

Together to fight AIDS

1st. Of December
was declared by the
WHO as the annual
AIDS world day



Retroviridae family contain 3 subfamilies

1.Oncovirinae: contains tumor viruses, including the human T cell lymphotropic virus-I (HTLV-I), which is the causative agent of certain Cutaneous T cell lymphomas of adults.

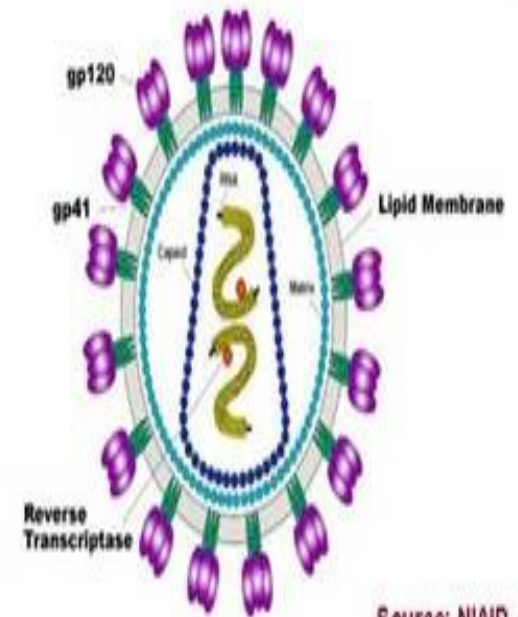
2.Spumaviriae: Contains viruses cause foamy degeneration (e.g. Human foamy virus)

3.Lentivirinae: contains agents able to cause chronic infections with slowly progressive neurological impairment, including HIV.

The Human immunodeficiency virus (HIV) a nononcogenic retrovirus, is the primary etiologic agent of acquired immunodeficiency syndrome (AIDS). The illness was first described in 1981, and the virus was isolated in 1983. AIDS is a worldwide epidemic, affecting different populations & geographical regions. The disease is characterized by gradual depletion of CD4 T lymphocytes & development of fatal opportunistic infections & tumors.

Retroviridae subfamilies

Organization of the HIV-1 Virion



Human Immunodeficiency virus (HIV)

The HIV is the causative agent of Acquired Immune deficiency syndrome (AIDS)

Family: Retroviridae

Subfamily : lentiviruses

Virion: spherical 80-100 nm

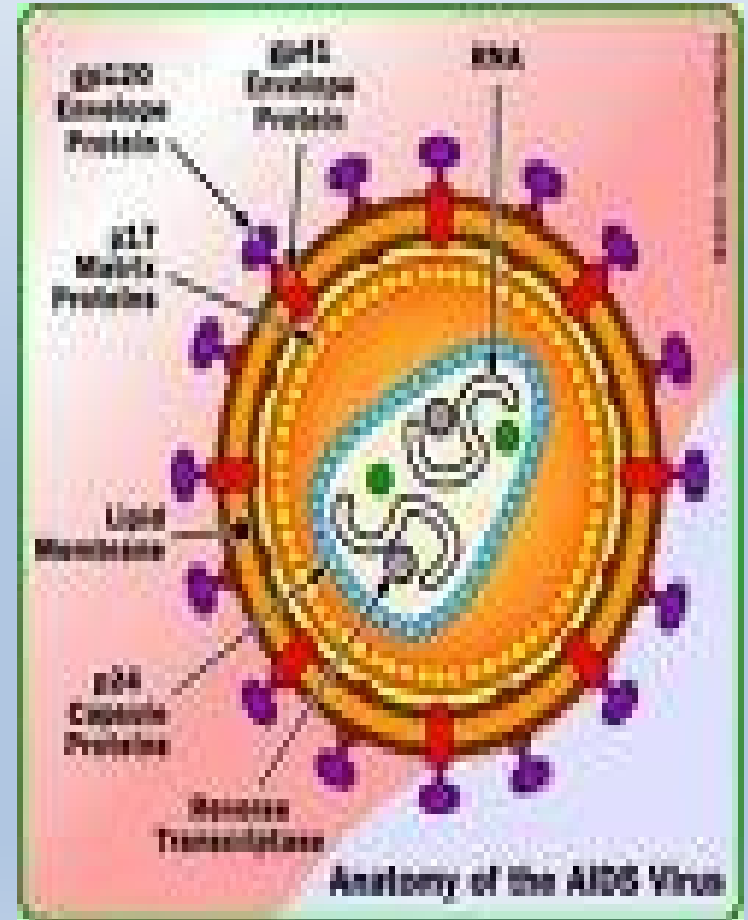
Genome: ssRNA positive sense, enveloped, 10 nm spiks

