A Comprehensive Review of HIV/AIDS

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Abstract

HIV/AIDS has consistently represented one of the most thoroughly global diseases. The human immunodeficiency virus (HIV) is a lentivirus responsible for HIV infection and AIDS. AIDS represents a condition in humans characterized by a progressive immune system failure that permits life-threatening infections and tumors to prosper. HIV infection happens through the transfer of blood, semen, vaginal liquid, human milk. In these bodily fluids, HIV exists as both free virus particles and virus inside immune cells that are infected. HIV infects essential cells in the human immune system, including helper CD4 T cells, macrophages. The infection with HIV causes a reduction in T cell levels due to several processes, such as pyroptosis of infected T cells.AIDS symptoms mainly arise from conditions that typically do not occur in people who have healthy immune systems. The majority of these conditions are opportunistic infections resulting from bacteria, viruses, fungi and parasites that are usually kept in check by the components of the immune system that HIV harms. The rate of HIV when a couple, one of whom is infected, consistently uses condoms the annual infection rate is below 1%. Some evidence suggests that female condoms may offer a comparable degree of safeguarding.

Keywords: AIDS, Transmission, Symptoms.

Introduction:

HIV denotes the human immunodeficiency virus. AIDS is an acronym for acquired immuno deficiency syndrome.

HIV

H-It affects only humans and is also spread between humans rather than animals. It cannot be passed on through the bites of mosquitoes, bats or other species.

I-The body possesses an immune system designed to safeguard our body from bacteria, diseases etc. However, an individual afflicted with HIV causes a lack of ability to combat illnesses. Nonetheless, immune system fails to meet requirements.

V-Virus is a small, simple entity that exists in an inactive state. External to the body, and is activated upon entering a human Body.

AIDS

A-It is not inherited, which means it cannot be passed down from one generation to the next. It is passed on to a healthy individual by contagion carrier.

I-It diminishes the immune system's strength.

D – erzeugt einen Mangel an CD4+-Zellen immunsystem.

S–It comprises a set of illnesses.

The virus HIV is responsible for causing AIDS. Usually, our body contains an immune system that fights off viruses and bacteria. The immune system contains white blood cells that shield us from infections. White blood cells include CD4+ cells, which are also referred to as helper T cells. An infected individual will be able to develop these infections exploit the body's immune system. These infections lead to various health issues and can even result in a person's death.HIV leads to a decreased ability to defend against diseases and a reduction in CD4 cell count.Although AIDS cannot be cured, certain medications are utilized to decelerate the diseases, allowing you to maintain better health for a longer duration duration. There are no medications that eliminate diseases [1].The virus HIV is responsible for causing AIDS. Usually, our body contains an immune system that fights off viruses and bacteria. The immune system contains white blood cells that shield us from infections. White blood cells include CD4+ cells, which are also referred to as Helper T cells. An infected individual will be able to develop These infections exploit the body's immune System. These infections lead to various health issues and can even result in a person's death. HIV lacks the ability to protectagainst illnesses, and the number of CD4 cells also drops in HIV. AIDS cannot be cured, but there are medications that can slow the progression of the disease and help you maintain your health for a longer period duration. There are no medications that eliminate diseases [1].

