Natural resistance mechanisms to hiv-1 infection

Natural resistance mechanisms to HIV infection Natural resistance is the mechanism by which an organism protects itself from infection by identifying and killing pathogens. It does so by using several types of proteins, cells, organs and tissues which interact in an elaborate and dynamic network. Human immunodeficiency virus (HIV) is a retrovirus that causes Acquired Immunodeficiency Syndrome (AIDS), a condition in which the immune system begins to fail, leading to infections. Wikipedia. 23 Feb. 2007. 24 Feb. 2007. . There are three major transmission routes which have been identified:

Blood or blood products transmission: This route could cause an infection in intravenous drug users, recipients of blood or blood products transfusion and hemophiliacs.

Mother to child transmission: It can occur in utero during the last weeks of pregnancy, at childbirth or breast feeding.

Sexual transmission: The majority of HIV infections are acquired through this form of transmission. It can occur when infected sexual secretions of one partner come into contact with the rectal, genital or oral membranes of another.

HIV has been found in small concentrations in the saliva, urine and tears but the risk of transmission from these is negligible.

There is currently no vaccine or cure for AIDS or HIV. The only known method is avoiding exposure of the virus. However a treatment known as post-exposure prophylaxis is believed to reduce the risk of infection if begun directly after exposure. Current treatment of HIV infection consists of highly active anti-retroviral therapy (HAART). This refers to combined therapy with three or more drugs, usually two that target the reverse transcriptase and

one that targets the viral protease. Kimball's biology pages. 7 Oct. 2004. 24 Feb. 2007 Natural resistance to HIV can be considered at two levels: resistance to becoming infected with the virus and resistance to the virus if the person is already infected. The mechanisms of natural resistance in both cases are:

Apoptosis. Apoptosis is a programmed death of the cells in multi-cells organism. During the HIV infection apoptosis is the main mechanism by which infected and uninfected CD4+ lymphocytes are eliminated. However apoptosis as a natural resistant mechanism to HIV infection has not been explored so far.

Genetic factor. To enter the cells, HIV usually must fuse with a receptor called CCR5 that sits on the surface of T-helper immune cells. The delta-32 mutation in the gene encoding the CCR5 protein results in a defective receptor site that blocks entry of the virus. People who have two copies of the mutation (one from each parent) are resistant to HIV infection. People who carry only one copy also maybe resistant. Science Daily. 24 Feb. 2007.

Innate immune cells. Interferons (IFNs) are natural proteins produced by the cells of the immune system. INF- is the only type II interferon. It is secreted by T-lymphocytes and NK (natural killer) cells only. INF- inhibits HIV-1 replication by both cytolytic and non-cytolytic mechanisms.

The importance of the study of these mechanisms can be summarized in two main parts: to prevent further spread of the disease and inventing vaccines to prevent it. Although over two dozen experimental anti-HIV vaccines have been developed, so far, the results have been disappointing. Learning the mechanisms of natural resistance could help the causes of unsuccessful results to be avoided.