Replication: The reverse transcriptase enzyme make DNA copy from the RNA genome, Genetic variability is common

HIV 1 worldwide, while HIV 2 prevalent in Africa.

Outstanding characteristics:

- Nononcogenic & may be cytocidal.
- Infect cells of the immune system.
- Provirus remains permanently associated with cells.
- Viral expression is restricted to some cells in vivo.
- Cause slowly progressive, chronic disease.
- Replication is highly species-specific.



HIV is transmitted by three main routes:

1. Blood and blood derivatives

The most efficient mode of transmission, yield 90-100% infection rate depending on the level of viremia and CD4 T cell count at the time of donation.. The high-risk populations are multiple blood transfusion, IDUs (60-70%), Prisoners, HCWs. Sharing of syringes, skin piercing instruments & related objects are important tools in HIV transmission. However, screening of blood has dramatically reduced the rate of infection.

2. Sexual intercourse

Is the most important route accounting for 75% of all HIV cases worldwide. However, the rate of transmission is variable and influenced by may factors, e.g. viral load & presence of ulcerative STDs.

Routes of transmission



3. Vertical transmission

The transmission rate is variable (15-30%). Breast-feeding is a common route.

4. Other routes include:

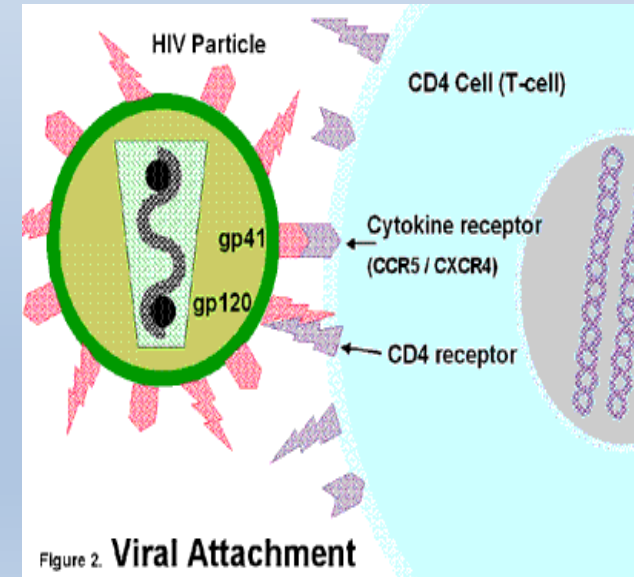
Organ transplantation, saliva, other body fluids

Tissue tropism & cellular receptors

HIV infects the CD4 T lymphocytes, which are the central cells in the immune system that initiate and coordinate the cell mediated and humoral mediated immune response in the body resulting in gradual depletion of these cells and consequently deterioration of the immune system.

The cellular receptor of the virus is the CD4 molecules, which are expressed on macrophages & T lymphocytes.

Tissue tropism & cellular receptors:



Course of HIV infection

The incubation period is widely variable ranging from 5-20 years, depending on :

1. The route of infection
2. The infecting inoculum
3. The immune status of the person

Whatever the route of infection, the course of HIV pass the following stages:

1. The primary infection
2. The clinical latency
3. The constitutional symptoms
4. The appearance of OPIs and malignancies
5. AIDS (death)

1.The primary infection: this stage characterized by

- a. Development of viremia after 4-11 days of primary infection, which become detectable at 8-12 weeks
- b. A (flu-like) syndrome develop in 50-75% of infectees.
- c. 3-6 weeks after primary infection there is sharp decrease in the total circulating CD4 T lymphocytes, plus sharp increase of plasma viral load (the concentration of RNA copies in the blood).

