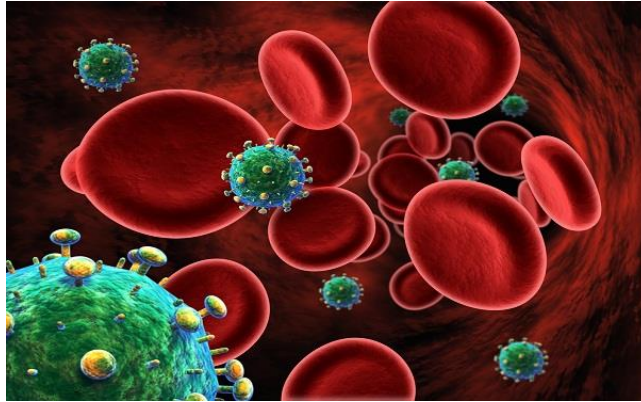


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For the Pharmacy Technician

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TL Lesson 4 - Review of HIV

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About AIDS

Introduction

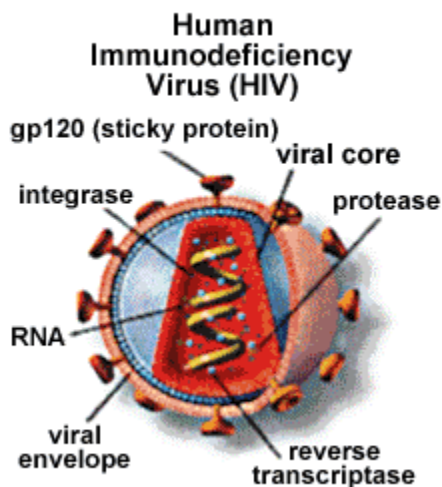
The statement “*if only we knew then what we know now,*” may be applied to the AIDS virus as we find ourselves learning more in the understanding of this virus since its detection in 1981. Acquired Immuno-Deficiency Syndrome (AIDS) onslaught has affected the world population in epidemic proportions.

Statistics today show 1.2 million people in the US have HIV. About 13 percent of them don't know it and need testing. In 2019, an estimated 34,800 new HIV infections occurred in the United States. HIV continues to have a disproportionate impact on certain populations, particularly racial and ethnic minorities and gay, bisexual, and other men who have sex with men.

Goals & Objectives

The Pharmacy Technician will have a basic understanding of the following:

1. Prevalence of HIV/AIDS
2. Viruses
3. Human Immunodeficiency Virus (HIV)
4. Acquired Immuno-Deficiency Syndrome (AIDS)
5. Laboratory Diagnosis of HIV/AIDS
6. Some Opportunistic Infections
7. Pharmacological Treatment of HIV/AIDS
8. Pharmacy Technician role and importance



In 1981, two very rare disease states were noted in increasing numbers. Clusters of cases of Kaposi's sarcoma were observed in young gay-male patients in San Francisco and New York as well as Pneumocystis pneumonia. Kaposi's sarcoma normally occurs in the United States in elderly men of Jewish or Mediterranean ancestry. Pneumocystis pneumonia, caused by an intracellular parasite (*Pneumocystis carini*), rarely seen, increased in numbers of young gay men. The disease was originally termed Gay-Related Deficiency (GRID). Selective loss of T4-cells, suggested a new virus was the culprit. In 1983 the AIDS virus was discovered. [Morbidity and Mortality Weekly Report -MMWR 1981-1982]

AIDS has no boundaries as far as socio-economic populations.

The idea that the AIDS epidemic is in control due to fewer infected individuals dying from AIDS is not valid. As more and more people survive with an HIV infection because of successful intervention, the number of infectious people in the population continues.

GLOBAL HIV STATISTICS 2020

- 37.7 million [30.2 million–45.1 million] people globally were living with HIV in 2020.
- 1.5 million [1.0 million–2.0 million] people became newly infected with HIV in 2020.
- 680 000 [480 000–1.0 million] people died from AIDS-related illnesses in 2020.
- 27.5 million [26.5 million–27.7 million] people were accessing antiretroviral therapy in 2020.
- 79.3 million [55.9 million–110 million] people have become infected with HIV since the start of the epidemic.
- 36.3 million [27.2 million–47.8 million] people have died from AIDS-related illnesses since the start of the epidemic.

