists do know, however, that a healthy immune system works to fight off infections that are caused by disease-producing organisms, such as viruses and bacteria. The immune system also works to repair any damage done by organisms that cause infection, such as viruses like HIV.

HIV, like all viruses, is made up of genetic material that is wrapped in a thin coat of protein. A virus cannot live on its own. This means that, in order to multiply, a virus needs to be supported by what is called a host cell. When a virus enters your body and takes over a host cell, the virus immediately begins to duplicate itself by using the cell’s genetic material and cell machinery. Thousands of copies of the virus are made. In the process, the virus will cause the host cell to rupture (or break apart).

When the cells break, the immune system starts repairing them and leading the charge to fight against invading germs. The damage to a cell caused by viruses gives a signal to the immune system that there is an infection to fight. An army of white blood cells gathers in the area where

The various parts of the immune system work together to fight off infections by identifying organisms, reacting against them, and repairing any damage they may have caused.
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The host cell ruptured. These white blood cells begin to battle the virus. The battle causes many of the symptoms that are associated with illness—pain, swelling, redness, rash, and fever.

Thus, the immune system springs into action to protect the body from “invaders.”

Pathogens such as bacteria, viruses, fungi, and parasites are often described as “invaders” because they enter into the body uninvited to cause sickness and diseases. These invaders can be transmitted into your body from the outside environment, another person, an animal, or an insect. Although disease-producing organisms are already in your body, they usually do not cause infection in a person with a healthy immune system.

Whatever the means of transmission, when an invader’s presence is detected by your immune system, a battle begins. The invading microbes carry foreign proteins called antigens into your body. Once in the body, these proteins enter your bloodstream. When your immune system recognizes that antigens are present, it begins to produce antibodies to fight them.

Three main factors determine whether you can fight off an infection: (1) the strength of the disease-producing organism (or invader), (2) the total number of invaders, and (3) the strength of your immune system to fight infection. Even some healthy immune systems require extra help to fight infection. Rabies is an example of an infection that is so powerful that it cannot be stopped by a healthy immune system alone. Rabies is always fatal without treatment, even in people who were healthy before they were infected. The use of rabies vaccines is the only way to help the body’s immune system fight off the rabies infection.

Another example of the need for immune system boosters are flu shots. Many people get flu shots every year. These vaccines can help prevent infection or lessen the length of time and decrease the symptoms if someone does get the flu. A person who has HIV or the end stages of HIV, also known as AIDS, has an immune system that is unable to work in a completely healthy way. The immune system has been weakened or practically destroyed during the progression from HIV to AIDS. Therefore, the flu, or even a common cold, can take longer to run its course or may even become a life-threatening illness for people living with AIDS.
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1. HIV RNA (HIV, like many viruses, only contain RNA, not DNA)

2. After HIV attaches to the T cell, its RNA uses genetic material from the T cell to create DNA strands, which can enter into the T cell nucleus.

3. The HIV DNA joins with the T cell DNA to create a long strand. Pieces of this strand separate off and join other T cell genetic material to form new HIV copies.

4. These newly formed HIV particles break through the T cell wall and move off to find new T cells to infect. The broken T cell dies.
The virus called HIV

HIV is different from most viruses. If you get a flu virus, you may get symptoms right away. Many people infected with HIV may not have clear symptoms of HIV infection for many years. That is because of the unique way that the virus works in the body.

HIV enters macrophages (a type of cell found in many parts of the body), which act as host cells for the virus. Instead of rupturing its host cells right away, as most viruses do, HIV multiplies quietly in the macrophages for years. During this time, HIV copies itself within these host cells, exits the macrophages without damaging them, and then enters other macrophages. While this is happening, the virus is doing no apparent damage to the body, and the person with HIV is symptom-free. Eventually, HIV begins infecting a type of cell called CD4 positive T cells (abbreviated as CD4+ T cells). These are the white blood cells that lead the attack against infections. Instead of quietly multiplying as it did in macrophages, HIV replicates (or copies itself) in CD4+ T cells and then ruptures and destroys these host cells. As more and more HIV is produced, more and more CD4+ T cells are destroyed, and the body’s defenses are weakened.

HIV presents a huge challenge to the immune system. Because it destroys the body’s T cells, it makes it difficult—if not impossible—for the immune system to fight off disease-producing organisms. This is where opportunistic infections come in. Although they usually can be fought off by a healthy immune system quite...
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easily, opportunistic infections can cause terrible illness in someone infected with HIV. [You can learn more about these illnesses in Part 2 which begins on page 19.]

The following paragraphs show the several stages of illness that occur as the action of the virus progresses:

**Acute/Primary HIV infection.**
The first symptoms can appear two to four weeks after exposure to the virus. Often, these symptoms are similar to those associated with the flu or with mononucleosis (“mono”). Even if the symptoms appear early, an actual diagnosis might not be possible for months. This is because someone with the symptoms of HIV infection will not be HIV positive by certain lab tests for three months or even as long as a year. It is vitally important to know, however, that at this stage of the illness, the virus can be transmitted. Over time, acute HIV infection advances to “asymptomatic” HIV infection.

**Asymptomatic HIV infection.**
In this stage, the person is without symptoms (or “asymptomatic”). The length of the symptom-free period varies. It can last for just a few years, or it can extend to 10 years or longer. During this stage, those infected are still highly contagious.

How long the stage lasts depends on how much HIV has replicated in the body. Because the virus lives in white blood cells, it spreads best when the body “turns on” the immune system. Staying healthy will keep the virus from spreading throughout the body. The amount of time this symptom-free stage lasts also depends on how well the person’s immune system deals with the virus. During this period, the virus still is infecting and killing T cells. From the symptom-free stage, the condition often progresses to early symptomatic HIV infection, also called AIDS-related complex (ARC).

**Early symptomatic HIV infection/AIDS-related complex (ARC).** During this stage of the condition, symptoms appear, including fevers, swollen glands, and thrush; the ARC
stage is just before the development of AIDS. People at the ARC stage are infected and therefore are HIV antibody positive. The ARC period is really the transition from HIV infection to HIV disease. The person with HIV has not yet developed opportunistic infections, cancers, or AIDS. Finally, though, early symptomatic HIV infection develops into AIDS.

**AIDS.** This is the final and most deadly stage of HIV disease. A person is said to have AIDS when he or she has fewer than 200 CD4+ T cells per cubic millimeter of blood. (Healthy adults have a CD4+ T-cell count of 1,000 or more.) Remember, CD4+ T cells are the primary host cells of HIV. When HIV destroys these cells, it makes the immune system weaker and allows opportunistic infections to develop. During this stage, an HIV-infected person often suffers from many opportunistic infections. These infections can attack the brain, the lungs, and other organs and can be caused by viruses, bacteria, or parasites or by cancer cell growth. (See part 2 of this book for more information.)

Although most people with HIV end up getting AIDS, some people infected with HIV will develop AIDS either very slowly or not at all. These people are called **non-progressors.** In some cases, non-progressors who have tested positive for HIV in the past eventually test negative and then show no signs of infection. These people are being carefully monitored, because monitoring them might show that the body is capable of controlling the virus. For the vast majority of HIV-infected people, however, the virus will progress to AIDS.

**When HIV becomes AIDS**

AIDS is not a disease. It is a **syndrome** associated with the loss of immune function caused by the human immunodeficiency virus (HIV). Only those who are infected with HIV will develop AIDS. This syndrome has no other known cause. Common sexually transmitted infections...
Part 1: What Are HIV and AIDS?

A lab worker performs an AIDS test on blood samples. The blood test checks for the presence of antibodies to the virus.

However, in a person with AIDS, the immune system is often more depleted and even less able to resist infection than it is with HIV infection alone.

A person also is considered to have AIDS if he or she is suffering from HIV as well as an **AIDS-defining condition**. An example of such a condition is **tuberculosis (TB)**, an airborne infection that usually affects the lungs, but that can affect other parts of the body, too. Because HIV affects the body’s ability to fight off diseases, TB can be more dangerous and harder to fight off than it is for a healthy person, but tuberculosis is one of the few opportunistic infections that can be cured with medication. When infected people are not diagnosed with TB early or if they do not follow their treatment plan properly, tuberculosis can speed up the progression of HIV to AIDS. TB is one of the leading killers of people with AIDS around the world.

The progression from HIV to AIDS is not completely understood, and in some cases it can take years. The CDC reports that there are tests showing a strong connection between the levels of HIV in the blood, the lowering of

such as herpes do not cause HIV or AIDS.

When a person is diagnosed with AIDS, it is usually following a long period of HIV infection. Many people, however, are not diagnosed with HIV until they have progressed to AIDS. At this point, the virus that causes AIDS has already weakened the person’s immune system. The body has become vulnerable to cancers and infections of all sorts. AIDS symptoms can be similar to those experienced by people with HIV infection. They include fevers, night sweats, swollen glands, chills, weakness, and weight loss.
CD4+ T-cell counts, and the development of AIDS. Scientists believe that if the amount of HIV in the blood is reduced, it can slow down the destruction of the immune system and the onset of AIDS.

On average, HIV weakens the immune system for about 10 years before AIDS develops. This period can be shorter or longer, depending on a person’s general health, lifestyle, and willingness or ability to follow prescribed therapies. If a person infected with HIV is generally in good health and actively maintains treatment, AIDS can take longer to develop. However, if an HIV-infected person has many infections or does not consistently follow treatment, AIDS can develop sooner. It is important to be diagnosed early so that treatment can begin as soon as possible.

HIV-infected people who suspect that they may have TB should be tested for it. Because TB is easy to spread to others, people with both HIV and tuberculosis should follow the standard guidelines involving safer sex, clean needles, and other exposures. (For information on guidelines, see Part 5 beginning on page 47.)

Even before a person is aware of any symptoms, he or she can transmit the virus to others. That person even may have been exposed to HIV 10 years before being diagnosed with the virus! Because the virus can be present but silent, because HIV infection can spread easily, and because early treatment might mean a longer period without symptoms, early diagnosis is very important.

To see if you have been exposed to HIV, doctors will usually perform the HIV ELISA/Western blot test. This test is done in two steps. The first step, the HIV ELISA test, shows whether an HIV antibody is present in your bloodstream. The HIV antibody is found only in people whose immune system created it to fight HIV (the antigen). If the HIV ELISA test is positive, the Western blot is used to double-check the result. Confirmation is necessary partly because there are other conditions (for example, lupus, Lyme disease, and syphilis) that can produce a false positive result on the ELISA test. If a Western blot also comes out positive, the diagnosis is HIV infection.

Even if both the ELISA and Western Blot tests are negative, you may still be infected with HIV. Further tests, such as the CD4+ T-cell count or the platelet count, might be done. These tests
are recommended especially if you are considered to be in a high-risk group or if you have symptoms of the virus. For example, if your immune system is impaired by drug or alcohol use, it can take much longer for your body to make antibodies to the virus. Therefore, more time is needed to see if HIV antibodies show up in your bloodstream. When someone suspected of carrying HIV receives a negative test result, he or she should be tested again every three months for one year. This retesting is important, because sometimes HIV-related symptoms are observed long before a test shows the presence of the HIV antibody.

If you have symptoms of HIV infection, but test negative for HIV-1 (the virus type more common in the United States), you should be tested for HIV-2. Although the overall number of cases of HIV-2 in the U.S. is low compared with cases of HIV-1, the CDC believe that routine testing for both types of HIV could help control the spread of the infection.

If you test positive for the HIV antibody, a doctor might order another test to determine your viral load, or viral burden. This term refers to the actual amount of HIV circulating in your bloodstream. It is an important measure, because a higher viral load can mean more severe symptoms or a faster progression to the

Who should be tested for HIV?

Anyone can get HIV, not just gay men or drug users. The following people, however, are at higher risk for HIV and should be tested as soon as they can:

**HIV-1**
- Those who have had many or multiple sexual partners.
- Homosexual men.
- Those who have had unprotected sexual contact (including anal sex, sexual intercourse, oral sex, etc.) with people at risk for infection (intravenous drug users, prostitutes and their customers, people who have had many sexual partners, and men who have had sex with men).
- Intravenous-drug users.
- People who received a blood transfusion or blood-clotting factor before 1985 (although this is very unlikely, because since 1985 all the blood used in transfusions and injections in the U.S. has been tested).
- Babies born to an HIV-infected mother.

**HIV-2**
- Those who have had sexual contact with a person from a country in which the virus is common.*
- The sexual partners of a person known to be infected with HIV-2.
- Anyone who received a blood transfusion or a nonsterile injection in a country where HIV-2 is prevalent.*
- Those who have shared needles or syringes with a person who is or may be infected, or with a person from a country where HIV-2 is prevalent.*
- Children of women who are at risk for HIV-2 infection or who are known to be infected.
- Anyone who appears to have symptoms associated with HIV infection, but who has tested negative for HIV-1.
- Those whose HIV ELISA/Western blot tests contain unusual patterns. (A physician will be able to recognize these patterns.)

* For a list of these countries, go to page 32.
next stage of infection. An **HIV RNA viral load test** determines the number of HIV copies found in a milliliter of blood. The same test might be done again and again over time to see whether there are any changes in viral load in relation to symptoms. The results of this test can help your doctor give you advice about whether or when to start treatment. If you are already on a particular drug therapy, the test can determine when to adjust the therapy.

The tests described in the next paragraphs can indicate whether your immune system is being suppressed, which means that something is keeping it from working properly. Often, these tests are used to monitor the progress of HIV infection or AIDS. Sometimes, the tests are given to help confirm an initial diagnosis of HIV infection.

**CD4+ T-cell count:** Remember, CD4+ T cells are the cells that act as hosts for HIV and that are eventually killed by the virus. In healthy people, the CD4+ T-cell count is usually 1,000 or more. A person with a count below 200 is said to have AIDS. With treatment, the count usually improves within two months.

**CBC (complete blood count) or WBC (white blood cell)** count:** On this test, a suppression of the immune system is evident if the result is below 4,000.

**Platelet count:** Suppression of the immune system is evident if the result is below 100,000 platelets per microliter of blood.

**Skin test anergy:** This test is used to determine how the immune system is functioning. A suppression of the immune system is indicated if there is no response to the test.

It is important to note that the immune system can be suppressed for reasons other than HIV infection or AIDS. The tests listed are only a starting point in determining whether you are infected with HIV.

**The importance of HIV tests**

Testing is the only way to determine for certain whether you are infected with HIV. In most states, testing can be done only after you give written consent. It is possible to be infected with HIV and yet to have no symptoms for years. It is not possible, however, to be infected and not test positive within three to six months. A positive result on an HIV test means that you have HIV infection, but not necessarily AIDS. Only a physician can determine whether someone with HIV has
developed AIDS. Since the symptoms of HIV infection are the same as those of many other illnesses or combinations of illnesses, it is important to avoid self-diagnosis. If you suspect that you might be infected with HIV, make sure to be tested by a doctor. This is the only reliable way to know whether you are infected.

