CHAPTER 1

The Basics of HIV/AIDS

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History Of HIV/AIDS

A great deal has been written about AIDS since the first cases were reported in 1981. It is difficult to read a newspaper, magazine or listen to the news on TV and radio, without seeing or hearing something about AIDS. For several years following its appearance, little information was available about this disease. Now, tens of thousands of published articles, studies, books and journals exist on the subject.

In 1981, the first cases of AIDS became known to the Centers for Disease Control (now called the Centers for Disease Control and Prevention) because several otherwise healthy homosexual and bisexual men in California and New York were becoming sick with rare opportunistic diseases. These men were typically 20 to 49 years old, and it was discovered that their immune systems had ceased to function properly. The Centers for Disease Control (CDC) was alerted, and the condition was referred to in some publications as GRID, Gay-related Immune Deficiency.

After epidemiologists were deployed to interview individuals with GRID, they learned that most of the infected people were males with multiple male sexual partners and/or injecting drug users who shared their drug needles. The transmission routes for this apparently new disease were similar to those of Hepatitis B, but the unknown causative agent did not appear to be quite as infectious. In 1982, the disease became known as AIDS, Acquired Immune Deficiency Syndrome, because its sexual and blood-to-blood transmission were not limited to just gay men.

In 1984, the causative agent was identified at the National Institutes of Health in the United States and called Human T-cell Lymphotrophic Virus-III (HTLV-III). About the same time, French scientists at the Pasteur Institute discovered the virus and called it, Lymphadenopathy Associated Virus (LAV). In published materials about AIDS, "HTLV-III/LAV" was used to identify the virus until 1986. At this time, the scientific community agreed on HIV, Human Immunodeficiency Virus, as the name for the virus that causes AIDS.

In March of 1985, a blood test for antibodies to the virus became available. The sole purpose of this test was to screen the nation's blood supply so that people could be protected from infection through blood transfusions. Donated blood and blood products were tested and discarded if they were positive. By the late 1980's, individuals who donated blood and blood products were questioned to assess their risk factors for HIV infection, in addition to their blood being screened. People who may have been at risk were

encouraged not to donate. Because of these efforts, almost no risk of infection with HIV exists from a blood transfusion.

As of December 31, 2001, 816,149 persons had been reported with AIDS in the United States; 56% of these had died. The estimated number of persons living with AIDS, 362,827, is the highest ever reported. Of these, 78% are men, 61% are black or Hispanic and 45% were infected through male-to-male sex.

Today, antiretroviral treatments are available that were not known when the first cases were reported in 1981. Also, therapies are available for the prevention and treatment of some of the opportunistic diseases and infections associated with HIV/AIDS.

Origin Of HIV

Several scientific theories have been developed about the origin of HIV. Since no cure exists for HIV or AIDS, researchers continue to speculate as to when, where and in what population this virus originated. Research published in early 1999 indicates a close link between simian immunodeficiency virus (SIV) and HIV in humans. There is a strong resemblance between these two very distinct viruses. The virus may have "jumped" to humans by the 1940's/1950's in this part of the world. While some believe HIV may be man-made (either accidental or deliberate), others believe HIV may have existed for many years as a harmless virus that subsequently mutated into the disease-causing agent first recognized in the early 1980s.

The theory of the virus being man-made was put to rest when the modern day Russian KGB admitted that, in the 1980's, they spread propaganda the CIA had created this virus and introduced it into specific populations (homosexual male and injecting drug user communities).

HIV could have emerged in rural Africa several decades before the first cases were recognized in 1981, due to the lengthy incubation period from infection to an AIDS diagnosis. By the late 1980s, millions of people were infected in Central Africa, when the virus was just appearing in other parts of the world. This may have been the result of people traveling more frequently to places, including Africa, after the 1950s. HIV probably began spreading at a greater rate in the 1960s and 1970s than it previously had because of jet airplane travel and the "sexual revolution." Also, multiple sex partners became more common with the advent of the birth control pill and the easy availability of antibiotics to cure most sexually transmitted diseases (STD). These and other factors probably contributed to the AIDS epidemic that became noticeable in the 1980s.