As a Pharmacy Technician, the understanding of HIV/AIDS is of vital importance. Behavior and norms must change to help slow the progression of this disease state. As a health professional, the Pharmacy Technician can offer important information to those in need. Regardless of new treatment and longer life expectancies of those with HIV/AIDS, the potential end result of this disease state is fatal. The importance in the counseling of abstinence or safe sex cannot be overstated.

Viruses

Viruses have been linked to causes of certain cancers in animals. Although inconclusive, certain viruses may also cause cancer in humans.

Viruses are responsible for a large proportion of mortality worldwide. Being the smallest of parasites, viruses can only be seen by electron microscope. Compared to the smallest of bacteria at 0.25 microns, the virus size can be anywhere from 0.02 to 0.03 microns in size.

Unlike bacteria, viruses are wholly dependent on cells for nutrition and reproduction. Several hundred viruses exist today that can infect man, but most are harmless or the human immune system is able to destroy them. Although there are numerous ways of virus spreading to other individuals, chiefly man himself, through respiratory droplets, spread the virus.

Diagnosis of virus is oftentimes difficult. A trip to the doctor's office in most cases is due to a virus. Since viral diseases are not susceptible to antibiotics, the virus usually just runs its course as the immune system takes care of it.

Today there are effective prophylactic vaccines available for certain viral infections but not HIV:

Example: influenza, measles, mumps, poliomyelitis, rabies, rubella, smallpox, yellow fever.

HIV

Human Immunodeficiency Virus (HIV) in 1983 was found to be the precursor to Acquired Immunodeficiency Syndrome (AIDS). In case of the Human Immunodeficiency Virus (HIV), the virus is life-threatening that slowly destroys the body's ability to fight disease. HIV belongs to a class of viruses called retroviruses that have genes composed of Ribonucleic Acid (RNA). The eventual outcome of HIV is Acquired Immunodeficiency Syndrome or AIDS.

HIV-I (*subtype B*)

- Is more deadly
- Responsible for most AIDS cases in US
- Has at least ten subtypes lettered A through J

HIV-II

- predominantly prevalent in Western and Central Africa
- at least two and possibly five subtypes

Two strains of HIV exist, HIV-I and HIV-II. Both attack and kill CD4+ or T4 Lymphocytes (T4-cells). The body uses T4-cells to activate the body's immune system.

White blood cells are comprised of 20 % of T4-cells. The activation of T4-cells increases the production of antibody-forming cells. HIV leaves the body deficient of T4-cells. In the case of both HIV-I and HIV-II, both are responsible for causing AIDS.

With the depletion of T4-cells, HIV is able to suppress the immune system of the individual infected. HIV thus predisposes an infected individual with life-threatening situations such as opportunistic infections. HIV is not the direct causative of death, but rather an indirect cause in allowing the body to become infected with pathogens or disease causing microorganisms.

AIDS

The onset of AIDS occurs, on average, 10 to 11 years after infection but in the absence of treatment some individuals progress much faster. About 20% of patients exhibit AIDS symptoms within 5 years of infection, while others remain disease free much longer than average.

In AIDS there is a serious deficiency of T4-cells, which causes the individual's immune system to be non-functional. In this case, the individual is susceptible to different types of opportunistic infections such as bacterial, protozoal, fungal, potential malignancy (cancer), and other viruses.

The Center for Disease Control (CDC) defines the condition of full-blown AIDS as the time when an individual is HIV positive and has one or more opportunistic infections such as bacterial pneumonia, meningitis, oral candidiasis and pneumocystis carinii pneumonia. Included in this criterion is a T4 Cell count of 200 per ml or less.

HIV cannot replicate independently and therefore must enter cells for its metabolic and reproductive needs. Once inside cell, HIV uses an enzyme called *Reverse Transcriptase* to convert RNA into DNA that can be incorporated into the host gene. This allows the HIV virus to integrate a copy of its genetic code into the host chromosomes.