Remember, you can be diagnosed with HIV infection before any symptoms appear. You can be infected with HIV and have no symptoms for years. Symptoms that are associated with HIV infection can last for a few days or weeks and can then go away.

**How AIDS affects the body**

The effect that AIDS has on the body depends on several factors. One is the length of time the person’s immune system has been affected prior to diagnosis; another is the coinfection of HIV/AIDS with other diseases. If a person learns he or she is infected at the end, or AIDS, stage of the disease, the immune system has already been greatly weakened and the person may have unknowingly spread the disease to others.

A person with AIDS can be quite ill for a while. However, new drugs and drug combinations, known as “drug cocktails,” can bolster the immune system so that it is able to return to CD4+ levels above 200 and, thus, to increased protection against invading infections. An improved immune system also enables a person living with AIDS to function in society and often to appear quite well.

In some people who are not able to enhance their immune system, AIDS may progress, and new or more severe neurological and physical symptoms may appear. Some of these symptoms are caused by damage from the disease itself. Severe side effects may be caused or made worse by drugs used to treat HIV infections.

People with AIDS can become quite disoriented. As they sleep longer, it becomes more difficult to wake them. When they are awake, they will rarely seem alert. Sometimes people in this end stage of AIDS hallucinate, which can cause them to be restless or afraid. They also may have trouble seeing or hearing. They often lose control of their bowels or bladder. Their skin might feel cooler to the touch. The area of the skin that touches the bed might appear darker due to a decrease in circulation that is common in people with AIDS.

People with AIDS often experi-
ence severe malnutrition, usually due to excessive medication—which can cause a general loss of appetite, nausea, vomiting, and diarrhea—or to an opportunistic cancer. Chronic wasting also can occur in an HIV-positive person and can become more severe in a person with AIDS, particularly one who is not taking his or her medications. Patients should do everything they can to avoid losing weight because weight loss can speed up the progression of AIDS.

A person diagnosed with AIDS
Part 1: What Are HIV and AIDS?

A Change of Direction

Years ago, A. Cornelius Baker was convinced that his life would revolve around a theater stage. He envisioned himself writing powerful scripts that could invoke laughter and tears and directing productions that would transport an audience to another time and place. But like a character in a dramatic script, Baker has discovered that one’s life story can take unexpected twists and turns—and doesn’t always turn out as expected.

The one-time aspiring playwright and director is now the executive director of the Whitman-Walker Clinic in Washington, D.C., one of the nation’s largest clinics devoted to providing services to persons infected with HIV/AIDS, as well as to educating the public about how the virus and disease can be prevented. It’s a role he never expected to play, but one he now embraces as his life’s mission.

“I fully expected to have a profession connected to the world of culture, but my life did take a turn,” reflects Baker. “It’s not exactly a professional life that’s filled with great joy, but it is extremely rewarding.”

It’s a professional path that began 20 years ago, when Baker moved to the nation’s capitol. With a coveted internship at the John F. Kennedy Center for the Performing Arts waiting for him, Baker—an openly gay man from Syracuse, New York—packed his bags and moved south. He expected to live in Washington for just a year or two.

Instead, Washington became the center of his professional life.

Over the years, he worked at the Kennedy Center, for the arts section of a local newspaper, and as a political staff member for both the government of the District of Columbia and the first Bush administration’s White House. Through it all, he carved out time to volunteer at the Whitman-Walker Clinic in downtown D.C.

His volunteer work for the clinic began in 1983. Back then, the clinic was housed in a tiny building in downtown D.C. and operated on a shoestring...
budget. Recognizing the enormous need for resources, Baker organized benefits for the clinic in the early 1980s. He was also a member of a small group that, in 1986, organized the first event to recognize the clinic’s small, but deeply committed, army of volunteers. Held in the basement of an apartment building, the party drew 150 people. Today, Whitman-Walker Clinic boasts more than 1,100 active volunteers and a staff of 270.

As its volunteer ranks have swelled, so, too, have its budget and resources. In 2003, the Whitman-Walker Clinic had more than 50,000 individual donors and a budget of $28 million. The clinic—which now has four sites sprinkled across the greater Washington, D.C., area—serves 10,000 clients, and support groups, medical services, and a pharmacy are among the multitude of services it offers.

As with the Whitman Walker Clinic itself, much has changed in the world of HIV and AIDS over the past 20-plus years. Scientific breakthroughs have had an enormous impact on the identification of the virus, drug treatments have extended the life spans of those infected, and public awareness about the disease and virus has increased significantly. Yet, despite appreciable gains, Baker, who is HIV positive, approaches his job with an unrelenting sense of urgency.

“I feel tremendous gratitude about just being alive, and I—and the people I work with—feel a responsibility to do all that we can to deal with this terrible disease. Our work is about a disease that is continuing to cause huge destruction in families across the world,” says the 41-year-old Baker.

Though his dreams of directing creative productions were long ago replaced by the realities of serving as director of a major HIV/AIDS clinic, it is clear that Baker still controls the spotlight—only now he is shining it on a deadly and global disease and ways to prevent and treat it.
already may have experienced infections, because HIV impairs the body’s ability to fight them. Sometimes multiple infections can leave a person with a very low body weight (from chronic wasting) or dementia. One thing that causes low body weight is the incredible demand the body is under to reproduce CD4+ T cells to replace those destroyed by the virus. An HIV-infected person can suffer from many disorders, ranging from common infections that will not go away to cancer. This next part of this book will talk about some of these disorders in more detail.

**Opportunistic infections**

People with AIDS often become ill because of opportunistic infections. These infections are called “opportunistic” because they take hold in a person with a weakened immune system. In other words, they use the opportunity that a fragile immune system creates to trigger illness in a person. A person who has a healthy immune system might experience annoying symptoms from a cold or flu that last a few days. To a person with AIDS, these same disease-producing organisms can be life threatening. This is because AIDS leaves an immune system so weakened that it cannot battle and destroy the organisms that regularly invade the human body. More than 100 germs can cause opportunistic infections in people with HIV or AIDS.

In some people with AIDS, cer-
tain opportunistic infections attack the central nervous system; others affect the lungs, causing difficulty in breathing. A person living with AIDS may have breathing problems resulting from a lack of strength to cough up fluids that have collected in the back of the throat or the lungs. The same problems can also result from a more serious obstruction or other health problems associated with AIDS. These conditions are so commonly found in people with the syndrome, and so rarely in people with intact immune systems, that they have come to be defined as symptoms of AIDS. (See Appendix 4 for a detailed description of some of the opportunistic infections commonly associated with AIDS.)

Cancer

A cancer develops when abnormal cells start to grow out of control in some part of the body. These cells can travel to other parts of the body as well. Unlike normal cells, which grow, divide, and die, cancer cells do not die. Cancer occurs because the genetic material (DNA) in the affected cells is damaged. Sometimes, the damaged DNA is inherited from a parent. Other times, environmental factors (such as pollution) or behaviors (such as smoking) can cause cancer. The damaged material continues to grow, taking over healthy tissue. Tumors or lesions can form and cause obstruction, pain, or both.

Certain types of cancer are more common in people with impaired immune systems. These cancers are among the AIDS-defining conditions that have been identified by the CDC:

**AIDS-related Kaposi’s sarcoma:** This cancer develops in connective tissue such as cartilage, bone, fat, muscle, and blood vessels. Before AIDS, Kaposi’s sarcoma was usually found in elderly Mediterranean and Jewish men...
or young African men, for whom it took a much gentler course. When it started to be diagnosed in young, homosexual men, doctors suspected that a new disease had emerged. In some ways, the sudden appearance of AIDS-related Kaposi’s sarcoma helped physicians identify HIV sooner than they might have otherwise.

In people without AIDS, this form of cancer usually affects one or two areas of the body. For those with AIDS who are not taking proper medications, the condition is more extensive. Soon after AIDS develops, Kaposi’s sarcoma can cause lesions (areas of abnormal tissue) to appear all over the body. Outside the body, lesions form on the skin and near the mouth. Inside, they can appear in the lungs, gastrointestinal tract, lymph nodes, liver, and spleen. When this form of cancer spreads to the lungs, it can be fatal. Usually, though, other AIDS-related complications are more likely to cause death.

Lymphoma: One of the first symptoms that people with AIDS experience is a swelling of the glands behind the ears, in the groin, and in the armpits. Abnormal cells divide rapidly and produce tumors. These tumors can occur in the central nervous system, in the gastrointestinal tract, or throughout the lymphatic system. In people with AIDS, lymphoma can be quite an aggressive disease. The most common forms of lymphoma found in people with AIDS are non-Hodgkin’s lymphoma (usually caused by cancerous white blood cells and marked by high fever, constipation, and mental confusion) and AIDS-related primary central nervous system lymphoma (affecting the brain and spinal cord).

Invasive cervical cancer: This type of cervical cancer is called “invasive” because it invades neighboring tissues. The primary risk factor for cervical cancer is infection with the human papilloma virus, which is transmitted sexually. Cervical cancer in the early stages often does not produce symptoms. Usually, the first sign of the disease is an abnormal Pap test result, so it is crucial that women get an annual Pap smear. In HIV-infected women, invasive cervical cancer is aggressive and often deadly.

When a person with AIDS gets cancer, the disease is often far more aggressive than in an otherwise healthy person. Common cancer treatments, such as chemotherapy and radiation, can be difficult or impossible for a person with AIDS to endure. Radiation treatment is designed to destroy cancerous cells. Although the treatment is focused on the area containing cancer,
sometimes radiation can destroy healthy cells. This can produce mild to severe side effects, among the most common of which are feelings of weariness, nausea and vomiting, weight loss, and itchy skin. Since these symptoms are also associated with AIDS, infected people often find radiation more difficult to deal with than other cancer patients do.

Unlike radiation, which targets the regions of the body affected by cancer, chemotherapy is a “systemic” medication. This means that the treatment affects the entire body. As with radiation, the side effects produced by chemotherapy are similar to those already suffered by people with AIDS. These side effects include nausea, vomiting, loss of appetite, diarrhea, mouth sores, and constipation. In severe cases, chronic bone marrow suppression, a side effect of chemotherapy that slows or stops blood cells from forming, can also occur.

**Weight loss**

As mentioned before, wasting or weight loss can occur in people who are at the end stages of the virus and not on medication. These people can lose a lot of weight for a variety of reasons. Mouth and throat sores can make eating difficult. Constant nausea, which can be brought on by medication, can prevent a person from getting proper nutrition. Chronic diarrhea can require a person to be placed on a severely restricted diet. Lack of exercise can contribute to a loss of muscle. Cancers such as AIDS-related Kaposi’s sarcoma can cause substantial weight loss because they affect the gastrointestinal tract.
Psychological and emotional issues

If a person has a personal or family history of physical and mental health illnesses, these illnesses can worsen when the person develops AIDS. Some people with AIDS experience neurological changes called AIDS dementia complex. The affected person may seem sleepy, clumsy, and unable to concentrate. He or she also may have difficulty speaking, walking, or grasping objects. In addition, some people experience frequent, severe headaches; have mood swings; have a very short attention span; and have swings in their ability to function. For example, one day they may seem perfectly alert, and the next they may have poor memory—often making daily living hard. These swings also can make it difficult for some people who are living with AIDS to stick to complex treatments.

A person with AIDS often experiences periods of major depressive disorders. (See the list of warning signs on the next page.) The related symptoms can come and go during the course of the illness. Sometimes they might seem manageable; other times they can become severe. At the earliest sign of depression, a mental health professional should be
contacted. This person—a psychologist, a psychiatrist, a psychiatric nurse practitioner, a clinical social worker, or a counselor—should work with the patient’s doctor to coordinate the use of medication. Coordination is particularly important because medications that treat depression and medications that treat AIDS can be harmful when used at the same time.

Some people want to use herbal remedies to treat depression or other illnesses. People being treated for AIDS, however, must consult with their primary care provider. Combining AIDS medications with herbal remedies can be dangerous. For example, St. John’s wort, a popular herbal remedy used to treat depression, interferes with the vital work of protease inhibitors, medications that help prevent the virus’s protease enzyme from producing infectious viral particles. A person who takes both St. John’s wort and protease inhibitors could experience drug resistance to AIDS medications, which in turn can make the syndrome worse.

Besides depression, other mental disorders that tend to affect people with AIDS are bipolar disorder (also called manic-depressive disorder) and anxiety disorders.

### Warning Signs of Depression

According to the National Institute of Mental Health, if a person experiences five or more of these symptoms every day for at least two weeks, the cause could be depression. This is more likely if these symptoms interfere with daily activities, such as hygiene, social life, caring for a child, or work.

- Sadness, anxiety, or a feeling of emptiness that does not seem to go away
- Feelings of hopelessness, worthlessness, or helplessness
- Loss of interest in activities that used to be enjoyable
- Lack of energy
- Difficulty concentrating or making decisions
- Loss of memory
- Difficulty sleeping or waking
- Loss of appetite and/or weight changes
- Feeling irritable or restless
- Thoughts of suicide, or making attempts at suicide

### Other problems

In addition to the symptoms that an HIV-infected person experiences, other complications can develop over time.

**HIV-associated dementia:**

Dementia involves a loss of brain function. This could include loss of memory or unclear reasoning or thought. When someone becomes infected with HIV, the brain is one of the first organs to be damaged. This is because, within hours or days of infection, HIV travels to the brain in some of the cells that it has invaded. HIV-associated dementia is one of the most
common forms of dementia worldwide. It is a degenerative condition that can slowly cause changes in behavior and personality, including a loss of coordination, memory, thinking abilities, and inhibitions.

**HIV lipodystrophy syndrome:** Lipodystrophy is a condition characterized by a poor or uneven distribution of fat cells. This distribution causes large amounts of fat to be stored in inappropriate places, which can lead to obesity in the lower belly and a hump on the upper back. The side effects of lipodystrophy also include diabetes and high levels of cholesterol and triglycerides.

**Chronic wasting from HIV:** When the power sources of cells (called mitochondria) supply less energy to tissues such as muscles and nerves, this form of weakening results. It usually causes an overall weight loss of about 10 percent, chronic diarrhea, chronic weakness, and fever.

**Osteonecrosis:** This condition, which results in a weakening of the bones and the death of bone tissue, is more common in people with HIV than in people without the virus. In NIH studies, osteonecrosis occurred most often in the hipbones of HIV-infected people.

**Hepatitis C:** In the United States, 25% of people with HIV also suffer from coinfection by another virus, called hepatitis C virus (HCV). Worldwide, this virus is found in 50% to 75% of injection-drug users infected with HIV. Being aware of this connection is important for several reasons.

First, the presence of HIV infection can diminish the accuracy of HCV antibody tests. Therefore, the risk of receiving either a false-negative or a false-positive result from HCV screening antibody tests is increased in people with HIV infection.