HIV (sometimes referred to as HIV-1) has similarities to two other viruses known today. The first is HIV-2, which behaves in a similar fashion to HIV. HIV-2 is almost exclusively

found on the west coast of Central Africa; however, there are a few documented cases in the US. HIV-2 causes AIDS at a much slower rate than HIV-1. The second virus is the simian immunodeficiency virus (SIV) that is found among certain members of the ape kingdom, such as the sooty mangabey monkey, which is indigenous to West Africa and sometimes known as the Green Monkey. Although several studies have indicated that there are no distinguishable genetic differences between HIV-2 and SIV, neither HIV-1 nor HIV-2 infect animals.

HIV probably spread quickly in the homosexual community due to the ease of transmission through unprotected anal sex; and through the injecting drug user community because of the ease of transmission through blood-to-blood contact.

One thing known about HIV today is that certain parts of the virus mutate very easily. If HIV can change genetically from one generation to the next and adapt to its environment, then it may have changed over the past several decades from a benign virus to the virulent one that is known today. Now that we have a brief overview of the origin and history of HIV, this training manual will focus on preventing the spread of HIV.

Immunology Antigen-defenses As a scapegoat which induces the formation of Antibodies. An antigen is introduced into the body or it may be formed in the body.

The human immune system is composed of several lines of defense against outside invaders like bacteria, viruses, fungi and other parasites. These defenses include: the skin, the mucous membrane lining of the mouth and vagina, the hairs and cilia of the nose and respiratory system, antibodies and enzymes in tears, sweat and the acids in the stomach. These are the primary and secondary lines of defense in the human body. Within the body there is a further line of defense which protects us from infection.

Ex: Bacteria Bacterial Toxins Foreign Blood Cells

When a foreign invader, or antigen, gains entry into the bloodstream, the body reacts by producing antibodies specific for the destruction of that antigen. T-4 helper lymphocytes (white blood cells), also known as CD4+ cells, are an integral part of the immune system that directs the attack on the antigen. T-8 (also known as CD8+ cells) killer lymphocytes and B lymphocytes (both types of white blood cells) are directed by the T-4 cells in the elimination of the antigen. Without the T-4 (CD4+) helper cells, this process cannot take place.

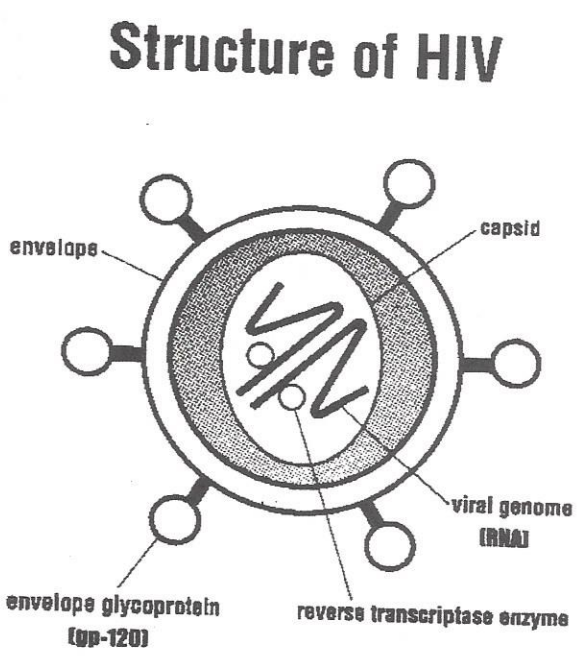
The immune system does exactly what it is supposed to do when HIV enters into the bloodstream. The body produces antibodies specific to HIV so this foreign invader can be destroyed. These antibodies can destroy free-floating virus in the bloodstream, but cannot destroy HIV once it enters the T-4 (CD4+) or other target cells. HIV attacks, enters, hides inside and destroys the cells that normally would direct its destruction. HIV also attacks macrophages, which ingest bacteria and dead tissue, but its chief targets are T-4 cells.

Basically, antibodies are soldiers that are rallied into troops whose mission is to kill the enemy or antigen. In this case, the antigen is HIV. The T-4 helper cells are the generals who direct the battles, and the T-8 and B cells are the actual soldiers.

