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ACQUIRED IMMUNE DEFICIENCY SYNDROME RECIPROCATES HUMAN IMMUNO VIRUS

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ABSTRACT

Many of the clinical features of HIV/AIDS can be ascribed to the profound immune deficiency which develops in infected patients. The destruction of the immune system by the virus results in opportunistic infection, as well as an increased risk of autoimmune disease and malignancy. In addition, disease manifestations related to the virus itself may occur. For example, during the primary illness which occurs within weeks after first exposure to HIV, clinical symptoms occur in at least 50% of cases, typically as a mononucleosis syndrome. HIV-related complications are rarely encountered in patients with preserved immunity (i.e. CD4 T-cell counts greater than 500 cells/mm^3). Recurrent mucocutaneous herpes simplex (HSV), herpes zoster (VZV), oral candidiasis and oral hairy leucoplakia occur with increasing frequency as the CD4 count drops below this level. Immune thrombocytopenia (ITP) occurs in association with HIV and often presents early in the clinical course. The risk of developing opportunistic infections and malignancies typical of AIDS increases progressively as CD4 counts fall below 200 cells/mm^3. The clinical manifestations of infections associated with AIDS tend to fall into well-recognized patterns of presentation, including pneumonia, dysphagia/odynophagia, diarrhoea, neurological symptoms, fever, wasting, anaemia and visual loss. The commonest pathogens include Candida albicans, Pneumocystis carinii, Mycobacterium tuberculosis, Toxoplasma gondii, Cryptococcus neoformans, Mycobacterium avium intracellular and cytomegalovirus. Malignant disease in patients with HIV infection also occurs in a characteristic pattern. Only two tumours are prevalent: Kaposi's sarcoma, a multifocal tumour of vascular endothelium which typically involves skin and mucosal surfaces; and non-Hodgkin's lymphoma, which is typically high grade in phenotype, often arising within the central nervous system. The principles of therapy include reduction of HIV replication by antiretroviral agents, prophylaxis against the common opportunistic infections and treatment followed by subsequent lifelong maintenance therapy for infections when they do occur.

KEYWORDS: HIV, AIDS, CD4CELL.

INTRODUCTION

What is HIV?

Figure-1: AIDS/HIV & Symbol.

HIV is a virus that attacks cells in the immune system, which is our body's natural defence against illness. The virus destroys a type of white blood cell in the immune system called a T-helper cell, and makes copies of itself inside these cells. T-helper cells are also referred to as CD4 cells.

As HIV destroys more CD4 cells and makes more copies of itself, it gradually weakens a person's immune system. This means that someone who has HIV, and isn't taking antiretroviral treatment, will find it harder and harder to fight off infections and diseases. If HIV is left untreated, it may take up to 10 or 15 years for the immune system to be so severely damaged that it can no longer defend itself at all. However, the rate at which HIV progresses

varies depending on age, general health and background.[1]

Basic facts about HIV

- HIV stands for human immunodeficiency virus.
- People with HIV can enjoy a long and healthy life by taking antiretroviral treatment which is effective and available to all.
- Once a person has HIV, the earlier they are diagnosed, the sooner they can start treatment which means they will enjoy better health in the long term.
- It's possible for antiretroviral treatment to reduce the level of HIV in the body to such low levels that blood tests cannot detect it. People living with HIV whose viral load is confirmed as undetectable cannot pass on HIV.
- Regular testing for HIV is important to know your status.
- HIV is found in semen, blood, vaginal and anal fluids, and breastmilk.
- **HIV can't be transmitted through sweat, saliva or urine.**
- Using external (or male) condoms or internal (or female) condoms during sex is the best way to prevent HIV and other sexually transmitted infections.
- If you inject drugs, always use a clean needle and syringe, and never share equipment.
- If you're pregnant and living with HIV, the virus in your blood could pass into your baby's body, during birth or afterwards through breastfeeding. Taking HIV treatment and becoming undetectable eliminates this risk.

What is AIDS?

AIDS is a set of symptoms (or syndrome as opposed to a virus) caused by HIV. A person is said to have AIDS when their immune system is too weak to fight off infection, and they develop certain defining symptoms and illnesses. This is the last stage of HIV, when the infection is very advanced, and if left untreated will lead to death.

Basic facts about AIDS

- AIDS stands for acquired immune deficiency syndrome; it's also called advanced HIV infection or late-stage HIV.
- AIDS is a set of symptoms and illnesses that develop as a result of advanced HIV infection which has destroyed the immune system.
- Fewer people develop AIDS now because treatment for HIV means that more people are staying well.
- Although there is no cure for HIV, with the right treatment and support, people living with HIV can enjoy long and healthy lives. To do this, it's especially important to commit to taking treatment correctly.[2]

Etiology of HIV/AIDS

People transmit HIV in bodily fluids, including:

1. Blood
2. Semen
3. Vaginal secretion
4. Anal fluid
5. Breast milk

In the United States, the main causes of this transfer of fluids are:

- Anal or vaginal intercourse with a person who has HIV while not using a condom or PrEP, a preventive HIV medication for people at high risk of infection.
- A woman living with HIV who is pregnant or has recently given birth might transfer the disease to her child during pregnancy, childbirth, or breastfeeding.
- The risk of HIV transmitting through blood transfusions is extremely low in countries that have effective screening procedures in place for blood donations.

