AIDSinfo

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HIV and Its Treatment

This series of fact sheets on HIV and its treatment is intended for adults and adolescents infected with HIV, their families, and their friends. The fact sheets include information on the basics of HIV/AIDS, when to start treatment and recommended anti-HIV medications, and how to ensure treatment success.

The fact sheets are based on information in the *Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents*. The Guidelines are developed by the U.S. Department of Health and Human Services (HHS) Panel on Antiretroviral Guidelines for Adults and Adolescents, a working group of the Office of AIDS Research Advisory Council (OARAC). The Guidelines are updated frequently by the Panel to reflect changes in the treatment of HIV/AIDS in the United States. The current Guidelines are available on the AIDS*info* Web site at http://aidsinfo.nih.gov/guidelines.

These fact sheets are not intended as a substitute for the expert advice and care of medical professionals. Individuals seeking HIV/AIDS-related medical advice should consult with a health care provider.

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HIV/AIDS: The Basics

What is HIV/AIDS?

HIV stands for **human immunodeficiency virus**. HIV attacks and destroys the infection-fighting **CD4** cells of the immune system. Loss of CD4 cells makes it difficult for the immune system to fight infections.

AIDS stands for **acquired immunodeficiency syndrome**. AIDS is the most advanced stage of HIV infection.

How is HIV transmitted?

HIV is transmitted (spread) from one person to another through specific body fluids—blood, semen, genital fluids, and breast milk. Having **unprotected sex** or sharing drug needles with a person infected by HIV are the most common ways HIV is transmitted.

You can't get HIV by shaking hands, hugging, or closed-mouth kissing with a person who has HIV. And HIV isn't spread through objects such as toilet seats, doorknobs, dishes, or drinking glasses used by a person with HIV.

Although it takes many years for symptoms of HIV to develop, a person infected with HIV can spread the disease at any stage of HIV infection. Detecting HIV during the earliest stages of infection and starting treatment well before symptoms of HIV develop can help people with HIV stay healthy. Treatment can also reduce the risk of **HIV transmission**.

What is the treatment for HIV?

Antiretroviral therapy (ART) is the recommended treatment for HIV infection. ART involves taking a combination (**regimen**) of three or more anti-HIV medications daily. ART prevents HIV from multiplying and destroying infection-fighting CD4 cells. This helps the body fight off life-threatening infections and cancer.

Although anti-HIV medications can't cure HIV, people with HIV are enjoying healthy lives and living longer thanks to ART.

Can treatment prevent HIV from advancing to AIDS?

Yes! Treatment with anti-HIV medications prevents HIV from multiplying and destroying the immune system. This helps the body fight off life-threatening infections and cancers and prevents HIV from advancing to AIDS.

Although it takes many years, without treatment HIV can advance to AIDS. To be diagnosed with AIDS, a person infected with HIV must either:

- Have a **CD4 count** less than 200 cells/mm^3. (The CD4 count of a healthy person ranges from 500 to 1,200 cells/mm^3. People infected with HIV with CD4 counts less than 500 cells/mm^3 should begin ART.)

  OR

- Have an **AIDS-defining condition**. (AIDS-defining conditions are serious and life-threatening illnesses. Having an AIDS-defining condition indicates that a person's HIV infection has advanced to AIDS.)

What illnesses are considered AIDS-defining conditions?

The Centers for Disease Control and Prevention (CDC) considers several illnesses AIDS-defining conditions.

Terms Used in This Fact Sheet:

AIDS: Acquired immunodeficiency syndrome. AIDS is the most advanced stage of HIV infection. AIDS is diagnosed when a person infected with HIV has a CD4 count less than 200 cells/mm^3 or has an AIDS-defining condition.

AIDS-defining condition: Any one of several illnesses that can lead to a diagnosis of AIDS in a person infected with HIV. AIDS is the most advanced stage of HIV infection.

Antiretroviral therapy (ART): The recommended treatment for HIV. ART involves taking a combination of three or more anti-HIV medications from at least two different drug classes every day to control the virus.

CD4 cells: Also called T cells or CD4+ T cells. Infection-fighting white blood cells of the immune system. HIV destroys CD4 cells, making it harder for the body to fight infections.

CD4 count: The number of CD4 cells in a sample of blood. A CD4 count measures how well the immune system is working.

HIV: Human immunodeficiency virus. HIV is a virus that attacks the immune system, putting people infected with HIV at risk for life-threatening infections and cancer. AIDS is the most advanced stage of HIV infection.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Unprotected sex: Sex without using a condom.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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Pneumocystis jiroveci pneumonia, tuberculosis, and toxoplasmosis are examples of AIDS-defining conditions.

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Testing for HIV

I may have been exposed to HIV. What should I do?

Get tested. The only way to know if you're infected with the virus is to get an HIV test.

Although some people newly infected with HIV may have flu-like symptoms, such as fever, sore throat, and rash, HIV can't be diagnosed by symptoms. Getting tested is the only way to know if you're infected with HIV.

What is the most common HIV test?

The most common HIV test is the **HIV antibody test**. The HIV antibody test checks for HIV antibodies in a person's blood, urine, or fluids from the mouth.

When a person becomes infected with HIV, the body begins to produce antibodies to HIV. Generally it takes about 3 months to produce enough antibodies to be detected by an HIV antibody test. (For some people, it can take up to 6 months.) The time period between infection and the appearance of detectable HIV antibodies is called the **window period**. Because HIV antibodies are not yet dectable, the HIV antibody test is not useful during the window period.

What HIV test is used during the window period?

The **plasma HIV RNA test** (also called a **viral load** test) can detect HIV in a person's blood within 9 days of infection, **before** the body develops detectable HIV antibodies. The plasma HIV RNA test is recommended when recent infection is very likely—for example, immediately after a person has had **unprotected sex** with a partner infected with HIV, and especially if the person also has flu-like symptoms.