Virology

The Human Immunodeficiency Virus is a retrovirus. Retroviruses are capable of using reverse transcriptase, an enzyme, in the host cell to reproduce. HIV enters a T-4 helper cell (the host) and turns it into an HIV factory before the process destroys the T-cell.

Once HIV enters the human body it targets and infects T-cells and immediately begins the HIV reproduction and T-cell destruction process. As the virus reproduces, it destroys its host T-cell and finds other T-cells that it can invade and set up more virus factories. This process continues for many months or years until death occurs from an opportunistic disease.



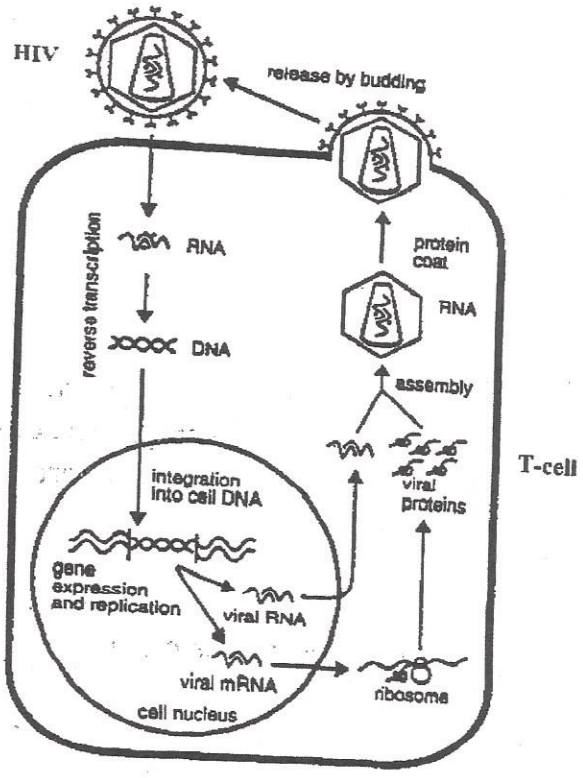
The thinking in the past was that HIV could hide in the lymph system or elsewhere for months or years and remain inactive. Now, it is evident that HIV goes to work immediately, however the effects may not be felt for months or years. It is not completely understood why HIV affects some individuals more quickly than others. Speculation is that some people who become infected have stronger immune systems, thereby making it more difficult for HIV to cause destruction. Also, once a person learns of their infection, strict nutrition, exercise, sleep patterns and drug therapies may slow the effect of HIV.

On the surface of the helper T-cell, HIV finds a protein molecule called CD4+. That is why helper T-cells also are known as CD4+ cells or T-4 cells. This molecule, CD4+, acts as a specific receptor for HIV. It is this perfect match between the virus and the molecule that makes the helper T-cells of our immune system vulnerable to HIV The outer coating of the *T-cell* is called CD4+. The outer coating of the *virus* is gp-120 (glycoprotein). The gp-120 is attracted to and binds with the CD4+. HIV then gains entry into the T-cell, reverse transcription takes place transforming viral genes (RNA) into cellular genes (DNA), and new viruses are manufactured (See diagrams on this and following page).

Over time, T-cells are methodically destroyed. A normal count in a healthy human adult is about 800-1000 T-cells per cubic millimeter (microliter) of blood. By the time an individual begins to experience rare opportunistic diseases and infections as a result of the destructive process of HIV, their T-cell count is usually below 200 per microliter. A person living with AIDS may have a T-cell count of close to zero per microliter. At this point, their immune system may no longer protect them from opportunistic infections and conditions.

T-cells are found in most body fluids. Consequently, HIV may be found in almost every human body fluid. Sweat is the only body fluid from which HIV has *not* been isolated. Since the number of T-cells is minute in fluids like saliva, urine and tears, these fluids do not transmit HIV. There are high volumes of T-cells in blood, semen, vaginal secretions and breast milk. These body fluids may transmit the virus through both sexual and blood-to-blood contact and through breast feeding.

