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Acquired immunodeficiency syndrome

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Abstract

Human immunodeficiency virus (HIV) is the infecting virus that initiates the condition acquired immunodeficiency syndrome (AIDS). HIV targets the body's immune system by attacking and destroying CD4 T-lymphocytes, which are responsible for the body's immune system, leading to the gradual breakdown in the immune system's strength. With the reduction in the number of functional CD4 cells, the patient becomes increasingly susceptible to secondary infections and tumors. It is common for a person HIV positive to take years before progressing to AIDS. HIV is classified as a retrovirus, being a member of the family of viruses that incorporate their RNA genetic material into the DNA of the infected cell (host cell) through a process called reverse transcription.

The first signs of the illness may often mimic flu; thereafter, the virus enters a dormant stage for a time while continuing to damage the immune system. The person is then able to develop opportunistic infections in addition to AIDS-defining conditions. The clinical symptoms comprise weight reduction, chronic exhaustion, intermittent fevers, oral and genital ulcers, hyperhidrosis, skin hyperpigmentation, and night sweats. HIV is contracted mainly through unprotected sex, sharing infected syringes or needles, and from mother to child “vertically” during pregnancy, childbirth, or breastfeeding. Current global mortality rates related to AIDS are being lessened through the use of antiretroviral therapy (ART), which, while HIV remains without a known cure, does at least significantly delay the progress of the disease. Preventative measures and treatment are a fundamental focus in the area of global health.

Keywords: HIV, AIDS, RNA, Retrovirus, reverse transcription

Retrovirus

Retroviruses are distinct due to their peculiar method of multiplication, which operates in reverse order to the usual cellular processes. In human cells, proteins are synthesized from RNA, which in turn, is transcribed from DNA. However, retroviruses possess RNA as their genome. They infect their host cell,

and then, utilizing the enzyme reverse transcriptase, convert their RNA to cDNA. Subsequently, the viral DNA is integrated into the host cell DNA, hijacking the cell's machinery to produce viral components [1]. HIV is the primary example of this group. Unlike many pathogens that replicate and then destroy cells, HIV permanently integrates into the host DNA, guaranteeing persistent, lifelong infection [2].

Stages of HIV Infection

Stage 1: Acute HIV Infection Between one to two months after exposure, some patients experience flu-like symptoms including fever, rash, and sore throat. Although these symptoms resolve after a few weeks, the virus continues to replicate at a high level. [3].

Stage 2: Clinical Latency (Chronic HIV) Following the acute phase, HIV transitions to a long asymptomatic or mildly symptomatic phase. HIV remains partially active within the lymphoid tissues and continues to erode immune function. This phase can persist for several years, during which the affected individual appears healthy but is able to HIV. [4]

Stage 3: Acquired Immunodeficiency Syndrome (AIDS) AIDS is the most advanced and severe stage of HIV infection, characterized by deep immunosuppression. Patients are vulnerable to opportunistic infections, including tuberculosis, pneumocystis pneumonia, and various fungate. There is also increased risk for malignancies, including Kaposi sarcoma and certain lymphomas. Diagnosis is based on CD4 count of less than 200 cells/mm^3 coupled with AIDS-defining illness. [5].

Symptoms

1- Primary (Acute) Infection: In the first two to four weeks after exposure, affected individuals may experience fever, headaches, lymphadenopathy, sore throat, rash, diarrhea, and night sweats. Some individuals may be completely asymptomatic. However, the risk for transmission remains very high during this phase of infection. [6,7].

2- Chronic or latent infection: HIV remains dormant in blood and lymphocytes during this period. Without ART, HIV can remain latent for almost a decade before progressing. [8]

3- Symptomatic HIV infection: Due to the progressive damage and replication of the virus, you might experience some mild infections or persistent symptoms like: (Febrile illness, Chronic fatigue, Lymphadenopathy, which is commonly one of the earliest indicators of an HIV infection, Intestinal looseness, decreased body weight, Oral candidiasis, commonly referred to as thrush, Zoster, commonly called shingles or herpes zoster, Lung inflammation or pneumonia.) [9].

Transmission Routes HIV infection

Result from exposure to infected blood, semen, or vaginal fluids. Known routes of transmission are the following: Sex intercourse (particularly unprotected vaginal or anal intercourse). Sharing used needles to inject drugs. Blood transfusions, although this is uncommon in countries with good blood screening practices. Vertical transmission during pregnancy, childbirth, or lactation. [10, 11, 12].

Risk Factors

Individuals of all ages, ethnicities, genders, and gender identities may acquire HIV/AIDS. People at higher risk include those who: Have multiple sex partners and engage in unprotected sexual intercourse. Have other sexually transmitted infections, as other infections can serve as HIV entry portals. Share needles or syringes while abusing intravenous drugs. [13, 14].

Complications

Cancers Associated with HIV/AIDS Lymphomas, which usually manifests as painless enlargement of lymph nodes. Kaposi Sarcoma, which represents tumoral vascular lesions as dark cutaneous or mucosal changes. Cancers caused by HPV such as cervical, anal, and oropharyngeal cancers. [15, 16].

Diagnosis

Diagnosis of HIV is based on blood or saliva testing. Available methods are: Antigen and antibody combination tests which detect p24 antigen and HIV antibodies. Antibody tests which may be blood or oral fluid based. Nucleic Acid Tests (NATs) which are used for early detection of HIV by identifying its RNA. [17,18].

Treatment

HIV infection is treated with antiretroviral therapy (ART) which combines several drugs suppressing viral replication. These include: Reverse transcriptase inhibitors comprising of NRTs and NNRTs. Protease inhibitors. Fusion and CCR5 inhibitors. Integrase strand transfer inhibitors. ART, when used consistently, reduces viral load, restores immune function, and prevents transmission. [19, 20].

Prevention

Preventive strategies include: Consistent use of condoms. No sharing of needles. Treatment or testing of other STI(s). Pre-exposure prophylaxis of (PrEP) for identified high-risk users. Post-exposure prophylaxis (PEP) for those with recent exposures. Policies for public health guarantee timely diagnosis and accessibility for treatment. [21].

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