Also, the coinfection with HIV hastens the progress of liver disease in 70% of people. In clinical studies, researchers have noted that HIV infection caused a faster progression of chronic hepatitis to cirrhosis and liver failure. In addition, hepatitis C virus may affect how well HIV can be managed and controlled in those who are infected, but more research is needed to confirm this idea. Some researchers recommend that HCV be thought of as an opportunistic infection in people with HIV because it can lead to death more rapidly due to liver disease.

Hepatitis C infection can be managed in those with HIV. Some evidence suggests that a “cocktail” of HIV medications known as
HAART may alter the rapid progression of HCV. Taking HAART may keep the HCV from progressing faster than it does for HIV-negative people. If chronic liver disease is already present, there are ways to reduce its impact. For these reasons and others, the U.S. Public Health Service recommends that all HIV-infected people be tested for the hepatitis C virus.

People with AIDS must always be aware that they are living with the disease, even though many may find that they are able to function almost normally for periods of time. For example, most people who are on medications can go to work full time, see friends, exercise, and sleep well. However, if they are not taking their medications and are exposed to an opportunistic infection, a life-threatening illness can appear and drain them of energy and peace of mind. By managing stress, eating right, getting enough rest, staying strong, and engaging in health-promoting behaviors (such as getting the right vitamins in their diet and exercising), people with AIDS can reduce the effects of an illness and recover faster when illness does strike.
Teen Dreams

As a teenager growing up in Arlington Heights, Illinois, Erin Leonard felt like the world really was her oyster. She had dreams of becoming a marine biologist after college, and she looked forward to becoming a wife and a mother. Her life, she thought, would be filled with marathon running, skiing, and other athletic pursuits.

Leonard’s life has taken a different turn, however. At the age of 30, she is a licensed clinical social worker who works with HIV-infected teenagers. She loves her job, and feels privileged to work with these young adults. After working with them, she also realizes how fortunate she was as a healthy teenager just to be able to imagine a life beyond high school. Leonard now knows that not everyone is so lucky.

“It’s tragic. So many of the kids I work with grew up thinking they were going to die young. They never planned for the future because they didn’t think they would have one. The emotional toll they go through is unbelievable—for them, it’s all so crazy and complicated,” says Leonard.

For the past three years, Leonard has teamed with a nurse practitioner and a physician at Chicago’s Children’s Memorial Hospital in a program dedicated to helping adolescents infected with HIV. Most of the teens contracted the virus at birth, while others became HIV positive through unprotected sex or from drug use.

In a variety of settings—clinical visits, group therapy, and one-on-one counseling sessions—Leonard works with the youth to deal with the complicated issues and feelings they face, including shame, fear, and anger. Knowing how to listen to them is key to making a connection.

The ability to communicate with someone about their physical and mental health is particularly important because the kids frequently don’t have anyone in whom they can confide. “Often, they’ve already lost one or both of their parents to the disease, and many—if not most—of the kids don’t tell their friends that they have the virus. It’s a life of secrecy,” explains Leonard.
By spending as much time as possible with “her kids,” as she refers to her patients, Leonard is successful in breaking through their walls of self-protection. The youthful-looking Leonard, who could practically pass for a teenager herself, even checks in with them during their lunch break at school. She keeps an ear out for clues as to whether the teens are taking their antiretroviral drugs—medications that many of them have taken for as long as they can remember. Being typical teenagers, they can be defiant about doing what they are told, but if they don’t take their drugs, the results can be life threatening.

Keeping the adolescents well, both physically and emotionally, is the cornerstone of the HIV Adolescent Program at Children’s Memorial Hospital. Key to achieving that goal is convincing the youths that they not only possess a future, but also have the power to shape it.

As a high school senior, Leonard remembers looking with anticipation to her college years: She knew that pursuing higher education would help her achieve her goals. One of her greatest accomplishments is the college scholarship program for HIV-infected adolescents that she recently started with the help of a local Christian ministry.

“It’s a dream come true,” Leonard says. “It’s wonderful to see my kids excited about the prospect of college. It’s something they never even thought about. Just the idea that other people believe in them is wonderful.”
Part 3: Who Has HIV and AIDS?

Worldwide, HIV and AIDS cases are found among all types of people: young, elderly, suburban, urban, rural, homosexual, heterosexual, and every race and ethnicity. New data reveals that AIDS in the United States is growing fastest among those in rural Southeastern states. In some places in Europe, it is growing fastest in urban areas.

The worldwide epidemic

According to the Joint United Nations Programme on HIV/AIDS, by the end of 2004, 36–45 million people in the world were living with AIDS. Of this total, 37.1 million were adults, 18.5 million of them were women, and 3 million were children under the age of 15. During 2004 alone, AIDS caused the deaths of more than 3 million people worldwide.

900,000 Americans have been infected with HIV since 1981. During this same period, more than 816,000 cases of AIDS were reported in the United States.

Currently, HIV infection is most widespread in central and southern Africa—particularly in South Africa, where more than 5 million people are HIV positive—and is a growing problem in Asia—particularly in India, where 4–5 million people are infected. Many cite the lack of governmental and financial support of HIV/AIDS awareness and treatment, the ease of obtaining inexpensive drugs, a lack of education about the disease and how it is spread, and the expense and complexity of treatments available as reasons for the high rates of disease and death in these areas. Some developing countries, such as Brazil, Thailand, and Uganda, have experienced a decrease in the number of HIV cases, due...
to educational programs, while officials in other countries have acknowledged the need to establish clean needle exchange programs, drug rehabilitation centers, methadone clinics, and educational programs both in remote, rural areas and in large cities.

**The continuing spread of AIDS**

In a recent report prepared by the CIA’s National Intelligence Council, analysts predict that, in the next decade, the spread of HIV will accelerate across Asia and Africa. The five countries with the highest populations are likely to have 75 million cases of HIV between them by 2010. These countries—China, India, Russia, Ethiopia, and Nigeria—make up 40% of the world’s overall population. Currently, they have somewhere between 14 and 23 million HIV cases.

Over the next 10 years, certain populations within these countries are expected to represent the majority of those infected. It is expected that the virus will continue to be transmitted by high-risk behaviors, indicating that awareness and education programs have not gone far enough.

**China:** Intravenous-drug users will make up the majority of cases in urban areas. In rural China, the ancient (but outlawed) practice of blood brokering will trigger other cases.

**India:** Heterosexual transmission will probably account for the greatest number. Many Indians are simply unaware of the impact of HIV and AIDS. By some esti-
mates, as many as half of all prostitutes in the major Indian cities are infected with HIV.

**Russia:** Widespread intravenous drug use will produce most of the future HIV infections in Russia, where sharing contaminated needles is common.

**Ethiopia:** After the wars with neighboring Eritrea ended, Ethiopia’s military was demobilized. As soldiers returned to their homes, they and prostitutes spread HIV through heterosexual transmission. This spread will likely continue.

**Nigeria:** Heterosexual HIV transmission could infect one-fourth of all adults in Nigeria.

The Joint United Nations Programme on HIV/AIDS reports that, globally, 95% of all HIV cases are in the developing world. Most of these countries are not able to provide adequate medical care (or even food) to their healthy citizens. People with HIV and AIDS living in developing countries rarely have access to the treatments that they need. Since awareness and education about HIV and AIDS are less widespread in these nations, the likelihood that HIV and AIDS will continue to spread there is higher than in the developed world.

**AIDS in the United States**

According to the CDC’s *HIV/AIDS Surveillance Report*, by the end of 2001 some patterns of AIDS exposure were obvious among certain groups in the United States. These patterns show in which groups the impact of the disease is greatest:

- Men who have sex with men: 368,971
- Intravenous-drug users: 201,326
- Heterosexuals who have sex: 90,131
- People whose risk is not identified: 81,091
- Men who have sex with men and inject drugs: 51,293
- People who received blood transfusions or blood products: 8,971
- People with hemophilia: 5,292

3 million children around the world are living with HIV.
Within this list of groups exposed to AIDS, most intravenous-drug users afflicted were men (145,750). Among those who were exposed through heterosexual contact, most were women (57,396). Even though many people who were exposed by a risk that has not been identified, it is likely that a large number of them fall into the categories that include the highest numbers. These statistics have helped public-health organizations determine where to focus their prevention efforts. As a result, the CDC has helped in developing peer outreach programs for homosexual men, street outreach programs for intravenous drug users, faith-based initiatives in African-American communities, and youth programs in and out of school settings.

The uneven impact of AIDS
In the United States, African Americans continue to be one of the populations in which HIV and AIDS have spread quickly. In 2001, although African Americans made up only about 12% of the U.S. population, they accounted for half of new HIV infections. Of new AIDS cases in the United States, the rate for African Americans was 58.1 per 100,000, almost 9 times the rate for whites (6.6 per 100,000). Some of the reasons for this high rate may be a lack of access to educational information about HIV and AIDS, inadequate medical care, a general lack of social support, and higher rates of risky sexual behavior, poverty, drug addiction, and sexually transmitted diseases.
Hispanics also have been extremely hard hit by the AIDS epidemic. In 2000, although Hispanics represented only 13% of the U.S. population, they accounted for 19% of the total number of new AIDS cases in the United States. In fact, the number of new AIDS cases among Hispanics in 2000 was 22.5 per 100,000, more than three times the rate for whites. From the beginning of the epidemic through December 2000, more than 114,000 Hispanic men were reported with AIDS in the United States. The highest percentage (42%) of these cases was due to men having sex with men (except for Puerto Rican men, for whom the highest proportion of cases was due to injecting drugs).

Although many people think that AIDS affects primarily men, women represent approximately 30% of new HIV infections in the United States. While advances in treatment and prevention have reduced the incidence of AIDS and the number of deaths due to the disease, women have not benefited at the same rate as men. Between 1993 and 1999, the number of new AIDS cases among women fell by only 36%, compared with 60% for men during the same period. Sadly, HIV was the fifth-leading cause of death among women between the ages of 25 and 44.

Among women, women of color—particularly African Americans—have been hardest hit by this epidemic. In 2001, African-American women accounted for nearly 64% of HIV-1 cases reported among women. Hispanic women also have not fared well. The rate of new AIDS cases among Latinas in 1999 was 14.9 per 100,000—more than 6 times the rate for white women (2.3 per 100,000). For African-American women, the story is even bleaker: In that same year, their rate of

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**African Americans and AIDS**

In the 1999 report entitled *On the Front Line: Fighting HIV/AIDS in African-American Communities*, the CDC published some statistics that indicate just how prevalent AIDS is among that population. Keep in mind that, in general, these numbers have only increased since that time.

In 1998, African Americans made up 13% of the population overall, but accounted for 48% of all reported cases of AIDS.

AIDS is still the leading cause of death for African Americans between the ages of 25 and 44.

Researchers believe that, of the 240,000–325,000 HIV-infected African Americans, more than 106,000 are currently suffering from AIDS.

An estimated 1 in 50 African-American men and 1 in 160 African-American women are infected with HIV.

Between 1995 and 1998, deaths from AIDS generally declined within most racial and ethnic groups. Still, among African Americans, the death rate from AIDS remains 10 times that of whites.

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Part 3: Who Has HIV and AIDS?
new cases was 49 per 100,000—more than 21 times the rate for white women!

Unlike men, who are most likely infected with HIV through homosexual contact, most women are infected with HIV through heterosexual contact or injection-drug use. In 1998, 61% of women from all racial and ethnic groups were estimated to have gotten HIV through sex with men, 36% due to injecting drugs. During sexual intercourse, HIV is transmitted more efficiently from men to women than it is from women to men. Also, having another sexually transmitted infection can increase women’s chances of getting HIV. Women have less access to good health care than men do. They are less likely to get the standard treatment for the disease, less likely to have private medical insurance, and more likely to put off getting medical care because of sickness or lack of transportation. Even if funding and programs increase, it will be a challenge for public-health officials to keep pace with the number of new HIV and AIDS cases that appear every year in these communities.

Billboards on AIDS prevention were produced by a local organization called Positive Action based in Lesotho.
“Your blood has tested positive for the HIV virus.”

When Michael Hice heard those words more than 15 years ago, panic and despair could have sent shock waves through his entire body. After all, when he received that fateful phone call in 1987, HIV was widely viewed as the “beginning of the end,” especially among gay men and others considered at high risk for contracting the disease.

But Hice, who now lives a largely symptom-free life on the outskirts of Santa Fe, New Mexico, received the news with calmness that—like his body’s ability to fight off disease—seems to be a part of his genetic makeup.

“I just don’t fall into negative traps,” explains Hice. “When I got the news that I was HIV positive, I just said, ‘Okay, now I know what I have to do.’ Though I had never been tested for HIV or AIDS, I had been living my life as though I were positive for years.”

Ironically, although Hice never sought out testing for HIV/AIDS, his blood was nonetheless examined for the dreaded virus. That’s because, in January of 1980, Hice was one of hundreds in San Francisco who had volunteered to have blood drawn as a part of a local clinic’s study on Hepatitis B. Years later, when the clinic’s director decided to test the stored vials of blood, it was revealed that the virus already had invaded Hice’s bloodstream in 1980.

That means that, for at least 23 years, Hice has lived with the virus—but other than the test results that confirm it, its presence in his body is not readily apparent. The virus has never progressed to AIDS, nor has his body fallen prey to the accompanying opportunistic diseases. In fact, aside from “bad knees” as a result of 10-mile runs, Hice, 56, is as healthy as he has ever been.

Surely, engaging in regular exercise, eating a good diet, and maintaining a positive attitude have contributed to his good health, but Hice is quick to note that, despite their best efforts, some people fall victim to HIV/AIDS more quickly than others. “It’s important to do all the right things, but there
are physical things that can’t be controlled. Some people have a stronger
genetic makeup than others” to fight viruses and diseases.

It is a point that hits home. Since 1981—when the first cases of AIDS were
being diagnosed in the United States—Hice has lost scores of friends and even
his partner of 12 years to AIDS. He knows he’s fortunate to live a full life, and
he cautions that people—particularly those in high-risk groups—should not
fall victim to complacency.

He offers these words of advice: “When one lives among a high-risk group
for anything, prevention should be an integral part of every activity—a con-
centrated effort. Do it not only for yourself, but for those who love you and
love others.”

For his part, Hice began taking a cocktail of antiretroviral drugs as a preventa-
tive measure about six years ago. His body’s ability to tolerate the drugs with-
out side effects has allowed Hice to lead a full life that includes work as a Web
site manager. Work, exercise, social interaction, and a pursuit of varied inter-
ests keep his days and nights full. “I have always led a full life. I love to exer-
cise, to see friends, and I can honestly say that there’s just about nothing that
I’m not interested in.”