HIV/AIDS Signs and Symptoms**Four Stages:****Stage I - initial infection**

- a. symptomatic - flu like symptoms occur in 70% of individuals
 - due to immune system still being functional
 - fever, rash, cough, headaches, diarrhea, fatigue
 - begins 2 to 4 weeks after exposure lasts 1 or 2 weeks
 - symptoms clear as antibodies are being made up against virus

Stage II - slow progression

- a. person is asymptomatic
- b. can last 2 to 10 years (may last longer due to current therapy)
- c. most transmission occurs
 - no realization that person has disease

Stage III - ARC (in some cases this Stage is bypassed)

- a. referred to as AIDS Related Complex (ARC)
- b. symptomatic
 - persistent symptoms, but not yet diagnosed as AIDS
 - weight loss, fatigue and fungal infections

Stage IV - AIDS

- a. symptomatic with one or more opportunistic infections
- b. depletion of T4-cells to less than 200 per ml
 - normal: 1000 – 5000 T4 cells per ml

Stages of disease depends on individual to begin with, the rate and fall of T4-cells and viral load. Viral load is a test that shows how much actual activity is in your blood stream. The lower number the better.

Diagnosis

With exposure to HIV and subsequent infection, the body produces antibodies against this foreign virus. Because of this reaction, diagnosis is made on the basis of HIV Antibody tests of which antibodies against the HIV virus is detected. In some cases, the number of antibodies may be minimal and even with new technology, undetectable until three to four weeks after exposure.

For the laboratory diagnosis of HIV, the mere presence of specific antibodies signals that infection has occurred. For the diagnosis to be correct, however, detection depends on the use of tests that are effective in identifying HIV antibodies, and not antibodies directed to other infectious agents that may be antigenically similar. Antigens used in HIV diagnostic tests must be appropriately specific, and are usually purified antigens from viral lysates. Viral lysates are antigens produced through recombinant or synthetic peptide technology. The use of such antigens allows HIV screening tests to possess both sensitivity (to detect infection) and specificity (to detect noninfection). Two of several current tests used today are the ELISA and the Western Blot:

ELISA

The Enzyme-linked Immunosorbent Assay (ELISA), is the most commonly used tests to screen for HIV infection because of its relatively simple methodology, inherent high sensitivity, and suitability for testing large numbers of samples, particularly in blood testing centers. More than 40 different ELISA test kits are currently available, but only about 10 are licensed by the FDA for use in the United States.

A positive result from this is not necessarily indicative of infection, but does single the need for retesting. Two or three samples must show to be positive before a confirmation test is given.

ELISA - Enzyme-linked Immunosorbent Assay

1. blood samples are taken and diluted
2. then placed on beads that have been coated with the HIV antigen
3. if the specimen contains HIV antibodies it will cling to the beads
4. after two hours, any unbound antibody is washed away
5. repeated with other enzymes and substrates
6. soon a color is displayed
 - a. certain color shows a positive versus a negative result
7. may have false positives
8. repeat tests necessary with two positive results
9. If three tests are positive, a confirmation test is required

Western Blot

The Western blot is probably the most widely accepted confirmatory assay for the detection of antibodies to the retroviruses; most authorities consider it the "gold standard" for validation of HIV results. It is based on using an electrophoretic technique to separate HIV antigens derived from a lysate of virus grown in culture. This technique denatures the viral components, imparts a negative charge to the antigens, and separates them based primarily according to their molecular weights. The separation of antigens in the technique allows for the identification of specific antibodies to each of the viral antigens in a subsequent set of steps similar to the ELISA methodology.

A positive Western Blot almost conclusively shows an individual is infected with HIV. In some cases, though, it has been known this test may be inconclusive as to whether the individual is positive or not. In this case, retesting with a different sample is necessary in two or three weeks.