The risk of HIV progressing to AIDS varies widely between individuals and depends on many factors, including:

- The age of the individual
- The body's ability to defend against HIV
- Access to high-quality, sanitary healthcare
- The presence of other infections
- The individual's genetic inheritance resistance to certain strains of HIV
- Drug-resistant strains of HIV

Figure-2: HIV virion.

HIV remains one of the continent's most intractable health challenges. Tremendous progress is being made to understand the virus, the immune mechanisms that contribute to its control and for new antiretroviral drugs and vaccines to be developed to treat and prevent HIV. But much remains to be done to overcome the health and economic devastation of the epidemic. African researchers have been performing cutting-edge research to contribute to addressing these problems. The sub-Saharan African Network for TB/HIV Research Excellence has been at the forefront of this research and has provided some important insights into how the virus spreads as well as the immune mechanisms that enable some people to control the virus without antiretroviral drugs.

This knowledge could be translated into effective vaccines or other novel interventions to prevent the spread of the virus or achieve a functional cure where people are able to live without antiretroviral drugs at least for a while. Although the goals of a vaccine or cure remain elusive, the research being done makes these goals appear increasingly likely.[3]

Immune systems are critical: Technically known as the human immunodeficiency virus, HIV destroys CD4+ cells, which are critical to your immune system. They're responsible for keeping you healthy from common diseases and infections. As HIV gradually weakens your natural defences, signs and symptoms will occur. Immune system prevents THE body from acquiring the diseases and infections that come your way. White blood cells defend against viruses, bacteria, and other organisms that can make sick. The killer CD8 T cells produced during the acute phase are also highly defective. They become exhausted and die off easily, which enables the virus to persist.

HIV evades or adapts to immune pressure: It continues to replicate and reproduce itself. That although this immune escape is common, in some cases the virus develops mutations that cripple it, making it unable to continue replicating efficiently.

Genetic and viral factors matter: Nonhuman primates (NHP), whether naturally or experimentally infected with simian immunodeficiency viruses (SIVs), display phenotypic variation on multiple levels, including differences in relative susceptibility to infection, variability in both acute and long-term viral replication levels, differing rates of disease progression, and differences in degree of pathogenesis). NHP populations, including both wild populations and captive-bred colonies, comprise genetically variable, outbred individuals, and it is reasonable to assume that variation in virological phenotypes reflects, in part, host genetic variation. Phenotypic variation in SIV-infected NHPs provides a considerable but largely unexplored opportunity to examine the influence of host genetics on primate immunodeficiency virus replication and disease. In the case of rhesus macaques, the most commonly used NHP in AIDS research, the availability of whole genome sequence (WGS) data has facilitated discovery and cataloguing of SNPs and copy-number variants that may prove useful for genetic and genomic analyses. WGS data are also available for chimpanzees and a variety of other NHPs representing all main primate lineages. Thus, comparative studies of the different SIVs and their respective primate hosts have the potential to identify and characterize genes that govern the transmission of viruses within and between populations.

The influence of viral genetic factors. One of the defining characteristics of the HIV/AIDS epidemic is that there are multiple genetic strains (known as subtypes or clades) that are unevenly spread throughout the world.

Symptoms: These conditions tend to progress further in people who live with HIV than in individuals with healthy immune systems. A correctly functioning immune system would protect the body against the more advanced effects of infections, and HIV disrupts this process. The early symptoms of HIV infection may include:

1. Fever
2. Chills
3. Joint pain
4. Muscles aches
5. Sore throat
6. Red rash
7. Tiredness
8. Thrust
9. Weight loss

These symptoms might also result from the immune system fighting off many types of viruses.

Asymptomatic HIV: In many cases, after the symptoms of acute retroviral syndrome, symptoms might not occur for many years. During this time, the virus continues to develop and cause immune system and organ damage. Without medication that prevents the replication of the virus, this slow process can continue for an average of around 10 years. Complying rigidly to a course of ART can disrupt this phase and suppress the virus completely. Taking effective antiretroviral medications for life can halt on-going damage to the immune system.[4]

Late-stage HIV infection

Symptoms of late-stage HIV infection may include:

- Blurred vision
- Dry cough
- A fever of over 100°F (37°C) lasting for weeks
- Night sweats
- Permanent tiredness
- Shortness of breath, or dyspnoea
- Swollen glands lasting for weeks
- White spots on the tongue or mouth

