

Acquired Immune Deficiency Syndrome (AIDS)

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ABSTRACT

The acquired immune deficiency syndrome caused by the virus HIV (Human immunodeficiency virus). In the year of 2024 AIDS caused population is approximately 39.9 billion people. This is a very fast spreadable disease in the world. The first AIDS disease is identified in the year of 1993 to 1995. This is viral infection transferred person to person by the contact of blood, semen, vaginal fluid, rectal fluid, unchanged needle and unprotected sexual course. It is diagnosed by the western blotting, southern blotting and ELISA (enzyme-linked immunosorbent assay). To treat the AIDS (acquired immune deficiency syndrome) by the highly active anti-retroviral therapy (HAART). It is the combination drug therapy with different types of mechanism of actions. It is prevented by the use of condoms and don't do any body to body contact. This review is helps to unrevealing the disease of HIV and AIDS it is having different types of stages like HIV-1 and HIV-2. The drugs used for the AIDS are anti viral drugs. Those are acyclovir, Pencyclovir, Valacyclovir, and Zidovudine, Stavudine, Lamivudine, Nevirapine, efavirez, Ritonavir and Nelfinavir. This is act by the entering into the Human immunodeficiency virus cell and reacts with the reverse transcriptase enzyme and inhibits the DNA replication and inhibits growth of virus in the host cell. The side effects of these drugs anaemia, Myopathy and Pancreatic diseases. This information is helps to know about the Human immunodeficiency virus infection and acquired immune deficiency syndrome. The HIV has the different stages of virus infection HIV-1, HIV-2 and AIDS. AIDS is the last stage of the viral infection.

Keywords: AIDS, HIV, PrEP: pre exposure prophylaxis, a medicine to help prevent HIV, NAT (Nucleic acid Amplification test): This locates the virus in blood.

INTRODUCTION

Since its discovery in 1983, HIV has killed about 40.4 million people worldwide as of 2022. This is an alarming figure, and if HIV continues to spread, it may become a worldwide health emergency. On the other hand, the HIV epidemic has been contained in part by the discovery, development, and general accessibility of highly active antiretroviral treatments (ARTs). Similarly, improvements in the management of opportunistic infections and HIV have made the disease a chronic but controllable condition. HIV patients are capable of leading long, healthy lives. Because of the underlying immunodeficiency, preventing chronic illnesses is a major health concern for this population.

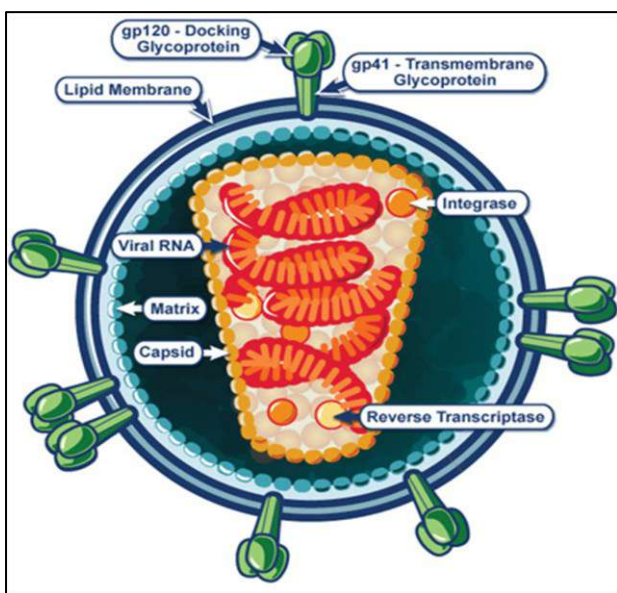
The UNGA targets are reachable with sufficient funding and advancements in implementation science, prevention, and treatment. By 2025, it is intended to have 95% of HIV-positive individuals diagnosed, 95% of those diagnosed receiving antiretroviral therapy (ART), and 95% of those

administered ART achieving viral load suppression. HIV and death rates are steadily declining worldwide. Nonetheless, a few nations have seen a rise in the number of infections; these are typically those experiencing political unrest or other unrest, or those where HIV stigma is particularly strong. The number of HIV patients is rising along with treatment advancements in 2020, there were about 37.7 million new cases of HIV by 2022, and there will be 39 million cases two thirds of these people reside in Africa. HIV places a heavy financial burden on people and the medical system. This virus infection raises the chronic illness of cardiac diseases and neurological diseases. ART slows the progression of the disease, but it is not a cure for HIV and has side effects. Treatment also necessitates a regular, ongoing relationship with the healthcare system. There are a number of obstacles to universal treatment, such as expenses, insufficient access to care, stigma from the public and from oneself, and inadequate care. HIV management that adheres to regional clinical