Other Tests

Noninvasive collected specimens, such as oral fluids (saliva), have been used for HIV testing as an alternative to blood samples. These fluids, containing crevicular fluid from capillaries beneath the tooth-gum margin, are transudates of blood; therefore, they include the same fluid (plasma) that is used for testing with serum-based tests. The concentration of antibodies in oral fluids is about 1/400 of that in plasma, however, because of the dilutional effect of fluids from the salivary glands (true saliva), necessitating extremely sensitive tests that are able to detect small quantities of antibody. The testing technology to detect these low quantities is now available, and oral fluid tests, both ELISA and rapid tests, are accurate.

PCR tests

Polymerase chain reaction (PCR) detects the genetic material of HIV, instead of the antibodies in blood. A PCR test can tell whether you have HIV much sooner than the antibody test -- within two to three weeks of infection. This test is also known as a viral load test. It is more expensive but more definitive, especially early after exposure to the virus.

Home HIV test kits

The CDC recommends that everyone between the ages of 13 and 64 years old be screened for HIV at least once as part of their routine health care. More frequent testing is recommended for people who have a higher risk of infection because of behaviors such as having sex without condoms, having sex with multiple partners, or injecting drugs using shared needles.

The OraQuick In-Home HIV Test is the only HIV test approved by the FDA that people can use to test themselves at home or in a private location. This test can detect antibodies of the virus from a saliva sample. It can provide results without a laboratory in 20 to 40 minutes. A positive result doesn't mean a definite infection with HIV, but rather that additional testing should be done in a medical setting. Also, a negative result doesn't mean that you are definitely not infected with HIV, particularly when exposure may have been within the previous three months.

Doodle space

Opportunistic Infections

HIV/AIDS again is not the causative cause of death in infected individuals. In all cases, an infection or opportunistic infection that takes advantage of a weakened immune system will be the cause of death. Medical care and antiviral treatment can reduce risk of an opportunistic infection, but only for so long. The end stage of immunosuppression is the development of an opportunistic infection. Below is a list of only a few opportunistic infections that can occur in an individual infected with HIV/AIDS.

Some common Opportunistic Infections associated with AIDS

Pneumocystis Pneumonia Infection (PCP) - Protozoal

Pneumocystis Infection (*Pneumocystis carinii*) is found in the soil and air. This form of opportunistic occurs in 80% of AIDS infected individuals and is the leading cause of death. Symptoms involve malaise, mild cough, fatigue, high fever and dyspnea or difficult breathing.

Pneumocystis is found in most healthy individuals and is of no concern. In immunosuppressed individuals such as AIDS patients, PCP becomes active and generally infects the lungs. Treatment protocols for this opportunistic infection involve the combination of two drugs trimethoprim and sulfamethazole (TMP/SMX), which can be found with the brand names of Septra® or Bactrim®. Other drugs used would include Dapsone, Pentamidine (aerosol or IV) and Atovaquone (Mepron®) for those allergic to TMP/SMX.

The best method to avoid PCP infections in AIDS patients is for these individuals to take as prescribed antiviral medications.

Karposi's Sarcoma (KS) - Malignancies

Karposi's Sarcoma is the most common form of cancer seen in 20% of AIDS patients not on antiviral therapy. The cancer causes purple or brown lesions on the skin or in the mouth, nose or rectum. The lesions resemble bruises but are painless and do not heal.

KS on the skin is not life threatening. However, KS lesions on the feet and legs can make it difficult to walk. If KS spreads to other parts of the body, it can cause serious problems. In the mouth lining, it can cause trouble eating and swallowing. In the intestinal tract or stomach, it can cause internal bleeding and blockages. If KS blocks lymph nodes, it can cause severe swelling of the arms, legs, face, or scrotum. The most serious form of KS is in the lungs, where it can cause a serious cough, shortness of breath, or an accumulation of fluid that can be fatal.

KS in the skin can be treated in several ways and is not a serious problem. KS in internal organs can be life threatening. Treatment protocols for this opportunistic infection involve chemo drugs such as doxorubicin (Doxil®), daunorubicin (DaunoXome®) and paclitaxel (Taxol®).