Detecting HIV at the earliest stage of infection lets people take steps right away to prevent HIV transmission. (See the **Preventing HIV Transmission** fact sheet.) This is important because immediately after infection the amount of HIV in the body is very high, increasing the risk of HIV transmission. Starting treatment at this earliest stage of infection may also be considered.

What does it mean to test HIV positive?

To be diagnosed with HIV, a person must have positive results from two HIV tests. The first test may be either an HIV antibody test (using blood, urine, or fluids from the mouth) or a plasma HIV RNA test (using blood). The second test (always using blood) must be a **Western blot** test. The Western blot test confirms that a person has HIV.

Terms Used in This Fact Sheet:

HIV antibody test: An HIV test that checks for HIV antibodies in a person's blood, urine, or fluids from the mouth. When the body is infected with HIV, the immune system produces HIV antibodies.

Mother-to-child transmission of HIV: The passing of HIV from an HIV-infected mother to her baby during pregnancy, during labor and delivery, or by breastfeeding.

Plasma HIV RNA test (viral load test): A test that measures the amount of HIV in the blood. This test is used to detect recent HIV infection or to measure viral load at any stage of HIV infection.

Rapid HIV antibody test: An HIV antibody test that can detect HIV antibodies in blood or oral fluids in less than 30 minutes.

Unprotected sex: Sex without using a condom.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

Western blot: A test used to confirm a positive HIV antibody or plasma HIV RNA test.

Window period: The time period between a person's infection with HIV and the appearance of detectable HIV antibodies.

How long does it take to get HIV test results?

Results of the first antibody test are generally available within a few days. (**Rapid HIV antibody tests** can produce results within an hour.) Results of the plasma HIV RNA test and Western blot are available in a few days to a few weeks.

If I test HIV positive now, will I always test HIV positive?

Yes. There's no cure for HIV. Because you will always be infected with the virus, you will always test HIV positive. However, treatment with anti-HIV medications can keep you healthy and protect you from AIDS-related illnesses.

If a pregnant woman tests positive for HIV, will her baby be born with HIV?

In the United States and Europe, fewer than 2 babies in 100 born to mothers infected with HIV are infected with the

virus. This is because most mothers infected with HIV and their babies receive anti-HIV medications to prevent **mother-to-child transmission of HIV**. (For more information, see the **HIV and Pregnancy** fact sheet series.)

Where can I find information on HIV testing locations?

Many hospitals, medical clinics, and community organizations offer HIV testing. To find an HIV testing site near you, contact AIDS*info* for the number of your state AIDS hotline or visit http://www.hivtest.org/.

For more information:

Contact an AIDS*info* health information specialist at 1–800–448–0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Seeing an HIV Health Care Provider

I just tested HIV positive. What should I look for in a health care provider?

Look for a health care provider who has experience treating HIV and AIDS. You may want to see a specialist in HIV.

You need a health care provider with whom you feel comfortable. You will be working closely together to make many decisions regarding your treatment.

What can I expect at my first health care provider visit?

Your health care provider will ask you questions about your health and lifestyle, do a physical exam, and order blood tests. Your health care provider will also discuss what it means to have HIV and how it might affect your life. Your first visit is a good time to ask your health care provider questions.

What questions should I ask my health care provider?

Ask your health care provider about:

- The benefits and risks of HIV treatment
- How HIV treatment may affect your lifestyle
- Lab tests used to monitor HIV infection
- How to avoid getting other infections
- How to avoid transmitting HIV

Write down your questions so you remember them when you visit your health care provider.

What tests will my health care provider order?

You will have three very important blood tests at your first medical appointment: a **CD4 count**, a **viral load** test, and **drug-resistance testing**.

- The CD4 count measures the number of CD4 cells in a sample of blood. CD4 cells are infection-fighting cells of the body's immune system. HIV destroys CD4 cells, making it hard for the body to fight off infections. Because the CD4 count indicates the level of HIV damage to the immune system, the test is key to deciding when to start HIV treatment. A goal of treatment is to prevent HIV from destroying CD4 cells.
- A viral load test measures the amount of HIV in a sample of blood. A goal of HIV treatment is to keep a person's viral load so low that the virus can't be detected by a viral load test.
- Drug-resistance testing identifies which anti-HIV medications will or will not be effective against a person's strain of HIV.

Your CD4 count, viral load test, and drug-resistance testing results will provide an initial measure of your HIV infection before you start treatment. Once you start treatment, your health care provider will compare future test results with your initial results to monitor your HIV infection.

Your health care provider may also order other tests, such as a blood cell count, kidney and liver function tests, and tests for **sexually transmitted infections (STIs)** and other diseases.

When will I begin HIV treatment?

Starting HIV treatment is a big step. When to begin treatment depends on your health and your readiness to take a combination of anti-HIV medications (a **regimen**) every day. Once you begin taking anti-HIV medications, you will probably need to take them for the rest of your life.

Your health care provider will help you decide if you are ready to start treatment. (See the When to Start Anti-HIV Medications fact sheet.) Once you start treatment, your health care provider will help you find ways to stick to your treatment regimen. (See the Treatment Adherence and Following an HIV Treatment Regimen fact sheets.)

Terms Used in This Fact Sheet:

CD4 count: The number of CD4 cells in a sample of blood. A CD4 count measures how well the immune system is working.

Drug- resistance testing: Testing to identify which anti-HIV medications will or will not be effective against a person's specific strain of HIV. Drug-resistance testing is done using a sample of blood.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Sexually transmitted infections (STIs): Infections that are usually passed during sexual contact.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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What happens if I don't start treatment right away?

If you don't start treatment right away, you should have a CD4 count and viral load test once every 3 to 6 months. Your health care provider will use the test results to monitor your infection and help you decide when to start treatment.