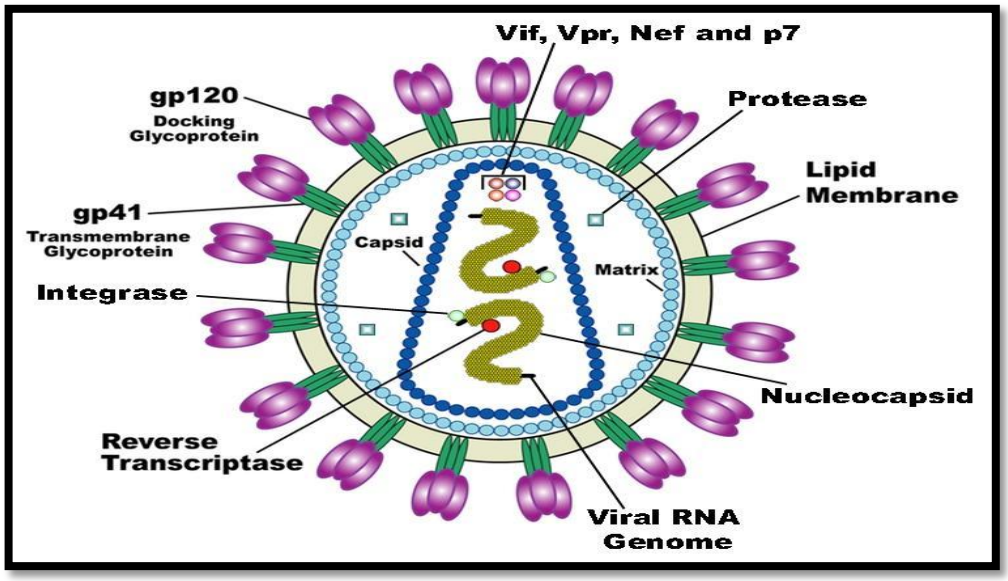

Fig.1: Structure of HIV Virus

Gp120

The number 120 in its name refers to its molecular weight. It is crucial for the virus to enter the cells, as it serves an important function in adhesion to certain cell surface receptors.

GP41

It represents a component of the envelope protein complex in retroviruses. Which includes the human immunodeficiency virus. It belongs to the family of viruses with envelopes that reproduce in host cells via process of the reverse transcriptase enzyme. It aims at a host cell.Viral membrane It is the envelope via which the virus attaches.

P17

The viral core consists of protein. Its shape resembles that of a bullet. 3 Die für die HIV-Replikation notwendigen enzyme sind rückwärts transkription, integrase and protease.

P 24

P24 constitutes a part of the HIV capsid.

Protease

This retroviral aspartyl protease is crucial for the life cycle of HIV, the retrovirus responsible for AIDS. This particular enzyme cleaves polyproteins that have been newly synthesized at the appropriate sites to produce natural protein components of the infectious HIV virion.

Integrase-Protein

Enzyme generated by retrovirus, allowing its genetic substance to be incorporated into the DNA of the infected cell.

RNA

All living organisms, as well as most viruses, keep their genetic substance on lengthy DNA strands. Retrovirus constitutes an exception as their genetic material consists of RNA [2].

Ursachen

It results from sexual contact between individuals individual. The virus HIV is a type of virus. When an individual contracts an infection of HIV is a virus that undermines and harms the body's defense mechanisms. System (the immune system) so that it is unable to fend off infections.

This is due to:

1. Using the same needles or syringes for drugs.
2. Sexual contact, whether oral or vaginal, with someone who is HIV-positive
3. Beneficial.
4. Possessing additional sexually transmitted infections like
5. The likelihood of syphilis, herpes, and gonorrhea appears to rise for contracting HIV through unprotected sexual contact with partner with infection.
6. Infants can contract the virus from their HIV-positive mother during gestation, delivery and nursing

Transmission

HIV transmission occurs mainly through three routes: via sexual contact, via blood through transfusions or blood products, or needles that are contaminated or via transmission from mother to child. Even though homosexual contact continues to be a primary source of HIV In the united states, "heterosexual transmission is the The key way through which HIV spreads globally today.The handling of donor screening and blood products has practically eradicated the risk of HIV from tainted blood products in developed nations, yet its dissemination persists among intravenous drug users who share syringes.In developing nations, contaminated blood and needles continue to be significant sources of infection. Deriving from infections, the rate among expectant mothers varies from 13% to 35% with HIV will transmit the infection to their children; Transmission takes place both prior to and during the process of childbirth. Brust It has been demonstrated that milk from mothers with infections has a high Virus levels as well.HIV is not transmitted through the fecal-oral route, aerosols, or insects; Or informal contact, like exchanging household items or embracing. Health care workers are primarily at risk from inoculation directly via needle sticks. Even though saliva cancontain minute amounts of the virus, it cannot be transmitted through kissing.

An Infected individual can pass HIV on to another person

Via:

• Menstrual blood and other types of blood,

• Sperma,

• Sekrete aus der Vagina,

• Milk from the breast.

Actions That Facilitate HIV Transmission

• Sexual activity without protection

• Direct contact with blood, such as drug-use implements that pierce the skin transfusions of blood, mishaps in medical environments or particular healthcare items.

• Mama to infant (prior to or amid childbirth) [2].

It is known that the transmission of HIV occurs only through:

• Contact with infected blood, semen, or vaginal and cervical fluids mucous membrane secretions.

• Transfusion or injection of contaminated blood or blood derivatives.

• Transmission in a vertical manner (i.e. from an infected mother to her fetus) And from mother to child through breast milk.

