**Human Immunodeficiency Virus (HIV)**

**Introduction**

HIV stands for Human-Immunodeficiency Virus. It is a retrovirus causing the HIV infection, and with time without proper treatment, it results to AIDS (Acquired-Immunodeficiency Syndrome) as the final stage. HIV actively attacks and affects human immune system thus destroying the immune systems. Complete destruction of the immune systems renders the patient highly susceptible to multiple and threatening infections hence (AIDS Joint United Nations Program on HIV/AIDS, 2008). The human body is unable to eliminate HIV thus it is a lifetime infection. Currently, HIV has no treatment although advanced medical care has been put in place to manage the disease for the infected. The major strains are HIV-1 and HIV-2. HIV-1 is easily transmitted and spreads across the world whereas HIV-2 is more confined in West Africa and some parts of UK.

 Different theories surround the origin of HIV virus. Most of them are discredited such as biological warfare except for the Hunter Theory that is considered more probable. SIVcpz (Simian Immunodeficiency Virus) virus from chimps is closely similar to HIV-1. It is believed that the persons contracted the virus through cuts or eating the meat which with time mutated resulting to HIV-1. International travel, prostitution, and slavery encouraged the spread of the virus.

**Virology**

 The HIV virion contains enzymes (reverse transcriptase, integrase, and protease) and two identical RNA genomes that are identical. It also comprises a lipid bilayer carrying glycoprotein pikes that envelops the protein capsid.

 HIV attacks explicitly the white blood particularly the ones containing CD4 receptor that is, lymphocytes. The CD4 receptors are present in dendritic cells, macrophages, and lymphocytic cells referred as T-helper cells (CD4+ cells) (Sierra, Kupfer, & Kaiser, 2005). The functions of the CD4 receptors is to recognize an antigen and then the signal is sent to B cells in order to attack the pathogen. Although the HIV hijacks the receptors by binding to it and injects the nucleocapsid that contains reverse transcriptase as well as RNA into the cell. RNA is then used as a template to make cDNA. The cDNA is then hybridized to double helix and integrated to the genome of the host. The HIV particles are assembled after the synthesis of proteins and viral RNA. The maturity of HIV leads to it leaving the cell and in the process acquiring its envelope resulting to cell membrane destruction hence cell death occurrence via lysis. The virus may remain latent to avoid any detection by the immune system. Also, the virus may be dormant for almost ten years after primary infection in which it does not cause any symptoms at this stage.

 Some persons are resistant to the HIV virus due to the occurrence of mutations in the genes that code CCR5 proteins. CCR5 regulates the immune by acting as a receptor for cytokines. HIV virus uses CD4 receptors and CCR5 receptors to invade the cells. Mutations inhabit the HIV virus from attaching itself to the lymphocytes. The homozygous persons do not express the receptors. Thus they show total resistance towards the HIV virus. The heterozygous persons have partial in which they may not be infected, and if they are, the progression is at a very low rate.

**HIV progressive stages**

 HIV progression involves three stages which are; acute, chronic and AIDS. The virus progresses with reduction of the CD4 count and increasing the bacterial load.

**Acute Stage**

 After the primary infection, there is a rapid replication of the virus and decrease of the CD4 cells within 2 to 4 weeks. The patient experiences symptoms such as a headache, fever, the enlargement of the lymph nodes or even muscle pain (Pandori, Hackett, Louie, Vallari, Dowling, Liska, & Klausner, 2009). The symptoms are highly misdiagnosed as flu or fever. In a months’ time, time, the CD4 cell return to normal levels and symptoms are subsidized.

**Chronic Stage**

 It is also referred to as an asymptomatic stage that may last for 7-11years depending on a person. The CD4 count remains albeit there is an increase in the number of CD4 cells that are infected. The immune responses are increased though they are overwhelmed and destroyed resulting in the last stage.

**AIDS**

 The immune systems are thoroughly compromised, and the count of CD4 cells is very low. Compromised immune encourage chances of opportunistic diseases such as TB, Herpes, Hepatitis A and B, candidiasis and many more. The symptoms associated with AIDS are rapid and extreme weight loss and dementia.