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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When to Start Anti-HIV Medications

I just tested HIV positive. Do I need to start treatment?

Even though you have HIV, you may not need to start treatment right away. When to start anti-HIV medications (also called **antiretrovirals**) depends on several factors, including:

- Your overall health
- How well your immune system is working (**CD4 count**)
- The amount of HIV in your blood (**viral load**)
- Whether you're pregnant
- Your ability and willingness to commit to lifelong treatment

You and your health care provider will work together to decide on the best time to start treatment.

Can anti-HIV medications really help?

Yes! Although anti-HIV medications can't cure HIV, treatment can keep you healthy and improve your quality of life.

HIV attacks the immune system, destroying the system's CD4 cells. This makes it hard for the body to fight infection. But anti-HIV medications can prevent HIV from multiplying. Reducing the amount of HIV in your body gives the immune system a chance to recover and produce more infection-fighting CD4 cells. An increase in CD4 count indicates that treatment is working.

Once you start treatment—and take your anti-HIV medications exactly as directed—it's possible to have an **undetectable viral load** within 3 to 6 months. An undetectable viral load means that the level of HIV in your blood is too low to be detected by a viral load test. You aren't cured. There is still some HIV in your body. However, an undetectable viral load indicates that your anti-HIV medications are working effectively to keep you healthy and reduce your risk of transmitting HIV.

How will I know when to start anti-HIV medications?

It's time to start treatment if:

- Your CD4 count is less than 500 cells/mm^3
- You have AIDS
- You're pregnant
- You have HIV-related kidney disease
- You need treatment for **hepatitis B virus (HBV)**

Terms Used in This Fact Sheet:

Antiretroviral: A medication that prevents a retrovirus, such as HIV, from making copies of itself. Anti-HIV medications are also called antiretrovirals.

Antiretroviral therapy (ART): The recommended treatment for HIV. ART involves taking a combination of three or more anti-HIV medications from at least two different drug classes every day to control the virus.

CD4 count: The number of CD4 cells in a sample of blood. A CD4 count measures how well the immune system is working.

Drug class: A group of medications that work in the same way.

Hepatitis B virus (HBV): A virus that causes a disease of the liver (hepatitis B). HBV can stand for hepatitis B virus or hepatitis B disease.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Treatment adherence: Closely following an HIV treatment regimen—taking the correct dose of each anti-HIV medication at the correct time and exactly as prescribed.

Undetectable viral load: The amount of HIV in a person's blood is too low to be detected with a viral load test.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

Some research suggests that it may be helpful to start treatment early, when the CD4 count is greater than 500 cells/mm^3. You and your health care provider may want to discuss the benefits and risks of starting treatment early.

If anti-HIV medications can help me stay healthy, why wait to start treatment?

Successful HIV treatment depends on a lifelong commitment to take anti-HIV medications exactly as directed (**treatment adherence**). If you and your health care provider feel you're not ready to closely follow an HIV **regimen** for the rest of your life, you may decide to delay treatment. Delaying treatment will give you and your health care provider time to address any issues that may make adherence difficult. (To learn more about treatment adherence, see the Treatment Adherence and Following an HIV Treatment Regimen fact sheets.)

What treatment is right for me?

The U.S. Department of Health and Human Services (HHS)

provides guidelines on using anti-HIV medications to treat HIV infection. The HHS guidelines recommend starting treatment with a regimen of three or more anti-HIV medications from at least two different **drug classes**. (See the FDA-Approved Anti-HIV Medications fact sheet.) Using a combination of anti-HIV medications to treat HIV is called **antiretroviral therapy (ART)**. The HHS guidelines list preferred ART regimens. (See the Recommended HIV Treatment Regimens fact sheet.) Because people's needs vary, the preferred regimens may not be right for everyone. You and your health care provider will consider your individual needs to select the most effective regimen for you.

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Recommended HIV Treatment Regimens

What is the treatment for HIV?

Antiretroviral therapy (ART) is the recommended treatment for HIV. ART involves taking a combination of anti-HIV medications (**a regimen**) every day. Anti-HIV medications (also called **antiretrovirals**) are grouped into six **drug classes** according to how they fight HIV. The six classes are non-nucleoside reverse transcriptase inhibitors (NNRTIs), nucleoside reverse transcriptase inhibitors (NRTIs), protease inhibitors (PIs), fusion inhibitors, CCR5 antagonists, and integrase inhibitors.

Recommended HIV treatment regimens include three or more anti-HIV medications from at least two different drug classes. Taking a combination of anti-HIV medications from different classes is the most effective way to control the virus. Some anti-HIV medications are available in combination (two or more medications in one pill).

Anti-HIV medications are approved by the U.S. Food and Drug Administration (FDA). See the FDA-Approved Anti-HIV Medications fact sheet for a complete list of medications used in HIV treatment regimens in the United States.

How will I know which anti-HIV medications to take?

The best combination of anti-HIV medications for you depends on your individual needs. Factors that you and your health care provider will consider when selecting your HIV regimen include:

- Other diseases or conditions you may have
- Possible side effects of anti-HIV medications
- How anti-HIV medications may interact with other medications you take
- Your **drug-resistance** testing results
- Complexity of the regimen—how many pills to take every day and how often, and if pills must be taken with or without food
- Any personal issues that may make following a regimen difficult (such as depression or alcohol or drug abuse)

What are the recommended regimens for people taking anti-HIV medications for the first time?

After considering your individual needs, you and your health care provider may select one of the following regimens recommended for people taking anti-HIV medications for the first time:

- **Atripla** (a combination of three anti-HIV medications in one pill)
- **Reyataz + Norvir + Truvada** (Truvada is a combination of two anti-HIV medications in one pill.)
- **Prezista** + Norvir + Truvada
- **Isentress** + Truvada

Terms Used in This Fact Sheet:

Antiretroviral: A medication that prevents a retrovirus, such as HIV, from making copies of itself. Anti-HIV medications are also called antiretrovirals.