Tuberculosis (TB) - Bacterial

Tuberculosis is a mycobacterium infection caused by a live tubercle bacterium. TB is transmitted when a person with active TB coughs or sneezes, releasing the TB antigen in the air. If inhaled by another individual, this may cause TB in that individual. Once infected, most people remain healthy and develop only latent infection. People with latent infection are neither sick nor infectious. However, they do have the potential to become sick and infectious with active TB.

In an immunosuppressed individual such as an AIDS patient, TB is active and will bring on symptoms such as malaise, night sweats, weight loss and diarrhea. TB surprisingly may be the disease state that leads to the diagnosis of AIDS in some patients. As TB progresses in HIV+ individuals, the bacteria infects the lungs and lymph system.

Treatment protocols include the use of multiple drugs: isoniazid, rifampin, pyrazinamide, ethambutol (or streptomycin). Unfortunately, there is a high failure rate as many individuals will not take the medication as prescribed. This leads to mutations of TB that are drug resistant.

Cytomegalovirus Infections (CMV) - Viral

Cytomegalovirus infection is a member of the herpes family. About 50% of all healthy individuals have CMV with no concern. Immunosuppressed individual such AIDS patients may exhibit serious symptoms such as retinitis, pneumonitis, colitis, fever, hepatitis. Almost any internal organ can be infected.

Treatment protocols include the use of ganciclovir, foscarnet and cidofovir. About 10% of those with CMV have a strain that is resistant to ganciclovir.

CMV Retinitis (eyes)

- Symptoms include vision blurring, blind spots.
- CMV can cause blindness.

CMV Encephalitis (brain)

- CMV in the brain isn't common.
- Symptoms include headache, fever.

CMV Esophagitis (throat)

- Symptoms include difficulty swallowing, chest pains, hiccups.

CMV Colitis (large intestines)

- Symptoms include diarrhea, cramps, rectal spasms, weight loss.

CMV Gastritis (stomach)

- Symptoms include fever, diarrhea, abdominal pain.

CMV Radiculopathy (spinal cord)

- Symptoms include leg pain, leg tingling.

Candidiasis - Fungal

Candidiasis (*Candida Albicans*) is the most common opportunistic infection found in the HIV/AIDS infected individual. Infection involves the mucous membranes that surround the mouth, vagina, esophagus and skin. Symptoms include white bumps, dry mouth, difficulty swallowing, and an altered sense of taste. In severe cases this opportunistic infection can also infect the lungs. Treatment protocols include the use of fluconazole (Diflucan®), clotrimazole (Mycelex®), ketoconazole, nystatin. For oral thrush, fluconazole, ketoconazole, itraconazole. For esophageal thrush and over-the-counter antifungal remedies, clotrimazole, miconazole. Alternatives: IV amphotericin B or amphotericin B oral solution usually reserved for fluconazole resistant *Candida*.

AIDS Dementia Complex (ADS) - Neurological

Although AIDS Dementia Complex is not a true opportunistic infection, it is one that is associated with the HIV virus. Damage to the Central Nervous System (CNS) occurs dramatically by not only the HIV virus, but also opportunistic infections and the treatment protocols established for HIV/AIDS.

Early symptoms of AIDS Dementia can be confused with general manifestations of clinical depression. These include apathy, loss of interest in one's surroundings and the like. Later symptoms involve cognitive and motor problems. Memory loss, as well as mobility problems, come into the picture.

Treatment of HIV/AIDS

Today HIV positive diagnosis is not a sentence of immediate death. It does mean that an individual has been exposed to the HIV virus that causes AIDS and the possibility of full blown AIDS will develop in the future. With early treatment and new drug protocols, patients are living longer with a better quality of life than ten years ago.

HIV positive means the virus has entered the body either through blood, semen or vaginal secretions. The virus replicates rapidly and will attack the immune system immediately. Presently there is no method of totally eliminating HIV from the body. Treatment protocols can only delay viral replication and disease progression.

Polytherapy versus Monotherapy

Initially the use of one drug (monotherapy) was considered the mainstay in AIDS treatment, but times have changed and the use of more than one drug (poly-therapy) is now considered the pillar in the treatment of AIDS.