HIV Replication



The gp-120 (outer coating of HIV antigen) attaches to the CD4+ (surface coating of the T-cell) and secondary receptors thereby gaining entry into the cell. Uncoating of the virus occurs. The enzyme *reverse transcriptase* causes transcription of RNA to DNA (DNA genes are normally transcribed into messenger RNA). The assembly of viral RNA and viral proteins takes place and a new Human Immunodeficiency Virus is manufactured. HIV is released by budding from the T-cell. Until the T-cell dies on its own or is destroyed by this HIV replication process, each time the T-cell replicates, it reproduces HIV along with it. (Diagram and replication information courtesy of Paul Elliott, Ph.D., (Former) Professor of Biology, Florida State University).

Opportunistic Infections And Conditions

When the T-cell count of an infected person falls to approximately 200 per microliter, opportunistic infections or conditions will usually occur. Opportunistic diseases emerge because the immune system is compromised or suppressed. A person with a healthy immune system and a normal T-cell count would probably not experience an opportunistic disease. However, there are a few diseases a person with a healthy immune system can get that may not be AIDS related, such as tuberculosis, candidiasis ("thrush") and salmonellosis. If a person with a healthy immune system came in contact with a person who has an opportunistic disease, the individual would normally not become ill with that disease.

Rather than being the direct cause of death, in most instances HIV sets the body up for opportunistic infections and conditions that attack and cause damage. Once the body can no longer defend itself because of a suppressed immune system, even a common cold or influenza can be difficult to eliminate.

Over 25 opportunistic infections and conditions are associated with AIDS. An individual with an AIDS diagnosis may have two or more diseases simultaneously. Some of these opportunistic conditions and diseases are treated prophylactically (preventively) since the HIV disease process is now better understood. Treated infections may recur at any time.

Several types of causative agents are responsible for these opportunistic diseases and conditions. These agents are: viruses, bacteria, fungi, protozoa and cancers.

The following is a list of the Centers for Disease Control and Prevention recognized opportunistic diseases and conditions associated with AIDS:

1. Candidiasis - This is a fungal infection commonly known as "thrush" in infants. Candidiasis appears as white, sometimes painful patches on the tongue and other oral mucous membranes, in the trachea, the esophagus or the lungs. Several medications are available for treatment.

2. Invasive Cervical Carcinoma - This is a type of potentially fatal cancer of the cervix. Treatment may consist of surgery, radiotherapy or chemotherapy.

3. Coccidioidomycosis - This fungal infection is found most often in HIV-infected individuals who live in the Southwest United States. In people with healthy immune systems, this is a self-limiting infection. Usually starting in the lungs, Coccidioidomycosis can spread to other parts of the body. Several anti-fungal treatments are available.

Cryptococcosis - This fungal infection usually involves the lungs. However, it may spread to other parts of the body, including the central nervous system. Anti-fungal medications are available, but lifetime treatment is necessary.

Cryptosporidiosis - This is a protozoal infection of the inner lining of the intestines. For someone who is immune compromised, the diarrhea it causes can be life threatening. Hydration therapy is the only available treatment, although experimental medications may be obtainable.

Cytomegalovirus (CMV) - This viral infection ranges from benign to severe depending on age and immune status. It can cause brain damage, colitis, pneumonia and blindness. Several antiviral medications are available to treat CMV retinitis.

HIV Encephalopathy - This may be any disease of the brain directly related to HIV infection. This condition is also referred to as AIDS Dementia Complex and affects the central nervous system. Available medications can reduce or reverse symptoms that include: poor concentration, forgetfulness, slowness, balance and behavioral problems.

Chronic Herpes Simplex - This disease is caused by a virus and is identified by mucocutaneous sores that are transmitted through sexual or other intimate contact. Symptoms last longer and can recur more often in an individual with a compromised immune system. Medications are available for control of herpes, but no cure currently exists.

Histoplasmosis - This is a fungal infection that may be pulmonary (in the lungs) or disseminated. Symptoms are similar to those of tuberculosis. Therapeutic medications are available.

Chronic Intestinal Isosporiasis - This is a protozoal infection that causes diarrhea and inadequate gastrointestinal absorption. Medication is available for this infection.