Antiretroviral therapy (ART): The recommended treatment for HIV. ART involves taking a combination of three or more anti-HIV medications from at least two different drug classes every day to control the virus.

Atripla: A combination of three anti-HIV medications in one pill—Sustiva (also called efavirenz or EFV), Emtriva (also called emtricitabine or FTC), and Viread (also called tenofovir or TDF).

Drug class: A group of medications that work in the same way.

Drug-resistance testing: Testing to identify which anti-HIV medications will or will not be effective against a person's specific strain of HIV. Drug-resistance testing is done using a sample of blood.

Isentress: An anti-HIV medication in the integrase inhibitor class. Isentress is also called raltegravir or RAL.

Norvir: An anti-HIV medication in the protease inhibitor (PI) class. Norvir is also called ritonavir or RTV.

Prezista: An anti-HIV medication in the protease inhibitor (PI) class. Prezista is also called darunavir or DRV.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Reyataz: An anti-HIV medication in the protease inhibitor (PI) class. Reyataz is also called atazanavir or ATV.

Sustiva: An anti-HIV medication in the non-nucleoside reverse transcriptase inhibitor (NNRTI) class. Sustiva is also called efavirenz or EFV.

Truvada: Two anti-HIV medications from the NRTI class—Emtriva and Viread—combined in a single pill. Emtriva is also called emtricitabine or FTC. Viread is also called tenofovir or TDF.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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Women who are planning on becoming pregnant or are in the first trimester of pregnancy should not use Atripla or **Sustiva**. (Sustiva, which is one of the medications in Atripla, can harm an unborn baby.) If you are pregnant or expect to become pregnant soon, talk to your health care provider about the benefits and risks of taking anti-HIV medications. (See the HIV and Pregnancy fact sheet series for information on HIV treatment regimens for pregnant women.)

Because individual needs vary, these recommended HIV treatment regimens may not be right for everyone. If none of the preferred regimens is right for you, your health care provider will help you select an alternative regimen based on your needs.

Will I have side effects from the anti-HIV medications in my regimen?

Anti-HIV medications can cause side effects. Side effects vary depending on the anti-HIV medication. And people taking the same medication may not have the same side effects. Before starting treatment, discuss possible side effects with your health care provider or pharmacist.

Most side effects from anti-HIV medications are manageable. However, side effects that become unbearable or life threatening call for a change in medications. Side effects that may seem minor, such as fever, nausea, fatigue, or rash, can indicate serious problems. Once you start treatment, always discuss any side effects from your anti-HIV medications with your health care provider.

For more information:

Contact an AIDS*info* health information specialist at 1–800–448–0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

FDA-Approved Anti-HIV Medications

Antiretroviral therapy (ART) is the recommended treatment for HIV infection. ART involves taking a combination of anti-HIV medications (a regimen) daily. A regimen contains three or more anti-HIV medications from at least two different drug classes. Anti-HIV medications keep HIV-infected people healthy by preventing the virus from multiplying. Anti-HIV medications don't cure HIV infection or prevent HIV transmission.

The following table lists anti-HIV medications approved by the U.S. Food and Drug Administration (FDA) for treatment of HIV in the United States. The medications are presented by drug class and identified by generic name/acronym and brand name.

Drug Class	Generic Name (Acronym)	Brand Name	Manufacturer	FDA Approval Date
Non-nucleoside Reverse Transcriptase Inhibitors (NNRTIs)				
NNRTIs bind to and alter reverse transcriptase, an enzyme HIV needs to make copies of itself.	Delavirdine (DLV)	Rescriptor	Pfizer	April 4, 1997
	Rilpivirine (RPV)	Edurant	Tibotec Therapeutics	May 20, 2011
	Efavirenz (EFV)	Sustiva	Bristol-Myers Squibb	Sept. 17, 1998
	Etravirine (ETR)	Intelence	Tibotec	Jan. 18, 2008
	Nevirapine (NVP)	Viramune	Boehringer Ingelheim	June 21, 1996
Nucleoside Reverse Transcriptase Inhibitors (NRTIs)				
NRTIs block reverse transcriptase, an enzyme HIV needs to make copies of itself.	Abacavir (ABC)	Ziagen	GlaxoSmithKline	Dec. 17, 1998
	Didanosine (ddI)	Videx Videx EC (enteric-coated)	Bristol-Myers Squibb Bristol-Myers Squibb	Oct. 9, 1991 Oct. 31, 2000
	Emtricitabine (FTC)	Emtriva, Coviracil	Gilead Sciences	July 2, 2003
	Lamivudine (3TC)	Epivir	GlaxoSmithKline	Nov. 17, 1995
	Stavudine (d4T)	Zerit	Bristol-Myers Squibb	June 24, 1994
	Tenofovir DF (TDF)	Viread	Gilead Sciences	Oct. 26, 2001
	Zidovudine (ZDV, AZT)	Retrovir	GlaxoSmithKline	March 19, 1987
Protease Inhibitors (PIs)				
PIs block HIV protease, an enzyme HIV needs to make copies of itself.	Atazanavir (ATV)	Reyataz	Bristol-Myers Squibb	June 20, 2003
	Darunavir (DRV)	Prezista	Tibotec	June 23, 2006
	Fosamprenavir (FPV)	Lexiva	GlaxoSmithKline, Vertex Pharmaceuticals	Oct. 20, 2003
	Indinavir (IDV)	Crixivan	Merck	March 13, 1996