The National Institute of Health (NIH) recommends that antiviral therapy begin when one of the following occur: T4-cells count reaches 500 cells per ml or less, viral load is above 5,000 or 10,000 and/or symptoms of chronic HIV occur.

Anti-Retroviral Treatment

Antiviral drugs work on various points of viral replication. One mechanism of action (MOA) is by blocking the virus binding to T4-cells. Another MOA is to inhibit the enzyme reverse transcriptase from converting viral RNA into DNA, the nucleic acid form in which the cell carries its genes.

Protease Inhibitors (PI) work by preventing the enzyme protease from creating new copies of the HIV infected virus. Once HIV's genetic material (RNA) is inside a T-cell's DNA, the cell produces long strands of genetic material that must be cut up and put together correctly by the enzyme protease to form new copies of the virus. Inhibiting the action of protease prevents the cell from producing new viruses.

Anti-Retroviral Drugs

Each drug works on various points of viral replication. Eradication of virus is impossible therefore treatment requires lifelong therapy.

Classifications:

NRTIs - Nucleoside/Nucleotide Reverse Transcriptase Inhibitors

Force the HIV virus to use faulty versions of building blocks so infected cells can't make more HIV

NNRTIs - Non-Nucleoside Reverse Transcriptase Inhibitors

These so called "non-nukes" bind to a specific protein so the HIV virus can't make copies of itself

PI - Protease Inhibitors

These drugs block a protein that infected cells need to put together new HIV virus particles

<u>Generic Name</u>	<u>Trade Name /Abbreviation</u>		<u>Classification</u>
Lamivudine	Epivir®	3TC	NRTIs
Zidovudine	Retrovir®	AZT	NRTIs
Stavudine	Zerit®	d4T	NRTIs
Didanosine	Videx®	ddI	NRTIs
Abacavir	Ziagen®	ABC	NRTIs
Emtricitabine	Emtriva	FTC	NRTIs
Tenofovir	Viread®	TDF	NRTIs
Efavirenz	Sustiva®	EFV	NNRTIs
Delavirdine	Rescriptor®	DLV	NNRTIs
Nevirapine	Viramune®	NVP	NNRTIs
Cabotegravir/rilpivirine	Cabenuva®		NNRTIs
Etravirine	Intelence®	ETR	NNRTIs
Rilpivirine	Edurant®	RPV	NNRTIs
Atazanavir	Reyataz®	ATV	PI
Darunavir	Prezista®	DRV	PI
Indinavir	Crixivan®	IDV	PI
Nelfinavir	Viracept®	NFV	PI
Ritonavir	Norvir®	RTV	PI
Saquinavir	Invirase®	SQV	PI
Apronavir	Angenerase®	APV	PI
Lopinavir/Ritonavir	Kaletra®	LPV	PI
Tipranavir	Aptivus®	TPV	PI
Fosamprenavir	Lexiva®	FPV	PI

Drug Regimens

Drug Regimens are used in the treatment of HIV and AIDS much like they are used in the treatment of cancer. Each individual regimen of different drugs is given the nickname "*cocktail*".

Regimens generally stay the same but can be rotated due to treatment failure. Treatment failure occurs when the viral load has not decreased or the T4-cells start dropping or clinical progression is noted such as the occurrence of an opportunistic infection.

Regimens can also be altered due to potential side effects that are intolerable to the patient. Another reason to switch regimens is due to compliance issues or discipline required of the patient taking the medications. Some patients are unable to take the large number of medications on a timetable format, such as six tablets five times per day. In some cases, medications can or cannot be taken with food or only certain times in the day. Finally, a regimen change can occur simply because a better one has been found.

Today drug combinations can be found in one fixed dose combination.