As for the future, Hice, who is outgoing and friendly, remains hopeful and
content. “When I found out that I was HIV positive, my life didn’t change
dramatically. Even before I found out I was positive, I led my life believing
that you have to do what you want to do, so you can look back without
any regrets.”
Many people are still unsure about who can get HIV, how the virus is transmitted, and what they need to do to prevent the spread of AIDS. If ignorance about HIV and AIDS continues, people throughout the world will spread both the virus and the disease unknowingly.

People with the greatest risk for acquiring both HIV and AIDS are those engaged in high-risk behaviors.

This part of the book describes the main ways that HIV and AIDS can be spread. The information is based upon years of evidence showing how the vast majority of infected people acquired HIV or AIDS.

**Exposure to infected blood and blood products**

Researchers and health care workers know that HIV and AIDS can be transmitted from person to person by exposure to contaminated blood and blood products. In the past, people who received blood transfusions or who used blood products sometimes were exposed to HIV unknowingly. It is also possible that they were exposed to hepatitis C virus (HCV) at the same time. In the late 1970s and early 1980s, the blood supply in the United States was contaminated with HIV and HCV because donors were not tested.

People with **hemophilia**, a serious blood disorder, often require infusions of clotting factor concentrates or other blood products. Since these blood products are...
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made from human plasma that is donated by numerous donors, each time a hemophiliac receives an infusion, there is a risk of exposure to many viruses.

By the early 1980s, thousands of hemophiliacs had been exposed to HIV through the treatments that they needed to stay alive. In fact, according to the National Hemophilia Foundation, 8,540 people with hemophilia or other bleeding disorders may have received contaminated blood products between 1978 and 1985. Although the exact numbers are not known, it is possible that as many as 8,000 of them were later diagnosed with AIDS. Almost 5,000 of these people have died of the disease. During this same period, HIV was transmitted to many of the sex partners and children of these people with hemophilia.

In the late 1980s and early 1990s, the blood supply was made safer. Clotting factor concentrates began to be heat-treated, a process that kills HIV. Some blood products were pasteurized or treated with detergents. Before 1985, blood-clotting products were not tested for HIV or hepatitis C virus. Since 1985, all blood donations have been tested for HIV-1. Since 1992, all blood donations made in the U.S. have been tested for HIV-2 and hepatitis C as well.

If a blood donation is found to test positive for either HIV-1 or HIV-2, the blood is not used and the person who donated the blood is no longer allowed to make donations. HIV-2 infection in blood donors appears to be rare.

People who are HIV-infected or who have AIDS should not donate blood, plasma, or sperm. They should not be organ donors. These
guidelines have been put in place because people have acquired HIV these ways. For example, an organ that is donated by an HIV-infected person can transmit the virus to the recipient. Likewise, a woman can acquire AIDS by being artificially inseminated with sperm that was donated by an infected person.

Those who take care of HIV-infected people are more likely to be exposed to contaminated blood. Caregivers who are family members and friends, many of whom are not trained, should be careful not to come into contact with blood or other substances (such as mucus or feces) from an infected person. Although HIV cannot live very long outside of the body and transmission in a household is unlikely, added precautions should be taken.

Health care workers know to avoid directly touching any material or surface that was recently exposed to anyone’s blood or bodily fluids, including the fluid that surrounds the brain and spinal cord, the fluid that surrounds bone joints, and amniotic fluid that surrounds a fetus. Because family, friends, and caregivers of infected people are not exposed to these fluids, they are not listed among the types of fluids that people normally are involved with, such as semen or vaginal fluids. Still, health care workers should be careful to avoid these fluids, just as they would avoid the blood of an infected person.

**Blood transfusions**

During the same period when many hemophiliacs were infected with HIV and hepatitis C virus, anyone else who received a blood transfusion was also at risk. Among these people were those who needed blood replaced during scheduled surgeries, as well as the many who received blood during emergency care.

Almost every person who was infected with HIV by a blood transfusion received it before 1985, the year that HIV testing of blood donations started. Since then, public health officials have been very careful to screen donors and select only those who are not infected. Even in areas where there are many cases of HIV infection, the risk of getting HIV or AIDS from a blood transfusion is now extremely low.
Sharing needles

When an intravenous-drug user injects drugs with a needle or a syringe that has been used by someone else, it is not sterile. It could be contaminated with the blood of an HIV-infected person. This can lead to the virus being transmitted to anyone who uses the equipment after the HIV-infected person does. In addition to causing HIV transmission, sharing needles and syringes can cause the spread of AIDS, hepatitis B virus, hepatitis C virus, and other infections.

Ultimately, these transmissions can infect and cause the death of the drug user and his or her sexual partners, as well as infants delivered by women who are infected. In some parts of Asia (China, Indonesia, Myanmar, and Vietnam), 60–70% of all HIV infections are among those who inject drugs. According to the CDC, one-third (35%) of all AIDS cases reported in the U.S. in 1995 were associated with drug use. Keep in mind that these were only the cases that were reported; there may have been many more.

In addition to needles and syringes, other equipment is used to prepare drugs that are injected. These, too, can transmit HIV. Spoons, bottle caps, water, containers, cotton, and cigarette filters often are reused and can be contaminated.

Many people do not realize that some of the most common methods for sterilizing needles and syringes are not reliable. Boiling or using alcohol will not always destroy
HIV. Bleach can work to kill HIV, but only if the process is done correctly. Many needles that appear to be clean, or uncontaminated, are not. Some “street” sellers of needles and syringes offer drug users repackaged, unclean needles and syringes. The equipment might look sterile, but usually it is not. A person with a daily drug habit often is not able to resist the temptation to use this equipment. For these reasons, HIV and AIDS continue to spread among intravenous drug users and their sexual partners and needle-sharing contacts.

**Sexual transmission**

HIV and AIDS commonly are spread during many forms of sexual contact. During oral, vaginal, and anal sex, bodily fluids are exchanged between people. These fluids, which include blood, semen, and vaginal secretions, can carry HIV if one or both of the partners are infected with the virus. Various sexually transmitted infections or diseases (STIs or STDs) can be passed undetected. In addition to symptoms that include rashes, sores, and pain, many STIs can cause infertility and cancers later in life.

Each year in the United States, approximately 20 million people are diagnosed with new cases of STIs. Years ago, syphilis and gonorrhea were the most common and most serious STIs. Although there are many more STIs now, HIV is the most serious of all, because it causes a lengthy illness and often leads to death.

HIV transmission can occur in a variety of ways from an infected person to an uninfected person. The virus can be passed from penis to vagina, from penis to anus, from vagina to penis, from penis or vagina to mouth, and from mouth to penis or vagina. HIV can enter the body anywhere where the skin’s protective shield is interrupted—for example, where there is a scratch, a cut, or an insect bite. HIV can enter a person’s body through the eyes and nose. To be transmitted, HIV needs to get from the body fluid of one individual into the body fluid of another.

**Mother-to-child transmission**

All HIV-infected women should receive counseling about the risks involved in pregnancy. Some might decide to avoid pregnancy. Others choose to conceive and take medication to prevent mother-to-child transmission. It is
important for every HIV-infected woman to know the facts about her condition and the risks to her child. The information should include details about the risks associated with conception, birth, and breastfeeding, and for the life of the child.

There are several established ways that an HIV-infected mother can transmit the virus to her child.

**In the womb:** Scientists believe that more than 90% of HIV infections worldwide in infants and children probably occur late in pregnancy or during birth. Drug treatment for HIV has reduced the chances of the mother passing the virus on to her unborn child, but may also increase the mother’s resistance to the drug in future treatments. A mother with HIV should talk to her health care provider to weigh the risks and benefits of using HIV drugs during pregnancy.

**During birth:** A mother can transmit HIV to her baby during delivery. In the birth canal, a baby is exposed orally (through the mouth) to the mother’s blood and genital secretions. Both of these fluids can contain HIV if the mother is infected. The risk of transmitting the virus to the baby is higher if there is a large amount of blood during delivery or if the mother’s viral load is high. Because of these risks, a doctor may recommend that an HIV-positive woman give birth by caesarean section (c-section), a surgical procedure sometimes used for complicated deliveries.

**During breastfeeding:** HIV also can be transmitted to a baby through breastfeeding. Breast
milk from an HIV-infected mother contains the virus. When a child nurses, the HIV in the breast milk can enter the child’s body. In the United States, mothers with HIV are encouraged to feed their babies formula from a bottle, since this is a safe and healthy alternative to breastfeeding. In developing countries, safe alternatives to breastfeeding may not be available. In these countries, breastfeeding protects babies from illness and death due to other infections, a fact that greatly outweighs the risk of HIV transmission.

According to the National Institutes of Health (NIH), a child born with HIV infection will likely develop symptoms within two years of exposure. For HIV-2, the transmission rate from mother to child is lower than for HIV-1. Still, there are documented cases of mothers transmitting HIV-2 to their unborn and newborn babies.

There are several ways that adults can avoid exposure to both HIV and AIDS. The main way to prevent HIV/AIDS is through modification of one’s behavioral activities. For those who are involved in relationships, it is important to note that a high percentage of HIV/AIDS transmission occurs through sexual activity.

If a pregnant woman is HIV-positive, her doctor may recommend a C-section delivery to protect her baby from further exposure to the disease.
In the United States, feeding babies born to HIV-positive mothers with a bottle is safer than breastfeeding them.
With the slam of a prison cell door reverberating in her ears, Donna Jean Navarro sat down on a bed and looked at her new home for the next two years: a small cell in a state prison in southeastern Oklahoma that was as dreary and depressing as it was cold. Navarro, who had experienced more than her share of life’s hardships—three broken marriages, physical and mental abuse, and an uncontrollable desire for alcohol, marijuana, and cocaine—didn’t think life could get worse.

In the days that followed, she found that it could.

As part of a routine physical for new prisoners, Navarro, 60 years old, received what she says “was the worst news of my life”: She tested positive for HIV, the virus that causes AIDS.

Stunned by the news, Navarro, a Native American from Oklahoma, searched her mind to think of how she could have become HIV positive. It didn’t take her long to realize that she must have contracted the virus by sharing a dirty needle to inject cocaine into her bloodstream. At the time, it never occurred to her that she could get anything but high from using the same syringe as her friends.

Despite all that she had gone through—most recently a prison sentence for selling drugs—nothing compared with the shame she felt at having HIV. “I just couldn’t believe how ashamed I was. I didn’t want to tell a soul—not my friends or my family. I was resigned to the fact that I was going to die of AIDS.”

Navarro’s life began a downward spiral, she feels, when, as the teenaged daughter of a minister, she first took a sip of alcohol. Now, she felt like she’d finally hit rock bottom. In a way, it seemed so unfair: Before she began serving her prison sentence in 1996, she’d finally freed herself from
the chains of her addictions with the help of her church. Now she had HIV to contend with.

Wanting to keep her HIV status secret, she asked prison personnel to tell no one. She didn’t breathe a word of her diagnosis to the people she loved the most—her sister and her two adult sons—even though it weighed heavily on her heart and mind. Instead, she told them that she had leukemia.

Finally, after carrying her secret for more than a year, Navarro couldn’t take it anymore. She blurted out the news to her younger son and his wife. But instead of shunning her, they looked at her with love and concern. “They told me how much they loved me and told me I had to battle the disease so that I could have a relationship with my grandkids. They gave me something to live for.”

Out of prison for close to five years, Navarro won’t touch alcohol, and the only drugs she takes these days are her antiretroviral medicines. She doesn’t have trouble remembering to take her daily pills. “I take my drugs because I know they will help me stay strong for my grandkids,” explains Navarro.

Navarro has fought more than her share of battles in life, but with her faith and the support of her family, she finally feels ready to tackle her HIV-positive status head-on.
Part 5: How Are HIV and AIDS Prevented?

Sexual transmission
Many federal programs encourage youth and others to abstain from sexual intercourse or to practice abstinence. When you practice abstinence, you do not take part in any form of sexual activity. However, to prevent the spread of HIV/AIDS among those who are sexually active, there are ways to engage in safer sexual practices. It is worth noting that even if you follow these safer practices, you are still at risk for exposure to HIV and AIDS. This is why some use the term “safer sex” rather than “safe sex.”

One important practice is the use of latex condoms each time there is sexual contact. A latex condom, if used correctly, can prevent HIV transmission. There are male and female types of condoms. One or both types should be put on before any sexual activity begins. This includes using condoms during oral and vaginal sex, as well as anal sex. New, clean dental dams (square latex protection devices used by dentists) should be used when giving oral sex to a man or a woman. Even if two HIV-infected people have sex, they should use condoms or dams.

A person infected with HIV can be re-exposed to a different strain of the virus. For example, a person infected with HIV-1 can be exposed to HIV-2 by having sexual contact with someone carrying that type of virus.
HIV and AIDS: The Science Inside

**Intravenous-drug use**

To avoid exposure to HIV and AIDS, do not share needles. Drugs injected by syringe directly into a vein anywhere in the body are considered intravenous. Needles and syringes that are shared or reused by people are not sterile. These needles can carry HIV or AIDS. When shared or reused, the needles give HIV a perfect delivery system—the virus travels directly into your bloodstream.

People who use intravenous drugs are at a greater risk of exposure to HIV and AIDS because they might reuse or share syringes and needles to inject drugs. These syringes are not sterile, which means that they may be contaminated with HIV. Transmission to an entire group of people can begin with just one infected person.

As mentioned earlier, it is difficult to sterilize syringes and needles. Some people believe that this can be done by boiling or by cleaning them with alcohol or bleach. These methods do not always work. This is why it is vital that intravenous-drug users *never* reuse or share syringes and needles. In 1996, the American Medical Association (AMA) published a guide for physicians about treating HIV. Among the guidelines, the AMA suggests that doctors instruct patients at risk of HIV exposure from injecting drugs to use a new needle and
syringe every time they inject drugs. The only way to make sure that a drug user has a sterile needle or syringe is to get it from a reliable source. Pharmacies, clinics, and organizations that are committed to supplying this equipment to prevent the spread of disease are reliable sources.

Protecting others from exposure

There are many ways to protect people from acquiring HIV. Complete abstinence (not having any type of sex) can prevent all forms of sexual transmission of the virus; safer sex practices can substantially lower the risk. Not sharing needles or syringes for injecting drugs can prevent transmission from these contaminated surfaces; this includes not having tattoos or body piercings done from places that are unclean or that do not know the status of their clients (places should ask you about your HIV status before they work with you). People living with HIV/AIDS who are interested in donating blood, blood products, semen, or body organs should check their state laws because some areas will allow donations to others who are also HIV positive.

If HIV-infected people decide to be sexually active, they should tell any new partner about the virus. This way, the partner will understand the need to take reliable safety measures every time there is sexual contact. Sometimes it is difficult to tell a person about HIV. A physician or a counselor can offer advice on how and when to approach the subject.

Condoms are not foolproof. There is always a risk that a condom will not be put on correctly; this may allow leakage and exposure to bodily fluids. Also, sometimes condoms break; using a water-based lubricant with the condom can decrease this risk. Avoid using an oil- or petroleum-based lubricant, because it can weaken a latex condom and make it more likely to break. Avoid any contact with semen, both in and on the body.