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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Drug Class	Generic Name (Acronym)	Brand Name	Manufacturer	FDA Approval Date
Protease Inhibitors (PIs)				
PIs block HIV protease, an enzyme HIV needs to make copies of itself.	Nelfinavir (NFV)	Viracept	Agouron Pharmaceuticals	March 14, 1997
	Ritonavir (RTV)	Norvir	Abbott Laboratories	March 1, 1996
	Saquinavir (SQV)	Invirase	Hoffmann-La Roche	Dec. 6, 1995
	Tipranavir (TPV)	Aptivus	Boehringer Ingelheim	June 20, 2005
Fusion Inhibitors				
Fusion inhibitors block HIV from entering the CD4 cells of the immune system.	Enfuvirtide (T-20)	Fuzeon	Hoffmann-La Roche, Trimeris	March 13, 2003
CCR5 Antagonists				
CCR5 entry inhibitors block CCR5 , a protein on the CD4 cells that HIV needs to enter the cells.	Maraviroc (MVC)	Selzentry	Pfizer	Aug. 6, 2007
Integrase Inhibitors				
Integrase inhibitors block HIV integrase, an enzyme HIV needs to make copies of itself.	Raltegravir (RAL)	Isentress	Merck	Oct. 12, 2007
Fixed-Dose Combination				
Fixed-dose combination tablets contain two or more anti-HIV medications from one or more drug classes.	Abacavir, Lamivudine	Epzicom	GlaxoSmithKline	Aug. 2, 2004
	Abacavir, Lamivudine, Zidovudine	Trizivir	GlaxoSmithKline	Nov. 14, 2000
	Efavirenz, Emtricitabine, Tenofovir DF	Atripla	Bristol-Myers Squibb, Gilead Sciences	July 12, 2006
	Emtricitabine, Rilpivirine, Tenofovir DF	Complera	Gilead Sciences	Aug. 10, 2011
	Emtricitabine, Tenofovir DF	Truvada	Gilead Sciences	Aug. 2, 2004
	Lamivudine, Zidovudine	Combivir	GlaxoSmithKline	Sept. 27, 1997
	Lopinavir, Ritonavir	Kaletra	Abbott Laboratories	Sept. 15, 2000

Treatment Adherence

What is treatment adherence?

Treatment adherence means adhering to (following) your treatment **regimen**—taking the correct dose of each anti-HIV medication at the correct time and exactly as prescribed. Adherence is very important for successful HIV treatment.

Why is adherence important?

Adherence affects the success of HIV treatment in two ways:

- Good adherence to an HIV treatment regimen helps anti-HIV medications work effectively to reduce the amount of HIV in the body (**viral load**). Skipping medications, even occasionally, gives HIV the chance to multiply rapidly. Preventing the virus from multiplying is the best way to stay healthy.
- Good adherence to an HIV treatment regimen also helps prevent **drug resistance**. Drug resistance develops when the virus mutates (changes form), becoming "resistant" to certain anti-HIV medications. One or more anti-HIV medications in a treatment regimen can become ineffective as a result of drug resistance.

  Skipping medications makes it easier for drug resistance to develop. HIV can develop resistance to the anti-HIV medications in a person's current regimen or to other, similar anti-HIV medications not yet taken, limiting options for successful HIV treatment. And drug-resistant strains of HIV can be transmitted to others, too.

Although there are many different anti-HIV medications and treatment regimens, studies show that *a person's first regimen offers the best chance for long-term treatment success*. Adhering to your regimen from the start will help ensure your HIV treatment is successful.

Why is treatment adherence sometimes difficult?

There are several reasons why adhering to an HIV treatment regimen can be difficult. Most treatment regimens involve taking several pills every day—with or without food, or before or after other medications. Other factors that can make treatment adherence difficult include:

- Difficulty taking medications (such as trouble swallowing pills)
- Side effects from medications (for example, fatigue or diarrhea)
- Daily schedule issues (including a busy schedule, shift work, or travel away from home)
- Being sick or depressed
- Alcohol or drug abuse

What can I do to adhere to my HIV treatment regimen?

Before you start treatment, be certain you're committed to taking anti-HIV medications every day as directed. Talk to your health care provider about any issues that may make adherence difficult:

- Possible side effects from the anti-HIV medications in your regimen
- How other medications you take may interact with your anti-HIV medications
- Your schedule at home and at work
- Any personal issues such as depression or alcohol or drug abuse
- Lack of health insurance to pay for anti-HIV medications

Understanding issues that can make adherence difficult will help you and your health care provider select the best regimen for you. Some people may find that adhering to an HIV treatment regimen becomes more difficult over time. So, talk to your health care provider about adherence at every visit. (See the Following an HIV Treatment Regimen fact sheet for tips on adherence.)

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Terms Used in This Fact Sheet:

Drug resistance: When HIV mutates (changes form), causing one or more anti-HIV medications to be ineffective.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Treatment Adherence: Closely following an HIV treatment regimen—taking the correct dose of each anti-HIV medication at the correct time and exactly as prescribed.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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Following an HIV Treatment Regimen

How can I prepare for adherence before I start HIV treatment?

Being prepared to take anti-HIV medications every day is a first step to treatment success. Planning ahead will help you adhere to your treatment **regimen** when you start treatment.

Begin by talking to your health care provider. Make sure you understand why you're starting HIV treatment and why **treatment adherence** is important. Discuss these important details about your treatment regimen:

- Each anti-HIV medication in your regimen
- The dose of each medication
- How many pills in each dose
- When to take each medication
- How to take each medication—with or without food
- Possible side effects from each medication, including serious side effects
- Possible interactions between the anti-HIV medications in your regimen and other medications you take
- How to store your medications

Tell your health care provider if you have any personal issues, such as depression or alcohol or drug abuse, that can make adherence difficult. If needed, your health care provider may recommend resources to help you address these issues before you start treatment.