Fixed-Dose Combinations

Some drug manufacturers put together specific medicines into a **single pill** so they're easier to take, including:

Protease inhibitor (PI)-based:

- Atazanavir + cobicistat, or ATV/c (Evotaz)
- Darunavir + cobicistat, or DRV/c (Prezcobix)
- Darunavir + cobicistat + tenofovir alafenamide + emtricitabine, or DRV/c/TAF/FTC (Symtuza)

Non-nucleoside reverse transcriptase inhibitor (NNRTI)-based:

- Doravirine + tenofovir disoproxil fumarate + lamivudine, or DOR/TDF/3TC (Delstrigo)
- Efavirenz + tenofovir disoproxil fumarate + emtricitabine, or EFV/TDF/FTC (Atripla)
- Rilpivirine + tenofovir alafenamide + emtricitabine, or RPV/TAF/FTC (Odefsey)
- Rilpivirine + tenofovir disoproxil fumarate + emtricitabine, or RPV/TDF/FTC (Complera)

Nucleoside/nucleotide reverse transcriptase inhibitor (NRTI)-based:

- Abacavir + lamivudine, or ABC/3TC (Epzicom)
- Abacavir + lamivudine + zidovudine, or ABC/3TC/ZDV (Trizivir)
- Tenofovir alafenamide + emtricitabine, or TAF/FTC (Descovy)
- Tenofovir disoproxil fumarate + emtricitabine, or TDF/FTC (Truvada)
- Tenofovir disoproxil fumarate + lamivudine, or TDF/3TC (Cimduo)
- Zidovudine + Lamivudine or ZDV/3TC (Combivir)

Descovy® and Truvada® have also been approved as ways to prevent HIV infection for people who are at high risk. Use of safe sex is still required.

PrEP Medication

PrEP stands for pre-exposure prophylaxis that can be taken before (“pre-”) HIV gets into the individuals’ system (exposure) to help protect against infection (prophylaxis). These medications work quite well, but they need to be taken as directed every day and are not 100% foolproof

That’s why it’s best to take other steps to protect yourself when you can. For example, consider using a condom for extra protection if you have sex with people who might have HIV.

PrEP medications for HIV include Truvada and Descovy.

People who inject drugs are often at higher risk for HIV, especially if they share needles or other tools. Gay and bisexual men are at higher risk from sexual activity, but heterosexual men and women can also get it from sexual activity.

PrEP can help protect both mother and baby pregnancy is planned from a partner with HIV. It helps block the virus during pregnancy and while breastfeeding.

Potential Severe Side Effects

Hypersensitivity reaction can occur in all of these drugs which include fever, rash, malaise, headache, muscle pains, nausea, vomiting and abdominal pain.

More severe side effects involving use of protease inhibitors may be associated with changes in blood sugar levels (and rarely, development of diabetes), elevations in blood fat levels, and changes in the way the body stores fat (including development of fat deposits in the abdomen and on the back of the shoulders as well as loss of fat in the arms, legs and face). In addition, there have been reports of uncontrolled bleeding in hemophiliacs.

The long-term effects of NRTIs have been associated with damage to the mitochondria (the cell parts that provide energy to the cell). This damage may cause low red and white blood cell counts, muscle pain and wasting (particularly in the arms and legs), fatigue, peripheral neuropathy, and more rarely, serious liver (lactic acidosis) or pancreas problems.

The cost factor involved in AIDS treatment is immense. Although some Federal agencies may offer discount rates for some and some HIV infected individuals are insured, the majority of HIV infected individuals are faced with the prohibitive costs associated in taking required regimen of two, three or more drugs. Here is a list of some approximate costs (US) associated with anti-viral drug therapy:

Trogarzo	9000.00 / 1 injection per month (highest)
Trueda	2700.00/ 30 tabs per month
Viread	1400.00/ month
Aprenavir	666.00 / month
Indinavir	523.00 / month
Zalcitabine	234.00/ month (lowest)

Conclusion

The roles of the Pharmacy Technician are changing dramatically whereas Technicians can offer advice on information that deals with sexually transmitted diseases (STD's). Although counseling by a pharmacist is always necessary for judgmental decisions such as medication use, questions regarding abstinence or safe-sex can be directed towards the Pharmacy Technician as this is generally the first and last individual a customer may see.