Kaposi's Sarcoma - This rare cancer was first recognized in elderly men of Mediterranean heritage in the late 1800's, and it may attack people with AIDS when their immune system is compromised. Purplish-gray lesions usually occur on the extremities, although they may be found anywhere on the skin and on internal organs. Treatments include chemotherapy, radiation therapy, surgery and alpha interferon with antiretroviral therapy.

Non-Hodgkin's Lymphoma - This refers to a group of similar solid type tumors that includes diffuse histiocytic lymphomas and Burkitt's or non-Burkitt's lymphomas. Several types of chemotherapies are available as treatment.

Primary Lymphoma of the Brain - This is a type of cancer found in the central nervous system and was very rare before the beginning of the AIDS epidemic. Although radiation therapy is used as a treatment, prognosis for recovery is poor.

Mycobacterium Avium Complex (MAC) - This is a common bacterial contaminant in the southeast part of the United States. It is not transmitted person to person, but causes chronic fever, anemia and wasting (unusual and uncontrolled weight loss) in individuals who have a compromised immune system. Although several experimental medications are under investigation, MAC is treated using combinations of antimycobacterial drugs.

Tuberculosis - *Mycobacterium tuberculosis* (TB) is a bacteria that is spread by airborne droplets through coughing or sneezing by an infected person. It usually infects the lungs but may be disseminated throughout the body. Treatment with multiple drug therapy over a lengthy period is usually required to resolve the infection.

Pneumocystis Pneumonia; formerly known as Pneumocystis Carinii Pneumonia; (PCP) - This protozoal infection of the lungs is the most common of the opportunistic diseases associated with AIDS. Several treatments and therapies are available, including prophylactic medication.

Recurrent Pneumonia - This is any type of pneumonia (inflammation of the lungs) that occurs more than once over a short period.

Progressive Multifocal Leukoencephalopathy (PML) - This viral infection affects the central nervous system. There is no approved effective treatment, however experimental treatments include steroids and other antiviral medications.

Salmonellosis - This bacterial infection affects the gastrointestinal system and is caused by ingesting contaminated raw foods. Several medications are available as treatment, but for a person with a compromised immune system, resolution of symptoms is very slow.

Toxoplasmosis - This protozoal infection can attack the brain and central nervous system. It is usually caused by exposure to cat feces but can also be caused by eating some types of raw meat. This disease is generally only a problem for women

who are infected during pregnancy and for individuals with compromised immune systems. Medications are available.

Wasting Syndrome - This is a significant loss of weight (defined by CDC as more than 10% of baseline body weight) in the absence of any other underlying intestinal cause, and directly associated with HIV infection. Therapy can include a dietary change to high protein food supplements and treatment with appetite stimulants, anabolic steroids and human growth hormone.

The Disease Spectrum

The point from which a person becomes infected with HIV until they begin to experience life threatening opportunistic infections and conditions is, on average, ten years. This is often referred to as the *latency or incubation period.* The latency period may be less than two years or it may be fifteen years or longer. Every individual who gets infected has a different set of circumstances and factors regarding their infection.

For example, if a person who injects drugs intravenously every day and shares needles becomes infected, they may develop symptoms of AIDS very quickly, possibly within two to five years. On the other hand, if someone who exercises regularly, eats a balanced diet and has regular sleep habits becomes infected, their immune system may be more difficult for HIV to break down, and it may be ten or fifteen years before they experience a life threatening condition.

Occasionally, when a person becomes infected with HIV, they will notice flu like symptoms within a few weeks (fever, malaise and body aches). This reaction is called Acute Retroviral Syndrome (ARS) and it represents the body's response to a foreign invader. Several months and, more commonly, years may pass before signs or symptoms of infection occur. This period is sometimes called *asymptomatic* HIV disease because few, if any, symptoms occur during this time.

As time passes, some pre-AIDS signs and symptoms may occur. Formerly referred to as ARC (AIDS Related Complex), these signs and symptoms are also known as *symptomatic* HIV conditions. Some of these conditions are: Candidiasis inside the mouth or on the tongue, colds and flus that linger, chronic headaches and chronic gastrointestinal upset.