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recommendations enhances patient outcomes and stops HIV transmission. Clinical guidelines support high-quality programming for patients with HIV or at risk of contracting the virus, ensuring timely diagnosis, treatment, and linkage to care. Expanding the reach of targeted treatments, strengthening the connection to care, and enhancing general health are all achieved by increasing the participation of community led groups in HIV testing and treatment several health condition tests are needed. With a primary focus on HIV-1, this clinical reference aims to give clinicians clear and current advice on managing HIV by reviewing the pathogenesis, clinical symptoms, and suggested treatment options for people with HIV. The World Health Organization (WHO), the Joint United Nations Programme for HIV/AIDS (UNAIDS), the United States Centers for Disease Control (CDC), and state legislatures Florida legislation is used as state legislatures and the US Centers for Disease Control (CDC) The best legislative and social contexts to support the HIV response are recommended, using Florida statutes as an example.

ETIOLOGY OF AIDS



The acquired immune deficiency syndrome is caused by the virus HIV (Human Immunodeficiency Virus). This disease is originated from the African chimpanzees and transferred to the humans by the bush meat. The first disease is identified in the year of 1959 at West Africa. After The virus contains the different types of proteins in the cell membrane and inside the cell. *Outer structure of the cell* contains the gp120-docking glycoprotein and gp41-

transmembrane glycoprotein and the cell membrane is made up lipids. *Inside of the cell* contains the matrix, capsid, viral RNA, integrate and reverse transcriptase. Those are used to virus cell replicated in the host cell. This involves the different types of steps in the replication process.

Life cycle and stages of HIV

The infection is transferred to the person to person by the sexual contact and blood contact this includes the

- ✓ Vaginal fluids
- ✓ Rectal fluids
- ✓ Semen
- ✓ Blood
- ✓ Breast milk
- ✓ Needle sharing
- ✓ Mother to child

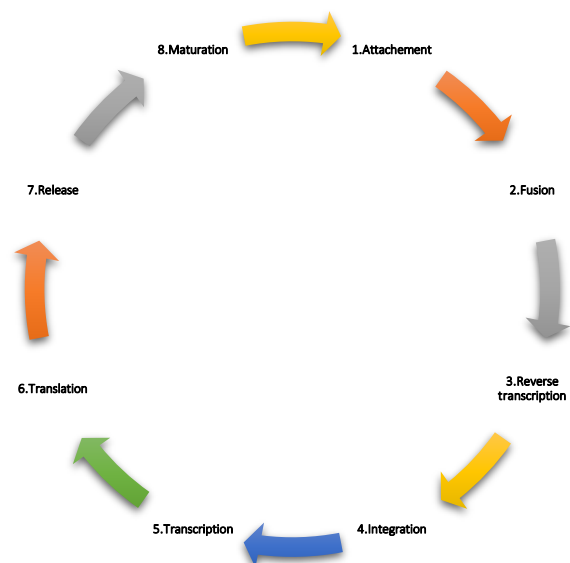
There no virus transmission by the hugging, food sharing and some physical activities. The viral infection followed by the 8 stages.

1. Attachment:

The virus is enters into the body and reacts with body immune system and attached to the CD₄ cells or T-Lymphocytes by receptors of CD₄ and co receptors of CCR₅/CXCR₄. This total mechanism is occurring on the membrane of the T-Lymphocytes and viral cell and it is called as attachment.

2. Fusion:

that it is spread in to the worldwide. This complete process is followed by the several stages This is the process of the capsid allows the CD₄ cell into the T-Lymphocyte. This followed by the use of gp41 protein in the virus cell it called as endocytosis process. After that the viral DNA is enters into the host cell.



