

Possible Pathogenesis and Treatment of Human Immunodeficiency Virus Infection

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Abstract

Human Immunodeficiency Virus (HIV) is most dangerous life threatening infection in this World. More than 10 thousand of dead detect in every year with 10 lack affected people in 2016. HIV infection can be transmitted through sexual, parenterals by infected syringe or by prenatal birth. It can be detected by various laboratory tests and managed by antiretroviral therapy.

Keywords: Zidovudine; ELISA; Western Blot

Introduction

HIV

HIV is also known as Human immunodeficiency virus. HIV is a member of slow lentivirinae, subfamily of retroviruses. There are two related but distinct types of HIV, HIV-1 and HIV-2 can be detected in humans. When HIV-1 infection is suspected, whether owing to symptoms or high-risk behaviour, it should be confirmed by laboratory. In HIV patients, the immune-defensive system can be weaker day by day with cluster of body syndromes which does not heal the patient to basic injury. HIV can be caused Acquired immunodeficiency syndrome (AIDS) [1].

Methods

The most common method is an enzyme-linked immunosorbent assay (ELISA), which detects antibodies

against HIV-1. The ELISA test is both highly sensitive (>99%) and highly specific (>99%) [2].

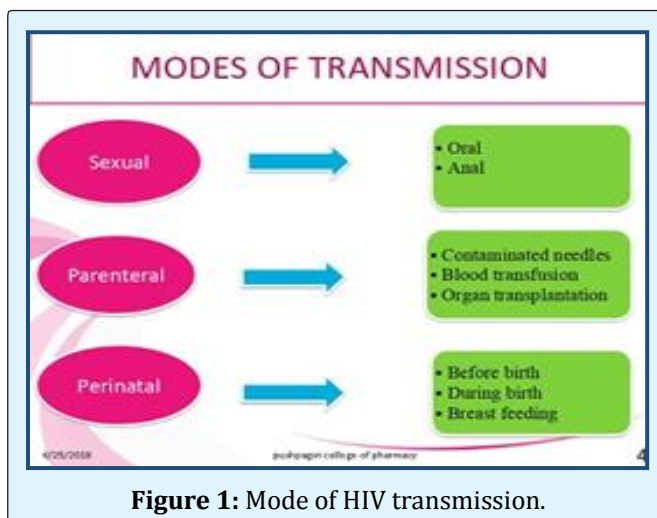


Figure 1: Mode of HIV transmission.

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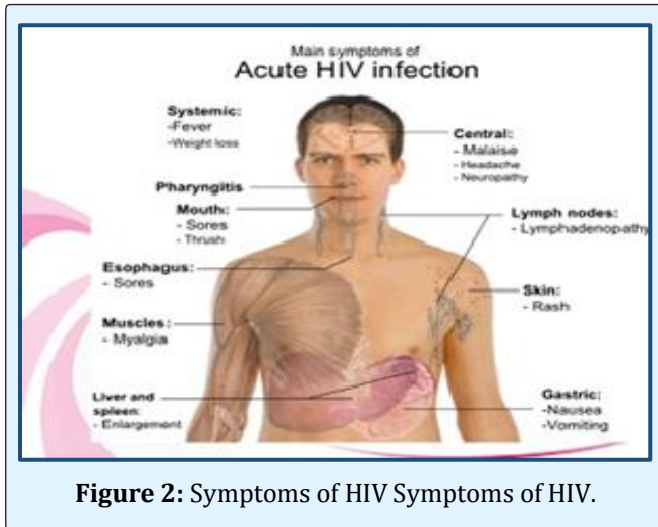


Figure 2: Symptoms of HIV Symptoms of HIV.

Epidemiology

- At the end of 2017, more than 36.7 million of world population were living with HIV.