How can I maintain adherence after I start treatment?

You may consider one or more of the following strategies to help you adhere to your regimen:

- Use a 7-day pill box. Once a week, fill the pill box with your medications for the entire week.
- Take your medications at the same time every day.
- Use a timer, an alarm clock, or your cell phone alarm to remind you to take your medications.
- Enlist your family members, friends, or coworkers to remind you to take your medications.
- Keep your medications nearby. Keep a backup supply of medications in your briefcase or purse or at work.
- Plan ahead for changes in your daily routine, including weekends and holidays. If you're going away, pack enough medications to last the entire trip.
- Use a medication diary to stay on track. Write down the name of each medication; include the dose, number of pills to take, and when to take them. Check off each medication as you take it. Reviewing your diary will help you identify the times you're most likely to skip medications.
- Keep all your medical appointments. Write down the date and time of heath care provider visits on your calendar or daily schedule. If you run low on medications before your next visit, call your health care provider to renew your prescriptions.
- Get additional tips on adherence by joining a support group for people living with HIV.

What should I do if I forget to take my medications?

Unless your health care provider tells you otherwise, take a medication you missed as soon as you remember that you skipped it. However, if it's almost time for the next dose of the medication, don't take the missed dose and just continue on your regular medication schedule. Don't take a double dose of a medication to make up for a missed dose.

What should I do if I have problems adhering to my treatment regimen?

Tell your health care provider that you're having difficulty following your regimen. Together you can identify the reasons why you're skipping medications.

Tell your health care provider about any side effects from the medications in your regimen. Side effects are a major reason treatment adherence can be difficult. A regimen that involves taking many pills at many times during the day can also make adherence difficult. Based on why you're having problems with adherence, your health care provider may adjust or change your regimen. (See the Changing an HIV Treatment Regimen fact sheet.)

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Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

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For more information:

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Is My Treatment Regimen Working?

How will I know if my HIV treatment regimen is working?

Your health care provider will use two important tests to monitor your treatment **regimen: CD4 count** and **viral load** test. Both tests are done using a sample of blood. The results of the tests will help your health care provider determine if the anti-HIV medications in your regimen are working.

What is a CD4 count?

HIV attacks the immune system, destroying the system's infection-fighting CD4 cells. Keeping the immune system healthy is an important goal of HIV treatment.

The CD4 count measures the number of CD4 cells in a sample of blood. Because a falling CD4 count is a sign that HIV is damaging the immune system, the test is a key factor in deciding when to start treatment. The CD4 count is also used to monitor how well treatment is working.

The CD4 count of a healthy person ranges from 500 to 1,200 cells/mm^3. HIV-infected people with a CD4 count less than 500 cells/mm^3 should begin taking anti-HIV medications. An HIV-infected person with a CD4 count less than 200 cells/mm^3 has AIDS.

Once you start treatment, you should have a CD4 count once every 3 to 4 months. An increasing CD4 count is a sign that your treatment regimen is working. If your regimen is working well, you need a CD4 count only once every 6 to 12 months.

What is a viral load test?

Preventing HIV from multiplying is another important goal of HIV treatment. The viral load test measures the amount of HIV in your blood. It's the best measure of how well your treatment regimen is controlling the virus.

The best sign that treatment is working is achieving and maintaining an **undetectable viral load**. An undetectable viral load doesn't mean that you're cured. It means that the amount of HIV in your blood is too low to be detected by the viral load test.

Once you start treatment, you should have a viral load test within 2 to 8 weeks, and then once every 4 to 8 weeks until your viral load is undetectable. You need the test done only every 3 to 4 months once your viral load is undetectable. If you have an undetectable viral load for more than 2 or 3 years, your health care provider may recommend viral load testing once every 6 months.

What causes treatment to fail?

HIV treatment can fail if anti-HIV medications are unable to control the virus or protect the health of the immune system. Sometimes treatment fails because of things you can't control, such as unmanageable side effects from anti-HIV medications, interactions between anti-HIV medications and other medications you take, or the body's poor absorption of anti-HIV medications. It may be necessary to change medications to deal with these problems.

Poor **treatment adherence** is another reason HIV treatment can fail. Skipping medications allows HIV to multiply, increasing your viral load. To achieve and maintain an undectable viral load, it's important to closely follow your treatment regimen.

Poor treatment adherence can also lead to **drug resistance**, which can cause treatment to fail, too. Skipping medications gives HIV a chance to change form and become resistant to (not affected by) the medications in your regimen.

Sometimes working with your health care provider to improve adherence can prevent treatment failure. For example, your health care provider can give you tips on how to manage medication side effects that make adherence difficult. Or your health care provider can simplify your regimen to make

Terms Used in This Fact Sheet:

CD4 count: The number of CD4 cells in a sample of blood. A CD4 count measures how well the immune system is working.

Drug resistance: When HIV mutates (changes form), causing one or more anti-HIV medications to be ineffective.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Treatment adherence: Closely following an HIV treatment regimen—taking the correct dose of each anti-HIV medication at the correct time and exactly as prescribed.

Undetectable viral load: The amount of HIV in a person's blood is too low to be detected with a viral load test.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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your medication schedule fit your busy lifestyle. (To learn more about treatment adherence, see the Treatment Adherence and Following an HIV Treatment Regimen fact sheets.)

What happens if my treatment fails?

If your treatment is failing, it may be time to adjust or change your regimen. However, before making any changes, your health care provider will consider:

- How closely you followed your treatment regimen
- Any side effects you had from your anti-HIV medications
- How well your body absorbed the medications in your regimen
- Your drug-resistance testing results

All of this information will help you and your health care provider select a new, more effective regimen. (See the Changing an HIV Treatment Regimen fact sheet.)

For more information:

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This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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Changing an HIV Treatment Regimen

Will my HIV treatment regimen ever change?