3. Reverse transcription:

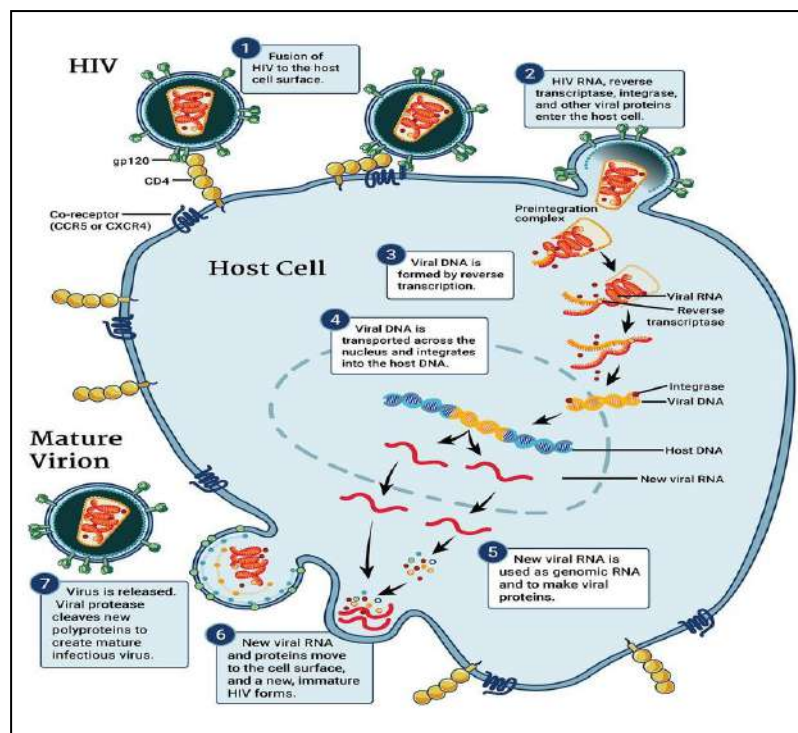
After the fusion all the viral material is released into the host cell. The enzyme reverse transcriptase is making single strand RNA to pro double strand DNA molecule in the host cell. This is the viral DNA within the host cell. After this process integration will start.

4. Integration:

The viral DNA base is enters into the nucleus of the host cell and integrate into the host DNA. The viral DNA is involved in the host DNA replication process. This makes the DNA combination of the both the host and viral DNA. This stage is called as latent stage and it is latently infected. By this use of hose DNA

material the viral DNA makes the own DNA strand. The total host nucleus material is used to make the viral DNA duplication in the host cell. This process will make the viral growth in the host cell. After the integration process transcription is started.

The viral and host DNA is combined to active in the both strands. After that the DNA strand is divided into the mRNA and genome RNA. This mRNA is makes the new viral proteins and enzymes in the cell. The genome RNA is making the complication with proteins and enzymes to make the new cell. onn the surface of the host cell. This mechanism is followed by the host RNA polymerase and leads to translation.



5. Transcription:

The viral and host DNA is combined to active in the both strands. After that the DNA strand is divided into the mRNA and genome RNA. This mRNA is makes the new viral proteins and enzymes in the cell. The genome RNA is making the complication with proteins and enzymes to make the new cell. onn the surface of the host cell. This mechanism is followed by the host RNA polymerase and leads to translation.

6. Translation:

In this process the viral DNA is used to make the multiplication process with in the host cell. This process is followed by the host lipids and enzymes. Through this process this leads to weakening of host cell. All the viral proteins and enzymes are transferred into the surface of the cell wall oof the host. This

whole process is followed to inhibition of the host immune system most probably T-Lymphocytes.

7. Release:

After the assembly of the viral proteins on the surface of the cell membrane this cell membrane is used to process the accumulation and reprocess the viral cell. After the new virus preparation is moved out of the cell.

8. Maturation:

The total process of viral cell replication completed after the released to out of the host cell. At this stage the virus is matured by the viral proteases and makes the capsid inside the cell. The cell is ready to make another cell and that leads to make growth of viral cells.

SIGNS AND SYMPTOMS

Acute stage of HIV:

HIV causes the different signs and symptoms to the body. It is identified as chronic and acute stage of the HIV.

- Fever
- Fatigue
- Weight loss
- Cough
- Diarrhea
- Muscle pain
- Swollen lymph nodes
- Rashes on the skin
- Tiredness

These are identified in the stage of the 3 to 6 months of the body. This is not harmful to the body system but in this stage body is infected.

Chronic stage of HIV:

At this stage infection is present in the body 8 to 12 months and in some cases 3 years. This is the chronic stage of the HIV and leads to sever damage of the body and my leads top cancer and cardiac diseases.