Pathogenesis

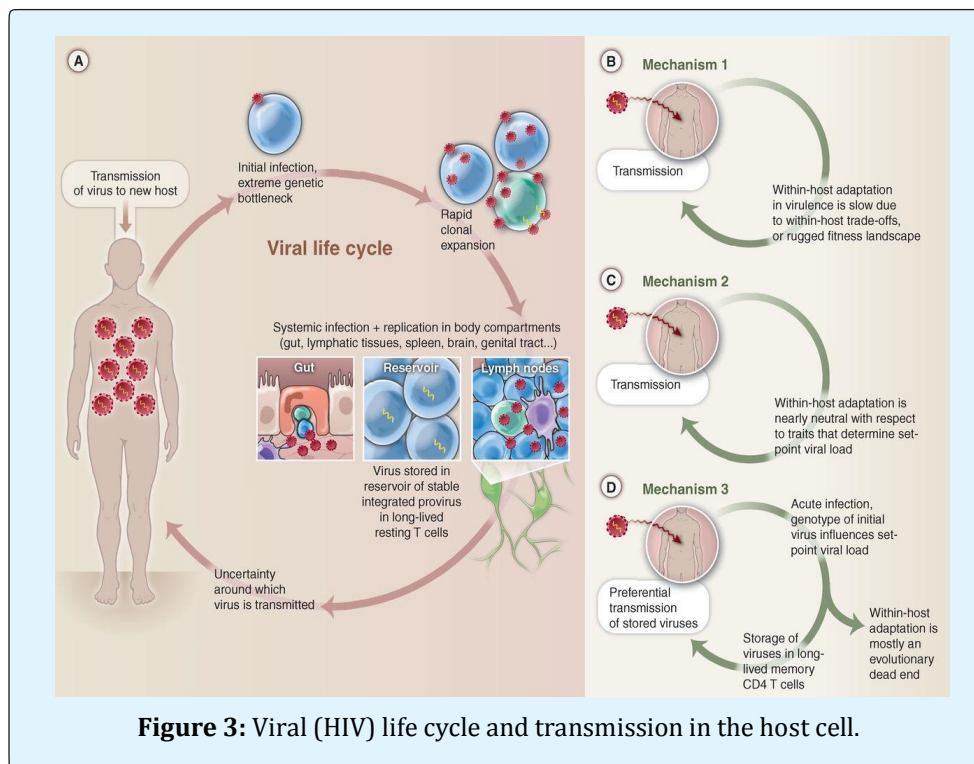


Figure 3: Viral (HIV) life cycle and transmission in the host cell.

- Globally in 2016, 1.8 million of newly diagnosed people were suffering from HIV.
- 1.8 million People become newly infected with HIV in 2016 globally.
- The most effected region of HIV is Africa and Sub-Saharan region of Africa with 25.6 million were affected.
- More than 19.5 million people in 2017 with HIV were receiving antiretroviral therapy (ART) globally [3].

Clinical Presentation of Primary HIV Infection in Adults

Symptoms Include

- Fever but not all times, sore throat, restlessness, reduce weight, diarrhoea, nausea, and may be vomiting.
- Myalgia (suffers 40% to 80% of patients).
- Morbilliform or a kind of Maculopapular rash on trunk.
- Lymphadenopathy, sweats in night with usually aseptic meningitis (fever, head pain, photophobia, and sometimes stiff neck).
- Reduction in CD4 lymphocytes [4].

Diagnosis

HIV test can be diagnosed by following lab procedures:

Blood Detection Tests	
HIV enzyme-linked immunosorbent assay (ELISA)	Screening test for HIV Sensitivity > 99.9%
Western blot	Confirmatory test Specificity > 99.9% (when combined with ELISA)
HIV rapid antibody test	Screening test for HIV Simple to perform
Absolute CD4 lymphocyte count	Predictor of HIV progression Risk of opportunistic infections and AIDS when <200
HIV viral load tests	Best test for diagnosis of acute HIV infection Correlates with disease progression and response to HAART

Figure 4: Blood detection test for HIV.

Urine Testing	Oral Testing
Urine Western Blot <ul style="list-style-type: none"> – As sensitive as testing blood – Safe way to screen for HIV – Can cause false positives in certain people at high risk for HIV 	<ul style="list-style-type: none"> • Orasure <ul style="list-style-type: none"> – The only FDA approved HIV antibody. – As accurate as blood testing – Draws blood-derived fluids from the gum tissue. – NOT A SALIVA TEST!

Figure 5: Another procedure to diagnose HIV.