Guidelines to Prevent HIV Infection in Intravenous-Drug Users

In 1995, the CDC and Johns Hopkins University co-sponsored a workshop to discuss the role of sterile syringes in preventing HIV transmission among intravenous-drug users. They made the following recommendations to people who continue to inject drugs:

- Seek substance abuse treatment or eliminate drug use.
- Use sterile syringes to reduce the risk of transmitting infection.
- Use new (or, ideally, sterile) water and other equipment to prepare drugs for injection.
- Use a new, clean alcohol swab to disinfect the injection site in order to prevent infection.
Other forms of sex should be done with caution. For example, anal sex causes small abrasions to form within the rectum, which can become pathways for the transmission of HIV. The semen from an HIV-infected man can enter an uninfected person’s blood directly through these abrasions. A person who takes the risk of having anal sexual intercourse should always wear a latex condom and use a water-based lubricant. Some forms of contact that should be avoided to prevent exposure are oral (mouth) or digital (fingers or hands) contact with the anus. Also, bodily waste should not meet another person’s mouth, anus, eyes, cuts, or sores.

If possible, try to know the status of your partner. It is safer to avoid having any type of sexual intercourse with a person suspected of being, or known to be, infected with HIV or AIDS. This includes oral, anal, and vaginal contact. No one should ever have even protected sexual intercourse with a stranger.

Do not practice risky sexual behavior. Sexual contact with many partners over time or with several people at the same time increases the risk of exposure to HIV and AIDS. Having sexual intercourse with any person who has had many partners also increases the risk of transmission.

Substance abuse can lead to harmful behaviors and HIV/AIDS. Many people try to use good judgment when deciding how, when, and with whom to have sex but place themselves at risk of HIV transmission in other ways. Alcohol and drug use can increase the likelihood that a person will engage in risky sexual behavior. Therefore, avoid making decisions about sexual contact when using alcohol or drugs. If one partner in a monogamous relationship is showing risky behavior, the other partner should insist on having only protected sexual contact. Alternatively, abstinence is even safer. Always insist on open, honest communication.
Treatments to protect the babies of HIV+ mothers

Since unborn babies and children cannot protect themselves, they must depend mainly on their mothers to avoid exposure. An HIV-infected mother can pass the virus to her unborn child in the womb, during birth, or through breastfeeding. If a baby or a child is exposed to HIV, ultimately he or she is also exposed to the possibility of contracting AIDS. There are steps that an HIV-infected woman can take to reduce the risk of transmission to a baby or child.

After being tested, seek counseling about HIV and pregnancy. If possible, a woman infected with HIV should have all the information necessary to make an informed choice before she decides to get pregnant.

Follow prescribed treatment. If she decides to get pregnant or already is pregnant, an HIV-infected woman can take medications that help prevent transmission of the virus to an unborn child. As mentioned earlier, a woman who is infected with HIV can transmit the virus to a fetus. There are medications that can be taken during pregnancy to reduce this risk.

Plan delivery carefully. Because a baby can be exposed to HIV during birth, it is important to limit this exposure. HIV is in the body fluids within the birth canal, including blood and vaginal secretions. If the delivery is done by caesarean section (c-section), the baby will be exposed to fewer bodily fluids. In addition, since c-sections take less time than natural, vaginal births, the baby is exposed to HIV-infected fluids for a shorter time. However, c-sections are not without risks, and a healthy mother with a low viral count and on good antiretroviral treatment is encouraged to have a vaginal delivery. Prolonged labor and ruptured membranes are indications for a c-section.

Do not breastfeed. Because HIV can be transmitted to a baby through breast milk and safe alternatives are available, HIV-positive women in the United States should not breastfeed.

Awareness and education

One way to combat the spread of HIV and AIDS throughout society is to get informed about the epidemic and then to share that knowledge with others. The goal of awareness and education programs is not to frighten people, but simply to inform them. Those who are informed are more likely
to change risky, harmful behaviors and help in prevention efforts.

Unfortunately, many people consider HIV and AIDS to be tragedies that cannot happen to them. Even though the rate of HIV-2 infection is still quite low in the United States, the best way to maintain this low rate is to continue educating people about the risk factors for HIV and AIDS. And, for people who may have been exposed to HIV/AIDS, testing can give them the information and knowledge that will help them decide the best course of action for their future.

A sexually active person should never be afraid to ask a new companion questions about his or her past sexual history. Information about this history should include any risky behavior with drugs or prostitutes and possible exposure to sexually transmitted diseases. It is not unreasonable to ask a companion to get tested for HIV before any sexual intimacy occurs. Testing should be done twice. After the initial test, another test should follow (approximately three months later). It is important for a person to know his or her partner thoroughly before having even protected sexual contact. These discussions provide opportunities for people to get to know each other better, to increase awareness, and to expand knowledge. This form of open communication can help build trust in a relationship and protect the health of both people.

Because coinfection of HIV with hepatitis C virus (HCV) is so common, it is important to ask new companions about the possibility of past exposure to HCV. Some of the same measures can prevent the transmission of both HIV and HCV. Sharing or reusing injected-drug equipment can transmit HCV. Even sharing toothbrushes and shaving razors with a person who is infected with hepatitis C virus can lead to infection. Moreover, tattooing and body piercing with unclean needles are dangerous. While it is unlikely that HCV can be sexually transmitted, it is better for the overall health of a coinfected person to practice safer sex.

Those who plan to help care for a person infected with HIV or AIDS should receive basic training about doing so safely. Remember, training is given to protect the infected person from exposure to illnesses. Therefore, a visitor who has chicken pox or shingles—
even if the sores are almost healed—can transmit an infection that can give a person living with HIV or AIDS a life-threatening disease. Being a caregiver for someone with HIV has its own unique rewards and challenges. However, having a strong support network can be as important for caregivers as it is for people living with HIV, so precaution and attention should be given to how much energy and time are given to caring for people living with HIV/AIDS.

The best place to start an awareness and education campaign is within your own relationships and your own community. The effort to find a cure or vaccine is ongoing, and there are always new developments in HIV and AIDS research. Knowing more about these developments—and about HIV/AIDS in general—can empower people throughout a community, particularly one in which the epidemic is widespread.
Knowing more about HIV/AIDS can empower people throughout a community.
AIDS Vaccine Research: Mission Possible

For more than two decades, the best minds in the world of science and medicine have tried valiantly to develop a vaccine to stamp out AIDS, arguably one of the most dreaded and mysterious diseases in history. And although significant scientific and medical breakthroughs have emerged, a vaccine—and, eventually, a cure—for AIDS remains elusive.

Yet, rather than feeling embattled, a large fellowship of researchers the world over continues to believe that a vaccination against HIV transmission is within reach. Their methods differ, but they are united in their commitment to conducting cutting-edge research that will finally put an end to the disease. Some researchers focus on closely examining the virus itself in culture cells in the laboratory. Others rely on protocols using adult volunteers. Still others, like Dr. Louis Picker, are convinced that the answer to the problem of AIDS lies with primates, the group of animals that includes monkeys, gorillas, and humans.

Picker, associate director of the Vaccine and Gene Therapy Institute at the Oregon Health and Sciences University, is focusing on primates because monkeys and humans have something critical in common. Both have been victims of a virus that causes a weakened immune system—which in turn leads to a variety of infections that can progress to life-threatening diseases. Simian AIDS is caused by the simian immunodeficiency virus (SIV), which is a close relative of the human immunodeficiency virus (HIV)—the cause of AIDS.

“I have tremendous respect for the monkeys I work with. They are beautiful and intelligent animals, but I firmly believe that these primates are key to valuable research to stop a disease that is projected to kill 68 million people by the year 2020,” says Dr. Picker.

Specifically, Picker is focusing his efforts on something called “memory” T-cells, which help the body’s immune system launch a counterattack when a disease tries to invade it. Here’s how it works: During an effective attack on a disease-causing organism, a set of T-cells capable of remembering and rapidly responding to that specific organism is formed. These “memory”
T-cells remain in the blood and tissues so that the immune system can mount another counterattack if need be. Memory T-cell activity is also one of the keys to explaining how vaccines work: The vaccine tricks the immune system into generating critical disease-fighting memory T-cells.

As Picker sees it, the big question is, Can the immune system conquer this virus? Picker is optimistic that it can, though he admits a vaccine is probably at least a decade away. “Convincing proof of the efficacy of newer vaccine approaches might occur within the next five years, but it will take longer than that for anything to be available to the population.”

The work can be tedious and frustrating, especially considering that he is often pulled away from his research by grant writing and other more bureaucratic parts of the job. “You can never go home from work feeling good, happy or relaxed,” says Picker, with a laugh. But he views his work as a challenge, and the human aspect of the disease—the lives that have been robbed by the disease and those that will fall prey to it in the future—is always on his mind. After all, like so many middle-aged adults, he knows first hand the tremendous toll that the disease has taken. He remembers with sadness the friends and acquaintances from his medical schools days at the University of California at San Francisco whose lives were claimed by the disease.

“Even though your mind is on research and making sure that you have adequate funding, the lives of people who had AIDS or who are now suffering from it are always in your thoughts,” explains Picker. “My lab partner from college died from the disease. It’s a horrible disease that needs to continue to be a top priority.”
Part 6: How Are HIV and AIDS Treated?

If you think you might have been exposed to HIV, the earlier you are diagnosed, the better off you will be. There is evidence that early diagnosis, education, and treatment all help an HIV-infected person slow the progression from HIV to AIDS. Many forms of treatment can also prevent some conditions that are associated with HIV.

Finding out that you are infected with HIV can produce shock and fear. Yet, this is one of the most important times in the course of the condition for you to try to remain positive and open. In the first stages of treatment, an HIV-infected person must try to avoid exposure to stress and situations that can lead to depression. It is important for those with HIV to stay away from anyone who has a serious infectious disease.

Adequate nutrition and exercise are also important. Maintaining social contacts and setting up a support network can help you cope with an HIV diagnosis. Even if the virus advances to AIDS, there are ways to manage the disease.

It is important to talk with a doctor or counselor after you have been diagnosed as HIV-positive.
Although advanced AIDS can seem hard to deal with, with discipline a person with AIDS can take all of the daily medications and keep the disease under control. Discipline is also important when a person with AIDS deals with the many decisions that can lead to risky behaviors. Loneliness, anger, or even hopelessness can lead a person with AIDS to consider having unprotected sexual contact. Anxiety can lead an infected person to consider injecting drugs. Many times, a person with AIDS needs a support group to inspire this discipline and help encourage safe behavior.

In addition to possessing discipline, an AIDS patient needs to have strength of mind in dealing with the syndrome. Every opportunistic illness can be life threatening. This alone can exhaust the infected person. Without strength, many people with AIDS lose the will to live. In battling AIDS, strong determination often comes from the belief that it is possible to live a full and meaningful life.

**Keeping the “viral load” down**

In treating HIV, it is important to keep the patient’s viral load low so that the immune system can recover some of its strength. Remember, the viral load is the amount of HIV that is in the bloodstream of the infected person. This amount can change often, as the condition develops. When the immune system is strengthened, the deterioration slows and the progression to AIDS takes longer. Also, an HIV-infected person seems to remain healthy for a longer time. If the viral load is high, the immune system is in crisis, working to keep up with the destruction of CD4+ T cells by making new ones. Often, when the immune system is overworked, it can be overcome by infection.

Although reducing the viral load is important, it is not a cure. No matter how low the viral load gets, the person remains infected. He or she can still transmit the virus to another person.

**Medications**

Many HIV medications are prescribed on the basis of the results of certain blood tests. As these results change, the types and dosages of medications are adjusted. For example, if a patient’s CD4+ T cell count is below 500, his or her immune system is considered to be suppressed. This patient is a good candidate for medication therapy. Likewise, if an HIV RNA viral load test indicates that a patient has a high viral load, this person will probably respond well to medication. Even someone with asymptomatic
HIV infection could have a CD4+ T-cell count below 200. In this case, the person may be advised to start antiviral therapy to slow the spread of HIV. Medications also are prescribed depending on the strain of HIV.

The antiviral therapies that work in those with HIV-1 do not always slow the disease in people with HIV-2. Even the standard tests that are used to monitor HIV-1 progression do not always help physicians determine an HIV-2-infected person’s response to treatment. Often, doctors must rely on other signs of immune system weakening in HIV-2 patients: opportunistic infections, weight loss, or unexplained fever.

In some instances, to decide whether a particular therapy is appropriate, health care providers need to determine whether the person is likely to take the medication as prescribed. Sometimes dosages are quite high, and often the medications need to be taken throughout the day. The success of medication therapy depends—in a significant way—on how well the infected person sticks to the prescribed treatment. If he or she has trouble taking prescriptions exactly as ordered, the virus can become resistant to the medication very quickly.

Resistance occurs when the virus is allowed to produce new strains in the presence of a low level of medication (not enough to suppress the virus). HIV can replicate easily if not enough medication is taken. Resistance can make the condition worse. Taking medication as prescribed means not combining the therapy with other medications, including those not prescribed by a physician, such as over-the-counter...
drugs (like aspirin or cough medicine) and herbal remedies. Because both of these can interfere with treatment for HIV, a physician or nurse practitioner should always be consulted before one takes such products.

The main HIV treatment currently given is called **highly active antiretroviral therapy (HAART)**. HAART medications work by reducing the amount of the virus in the bloodstream. This allows the immune system to recover some of its strength. More than 16 antiretroviral medications have been approved for treating HIV infection. They work by preventing one of the most basic ways that HIV functions. Enzymes are proteins found in every organ of the body that help the body to function normally. When HIV takes over a cell, it uses certain enzymes to help it survive. Antiretroviral medications stop the virus from doing this. There are several kinds of antiretroviral medications—the most commonly prescribed include protease inhibitors and RT inhibitors. These medications work by getting in the way of particular steps in HIV’s life cycle.

HIV makes a chemical called a protease enzyme which produces the viral particles that allow the virus to make copies of itself. **Protease inhibitors** work by interfering with this process, only letting the virus replicate itself in ways that cannot infect other cells. As mentioned earlier, a virus copies itself by using a host cell’s genetic material (DNA). HIV uses the enzyme called reverse transcriptase (RT) to use a cell’s DNA. **Nucleoside/nucleotide RT inhibitors**, or “nukes,” trick reverse transcriptase into creating faulty DNA that will not replicate HIV. **Non-nucleoside/nucleotide RT inhibitors** (NNRTIs) attach themselves to reverse transcriptase to keep the viruses from reproducing. Most of the medications that are effective in treating those with HIV-1 do not work as well in patients with HIV-2. For example, protease inhibitors seem to be somewhat effective against HIV-2, but non-nucleoside reverse transcriptase inhibitors are not.