**Transmission**

Some of the transmission routes are:

Through contaminated blood for instance through injection by drug users or blood transfusion (improved screening has reduced this chances).

Engagement in sexual intercourse with an infected person whether anal or vaginal (Greenberg et al., 2009).

From the mother-child possibly during birth, through breastfeeding or even during pregnancy.

**Testing**

 Different testing methods utilize various techniques, for instance, detection of HIV against antibodies but not the virus itself. ELISA (enzyme-linked-immunosorbent-assay) kit is used in detecting HIV-1 antibodies. Individuals with reactive kits are retested with duplicates, and if they are still reactive, CPR or IFA or western blot are used re-retesting, and if still reactive, they are concluded to be positive whereas individuals with unreactive kits are considered negative. The combination of different assays is referred as combination assay and is utilized by multiple laboratories. The modern HIV testing is highly accurate and fast. Individuals also buy home testing kits over the counter. Regardless of the results being either negative or positive, it is a prerequisite for a person undergoes counseling before and after testing. That is why it is of great importance to undertake the tests in a clinic or hospital.

**Treatment**

 Currently, there is neither vaccine nor cure for HIV virus. Although there is no cure, physicians have developed drugs that help manage the disease. The drugs are called antiretroviral therapy (ART or ARVs). The therapy controls the infection as well as increasing life expectancy (Broder, 2010). They also reduce the chances of infecting others. The drugs have a different mode of actions.

**ARVs Mode of Action**

 Reverse Transcriptase Inhibitors (RTIs);The drugs prevent replication of the virus by blocking the reverse transcriptase in the synthesis of DNA. They may be categorized as no-nukes and nukes.

 Protease Inhibitors (PIs);the drugs block the action of enzyme protease. Such inhibition prevents virus replication thus decreased new virus production.

 Entry Inhibitors (EI); the drugs highly prevent the attachment of the HIV virus on the receptors of the cells of the hosts.

 Combination therapy is used due to significant increases in genetic variability in HIV virus that occur with mutations and increased rate of replication against time. The combination therapy may also incorporate other types of antibiotics with the intent of fighting opportunist infections that occur with different stages especially the final stage (AIDS). There are other drugs known as Immediate post-exposure prophylactic treatment (PEP). They are short anti-retroviral drugs that are used with suspicion of HIV virus exposure. PEP is taken with an hour or maximum of three days of exposure up to four weeks to prevent infection.

 Different type of vaccines (Hedestam et al., 2008) has been developed though none them have successfully passed phase III of clinical trials such as peptide vaccines, live vector vaccine, DNA vaccine and pseudovirion virus.

**Prevention**

 The prevention of HIV transmission is critical to improve the quality of life. The spread of the virus can be done by one having healthy and controlled sexual behaviors such as involvement with a single sexual partner. An individual has to be faithful to their partner who is equally faithful to them. Sexually active individuals can also incorporate condoms whether male or female in their pleasure (protected sex). The drug users should quit drugs or decide not to share injection materials. Also, proper screening of blood in health facilities must be encouraged. Pregnant women should be advised to give birth in hospitals, and infected women must avoid breastfeeding their children to prevent transmitting the infection to toddlers. Also, faithfulness in undertaking anti-retroviral for PEP must be a hundred percent. Creating awareness about HIV and the benefits that come HIV testing (Broder, 2010). The realization of person’s status encourages them to undertake preventive measures of spreading or avoid infection of the diseases as well as take the treatment.

**Conclusion**

 HIV is pandemic that is claiming multiple in the world. The discovery and development of drugs against HIV virus has posed a challenge due to extensive genetic variabilities. The fast rate of cycle replication and increased mutation on HIV increase variants of HIV in a single individual in twenty-four hours. The consequence of the cycle replication is a single person ends up carrying different HIV strains. It is thus very essential for persons to join hands and play significant roles personally and globally in preventing transmission of HIV virus.

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