- Tuberculosis
- Cryptococcus meningitis
- Risk of cardiac diseases
- Lymphomas cancer
- Kaposi's sarcoma

DIAGNOSIS

The HIV test is followed by the count of CD₄ cells and blood test. This blood test is followed by the complete blood profile test.

The tests needed for the HIV:

- Screening tests

A. Southern blotting

B. western blotting (this includes the antigen and antibodies count)

- CD₄ cell count:

500 to 1500 cells/mm³ of bloods is normal state and less than 200 is chronic stage this is the AIDS stage.

- Tuberculosis test
- CBP(complete blood profile test)
- Urine test
- ELISA(enzyme linked immunosorbent assay)
- NAT(nucleic acid test)

Those are several tests needed to know the AIDS status in the body. The AIDS is chronic status of the HIV infection in the body.

TREATMENT

The HIV is treated by the ART (Anti Retroviral Therapy) drugs. These drugs are used to treat the viral infection effectively through the inhibition of the DNA Replication process in the cell. Generally this treatment is given to the lifelong for the only inhibition purpose. The viral infection is inhibited by the several gene mechanisms and several steps.

It is the combination drugs for the HIV infection in the infected body. Drugs to treat HIV or AIDS:

1. Nucleoside reverse transcriptase inhibitors:

These drugs NRTI are act by the inhibition of the reverse transcriptase enzyme in the viral cell.

Examples: Zidovudine, Stavudine, Lamivudine, Abacavir, Didanosine, Tenofovir.

2. Non-Nucleoside reverse transcriptase inhibitors:

These are bind to the non-nucleoside of the cell and later change its action and inhibit the reverse transcriptase.

Examples: Efavirez, Nevirapine.

3. Protease inhibitors:

Drugs inhibit the protease enzyme in the viral cell and block the preparation of the gp41 and gp120 for the new cell.

Examples: Ritonavir, Indinavir, Nelfinavir, Sequinavir, Lopinavir, Atazanavir.

4. Integrase inhibitors:

These drugs are act by the inhibition of the Integrase enzyme. This is helps to inhibition of the RNA formation in the viral cell.

Examples: Raltegravir, Elvitegravir, Dolutegravir, Cabotegravir, Bictegravir.

5. CCR⁵Receptor inhibitors:

These receptors are helps to bid with viral DNA into the host cell. It's inhibited to stop the binding of the cell.

Examples: Mataviroc, Vicriviroc, Aplaviroc.

These drugs are the competitive receptor blockers and help to inhibit the DNA replication process.

6. Fusion inhibitors:

This will blocks the CD₄ cells binding into the host cell. This will helps to there is no viral replication.

Examples: Enfuvirtide, T-20, Albuvirtide.

These are the common drugs which are used to inhibit the viral DNA growth in the host cell. All these drugs are the antiretroviral drugs.

General mechanism of action:

The mechanism of action of the drugs is followed by the inhibition of the viral DNA. When the drug is

enters in to human body and involve in the pharmacokinetics completed. After that pharmacodynamics are followed by distributed into the all the body parts. After the reaching of the drug into the site of action this will inhibits the viral DNA mechanism like CD₄ receptor blockage, NRTI and Non-NRTI. Enzyme protease inhibition in the viral cell.

Prevention

To prevent the HIV or AIDS in the global level by the

- Stop unprotected sex with infected partner instead use latex condoms.
- Stop the use infected needle to the individual.
- Stop the breast milk feeding to the baby.
- Use antiretroviral drugs

These all the common procedures for the prevention of the HIV in the people.

Adverse drug reactions:

- Nausea
- Vomiting
- Diarrhea
- Blotting
- Abdominal pain
- Dizziness
- Drowsiness
- Depression
- Conjunctivitis
- Rash
- Blisters
- Fatigue
- Sleep trouble
- Diabetes
- Hyper lactic acid secretion.

These all are the common drug reactions to the antiretroviral drugs.

CONCLUSION

The HIV is the viral infection it is originated from the chimpanzees of West Africa and that is transferred into the humans by the eating of the bushmeat. By this it is dispersed into the world wide and immune system in the human body decreased leads to AIDS. It is the chronic stage of the HIV and we have to use the antiretroviral therapy for the treatment of the HIV. Also use the prevention techniques and make awareness to worldwide population. This involves the complete life cycle of the HIV in the host cell. All the people are know about the HIV formation in the world wide. This viral infection is transferred through the

sexual intercourse, blood contact and breast feeding. Make aware of HIV/AIDS and stay healthy.

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