Even though decades have passed with this disease state, HIV/AIDS is still around. Information regarding safe sexual practices is much needed for those who are naïve and unaware of the potential ramification of any sexually transmitted disease, especially HIV/AIDS. Inaction will only make matters worse and cause unnecessary suffering for individual with HIV/AIDS and family members having to deal with this disease state. If we were to view the value of providing information to an individual, we could say that the Pharmacy Technician is in the role of actually saving lives.

About the Author

Joe Medina, CPhT, Pharm D., former Program Director of a Pharmacy Technician Program at two community colleges in Colorado is a lifetime national advocate for the Pharmacy Technician Profession. Mr. Medina has helped produce several textbooks and co-authored the *“Pharmacy Technician Workbook & Certification Review”* through Morton Publishing. With fifteen years as a Pharmacy Technician and fifteen years as a Pharmacist, Mr. Medina understands the needs of the Pharmacy Technician and the important role they play in interacting with Pharmacists, Medical paraprofessionals and the community in the Pharmacy setting.

End of Lecture 11 - About AIDS

Lecture 11 - About AIDS Worksheet**Multiple Choice**

1. Of the following statements, which one is false?
 - a. Unlike bacteria, viruses are wholly dependent on cells for nutrition / reproduction
 - b. HIV belongs to a class of viruses called retroviruses
 - c. Two strains of HIV exist, HIV-I and HIV-II
 - d. HIV-II virus is responsible for most AIDS cases in the United States

2. Of the following stages of HIV/AIDS which one is asymptomatic?
 - a. Stage I
 - b. Stage II
 - c. Stage III
 - d. Stage IV

3. Of the following medications, which one is a protease inhibitor?
 - a. AZT
 - b. 3TC
 - c. d4T
 - d. IDV

4. Regimens of drug treatment are used in the treatment of HIV/AIDS. Of the following statements, which one is most true.
 - a. Regimens can stay the same, but can be rotated due to treatment failure
 - b. Regimens can stay the same, but can be rotated due to side effects
 - c. Regimens can stay the same, but can be rotated due to compliance issues
 - d. All of the above are true statements

5. The Center for Disease Control (CDC) defines full-blown AIDS when an individual is HIV positive and has one or more opportunistic infections such as bacterial pneumonia, meningitis, oral candidiasis and pneumocystis carinii pneumonia. Included in these criteria is a T4-cell count of 2000 per ml or less.
 - a. True
 - b. False

6. Of the following laboratory tests available in the detection of HIV infection. Which one involves the detection of HIV antigens?
 - a. The Enzyme-Linked Immunosorbant Assay
 - b. The Western Blot Assay
 - c. HIV crevicular fluid (saliva) Assay
 - d. None of the above

7. PrEP medications for HIV include Truvada and Descovy
 - a. True
 - b. False

8. Of the following statements, which one is false?
 - a. In AIDS there is a serious deficiency of T4-cells, which causes the individual immune system to not function.
 - b. Viral load is a test that shows how much actual viral activity is in your blood stream. The higher the number the better.
 - c. Repeat and confirmation tests are mandatory when testing for HIV in the laboratory setting
 - d. HIV/AIDS is not the causative cause of death in HIV infected individuals

9. Of the following opportunistic infections, which one is the most common one found in the HIV positive individual?
 - a. Pneumocystis Pneumonia
 - b. Karposi's Sarcoma
 - c. Tuberculosis
 - d. Candidiasis

10. Of the following statements, which one is false?
- The end stage of immunosuppression is the development of an opportunistic infection
 - Noninvasive collected specimens such as saliva, have been used for HIV testing as an alternative to blood samples
 - The Western Blot is the most commonly used Assay to test for HIV infection
 - The use of more than one drug (polytherapy) is the mainstay in HIV/AIDS treatment
11. Of the following anti-viral drug classifications, which one is associated with lactic acidosis?
- NRTI
 - NNRTI
 - PI
 - None of the above
12. Presently there is no method of totally eliminating HIV from the body. Treatment protocols can only delay viral replication and disease progression
- True
 - False

Submit your answers on the following Link:

<https://form.jotform.com/213294357337157>

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