Course of HIV infection

2. Clinical latency:

Through out this stage, which may extend for 10 years, there is high ongoing viral replication no clinical signs, but the person test positive for anti-HIV antibodies.

a. At the end of this period, a constitutional symptoms develop.

3. Constitutional symptoms: these include non-specific signs and symptoms

1. Significant weight loss
2. Persistent cough more than one month for unclear reason
3. Persistent diarrhea for unclear reason
4. Low grade fever
5. Night sweat
6. Oral candidiasis (thrush)
7. Persistent generalized lymphadenopathy

Course of HIV infection

4. Appearance of OPIs and malignancies: The predominant cause of death in late stage HIV infection is OPIs. The most common OPIs in AIDS patients are Protozoal, Fungal, Bacterial and Viral infections.

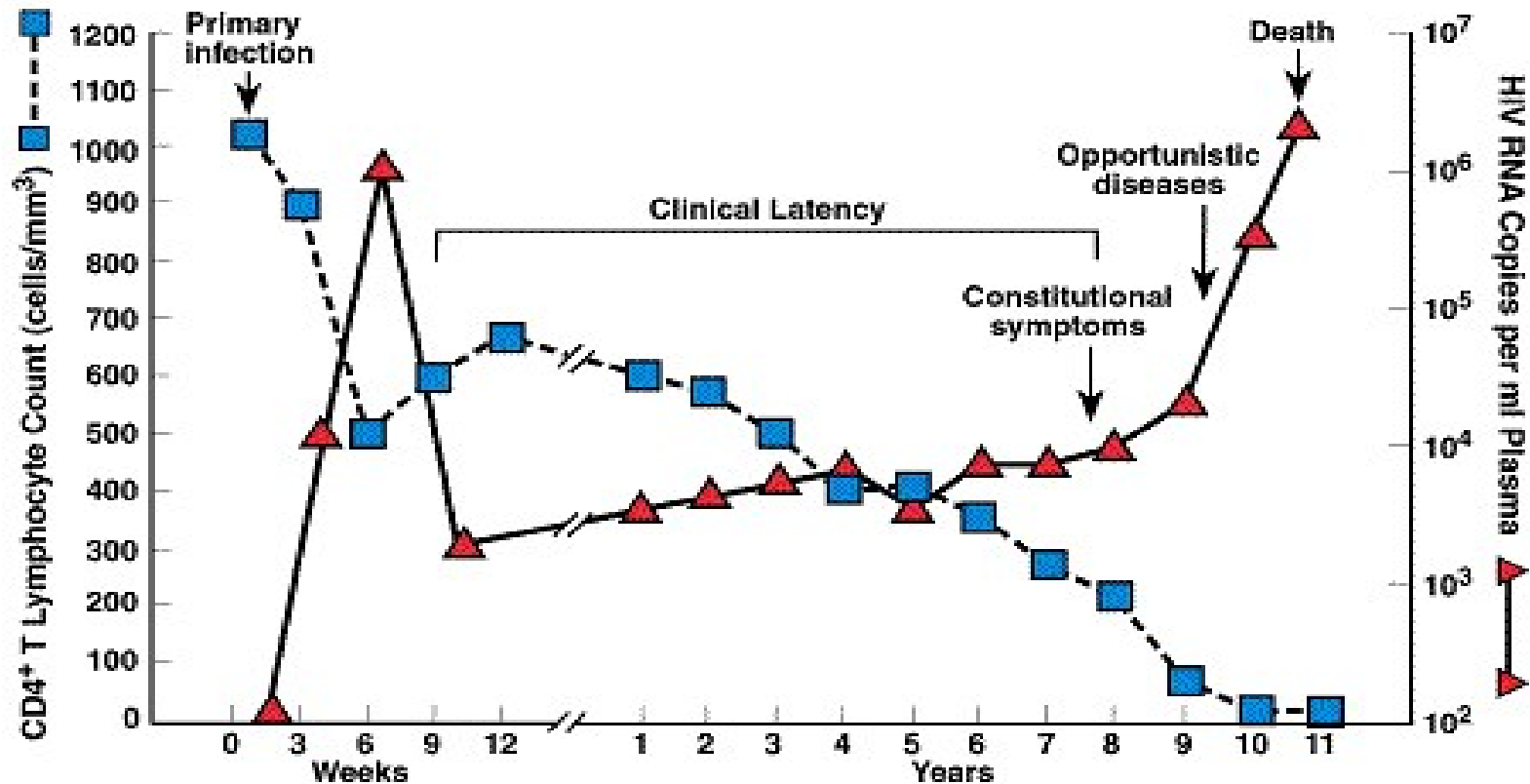
malagnancies:

The proven types of AIDS-related cancers are non-Hodgkin's lymphoma & Kaposi Sarcoma . Other cancers that appear more often in AIDS patients are anogenital Ca.

5. Death: usually occur after 2 years of the appearance of clinical symptoms.

The most two important markers for prediction of HIV progression are plasma viral load and total circulatory CD4 T lymphocytes

Typical Course of HIV Infection



Modified From: Fauci, A.S., et al, *Ann. Intern. Med.*, 124:654, 1996

Laboratory diagnosis of HIV

- * Virus isolation.

- * Serology

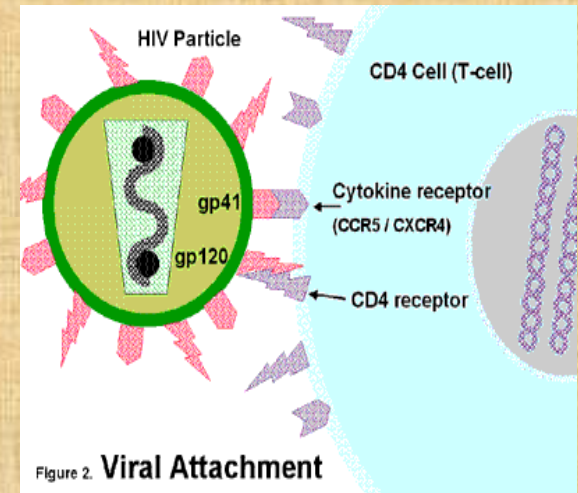
ELISA techniques : are used for screening of low risk population (Blood donors), -positive sera (Anti-HIV Abs) must be confirmed by repeated test, Western blot technique is widely used. The majority of HIV infected persons are seroconvert after 2 ms of exposure.

- * Detection of viral Nu.acid & Ags: Viral infection is quantified by Reverse transcriptase assay, which measure the enzyme activity of released HIV particles.

RT- polymerase chain reaction (RT-PCR) which measure HIV nucleic acid.

The viral load is of significant prognostic value and predictor of long-term clinical outcome & in assessing the effectiveness of antiviral therapy.

- * Estimation of peripheral CD4 and CD8 T cells is also of value in this regard. It is the best predictor of short-term risk of developing OPIs.



Epidemiology of HIV/AIDS

The HIV/AIDS pandemic is worldwide, The first reported cases was in USA in 1981. The prevalence of the disease is largely depend on the route of transmission and the risky groups affected. All ages could be infected. Male : female ratio depend on the area & risky population.

In Iraq, upto the end of 2002, there were 234 cases of HIV/AIDS . Most of the Iraqi patients were hemophilic, and they acquired the HIV infection through factor VIII.

Vaccination: Different types of vaccines all are of limited efficacy.