Many medications have been approved to treat HIV infection. The box to the left only lists the generic names for these drugs. Each medication has a generic name, a brand name, and a nickname (or acronym). For example, zidovudine is the generic name for the brand name Retrovir, which has the nickname AZT.

During HAART treatment, if an infected person becomes drug resistant from not taking the med-
ication as directed, “rescue” therapies must be used. Also called “salvage” therapies, these medications work by lowering the viral levels in the blood.

People who are coinfected (for example, infected with both HIV and hepatitis C virus) should be monitored carefully while on HAART. These people are at greater risk of developing liver toxicity from the medications. In general, HAART medications are not effective against HCV. This means that a person may need both antiviral and antiretroviral medications for HIV—a combination that can be toxic to the liver.

**Keeping fit**

A person with HIV should try to remain active. Walking can help strengthen muscles, joints, and the respiratory system. In order to keep fit, it is also important to eat nutritious meals and get a sufficient amount of sleep. Using less alcohol and tobacco—or, better, none at all—will help strengthen the body to fight infection.

A person with HIV or AIDS might find that getting proper nutrition and exercise can be difficult at times. Mouth sores, diarrhea, nausea, or a loss of appetite can cause a person not to eat right. Health care workers can suggest ways to prevent these symptoms. Here are some other ideas:

- Drink plenty of filtered water each day—8 to 10 glasses.
- Drink high-calorie milk shakes or add powdered milk to other drinks.
- With a physician’s approval, take a multivitamin with food each day.
- Eat many small meals each day instead of three large ones.
- To avoid making diarrhea worse, avoid fatty, fried foods and foods high in fiber. Instead, eat bland foods, such as bread, rice, and applesauce.
- To keep from aggravating mouth sores, avoid citrus fruits, hot and cold foods, and spicy foods. Use a straw when drinking liquids.
- To control nausea or vomiting, avoid drinking liquids with meals. Eat smaller meals with milder foods. Sit and relax for 30 minutes after each meal.
- Start aerobic exercises slowly and increase their intensity gradually.
- For weight lifting, begin with a light weight that is easy to lift. Add weight carefully. Never lift too much weight or do too many repetitions of an exercise. Rest after each repetition.

Monitoring health

Even if they are feeling well or have no symptoms, HIV-infected people should make regular visits to a physician’s office for check-ups. During these appointments, the doctor will monitor how well treatments are working and suggest ways to address any problems that come up. Regular visits to a dentist’s office are also important, because some symptoms associated with HIV involve the teeth and mouth tissues. Even bleeding gums, a condition that is common in healthy people, can increase the risk of transmitting HIV.

A person living with HIV should keep a daily journal. In it, he or she can note any changes in symptoms, eating and sleeping habits, exercise, and emotional state. This information can be very helpful for both the infected person and any health care workers treating the person. Keeping a journal is one way that infected people can play a more active role in their own treatment program.

People who are infected with HIV are living longer than they used to. As they age, new challenges are
emerging for those who are trying to keep HIV under control. Many of these challenges result from medical problems associated with aging. As people with HIV age, they need to pay close attention to any changes in their bodies that can reduce the positive effects of treatment. For example, an HIV-infected woman could start to experience menopause symptoms during treatment for HIV. These new symptoms should be treated in ways that do not interfere with the success of HIV therapies.

Maintaining emotional health

It can be frightening to learn that you are infected with HIV. Much of this fear comes from not knowing enough about the virus and about what to expect. Learning more about HIV and AIDS not only helps to address concerns, but also assists you in making decisions about treatment.

Family members and friends might try to provide an HIV-infected person with information about the condition, but some of that information may be unreliable. The most reliable sources for information on HIV and AIDS are physicians, nurses, and counselors who have been trained to treat the conditions; ask them when questions come up. In addition, there are national, state, and local organizations that provide useful information on these topics. (See the “Resources” section for additional information.)

An HIV-infected person faces many types of stress from different sources. Apart from the anxiety that is produced from dealing with the daily challenges of battling the virus, many people face stress at home and at work. Some people become so ill that they feel overwhelmed. It is important to try to identify the sources of stress as soon as the symptoms appear. That way, the stress can be treated.

While it is common for a person to experience fear, anxiety, or depression soon after diagnosis, it can be harmful if any of these reactions continue. Sometimes feelings of hopelessness can lead to difficulty sleeping, focusing, or eating. All of these problems can affect health in negative ways. For an HIV-infected person, such problems can further threaten a weak immune system. All stress-related symptoms can be treated, yet they often go undiagnosed because of confusion over what is causing them. Seeking treatment early will help improve the person’s general health. Without treatment, a person will have less energy and strength to fight HIV.
One way to remain emotionally healthy is to join a support group. The members of such a group experience similar concerns and problems. Those who have fought the virus over a longer time are often able to help those who have just been diagnosed.

Nurturing positive relationships with friends can help minimize depression. So can having a pet. Exploring different interests or acquiring a hobby can prevent sadness from becoming incapacitating.

For a list of the warning signs of depression, see the “Psychological and emotional issues” section of Part 2 on page 23.

Preventing and treating opportunistic infections

The opportunistic infections that are associated with AIDS often cause many of the symptoms from which an infected person suffers. If these infections are prevented or treated, a person with AIDS will experience fewer threats to the immune system and will maintain better general health. While it is difficult for anyone with AIDS to avoid infection, some measures can help an infected person remain healthy.

• Eat nutritious meals.
• Exercise, but do not overexert yourself.
• Get vaccinated against the flu (yearly) and pneumonia (as indicated).
• Follow the treatment plan that has been established.
• Avoid alcohol, tobacco, and recreational drugs.
• Get a TB skin test and a chest X-ray.

Some of the AIDS medications that are used to treat the overall disease offer the added benefit of helping reduce the number or extent of opportunistic infections. Current treatments for AIDS have been found to reduce the number of lesions that usually accompany Kaposi’s sarcoma. Sometimes, the AIDS medications that help keep a person’s viral load down also can help prevent opportunistic infections from gaining ground. Toxoplasmosis, a common nervous system infection that affects people with HIV and AIDS, can be kept inactive by keeping HIV and AIDS under control.

Other opportunistic infections should be dealt with separately. PCP, the pneumonia that is the first indication of AIDS in half of all people with HIV, can be prevented with proper treatment. Usually, a combination of antibiotics is given as soon as symptoms appear.
Part 6: How Are HIV and AIDS Treated?

Treating the other health problems of AIDS

In addition to opportunistic infections, other disorders are common among people with AIDS. It is important to recognize the early signs of these disorders, so that treatment can begin as soon as possible.

Skin conditions. Many of the skin conditions that are common in healthy people are far more severe in those with AIDS. For example, warts tend to be larger, more numerous, and more widespread. They might first appear on the hands, but then quickly spread to the genitals. Sometimes these warts do not respond as well to standard treatment and often return after a successful treatment.

Seborrheic dermatitis can produce red rashes from the forehead to the groin. In those with AIDS, this condition can become quite severe and lasting.

Psoriasis, a skin condition in which thick, scaly pink lesions appear on the scalp, elbows, and knees, can completely cover the body of a person with AIDS, making hospitalization necessary. A medication that is often prescribed for people with the standard type of severe psoriasis cannot be given to those with HIV or AIDS because it further suppresses the immune system.

Herpes Simplex. Type I herpes usually causes sores around the nose or mouth. Type II sores are often near the genital or anal regions of the body. In those with AIDS, these sores tend to be larger ulcers that increase in size and remain quite painful for weeks. Left untreated, the virus can spread into the body and produce fever, mental confusion, headaches, and weakness, requiring hospitalization. Oral antiviral and topical medications can be effective. If there is a secondary bacterial infection, antibiotics will be prescribed.

Molluscum Contagiosum. This condition produces smooth, pearly, or waxy flesh-colored bumps that appear on any skin surface. The bumps have a core that is filled with a cheeselike substance. Generally, these bumps are not painful. Dermatologists can remove them by freezing or scraping.

Hairy Oral Leukoplakia. This condition causes small, white, fuzzy patches to appear on the tongue. It is often confused with thrush, which is a yeast infection of the mouth that is also common in people with AIDS. The patches are usually not painful, although they can be numerous. This condition can be one of the first indications that a person is infected with HIV.
Yeast infections. In those with AIDS, these severe, itchy red areas of rash often appear in the skin folds of the genital area. The infection can spread to the buttocks, genitals, and thighs. In women, this infection can produce severe vaginitis. Oral medications and creams usually are prescribed to treat such infections, but people with AIDS often have built up a resistance to these drugs. Even if the initial treatment is successful, the rash often comes back after the therapy ends.

Bacterial infections. Skin infections that are caused by bacteria are common in people with AIDS. Widespread clusters of blisters often appear, filled with pus that sometimes oozes. After the blisters break, crusty yellow ulcers emerge. In those with AIDS, bacteria can be particularly harmful because they can spread to the bloodstream and then throughout the body. These people often need to be injected with antibiotics.

Fungal infections. Chronic cases of scaly rashes on the skin, nails, toes, and fingers tend to reoccur in people with AIDS, even following successful initial treatment. A single case of fungal infections of the nails can take months to treat with oral medication, which can be toxic to the liver as well.

Some of the most challenging aspects of AIDS to treat are psychological or emotional symptoms, which often continue undiagnosed and tend to have a harmful effect on a person’s overall health. For a person with AIDS to remain healthy, any attempt at maintaining a positive outlook can be useful.

Since there is no cure for the disease and the symptoms can be severe and relentless, it is nearly impossible for the infected person to battle this disease alone. If friends, family, support groups, and health care workers all attempt to contribute in positive ways to the infected person’s life, the struggle will be easier. These contributions should include helping the person cope with emotional distress and anxiety. Often, when the symptoms of depression are worst, the victim is not aware of them. Others can help the infected person face issues and seek treatment.
Part 7: What Does Research Tell Us about HIV and AIDS?

Current lines of research
Several types of research on HIV and AIDS are ongoing. Some areas focus on the science of the disease. These research efforts help scientists understand the ways the virus behaves and the effects it has on certain populations. Another area of HIV and AIDS research deals with prevention. The results of this research can lead to creative ways of dealing with the spread of HIV and AIDS among certain groups. It also can help health officials determine which programs are working and which are not. Different types of vaccines are being researched in clinical trials. No vaccines have been approved yet for use in humans.

Researching the science of the disease. This important area of research, which is crucial to finding treatments and, eventually, cures for HIV and AIDS, addresses such issues as the following:

- understanding the processes that allow for transmission of the virus;
- figuring out why some people who are exposed to the virus get infected and others do not;
- gaining insight into those infected people who remain symptom-free;
- learning why certain groups have higher rates of infection; and
- finding out how the virus responds to certain therapies.

Recently, researchers identified a gene (MCP1) that seems to make some people less likely to become infected with HIV. However, once infection occurs, this same gene accelerates HIV-associated dementia. In a study published in the Proceedings of the National Academy of Sciences, researchers found that MCP1 at first produces a protein that helps the immune system resist HIV. One form of this gene even seems

Both people who are HIV-positive and those who are not are needed as volunteers for clinical trials.
to produce additional amounts of the protein. However, if HIV infection does occur, the protein triggers certain cells to cause inflammation and injury in various organs within the body. In the brain, this damage leads to dementia. Those who were studied had a 50% reduced risk for HIV infection, but were four times more likely to suffer from dementia if HIV infection occurred. Scientists have not yet found a way to prevent the negative activity of MCP1. Still, this study’s findings could help physicians identify people who are most at risk for HIV-associated dementia.

Physicians at the University of Washington in Seattle are studying the role of a certain protein in infant saliva that could protect babies from acquiring HIV through the mouth. Someday, this protein, called secretory leukocyte protease inhibitor (SLPI), could be developed into a medication. SLPI has antiviral, antibacterial, and anti-inflammatory properties.

In a study published this year in the *Journal of Infectious Diseases*, babies with higher levels of SLPI in their saliva at one month old were half as likely as other babies to acquire HIV from their mothers’ breast milk.

The Pharmaceutical Research and Manufacturers Association says that there are more than 80 new HIV/AIDS medications in development. Some of these stop HIV from replicating like new protease inhibitors and stronger, but less toxic, reverse transcriptase inhibitors. New categories of medication have been developed which interrupt steps in the HIV life cycle, that, until now, were not addressed. Among these medications are **fusion inhibitors** (which try to stop HIV from entering a cell) and **integrase inhibitors** (which try to stop HIV from putting its genetic materials into a cell’s normal DNA).

According to the American Cancer Society, research is leading to the development of new treatments for Kaposi’s sarcoma in people with AIDS. Medications such as **angio- genesis inhibitors** block the growth of blood vessels to tumors, one of the main causes of lesions throughout the body. In various clinical trials, new ways of delivering chemotherapy, as well as new
combinations of chemotherapy and antiretroviral medications, are being tested.

For those with hemophilia, who must rely upon the use of blood products to survive, researchers are exploring safer alternatives for treatment. New blood factor concentrates are being developed that are not made from human plasma. Once in use, these new concentrates could offer a virus-free way for hemophiliacs to maintain good health.

**Researching ways to prevent the spread of infection and disease.** In an effort to find new and better ways to fight infection and disease, researchers are examining the specific needs of at-risk groups. Education plays a central role in any prevention program. Educational efforts can be tailored to the specific needs of the various groups that are identified through research. People of certain cultures might be plagued by particular, harmful myths about HIV. Researching these myths and learning more about how to dispel them can help prevention efforts.

Recently, researchers examined the rates of infection among groups of South African children. The scientists knew that more than 11% of South Africans (4.5 million) were infected with HIV. Through their study, they learned that 13% of children aged 2 to 14, or more than 650,000 children, had lost one or both parents to AIDS. This information can help focus an education effort on a population of orphaned children. Without such information, researchers might have been inclined to think that most parents could offer guidance on HIV and AIDS to their children. The information is also useful for social services staff that need to reach out to these children. In addition, the study revealed that there is widespread support within South Africa for using antiretroviral medications, an approach that once was dismissed by the South African president.

Another prevention-based research study, conducted in Botswana, informed scientists about the extent to which that country is losing its battle with HIV and AIDS. Despite an extensive partnership, strong leadership and support from within the government, free medication, and generous funding, the rate of infection is growing in Botswana. One-third of all adults in the country are infected with HIV. Life expectancy has dropped from 65 years to under 40. More than 65,000 of Botswana’s children have lost both parents to AIDS. Researchers expect this number to double or triple by 2010. When a preven-
tion study reveals that the original plan has been unsuccessful (in this case, two years into a five-year program), this gives health officials an opportunity to alter their plan to accommodate reality.