An effective treatment **regimen** prevents HIV from making copies of itself. If the anti-HIV medications you take aren't controlling the virus, you may need to adjust or change your regimen. However, before changing regimens, it's important to understand why your treatment regimen is not working effectively.

Why do treatment regimens fail?

HIV treatment regimens can fail for a variety of reasons, including:

- Side effects from anti-HIV medications
  Unpleasant side effects, such as fatigue, nausea, and diarrhea, can make **treatment adherence** difficult. Severe side effects make it impossible to safely follow a regimen.
- Poor absorption of anti-HIV medications
  To work effectively, anti-HIV medications must be absorbed by the body.
- Drug interactions
  Drug interactions between anti-HIV medications and other medications can increase the risk of side effects. Drug interactions can also reduce the effectiveness of anti-HIV medications. (Anti-HIV medications can also have the same effects on other medications.)
- Drug resistance
  Drug resistance occurs when HIV mutates (changes form), causing one or more medications in a regimen to be ineffective.
- Poor treatment adherence
  Skipping medications gives HIV the chance to multiply, increasing a person's **viral load**. Poor adherence also increases the risk of drug resistance.

Your health care provider will do many things to help prevent treatment failure. For example, your health care provider will monitor you closely for side effects and drug interactions. **Drug-resistance testing** will help your health care provider determine which anti-HIV medications will and will not be effective against your strain of HIV. And to make adherence easier, your health care provider can simplify your regimen so that you take fewer pills (or take them less often during the day).

If my treatment regimen fails, how will my health care provider select a new regimen?

Sometimes adjusting medications to avoid side effects or drug interactions or taking steps to improve adherence is not enough; your treatment regimen may still fail. A change in regimen may be necessary. However, before changing your regimen, your health care provider will order tests to confirm that your regimen is not effective (**CD4 count**, viral load test, and drug-resistance testing).

In general, your new treatment regimen should include two or more medications from two or more **drug classes**. To select new medications, you and your health care provider will review your medication history, past side effects from medications, and results of drug-resistance testing. Your health care provider may recommend a regimen that includes anti-HIV medications you have never taken before.

If you have already taken many of the FDA-approved anti-HIV medications, your health care provider may recommend a new medication currently being studied. You may be eligible to take part in a research study (**clinical trial**) using the new medication. Ask your health care provider about partici-

Terms Used in This Fact Sheet:

CD4 count: The number of CD4 cells in a sample of blood. A CD4 count measures how well the immune system is working.

Clinical trial: A type of research study that tests how well medical treatments work in people.

Drug class: A group of medications that work in the same way.

Drug interaction: A change in how a drug works when taken with another drug (drug-drug interaction) or with a specific food (food-drug interaction).

Drug resistance: When HIV mutates (changes form), causing one or more anti-HIV medications to be ineffective.

Drug- resistance testing: Testing to identify which anti-HIV medications will or wil not be effective against a person's specific strain of HIV. Drug-resistance testing is done using a sample of blood.

Regimen: A combination of three or more anti-HIV medications from at least two different drug classes.

Treatment adherence: Closely following an HIV treatment regimen—taking the correct dose of each anti-HIV medication at the correct time and exactly as prescribed.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

This information is based on the U.S. Department of Health and Human Services' Guidelines for the *Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents* (available at http://aidsinfo.nih.gov/guidelines).

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pating in a clinical trial or visit the Clinical Trials section of the AIDS*info* Web site at http://aidsinfo.nih.gov/clinicaltrials.

How can I give my new regimen the best chance of success?

Before starting your new regimen, talk to your health care provider about things that can make adherence difficult, including:

- Possible side effects of the new medication.
- Lifestyle or personal issues that may prevent you from taking your medications as directed

Make a commitment to keep your medical appointments and adhere to your new regimen. Taking your anti-HIV medications every day as prescribed will give your new regimen the best chance to succeed. (See the Treatment Adherence and Following an HIV Treatment Regimen fact sheets.)

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

HIV Coinfections

What is a coinfection?

Coinfection means infection with more than one disease at the same time. Some coinfections commonly seen in people infected with HIV include:

- **Hepatitis B virus (HBV)**/HIV coinfection
- **Hepatitis C virus (HCV)**/HIV coinfection
- **Tuberculosis (TB)**/HIV coinfection

People infected with HIV should be tested for HBV, HCV, and TB.

What are HBV and HCV?

HBV and HCV are two different viruses that both cause liver disease. They are also among the most common causes of liver cancer.

HBV is spread through the blood, semen, or other body fluid of an HBV-infected person. Having **unprotected sex** or sharing drug needles with a person infected with HBV are the main ways people get HBV. (To prevent HBV infection, people infected with HIV may consider getting the HBV vaccination.)

HCV is spread through the blood of a person infected with HCV. Sharing drug needles with a person with HCV is the main way people get HCV; however, HCV can also be transmitted during unprotected sex.

Having unprotected sex or sharing drug needles are also ways people get HIV. That is why some people become coinfected with HIV and HBV or HCV (or both) at the same time.

What is TB?

TB is a disease caused by germs that spread through the air when a person with active TB coughs, sneezes, or talks. TB usually affects the lungs.

There are two forms of TB: **latent TB infection** and **TB disease**. Latent TB infection is the inactive form of TB. The TB germs in the body are "sleeping" and don't make the person sick. A person with latent TB infection can't spread TB to others.

Without treatment, latent TB infection may advance to TB disease, especially in people with weakened immune systems. The TB germs in the body multiply and become active, making the person sick. A person with TB disease of the lungs can spread TB to others.

Because HIV weakens the immune system, latent TB infection is more likely to advance to TB disease in a person with HIV. In a person infected with HIV, TB disease is considered an **AIDS-defining condition**, and TB treatment should be started immediately.