A normal, healthy T-cell (CD4+) count is 800 to 1000 per microliter (cubic millimeter) of blood. This count drops over time for individuals infected with HIV or having a diagnosis of AIDS. After several years, when the T-cell count falls to about 200 cells per microliter of blood, opportunistic diseases and conditions appear.

The point from which a person is diagnosed with AIDS until death may be a few years or many years, depending on factors such as available treatments.

Fatality Rate

A question often asked is, *does AIDS always lead to premature death?* The answer is, *in most cases, yes.* In a small number of HIV-infected individuals, T-cell counts do not decline with time. These persons have been designated "long-term non-progressors", and some of them are enrolled in clinical studies seeking to identify how their immune systems have counteracted the effects of HIV.

CDC Definition of AIDS

In an adult or adolescent, CDC defines AIDS as someone with:

- -A positive HIV antibody or antigen test, ***and***
- -A T-cell (CD4+) count of less than 200 cells per microliter (Or, T-cells that are less than 14% of total lymphocytes), ***and/or***
- -Diagnosis of one or more opportunistic infections or conditions associated with AIDS (See the section entitled, "Opportunistic Infections and Conditions"-page 8).

HIV

The 1996 Florida Legislature passed a law allowing for name reporting of HIV-infected individuals. Reporting began on July 1, 1997. Since CDC does not require the reporting of HIV-positive individuals, states that choose to report do so differently. Some states require *name* reporting for the purpose of epidemiologic follow-up (partner notification and evaluation), whereas other states require the reporting of test results by only *age, race and sex.*

HIV antibody testing has only been available nationally since March 1985, and it is not known whether *all* individuals who test positive will progress to AIDS. Considering the period from infection with the virus until a diagnosis of AIDS is usually many years, not everyone who has tested HIV positive has yet advanced to AIDS. Indications from years of studying this disease process are that an infected person *will probably* progress to an AIDS diagnosis and death over time.

Symptoms

A wide range of symptoms are associated with AIDS. Many symptoms are not necessarily due to the breakdown of the immune system, but are the result of opportunistic diseases and infections and *their* manifestations.

The number one killer of people with AIDS is Pneumocystis Pneumonia (PCP) (See the earlier section entitled, "Opportunistic Infections and Conditions"-page 8). As with other lung diseases, people with PCP experience shortness of breath, a non-productive (dry) cough, anemia and fever. PCP was a rare disease before the AIDS epidemic.

Another opportunistic condition sometimes experienced by people with AIDS is Kaposi's Sarcoma. This type of cancer manifests itself with grayish-purple skin lesions, lesions on several internal organs, night sweats and weight loss.

Other symptoms associated with the various opportunistic diseases and conditions are: chronic headaches, chronic and persistent diarrhea and vomiting, blindness, memory loss, rashes, sores, assorted aches and pains, neurological dysfunctions and other manifestations.

Women

Females who become infected with HIV will sometimes experience different symptoms and diseases than infected males. Since the January 1, 1993, revision of the CDC AIDS case definition, cervical cancer has been included as an opportunistic disease. Although HIV-infected women can be diagnosed with any of the other opportunistic diseases and conditions associated with AIDS, they are less likely than men to get Kaposi's Sarcoma.

Pediatric AIDS

The term "pediatric AIDS" refers to cases of AIDS among individuals who are under thirteen years of age. Generally, *infants* with AIDS are those under two years of age.

Almost all children with AIDS in this country were born to an infected mother. Children do not fare as well as adults with HIV and AIDS. HIV-infected adults will usually live a relatively healthy life before developing AIDS, whereas an HIV-infected child will probably be diagnosed with AIDS in half that time, according to several studies. Combination antiretroviral therapy is changing this situation, and many children born HIV infected are now living in good health into their teens, and beyond.

As with infected adults, PCP is the most common opportunistic disease in infected infants and children. Typically, pediatric AIDS cases do not include other diseases that are common in adults with AIDS, such as, Toxoplasmosis, Kaposi's Sarcoma and tuberculosis.

Treatment

The FDA has approved an array of antiretroviral drugs to directly treat HIV infection. There are four classes of antiretrovirals, each of which interferes with the virus's ability

to replicate inside a human host cell. They are recommended for use in combination with one another at least three at a time from the same or different classes in order to minimize development of viral resistance. The United States Department of Health and Human Services treatment guidelines include recommendations for such combination treatment, known as Highly Active Antiretroviral Therapy (HAART).