The most common method for detection of HIV is ELISA it detects antibodies against HIV-1 - with a strong range of highly sensitive and specific results. Minimum time to develop antibodies is 3 to 4 weeks from initial exposure. Positive ELISAs - repeated in duplicate and if one or both tests are reactive, a confirmatory test is performed for final diagnosis. Western blot assay-most commonly used confirmatory test [5].

Viral load can be used as a prognostic factor to monitor disease progression and the effects of treatment. The number of CD4 lymphocytes in the blood is a surrogate marker of disease progression. The normal adult CD4 lymphocyte count ranges between 500 and 1600 cells/mL, or 40% to 70% too all of the total lymphocytes [6].

Management of HIV Infection

Anti Retroviral Therapy

There have been three primary groups of drugs used:

- Nucleoside reverse transcriptase inhibitors (NRTI).
- Non-nucleoside reverse transcriptase inhibitors (NNRTI).
- Protease inhibitors (PI).

NRTI	NNRTI	PI
Abacavir (ABC)	Delavirdine (DLV)	Amprenavir (APV)
Zidovudine (AZT or ADV)	Efavirenz (EFV)	Atazanavir (ATV)
Lamivudine (3TC)	Nevirapine (NVP)	Indinavir (IDV)
Stavudine (d4T)		Lopinavir (LPV)
Didanosine (ddi)		Nelfinavir (NFV)
Emtricitabine (FTC)		Ritonavir (TRV)
Tenofovir (TDF)		Saquinavir (SQV)
Zalcitabine		

Table 1: List of antiretroviral drugs.

Antiretroviral Regimens Recommended in Antiretroviral-Naive Persons

NNRTI-Based Regimens

Preferred: Efavirenz + lamivudine + zidovudine (or tenofovir DF or stavudine) except for pregnant women or women with pregnancy potential.

Alternatives: Efavirenz + emtricitabine + zidovudine (or tenofovir DF or stavudine) except for pregnant women or women with pregnancy potential- Efavirenz + (lamivudine or emtricitabine) + didanosine except for pregnant women or women with pregnancy potential- Nevirapine + (lamivudine or emtricitabine) + zidovudine (or stavudine or didanosine) [7].

PI Based Regimens

Preferred

Lopinavir/ritonavir + lamivudine + zidovudine (or stavudine)

Alternatives

Amprenavir/ritonavir + lamivudine (or emtricitabine) + zidovudine (or stavudine) Atazanavir + lamivudine (or emtricitabine) + zidovudine (or stavudine) Indinavir-ritonavir + lamivudine (or emtricitabine) + zidovudine (or stavudine) Lopinavir-ritonavir + emtricitabine + zidovudine (or stavudine) Nelfinavir + lamivudine (or emtricitabine) + zidovudine (or stavudine) Saquinavir-

ritonavir + lamivudine (or emtricitabine) + zidovudine (or stavudine) [8].

Triple Nucleoside Reverse Transcriptase Inhibitor

Based Regimen (Only as an alternative to NNRTI- or PI-based regimens when these cannot be used as preferred therapy) Abacavir + lamivudine + zidovudine + Abacavir + lamivudine + stavudine.

Treatment of HIV in Pregnancy

Ritonavir Boosted

PI (e.g. lopinavir) with zidovudine and lamivudine from 20 weeks: all mothers, with PI plasma level monitoring. Nevirapine can be used cautiously (risk of hypersensitivity hepatitis) but only when CD4 counts <250 cells/mm³ [9].

Zidovudine Monotherapy

Those with viral loads < 10000 copies/mL and wild-type virus who are willing to have Caesarean section. ZDV i.v. infusion at onset of labour: those on ZDV alone or those on HAART but with detectable virus, undergoing normal vaginal delivery [10].

Discussion

HIV infection is the most dangerous infections in this World. Most of the infections just treat with antiretroviral therapy but after HIV stage 2 it is not curable. HIV patient leads to suffer from various systemic infections and syndromes which also reduced the level of immune system. In early stages of HIV can be diagnosed by laboratory test and procedures and managed by antiretroviral therapy including the preferred dose of NNRTI, NRI and protease inhibitors. In some patients a therapy of HAART can be preferred to treat HIV.

Conclusion

HIV is non curable disease; patients can be treated by antiretroviral therapy depend upon the condition. HIV infection can be easily detected by a way of ELISA test.

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