

ACQUIRED IMMUNODEFICIENCY SYNDROME – THE GROWING MENACE OF CENTURY

Dr. Shubha A. Chogle, M.Sc., Ph.D

Acquired Immunodeficiency Syndrome (AIDS) is caused by Human Immunodeficiency Virus (HIV).¹ Human T cell Leukemic Virus (HTLV type III) is very efficient for transmitting AIDS through vaginal intercourse.²

Aids was first reported in United States in 1980-82 in homosexual men. The WHO has described AIDS situation as “global health emergency”.

About 5 to 10 million people are currently infected world wide with HIV.

Currently two genetically and immunologically distinct human immunoviruses are recognized causing AIDS such as HIV1 having widest distribution and HIV2 mostly found in West Africa.

The Human T cell leukemic virus possess many biologic and physicochemical properties common to the members of the family of retroviruses and those of subfamily Lentivirus.³

Structure of HIV Virus

Complete HIV virus particle has three layers.⁴

1. The centre “Core” containing two identical strands of Viral RNA, structural proteins, enzyme reverse transcriptase and other enzymes. RNA carries genetic material of the virus.
2. The core is surrounded by a protein coat called as Capsid.

3. The entire virus particle is surrounded by lipid bilayer membrane known as the envelop. This membrane is derived from host cell membrane. It also contains host proteins.

Mode of Infection

The HIV infects any cells bearing CD4 antigen receptor. The cells bearing CD4 antigen receptors are T4 lymphocytes, Macrophages and Monocytes. These cells are rich reservoirs of HIV. Monocytes carry the virus to lungs and brain and various organs of the body.

The glycoprotein which is present on the surface of the virus interacts and binds to the CD4 antigen.

Attack of HIV on host cells - T4 lymphocytes

In the first step, the core proteins and the enzyme Reverse Transcriptase enter the host cell. The reverse transcriptase enzyme catalyzes the production of single stranded HIV from the HIV RNA (Provirus formation). Provirus enters into the nucleus of host cell and gets integrated into the host cell's DNA. On activation, these integrated DNA produce copies of viral RNA and viral proteins. Then the mature virus particle leaves the cells by budding. Budding causes rupture of T4 lymphocytes. Thus the reduction of T4 lymphocytes causes immunosuppression and the process of regulating bodies to immune responses is ceased. The person becomes progressively ill as the immune system is damaged.⁴

Transmission of HIV

Most HIV infection is transmitted through sexual intercourse with an infected partner. Major source of HIV is semen, vaginal or cervical secretions and blood. These are main vehicles through which HIV is transmitted. The virus is not transmitted through water, food, sharing utensils, coughing, sneezing or by casual contacts like hand shaking.⁵

The AIDS virus is predominantly found in homosexual men, intravenous drug abusers, Haitians, hemophiliacs, transfusion recipients, heterosexual men, women and then partners. However children born in these families have high risk for AIDS.

Clinical Manifestation in AIDS

Patients with AIDS suffer not only from immunosuppression but also with various cancers.

Patients are recurrently attacked by Herpes Zoster. Patients with AIDS may suffer from malignancy of skin, lips, lungs. Moreover B cell lymphomas, squamous carcinomas of several sites, Kaposi sarcoma, Non-Hodgkin's lymphoma, Burkitts lymphoma etc. are well known.

However, Kaposi sarcoma or severe opportunistic infections such as pneumocystis carinii pneumonia are common clinical findings in patients with AIDS.

Hematological findings in AIDS

Patients affected with AIDS with kaposi sarcoma exhibit leukopenia especially lymphopenia (decreased number of lymphocytes) along with mild anemia.

There is marked reduction in T helper or inducer lymphocytes with increase in T suppressor lymphocytes inverting the normal ratio of T helper to T suppressor lymphocytes. The immune biochemical changes occurs in patients with AIDS are very complicated. They are polyclonal hypergammaglobulinemia, elevated α_2 microglobulin and elevated α_2 Thymosin. The presence of acidlabile-interferon, and imapire dinterleukin-2-production by peripheral blood lymphocytes (in response to antigens) are some of the biochemical abnormalities in serum of patients with AIDS. However presence of acid labile interferon is an indicator of poor prognosis.

Treatment

Chemotherapy treatment for the associated malignancy in AIDS (Kaposi's sarcoma or non-Hodgkins lymphoma) results in disappearance or reduction of skin lesions, chronic odema, skin tumours on the lower extremities followed by healing of invasive bone lesions.

Chemotherapeutic agents used are:

a) Vinblastine, b) Bleomycin, c) Antinomycin D, d) Vincristine, e) Combination of Activnomycin D with Vincristine etc.

All these agents provided transient improvement. However long lasting improvement was achieved in AID patients when treated with combination of Adriamycin, bleomycin, Vinblastine and Decarbazine (ABVD combination).

30% complete remission was observed in patients treated with VP-16 or etoposide.⁷

Treatment with immunomodulators like the alpha interferons was well tolerated by the patients.

Treatment studies with gamma interferons (produced by T lymphocytes) and interleukins-2 are still under evaluation.

Precautions to be taken when handling the patients with AIDS

1. All AIDS specimens should be clearly labelled as "Precaution - AIDS KS". All AIDS specimens delivered to the laboratory should be notified by telephone before the specimen delivery.
2. Mechanical pipetting should be conducted for any serum sample of AIDS patients and mouth pipetting should be strictly avoided.
3. Gloves should be worn to avoid direct contact with AIDS material.
4. Laboratory work surfaces should be decontaminated with freshly prepared 1:5 diluted solution of sodium hypochlorite.
5. Needles and syringes should be disposed and all laboratory waste should be decontaminated by incineration.
6. All personnel handling the patients with AIDS should wash their hands with providone-iodine (Betadine) on completion of laboratory activity and before leaving the laboratory.
7. Sexual intercourse should be strictly restricted to only single uninfected partner.⁸

REFERENCES

1. Text book of Medical Laboratory Technology by Praful B. Godkar, 1994; pg. 404. Bhalani Publishing House.
2. 'AIDS', etiology, diagnosis, treatment and prevention by Vincent T. Devita, Samuel Hellman, Steven A. Rosenberg,; J.B. Lippincott Company.
3. Textbook of Medical Laboratory Technology by Praful B. Godkar, 1994; pg. 404.
4. Textbook of Medical Laboratory Technology, by P.B. Godkar, 1994; pg. 404.
5. Ibid, pg. 404-405.
6. 'AIDS', etiology, diagnosis, treatment and prevention by Vincent T. Devita, Samuel Hellman, Steven A. Rosenberg, page 198, J.B. Lippincott Company.
7. Ibid; pg. 201-203.
8. Ibid; pg. 270-271.