Contact of Sexual Fluids or Blood with Mucous Membranes:

The virus cannot penetrate intact skin. HIV is capable of enter the organism via the mucous membranes that cover the urethra, rectum, vagina, and possibly the oral cavity. Injury to a mucous membrane can raise the risk Of HIV transmission but is not required for transmission to happen.

Infection via Blood Injection:

Infected blood entering directly into the blood circulation via intravenous, intramuscular, or injection under the skin.

Transmission from blood to blood happens through the following means:-

• Transfusion of tainted blood and blood products and other recipients of blood.

• Sharing of syringes and hypodermic needles that have not undergone sterilization.

The risk of HIV transmission relies on:

• The level of HIV concentration in the infected fluid.

• The VOLUME of fluid that is introduced into the body.

• The ACCESS of the contaminated fluid to the t4 cells.

Fluid containing a high concentration of HIV:

• Sperma,

• Blood and its components,

• Menstrual discharge,

• Sekrete aus der Vagina,

• Vor ejakulatorische Flüssigkeit,

• Milk from the breast.

Fluids with a LOW HIV Concentration

- Saliva,
- Tears,
- Urine,
- Feces,
- Vomiting,
- Nasal mucosa

Signs

A large number of individuals with HIV exhibit no apparent signs or symptoms whatsoever. Recent findings indicate that from 70%–90% of individuals who contract HIV Have flu-like symptoms within a few weeks after contagion. Typical symptoms include a rash and fever along with a painful sore throat, all happening simultaneously. These ones In an otherwise healthy individual, symptoms may suggest recent HIV contamination.Patients infected with HIV can develop yeast infections (either oral or (vaginal), which are frequent or persistent. And often Serious herpes infections that lead to oral, genital, or anal sores are frequent as well infected patients are at a higher risk of developing herpes zoster (shingles). Other pulmonary infections (like pneumonia) or atypical mycobacterial infections can pose serious risks for your beloved. Pelvic inflammatory disease can affect women which does not show a response to treatment. The virus can assault the nervous system (brain, spinal cord or nerves) and create a diverse symptoms that include tingling in the feet and difficulty in walking to memory issues [3].

Symptoms

- lymph nodes of considerable size or “swollen glands” that could be augmented,
- over a period of more than three months,
- regularly occurring fevers and sweating, as well as skin rashes or flaking skin that does not leave,
- loss of memory in the short term,
- children exhibiting slow growth or frequent illnesses,
- coughing and breathing difficulties,
- epileptic fits and absence of coordination,
- trouble swallowing or swallowing that hurts,
- disorientation and amnesia nausea, cramping, diarrhea, or
- Vomiting that persists,
- loss of vision,

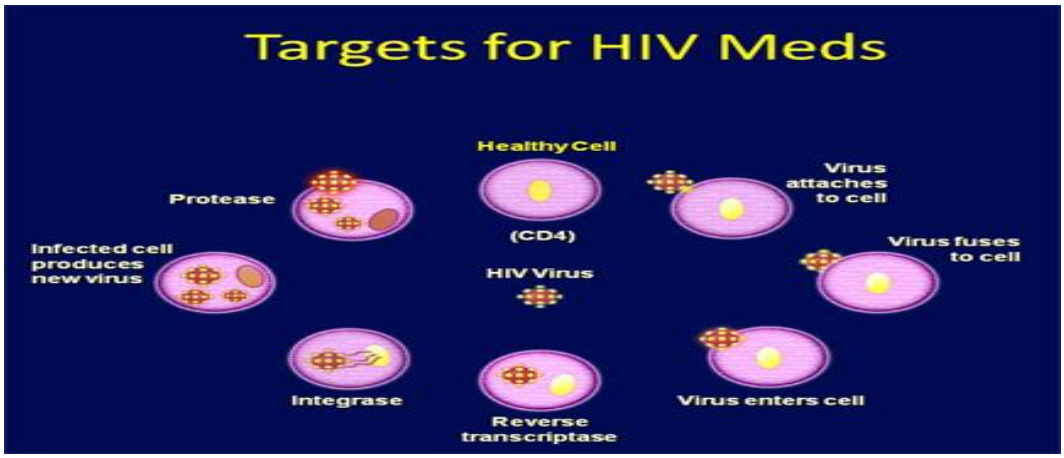

Fig. 2: Life cycle of HIV AIDS

Access to human cells

HIV is the only virus that creates new copies of itself within human cells. The process starts when this virus enters a cell that has a protein on its surface that is cd4. The HIV virus attaches to the CD4 receptor and enables them to Fusee.The primary targets of HIV infection are immune cells, specifically T-helper cells that constitutes the bodily immune system. HIV infects a greater number of cells, Thus, the immune system weakens.