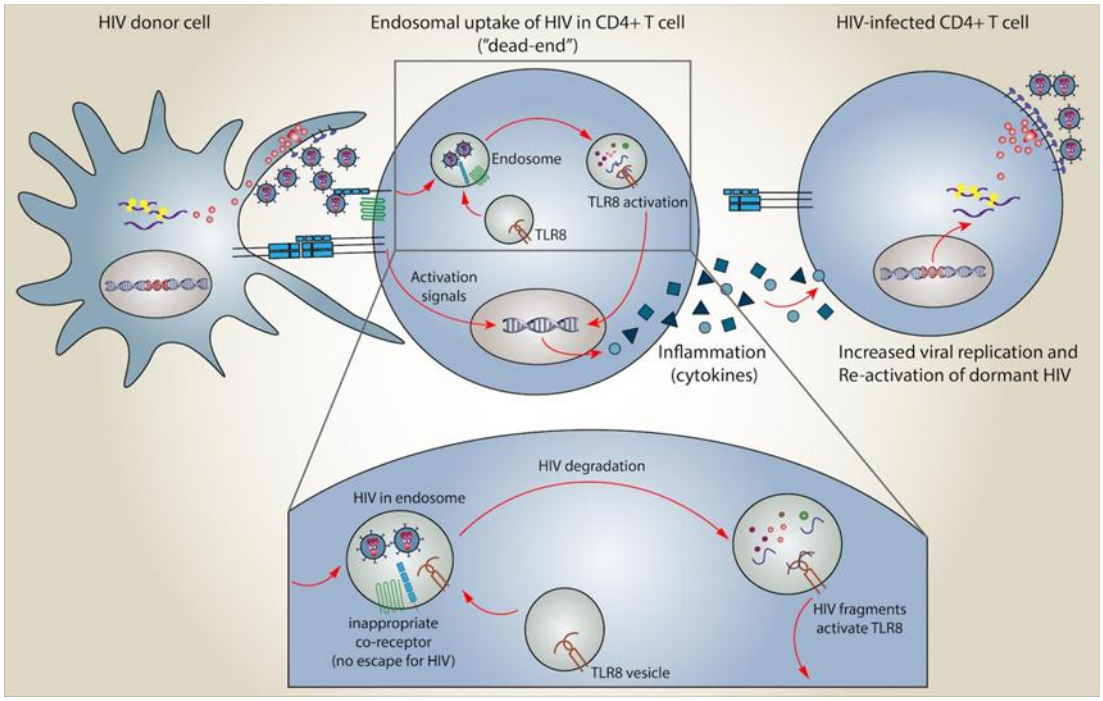

Figure-3: HIV cycle.

Prevention

Preventing OIs is key to extending life expectancy with late-stage HIV. Aside from managing HIV viral load with medications, a person who lives with the disease must take precautions, including the following steps:

- Wear condoms to prevent other STIs.
- Receive vaccinations for potential OIs. Discuss these with your primary care physician.
- Understand the germs in your surrounding environment that could lead to an OI. A pet cat, for example, could be a source of toxoplasmosis. Limit exposure and take precautions, such as wearing protective gloves while changing litter
- Avoid foods that are at risk of contamination, such as undercooked eggs, unpasteurized dairy and fruit juice, or raw seed sprouts.
- Do not drink water straight from a lake or river or tap water in certain foreign countries. Drink bottled water or use water filters.
- Ask your doctor about work, home, and vacation activities to limit exposure to potential OIs.
- Antibiotic, antifungal, or antiparasitic drugs can help treat anOI.

The Figure-2 shows how HIV can get trapped in an endosome, or pocket, on a CD4+T cell (centre cell). Researchers previously thought this was a dead-end for HIV, because the virus wasn't able to actually replicated. But the new CEMIR research shows that once HIV is in the endosome and is destroyed, its fragments activate a substance called TLR8, which in turn triggers inflammation. The inflammation can then activate HIV in dormant cells, or boost the production of HIV in infected cells. Although this may sound like a bad thing, it offers researchers a way to smoke out HIV in dormant cells, which is an important step in developing a cure.[5]

Transmission

The following cannot transmit the virus:

1. Shaking hand
2. Hugging
3. Kissing
4. Sneezing
5. Touching unbroken skin

Diagnosis: The Centres for Disease Control and Prevention (CDC) estimates that about 1 in every 7 HIV-positive Americans is unaware of their HIV status. Becoming aware of HIV status is vital for commencing treatment and preventing the development of more severe immune difficulties and subsequent infections.

CONCLUSION: HIV blood tests and results:

A doctor can test for HIV using a specific blood test. A positive result means that they have detected HIV antibody in the bloodstream. The blood is re-tested before a positive result is given. After potential exposure to the virus, early testing and diagnosis is crucial and greatly improves the chances of successful treatment. Home testing kits are also available.HIV might take 3 – 6 months to show up in testing, and re-testing may be necessary for a definitive diagnosis. People at risk of infection within the last 6 months can have an immediate test. The test provider will normally recommend another test within a few weeks.

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