Are coinfections more serious in people infected with HIV?

Yes. Coinfections may become serious more rapidly in people infected with HIV.

HBV and HCV both lead to liver damage more quickly in people infected with HIV. People co-infected with HBV or HCV also have a higher risk of developing liver damage from anti-HIV medications.

Terms Used in This Fact Sheet:

AIDS-defining condition: Any of several illnesses that can lead to a diagnosis of AIDS in a person infected with HIV. AIDS is the most advanced stage of HIV infection.

Coinfection: Infection with more than one disease at the same time. Some people infected with HIV are coinfected with hepatitis B virus (HBV), hepatitis C virus (HCV), or tuberculosis (TB).

Hepatitis B virus (HBV): A virus that causes a disease of the liver (hepatitis B). HBV can stand for hepatitis B virus or hepatitis B disease.

Hepatitis C virus (HCV): A virus that causes a disease of the liver (hepatitis C). HCV can stand for hepatitis C virus or hepatitis C disease.

Latent tuberculosis (TB) infection: The inactive form of TB, which doesn't make a person sick and can't be spread to other people.

Opportunistic infection: An infection that is more frequent or more serious in people with weakened immune systems, including people infected with HIV.

Tuberculosis (TB) disease: The active form of TB, which makes a person sick and can be spread to other people if the infection involves the lungs. In a person infected with HIV, TB disease is considered an AIDS-defining condition.

Tuberculosis (TB): A disease caused by germs that spread through the air when a person with active TB coughs, sneezes, or talks. TB usually affects the lungs.

Unprotected sex: Sex without using a condom.

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And TB disease can cause HIV infection to advance more rapidly, putting the person at risk of **opportunistic infections**.

Can coinfections be treated?

Yes; however, the effectiveness of treatment depends on the coinfection.

- TB treatment can cure TB disease or prevent latent TB infection from advancing to TB disease.
- Although there is no cure for HBV, treatment can slow down HBV infection.
- Treatment for HCV is generally less effective.

Are HIV and coinfections treated at the same time?

Yes, however, what medications to take and when to start them depend on the coinfection. Some anti-HIV medications are effective against both HIV and HBV. Treatment for HCV or TB involves taking other medications in addition to anti-HIV medications.

When treating coinfections, health care providers closely watch for any side effects or drug interactions between anti-HIV medications and medications used to treat coinfections.

Talk to your health care provider if you have questions about HIV and coinfections.

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Preventing HIV Transmission

How is HIV transmitted?

HIV is transmitted (spread) through the blood, semen, genital fluids, or breast milk of an infected person. The spread of the virus is called **HIV transmission**. The most common ways people become infected with HIV are by:

- Having **unprotected sex** with a person infected with HIV
- Sharing drug needles or syringes with a person infected with HIV

Women infected with HIV can transmit the virus to their babies during pregnancy or childbirth or by breastfeeding. If you are a woman who has HIV, talk to your health care provider about ways to prevent pregnancy. And if you are pregnant or plan to become pregnant, ask your health care provider how you can protect your baby from HIV. (See the HIV and Pregnancy fact sheets.)

I am taking anti-HIV medications and my viral load is undetectable. Can I still infect another person with HIV?

Your anti-HIV medications are doing a good job of controlling your infection. The amount of HIV in your blood is so low that a **viral load** test can't detect the virus. However, having an **undetectable viral load** doesn't mean you're cured. You still have HIV. And although having an undetectable viral load reduces the risk of HIV transmission, you can still infect another person with the virus.

How can I prevent transmitting HIV?

To prevent infecting another person with HIV:

- Use a condom every time you have sex.
- If you inject drugs, don't share your needles or syringes.
- Don't share your razor, toothbrush, or other items that may have your blood on them.
- Take your anti-HIV medications according to your health care provider's directions.
- If you are a mother infected with HIV, don't breastfeed your baby.

Talk to your health care provider about how HIV is transmitted and ways to prevent spreading the virus. At each visit, discuss any high-risk behaviors (such as having unprotected sex or sharing drug needles) with your health care provider.

Talking about high-risk behaviors can be difficult. And making changes, even when we want to, isn't always easy. However, it's important to be honest with your health care provider about any high-risk activities. Discussing ways to prevent HIV transmission can reduce your chances of infecting another person with the virus.

Can I put my partner who is also infected with HIV at risk?

It's important to use condoms and not share drug needles even if your partner is also infected with HIV. You and your partner may have different strains of the virus. Your partner's HIV could act differently in your body or cause the anti-HIV medications you take to be less effective. And your strain of HIV could have the same effects on your partner.

Where can I find more information about HIV prevention?

The Centers for Disease Control and Prevention (CDC) National Prevention Information Network (NPIN) provides information about prevention of HIV infection, other **sexually transmitted infections (STIs)**, and **tuberculosis (TB)**.

If you have questions about HIV transmission, call CDC-INFO at 1–800–232–4636 or visit http://www.cdc.gov/hiv/.

For more information:

Contact an AIDS*info* health information specialist at 1-800-448-0440 or visit http://aidsinfo.nih.gov. See your health care provider for medical advice.

Terms Used in This Fact Sheet:

HIV Transmission: The spread of HIV from a person infected with HIV to another person through the blood, semen, genital fluids, or breast milk of the HIV-infected person.

Sexually transmitted infections (STIs): Infections that are usually passed during sexual contact.

Tuberculosis (TB): A disease caused by germs that spread through the air when a person with active TB coughs, sneezes, or talks. TB usually affects the lungs.

Undetectable viral load: The amount of HIV in a person's blood is too low to be detected with a viral load test.

Unprotected sex: Sex without using a condom.

Viral load: The amount of HIV in the blood. One of the goals of antiretroviral therapy is to reduce viral load.

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