The goal of HIV treatment is to suppress replication of HIV in order to limit damage to the body's immune system. Successful therapy results in increased CD4+ cell counts accompanied by decreased viral loads. Individuals may respond differently to the same drug combinations, and some may experience side effects that make it difficult to take the drugs as prescribed. Antiretroviral drugs are not a cure for HIV/AIDS, but they can prolong and improve the quality of life for an HIV-infected person. More effective antiretroviral drugs are being developed and approved involving fewer pills, once-a-day dosing and fewer side effects. These medications are aimed at ultimately enabling persons with HIV to live more full and normal lives.

Antiretroviral Medications

1. Nucleoside Analogs
   As of December 2002, there are eight FDA-approved products in this class: AZT, ddI, ddC, d4T, 3TC, Combivir (AZT/3TC), Abacavir, and Trizivir (AZT/3TC/Abacavir). These drugs (which include the most commonly known anti-HIV drug, AZT) incorporate themselves into the enzyme that helps the virus to copy itself, thereby stopping the building process. This was the first class of drugs specifically targeting HIV and they form the backbone of most combination antiretroviral regimens.

2. Nucleotide Reverse Transcriptase Inhibitor
   The first drug in this class, tenofovir (Viread), was approved in October 2001. Nucleotides are similar to nucleoside analogs, and block HIV replication in the same manner. In addition to the advantage of simple and convenient dosage (it is taken once daily), the drug has been effective for treatment in clients with high levels of resistance to other agents.

3. Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTI)
   There are currently three drugs in this class: nevirapine (Viramune), delavirdine (Rescriptor) and efavirenz (Sustiva). Non-nucleoside drugs bind directly onto reverse transcriptase at a different location than nucleoside reverse transcriptase inhibitors, and prevent the conversion of viral RNA to DNA which can be incorporated into human cell chromosomes. Use of these drugs can effectively expand treatment options but viral resistance to a single drug in this class can extend to other NNRTIs (cross-resistance) even if the patient has never taken the other drugs.

4. Protease Inhibitors
   Protease inhibitors are considered the most powerful drugs against HIV. They work during the last stage of viral replication by preventing HIV from being successfully assembled and released from the infected CD4+ cell.

   There are currently seven formulations of protease inhibitors available: Saquinavir (Invirase, and an improved version, Fortovase), Ritonavir (Norvir), Indinavir (Crixivan), Nelfinavir (Viracept), Amprenavir (Agenerase), and Lopinavir/ Ritonavir (Kaletra).

5. Fusion Inhibitors
   The first drug in this class, Fuzeon (T-20), was approved in early 2003. Unlike existing anti-HIV drugs, which target enzymes involved in replication of the virus, fusion inhibitors block HIV from fusing with a host cell.

Optimal Therapy

With current treatment options, there are more than 200 possible three-drug combinations. Selection of the best option is a complex process and should be a mutual decision involving the medical provider and patient. AIDSinfo is a central resource for the most recent federally approved treatment guidelines for HIV and AIDS, accessible at www.aidsinfo.nih.gov.

Side-Effects and Toxicities

The occurrence of side effects plays a large role in adherence to drug regimens, which in turn can impact the development of drug resistance. One of the primary factors deterring people with HIV from starting combination anti-HIV therapy is the potential side effects.

Such toxicities may affect all systems of the body, and may range from serious enough to necessitate stopping a drug completely, to not dangerous but uncomfortable or annoying enough to interfere with daily life. Some of the most common categories of adverse events associated with antiretroviral drugs are listed below. Further details may be obtained from such websites as AIDSinfo: www.aidsinfo.nih.gov

- Gastrointestinal - Nausea, vomiting, diarrhea and resulting nutritional and electrolyte imbalance

- Dermatologic - Rashes ranging from mild, to photosensitive, to life-threatening hypersensitivity or "Stevens-Johnson" syndrome

- Organ Related - Medication-induced hepatitis, pancreatitis, kidney stones