In a report entitled *HIV Incidence among Young Men Who Have Sex with Men—Seven U.S. Cities, 1994–2000*, CDC researchers noted that, 20 years after the HIV epidemic started, young men are still at high risk for HIV infection. The seven cities in which these men were studied were Baltimore, Dallas, Los Angeles, Miami, New York, San Francisco, and Seattle. The men, aged 15–22, reported having more than five sexual partners in the six months preceding the study, having unprotected anal sex, or injecting drugs. Rates of infection were highest among African-American men aged 20–22. The researchers admit that the rates of HIV infection might have been lower had the sample been larger or the geographic areas included smaller towns. However, the numbers do confirm what public health officials already know: It is vital that outreach programs expand to target certain populations. The research also confirms that HIV is still being transmitted through unprotected sex with many partners and through intravenous-drug use.

Researchers have sought to find a vaginal cream or gel that could help women reduce the risk of HIV and sexually transmitted infection transmission. In earlier studies, researchers had hoped to demonstrate that spermicides containing nonoxynol-9, a substance used to kill sperm and prevent pregnancy, could block the spread of HIV. What they discovered was that, at times, these spermicides actually increased a woman’s risk of contracting HIV. In several studies, the creams destroyed healthy vaginal cells as well as some of the “good” bacteria found in the vagina. Both results contributed to an increased risk of being infected with HIV.

A new study seems more promising. A vaginal gel that contains a compound called mandelic acid condensation polymer (SAMMA) appears to be a safe and effective contraceptive, as well as a way to block HIV and two strains of herpes simplex virus. It did not kill sperm, but prevented it from functioning. It also weakened gonorrhea and, to a lesser degree, chlamydia.

**Researching vaccines.** One type of vaccine that researchers are examining is preventative, so it is intended for those not infected with HIV. The goal of this type of vaccine is to prevent HIV infection in people around the world. Therefore, the vaccine must pre-
vent infection by every known strain of the virus. It is important to note that a person cannot become infected with HIV from the types of preventative vaccines that are being studied. One of the main challenges facing researchers in this area is a characteristic of the virus itself: HIV has a relentless ability to mutate and escape the built-in immune system defenses. In testing this type of vaccine, researchers are hoping to discover an immune system response. Testing is going on in the United States, Haiti, and South Africa.

Another type of vaccine that is being researched is called therapeutic. It is intended for use in HIV-infected people. The hope is that someday this type of vaccine will improve immune system functioning in those not yet suffering from AIDS. Therapeutic vaccines are designed to lower viral load as well. In patients who receive them, the vaccines will be taken together with pre-
scribed HIV therapies. Later in the clinical trials, an HIV-infected person might be taken off some medications to see if the therapeutic vaccine (alone) can help the body fight infection.

The important role of volunteers

Volunteers are crucial to the success of research into the causes of and treatments for HIV and AIDS. Physicians and researchers have made advances that would not have been possible if not for the many volunteers who took part in medical studies. Clinical research trials, which test new medications, have helped drug companies develop new therapies for many people.

If people infected with HIV or AIDS were not willing to volunteer for these trials, many new drugs could not have been tested. This would mean that some of the medications that are currently in use would not have been made available. The information that is gathered as a result of these studies is enormous and could lead to the development of vaccines or even cures.

It is important that all racial and ethnic groups be represented in medical studies and trials. That way, investigators are able to gather information that is useful to specific groups. African Americans and Hispanics are especially encouraged to volunteer. HIV and AIDS infection rates are quite high within certain urban populations, and often the medical care available is inadequate. Participating in medical studies can lead to an entire community gaining access to new medications.

People choose to volunteer for studies and trials for a variety of reasons. Some are interested in helping to further science. Others want to have an opportunity to try a new treatment. Still others want to have access to medical care and specialists not covered by insurance. Some volunteers have no insurance at all. Many volunteers are paid to participate in studies and trials. Volunteering gives most people an opportunity to receive treatment and expand their knowledge about their conditions.

When a person decides to take part in a study, it is important to consider the commitment that is involved. Frequent visits to a research site are often required. Someone with AIDS or someone infected with HIV is already in a life-threatening medical situation. Often, he or she experiences a lot of symptoms from these conditions. The infected person might
be asked to endure reactions to therapies that cause more discomfort.

A person who volunteers must agree to complete the study. Sometimes, a volunteer will decide to leave the study before it ends—if, for example, the side effects or the schedule becomes too difficult to manage. The conditions of a medical trial can make a volunteer’s symptoms worse. In some cases, an investigator might ask a volunteer to withdraw because it is in the interest of the volunteer’s health to do so. Medical or drug company staff might end a study or trial if the drug’s side effects seem too severe or the drug is judged ineffective or toxic. Often, many studies are being conducted over the same period. If one study is not suitable, perhaps another one will be.

Because there are so many infections that can occur during the course of HIV and AIDS, the progress of the disease is unknown. Within the same study, one person could have her health threatened by serious infection and another could experience very few symptoms. In this case, how each responds in the same drug trial can be drastically different. The differences can help researchers develop drugs that are useful to all people with HIV or AIDS.
Conclusion: Let’s Stop the HIV and AIDS Epidemic

When AIDS was first identified, people who had it rarely survived for more than two years. There is still no cure for HIV or AIDS. However, many therapies and lifestyle changes can slow the progression of the conditions and increase the quality and the length of an infected person’s life.

Worldwide, drug use is a serious social problem. In addition to the number of lives wasted and destroyed by drug use, many deaths occur because of sharing HIV-contaminated drug equipment. There are too few drug treatment programs to help people deal with their addictions. If there were more programs, fewer people might use injectable drugs. For those who already do inject drugs, there are too few programs that supply clean needles and syringes. HIV and AIDS continue to spread among this population of addicted people. It is critical to support public-health efforts to educate people about the dangers of drug use, addiction, and sexually transmitted diseases. In addition, the support of national, state, and local programs that work to stop addiction and to treat drug-related illnesses is essential.

HIV and AIDS have continued to spread among certain populations, affecting millions of people worldwide. Through treatment and lifestyle adjustments, both the virus and the disease can be managed well enough to allow people with symptoms to live longer. People who are infected can play active roles in managing the threat of HIV and AIDS for themselves and for others. Here’s how:

Get educated about HIV and AIDS. A physician’s office, a clinic, a library, and the Internet are all good places to start learning more about the virus and the syndrome that it causes. People who learn about the range of symptoms, prevention methods, and treatments can help educate family and community members. Often, this education can save lives. Both HIV and AIDS can be prevented, throughout the world in every population.

Put that knowledge into practice. People who recognize symptoms and suspect that they are infected can take charge of their own health care. The first step in doing so is to get tested for HIV. While waiting for the results, get information about HIV and AIDS. Study it, and share it with others. If the test result indicates HIV
infection, talk to a doctor and start a treatment plan immediately and actively. If the test is negative, make the lifestyle changes that will prevent future transmission. Then, get retested in three months. Whatever the test result is, continue to take precautions, remain informed, eat well, rest, and exercise.

Encourage family and community members to learn more about HIV and AIDS. Helping others get educated about HIV and AIDS can lead to changes in behaviors that cause transmission. People who know how risky certain behaviors are will be more likely to avoid them. If the consequences of these risky behaviors are clearly defined, even skeptical people will take notice.

Volunteer for medical studies and trials. Participating in medical studies and trials can benefit many people, including those who are not yet infected as well as those who are. New treatments, vaccines, and potential cures are all evaluated within these programs. An entire community can participate in a study. This can lead to positive change in the lives of many people, especially those at greater risk of infection.
Appendix 1: Myths about HIV and AIDS

There are so many hoaxes and rumors about HIV and AIDS that it is difficult to address all of them. One hoax describes a new form of HIV that supposedly mutated and is being transmitted through the air. This is not true. One rumor concerns infected syringes being intentionally left on playgrounds throughout the United States. News about children being infected by touching these syringes is as untrue as is the story about the devices being left on playgrounds at all.

Throughout the world, there are many myths about how HIV and AIDS can be transmitted. Some myths are particular to certain cultures. Only awareness and education can destroy the dangerous myths about HIV and AIDS.

In certain parts of Africa, some people believe that if a man has sex with a virgin, he will be cured of AIDS. This myth is not only untrue, but can lead to both the spread of HIV and AIDS and the rape of women who are virgins.

In the United States, many people still consider AIDS a “gay disease,” occurring only among homosexual men. This myth is dangerous not just because it is false, but also because believing it can lead to many heterosexuals remaining at greater risk of being infected.

There is a myth about HIV/AIDS and the elderly. Many people believe that the elderly are unlikely to contract HIV for a few reasons. People often think of the elderly as not sexually active. Many believe that elderly men are less likely to visit prostitutes. Many believe that elderly men are less likely to visit prostitutes. The truth is that most elderly people are sexually active. This number has increased since the impotence drug Viagra was introduced. Elderly men who have sex with prostitutes and who continue to have sexual contact with other elderly people further increase the likelihood of spreading HIV and AIDS among the elderly. HIV and AIDS educational efforts have expanded to nursing homes, particularly in areas where these residences are numerous, such as Florida, to fight the growing number of HIV and AIDS cases among the elderly.
Appendix 2: Questions to Ask Your Physician about HIV and AIDS

1. How can I get HIV?
2. If I get HIV, will I develop AIDS?
3. What’s the difference between HIV and AIDS?
4. How long does it take HIV to cause AIDS?
5. How will I know if I am infected?
6. When should I get tested?
7. How often should I be tested?
8. Should I have my children tested?
9. What should I do if I think that my partner is infected but not telling me?
10. Can I get HIV or AIDS from a mosquito bite?
11. Can I get infected from playing contact sports?
12. When I am tested, will it be for both HIV and AIDS?
13. If I test negative for HIV, am I definitely uninfected? Is my partner safe?
14. How safe is the U.S. blood supply?
15. Can I get HIV or AIDS from donating blood?
16. Can I get infected from a blood transfusion?
17. Will a latex condom always prevent the transmission of the virus?
18. If I have a sexually transmitted infection (STI), is it more likely that I’ll get HIV?
19. Can I get HIV from body piercing or tattooing?
20. Can I get infected with HIV from the tools at a dental office?
21. If I am infected, will the disease kill me?
22. What treatments are available for HIV and AIDS?
23. If I am going to die from infection, why should I get treated for it?
24. Can my medical insurance be cancelled if I test positive for HIV?
Appendix 3: Taking Part in Research Studies—Questions to Ask

A research study is a way of finding answers to difficult scientific or health questions. Here are important questions you should ask of anyone who wants you or members of your family or community to be part of a research study on high blood pressure.

1. What is the study about?
   Why are you doing this study?
   Why do you want to study me or people like me? Who else is being studied?
   What do you want to get out of this study?
   What will you do with the results?
   Have you or others done this type of study ever before? Around here? What did you learn?

2. Who put this study together?
   Who is running or in charge of this study?
   Whose idea was this study?
   How were people like me part of putting it together?
   Who are the researchers? Are they doctors or scientists? Who do they work for?
   Have they done studies like this before?
   Is the government part of this study? Who else is a part of this study?
   Who is paying for this study?
   Who will make money from the results of this study?

3. How can people like me share their ideas as you do this study?
   How will the study be explained in my community?
   Who of people like me will look at this study before it starts?
   Who of people like me are you talking to as you do this study? A Community Advisory Board?
Who from the study can I go to with ideas, questions, or complaints?
How will people like me find out about how the study is going?

4. Who is going to be in this study?
   What kinds of people are you looking for? Why?
   Are you trying to get minorities in this study?
   Are you including people less than 18 years old?
   How are you finding people for this study?
   Are transportation and/or daycare provided for people in this study?
   Do I need to sign to participate?
   Will you answer all of my questions before I sign the consent form?
   Can I quit the study after signing the consent form? If I quit the study, will anything happen to me?

5. What will I get out of this study?
   What are the benefits?
   Is payment involved? How will I be paid?
   Will I get free health care or other services if I participate?
   For how long?
   Will I get general health care and/or psychological care if I participate? For how long?

6. How will I be protected from harm?
   Do I stand a chance of being harmed in this study? In the future?
   Does the study protect me from all types of harm?
   If I get harmed, who will take care of me? Who is responsible?
   If I get harmed in any way, will I get all needed treatment? Who pays for treatment?

7. How will my privacy be protected?
   Who is going to see the information I give?
   Will my name be used with the information?
   What happens to the information I gave if I quit the study?
   Is there a written guarantee of privacy?

8. What do I have to do in this study?
   When did you start this study? How long will it last?
   Have there been any problems so far?
Will I get treated the same as everyone else?
What kinds of different treatments are offered in this study?
Are there both a real and a fake treatment?

9. What will be left behind after the study is over?
   What will happen to the information people give?
   How will it be kept?
   What are you going to do with the results of the study?
   How will the public learn about the results? Will results be in
   places where the public can see them?
   Are you going to send me a copy of the results? When?
   What other studies are you planning to do here?

The questions above are from a pamphlet developed by Project LinCS
(Linking Communities and Scientists), Community Advisory Board
(Durham, NC), and Investigators (University of North Carolina Center
for Health Promotion and Disease Prevention) in cooperation with the
Centers for Disease Control and Prevention, Atlanta, GA.

For copies of this brochure contact the CDC National Prevention
Information Network at 1-800-458-5231.
Appendix 4: Opportunistic Infections Commonly Associated with AIDS

**Pneumocystis carinii pneumonia (PCP):** This serious illness is often found in HIV-infected people. It is caused by an organism called *Pneumocystis carinii*. Most people have PCP throughout their bodies by the time they are in their 30s, but those with healthy immune systems are usually not affected by the bacteria. Those with weakened or failing immune systems, however, often develop PCP. Symptoms include fever, cough, and difficulty breathing. It can only be diagnosed by testing fluid or tissue from your lungs. If you are infected with HIV and have a CD4+ T cell count below 200, your physician will probably prescribe trimethoprim-sulfamethoxazole (TMP-SMZ). This drug has different brand names, such as Bactrim®, Septra®, and Cotrim®. Your doctor may also have you take TMP-SMZ if you have certain symptoms, such as a temperature above 100°F that lasts for two weeks or more, or a yeast infection in your mouth or throat (thrush). PCP can kill you if it is not treated. Fortunately, because of treatment with TMP-SMZ, PCP is less common than it used to be. However, it is still the most common of all of the serious infections that HIV-infected people (especially children) must battle.