Transcription inversée

An enzyme known as reverse transcriptase assists in transcription in reverse direction. The primary purpose of reverse transcriptase converts viral RNA into DNA. Subsequent to that DNA is carried to the nucleus of the cell, where DNA insertion is performed by the enzyme integrase.

Transcription and rendering into another language

At this point, transcription occurs. The HIV virus transforms itself into messenger RNA.

Assembly, development, and maturation

HIV copies cluster with newly synthesized HIV protein and enzymes to create new viral particles that are then budded derived from the original CD4 cell. The enzyme protease cleaves the lengthy chains of HIV protein into smaller fragments. These ones the newly emerged virus can target and infect other CD4 cells [4].

Diagnose

The most common way to diagnose HIV is by testing your blood or spittle for antibodies against the virus. It takes time, unfortunately for your body to produce these antibodies – generally up to 12 week. A more recent kind of test that verifies the presence of HIV antigen, a the virus-generated protein that appears right after infection, can rapidly verify a diagnosis shortly after infection [5].

Below are the tests used to detect HIV AIDS:

Home-Test

A home test approved by the Food and Drug Administration. In order to accomplish In the test, you collect a sample from your upper and lower gums using a swab. If the test result is positive; you should consult your doctor to verify the diagnostic assessment. In case of a negative test result, it has to be done again in Three months for result confirmation. Examinations for treatment customization

Upon receiving an HIV/AIDS diagnosis

various kinds of examinations can be carried out. The tests consist of the following:

CD4-cell count

CD4 cells are a kind of white blood cell that is specifically specifically aimed at and annihilated by HIV.

Viral load

This examination assesses how much virus is present in your blood. Research has demonstrated that individuals with elevated viral loads typically perform more poorly than individuals with a lower viral load.

Resistance to drugs

This blood examination establishes if the strain of HIV you will be resistant to specific anti-HIV medications [6].

Treatment

HIV is treated with antiretroviral drugs. These are the ones medications that act against the human immunodeficiency virus (HIV) That is a retrovirus. They serve to extend and enhancing the quality of life. Antiretroviral medications are categorized as stated below:

Nucleoside reverse transcriptase inhibitors (NRTIs): Zidovudine (AZT), Didanosine, Lamivudine, and Tenofovir.

Nonnucleoside RT inhibitors:

Nevirapin, Delavirdin, Efavirenz.

Inhibitors of protease:

Indinavir, Nelfinavir, Amprenavir, Lopinavir, Atazanavir

Nucleoside analogue reverse transcriptase inhibitors (NRTIs)

were the initial class of medication used to treat HIV infection, becoming available in 1987. Upon infection of a cell by HIV, it replicates its own the cell's DNA contains the genetic code, and the cell is then set up to make new copies of HIV.For reproduction, HIV must initially transform its RNA into DNA utilizing the enzyme reverse transcriptase. These inhibitors function as deceptive building blocks and vie for with the nucleosides of the cell, thus averting DNA consolidation.

NNRTIs (Non-nucleoside reverse transcriptase inhibitors)

Began receiving approval in 1997. These also disrupt the capability of HIV to infect cells by focusing on reverse transcriptase. Unlike nucleoside analogue reverse transcriptase inhibitors that are non-nucleosides attach themselves directly to the enzyme [7].

HAART

This is highly active antiretroviral therapy. HAART can also be used to treat HIV. This is a mixture of three medications.

Conclusion

Programs aimed at preventing HIV have primarily concentrated on creating risk-reduction strategies for individuals At a high risk of contracting HIV. Im Jahr 1999, a examination of 55 applications from states and cities to the CDC for funding for HIV prevention programs showed that merely 18 32.7% identified individuals infected with HIV as a priority people targeted by programs aimed at preventing HIV. Even though there are tens of millions of americans at "behavioral risk" For HIV infection, the transmission can happen exclusively from individuals Who carry the virus. With the quantity of persons as the number of individuals living with HIV rises due to ART, so does the need for tailored lifelong prevention strategies.

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