**Cryptosporidiosis (also called “crypto”):** This disease is caused by a parasite called *Cryptosporidium parvum*. Symptoms can include watery diarrhea, stomach cramps, an upset stomach, and a slight fever. Some people with crypto have no symptoms. This illness is both severe and long lasting in HIV-infected people, and can be fatal. Crypto can be treated, but not cured. Certain antiretroviral drugs can help control the symptoms. Those who carry the disease, even without obvious symptoms, can still transmit it to someone else. It is spread in human or animal feces, not in the blood. To avoid exposure, (1) wash your hands often; (2) never put your mouth on someone’s anus; (3) do not touch human or animal feces; (4) do not swallow water when swimming or in hot tubs; (5) wash fruits and vegetables and
Cytomegalovirus infection (CMV): This is a common viral infection in healthy people. In fact, 50% to 85% of 40-year-old Americans carry this virus, but are not ill from it. CMV can be devastating, however, to an HIV-infected person, in whom it can cause blindness, painful swallowing, diarrhea, and numbness of the legs. CMV is spread by touching saliva, semen, vaginal secretions, blood, urine, or breast milk, and then touching the nose or mouth. This can happen during sexual contact, blood transfusions (most blood banks do not screen for it), breastfeeding, or organ transplants. You can reduce your risk of exposure by washing your hands frequently and using condoms during sex. A blood test is used to diagnose it. At least one medication (Ganciclovir) can be used to treat it, but it does not work for everyone. Even after treatment, people with advanced HIV infection can get CMV again, as well as other viruses they may have encountered earlier (such as herpes and Epstein-Barr). HIV-infected people with CD4+ T cell counts below 100 are more likely to be affected by CMV disease.

Toxoplasmosis: A common infection among those with HIV or AIDS, “toxo” affects a person’s central nervous system. Headache, confusion, and fever are common symptoms. Seizures, poor coordination, and nausea are less common. Toxo hides in cysts within the brain and muscles. These cysts remain inactive in a person with a healthy immune system. Those with HIV or AIDS, however, often advance to toxo infection, which causes active symptoms. It can be treated, but, like CMV, it can often come back. If you have had toxoplasmosis once, you must remain on preventative medication for the rest of your life.

Cryptococcus: Headaches, as well as mental changes associated with AIDS, often result from cryptococcus, which can cause cryptococcal meningitis. Another form, Cryptococcus neoformans, affects a person’s central nervous system.

Mycobacterium avium complex (MAC): Caused by an organism that is similar to the one that causes tuberculosis (TB), MAC is mainly a problem for people with HIV or AIDS. The organism is commonly found in most environments, but few healthy people are made ill because of it. In those with HIV or AIDS, MAC can cause swollen glands, lung disease, and infections throughout the body.
Resources

AIDSinfo
Affiliated with the Department of Health and Human Services, this project provides information on HIV and AIDS clinical trials, treatment and prevention, and medical practice guidelines.
PO Box 6303
Rockville, MD 20849-6303
aidsinfo.nih.gov

CDC National STD and AIDS Hotline
A 24-hour-a-day, 365-days-a-year hotline to discuss risk factors for sexually transmitted diseases, HIV, and AIDS and ways to prevent them.
www.ashastd.org

CDC National Prevention Information Network
The American reference, referral, and distribution service for information on HIV/AIDS, sexually transmitted diseases (STDs), and tuberculosis (TB). Health information specialists staff the hotlines.
PO Box 6003
Rockville, MD 20849-6003
www.cdcnpin.org

ClinicalTrials.gov
A web-based resource for finding clinical trials in need of volunteers.
www.clinicaltrials.gov
Type “HIV” or “AIDS” into the search box to search for related trials.

Combined Health Information Database
A web-based service that combines resources on HIV, AIDS, and other diseases from several federal agencies. A service of the National Institutes of Health.
chid.nih.gov/simple/simple.html
Elizabeth Glaser Pediatric AIDS Foundation
A non-profit dedicated to issues surrounding HIV/AIDS, particularly as they relate to children and families.
1140 Connecticut Ave., NW, Suite 200
Washington, DC 20037
888-499-HOPE
www.pedaids.org

Gay Men’s Health Crisis (GMHC) Hotline
A community-based organization that works to reduce the spread of HIV, particularly in the gay and lesbian communities.
The Tisch Building
119 West 24th Street
New York, NY 10011
800-AIDS-NYC/TTY: 212-645-7470
www.gmhc.org

Healthy People 2010
A nationwide health promotion and disease prevention campaign sponsored by the Department of Health and Human Services. One of the goals of the campaign is to reduce health disparities.
Office of Disease Prevention and Health Promotion
200 Independence Avenue, SW, Room 738G
Washington, DC 20201
www.healthypeople.gov
For information on the Healthy People 2010 microgrant program that finances community-based prevention activities:
www.healthypeople.gov/implementation/community/

MEDLINEplus
A comprehensive source of health information provided by the National Library of Medicine.

National Institute of Allergy and Infectious Diseases (NIAID)
The branch of the National Institutes of Health that focuses on researching and informing the public about infectious diseases, including HIV/AIDS.
Division of Acquired Immunodeficiency Syndrome
31 Center Drive
Bethesda, MD 20892-2520
301-496-5717
www.niaid.nih.gov
Resources

National Institute of Mental Health (NIMH)
The branch of the National Institutes of Health that focuses on researching and informing the public about mental health, including depression.
Office on AIDS
6001 Executive Blvd.
Bethesda, MD 20892-9663
301-443-4513/TTY: 301-443-8431
For publications on depression, call: 800-421-4211
www.nimh.nih.gov

The National Minority AIDS Council
This national organization develops leadership in communities of color to address the challenges of HIV/AIDS.
1931 13th St., NW
Washington, DC 20009
202-483-6622
www.nmac.org

The New Mexico AIDS InfoNet
An online international resource for information on HIV/AIDS, available in fact sheets in English and Spanish.
www.aidsinfonet.org

New York Online Access to Health
An online, searchable health information resource in English and Spanish.
www.noah-health.org/index.html

Office for Human Research Protections
A source of information on the guidelines and ethics of research studies with humans.
Department of Health and Human Services
1101 Wootton Parkway, Suite 200
Rockville, MD 20852
301-496-7005
www.hhs.gov/ohrp/
HIV and AIDS: The Science Inside

Office for Research on Minority Health
Promotes the health of racial and ethnic populations through research and education and through support of minority involvement in research careers. Affiliated with the National Institutes of Health.
6707 Democracy Blvd., Suite 800
MSC 5465
Bethesda, MD 20892-5465
800-444-6472 or 301-402-1366
ncmhd.nih.gov

Office of Minority Health Resource Center
Serves as a national resource and referral service on minority health issues, including HIV and AIDS. Affiliated with the U.S. Department of Health and Human Services.
P.O. Box 37337
Washington, DC 20013-7337
800-444-6472
www.omhrc.gov/omhrc/

Project Inform
A national nonprofit, community-based organization working to end the AIDS epidemic. Runs a hotline staffed by HIV-positive volunteers who are trained to answer questions on HIV treatments and related diseases.
205 13th Street, #2001
San Francisco, CA 94103
800-822-7422
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Bibliography


ties/ViewDocument.asp?href=http://gva-doc-
owl/WEBcontent/Documents/pub/Publications/IRC-pub06/JC943-
HIV and AIDS: The Science Inside

—. *AIDS Epidemic Update: December 2004.*

**National Center for HIV, STD, and TB Prevention.** “The Connection between TB and HIV (the AIDS virus).”

**National Institute of Allergy and Infectious Disease.**

—. “Understanding the Immune System: How It Works.”

—. “Treatment of HIV Infection.”

**National Institute of Mental Health (NIMH).**

**National Institutes of Health (NIH).**

**The New Mexico AIDS InfoNet.** “Fact Sheet 507: Hepatitis C and HIV.”

—. “Fact Sheet 403: Antiviral Therapy.”

**The Pharmaceutical and Research Manufacturers of America.**

**Raymond, Daniel.** “Co-Conspirators: HIV Spread Threatens Decade’s Tuberculosis Treatment/Prevention Success.”
TAGline, July 2002.
ab·sti·nence: a practice whereby a person does not have any form of sexual intercourse.

a·cute/pri·mar·y HIV in·fec·tion: a form of the virus in which symptoms can start to appear two to four weeks after exposure. Often, these symptoms are similar to those associated with the flu or with mononucleosis.

AIDS (acquired immune deficiency syndrome): the final and most deadly stage of HIV disease. During this stage, an HIV-infected person often suffers from many opportunistic infections and cancers. When a person has a CD4+ T-cell count below 200, he or she is said to have AIDS.

AIDS-de·fin·ing con·di·tion or AIDS in·di·ca·tor ill·ness: a condition that can be serious in healthy people will change an HIV-infected person’s status to having AIDS. For example, an HIV-infected person who acquires tuberculosis is said to have AIDS. For this person, tuberculosis is the AIDS-defining condition.

AIDS de·men·tia com·plex: neurological impairment due to AIDS.

AIDS-re·lat·ed Ka·po·si’s sar·co·ma: a form of the cancer Kaposi’s sarcoma that is common in people with AIDS. It develops in connective tissue such as cartilage, bone, fat, muscle, and blood vessels.

an·gi·o·gen·e·sis in·hib·i·tors: a new category of medication that block the development of the blood vessels to tumors, which cause lesions to forming throughout the body of a person with AIDS-related Kaposi’s sarcoma.

an·ti·bi·ot·ics: medicines used to fight bacterial infections.

an·ti·body: a protein that is produced by the immune system whenever an antigen is present in the body. An antibody attacks and attempts to destroy an antigen.

an·ti·gen: a foreign protein that can be found on the surface of human cells. An antigen’s presence triggers the production of antibodies.

a·sym·pto·mat·ic HIV in·fec·tion: a stage in the progression from HIV to AIDS in which the infected person has no symptoms. The person remains infected and highly contagious during this stage.

B cells: lymphocytes that produce antibodies to do battle with antigens, the foreign substances created by a disease-producing organism that invades the body.

CD4 pos·i·tive T cells: a type of T cell that protects the body against infection. CD4+ T cells are the primary host cells of HIV.

CD4+ T-cell count: The number of CD4+ T cells in the body. A person with a count below 200 is said to have AIDS.

chla·my·di·a: a sexually transmitted infection caused by bacteria.

cir·rho·sis: a chronic progressive disease of the liver characterized by the replacement of healthy cells with scar tissue.
**HIV and AIDS: The Science Inside**

**contagious:** transmitted from one person to another by direct or indirect contact.

**degenerative:** causing or showing a gradual deterioration in the structure of a body part with a consequent loss of the part's ability to function.

**early symptomatic HIV infection:** a stage in the progression from HIV to AIDS in which the infected person has symptoms that were not present earlier. The person with HIV has not yet developed opportunistic infections, cancers, or AIDS.

**epidemic:** an outbreak of a contagious disease that spreads rapidly and widely.

**false positive:** when a test incorrectly shows a positive result for a disease.

**fusion inhibitors:** a new category of anti-retroviral drug that works by preventing HIV from entering cells.

**gonorrhea:** a sexually transmitted infection that causes burning pain when urinating and a discharge.

**hemophilia:** a serious blood disorder in which the blood clots much more slowly than normally, resulting in extensive bleeding from even minor injuries.

**hepatitis C virus (HCV):** a virus that infects many people with HIV. The association between HIV and HCV is so common that hepatitis C is often called an opportunistic disease for HIV.

**highly active anti-retroviral therapy (HAART):** medications that work by reducing the amount of HIV in the bloodstream. This allows the body's immune system to try to recover some of its strength. HAART medications include protease inhibitors and nucleoside/nucleotide and non-nucleoside reverse transcriptase inhibitors (NNRTIs).

**HIV (human immunodeficiency virus):** a virus that kills or damages cells of the body's immune system, gradually destroying the body's ability to fight infections and certain cancers.

**HIV-1:** a type of human immunodeficiency virus that is more common in the United States.

**HIV-2:** a type of human immunodeficiency virus that is found mainly in certain populations in Africa.

**HIV E:LI-SA/Western blot test:** done to determine whether a person is carrying HIV. This test is done in two steps. These steps show if an HIV antibody is present in the bloodstream.

**HIV RNA viral load test:** a blood test that indicates the amount of HIV present in a person's bloodstream.

**host cells:** the cells in the body that have the virus and that the virus uses to copy itself.

**immune system:** the combination of all the body's ways of recognizing cells, tissues, objects, and organisms that are not part of itself, and then fighting these "invaders" to keep the person healthy.

**integrate inhibitors:** a new category of medication that interrupts steps in the HIV lifecycle. In this case, medications that attempt to prevent HIV from inserting its genetic materials into a cell's normal DNA.

**intravenous drugs:** those that are injected directly into a vein anywhere in the body by using a syringe.

**invasive cervical cancer:** a cancer that can be more common in AIDS-infected people, it is called invasive because it spreads to neighboring tissue. When the condition is advanced, there can be significant vaginal bleeding.

**leukocytes (or white blood cells):** as part of the body's immune system, these cells work to destroy foreign organisms that enter the body. They also work to repair damage done by the invaders.
**Glossary**

**lymphocytes:** cells that play the most prominent role in helping the body create a natural resistance to disease. There are two types of lymphocytes, B cells and T cells.

**lymphoma:** a form of cancer commonly found in people with AIDS. The most common forms of lymphoma found in AIDS-infected people are non-Hodgkin’s lymphoma (high fever, constipations, mental confusion) and primary central nervous system lymphoma (affecting the brain and spine).

**macrophages:** large cells present in blood, lymph, and connective tissues, which remove waste products, harmful microorganisms, and foreign material from the bloodstream.

**non-nucleoside/nucleotide RT inhibitors (NNRTIs):** medications that bind reverse transcriptase, which stops HIV from replicating.

**non-progressors:** people infected with HIV who develop AIDS very slowly or not at all.

**nucleoside/nucleotide RT inhibitors:** medications that create faulty DNA building blocks, which stops the DNA chain that HIV uses to make copies of itself.

**opportunistic infections:** diseases that tend to cause illness in people with weakened immune systems or conditions of people who have the virus that make it difficult to fight off infection.

**PCP (pneumocystis carinii pneumonia):** a common opportunistic infection that often occurs in HIV-infected children, as well as adults. Initial symptoms are similar to those of the flu: fever, cough, and difficulty breathing.

**protease inhibitors:** medications that work by interfering with HIV’s attempts to use a cell’s protease enzyme to produce infectious viral particles.

**sterile:** free from living bacteria and other microorganisms, such as HIV.

**syndrome:** a group of signs and symptoms that occur together and that make up a health problem.

**syphilis:** a serious sexually transmitted disease that affects many body organs and parts, including the genitals, brain, skin, and nervous tissue.

**T cells:** lymphocytes that help the immune system by attacking foreign organisms or virus-infected cells in the body.

**tuberculosis (TB):** an opportunistic illness, this is a disease that can affect any part of the body, especially the lungs. It causes coughing, chest pain, and fatigue.

**toxoplasmosis:** an acquired disease characterized by fever, swollen lymph nodes, and lesions in the liver, heart, lungs, and brain.

**vaccines:** preparations containing weakened or dead microbes of the kind that cause a particular disease. They are given to stimulate the immune system to produce antibodies against that disease. However, the HIV vaccines being tested do not contain HIV and, therefore, cannot cause HIV infection.

**viral load or viral burden:** the actual amount of a virus (in this case, HIV) circulating in the bloodstream.
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