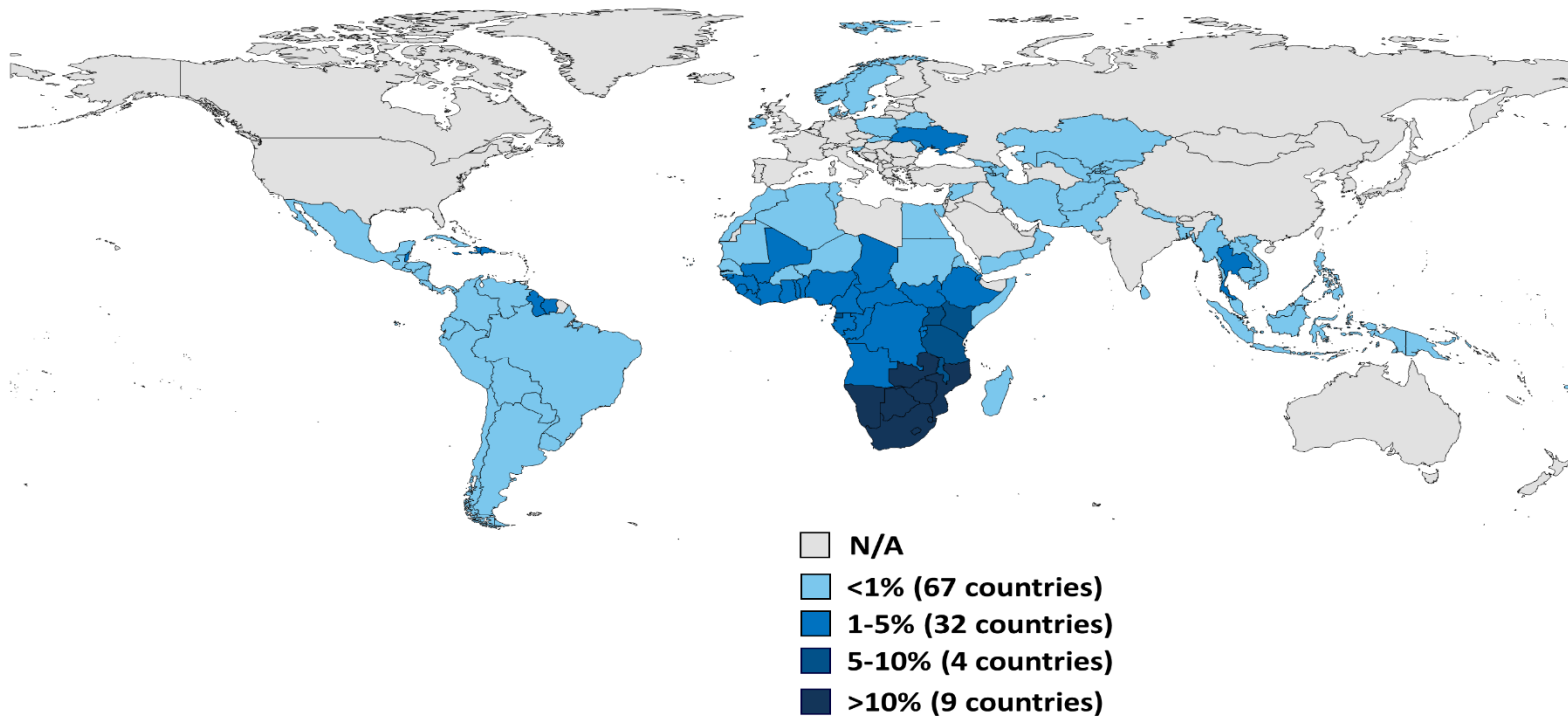
Control measures:

- Eliminate the high risk factors.
- Screening of blood pints & other risky groups.
- Health education Through:
- Avoid illegal sex.
- Avoid sharing needles or syringes.
- HIV infected mother should avoid breast-feeding.

Global distribution of HIV/AIDS

Adult HIV Prevalence Rate, 2014

Global HIV/AIDS Prevalence Rate = 0.8%



NOTES: Data are estimates. Prevalence rates include adults ages 15-49.

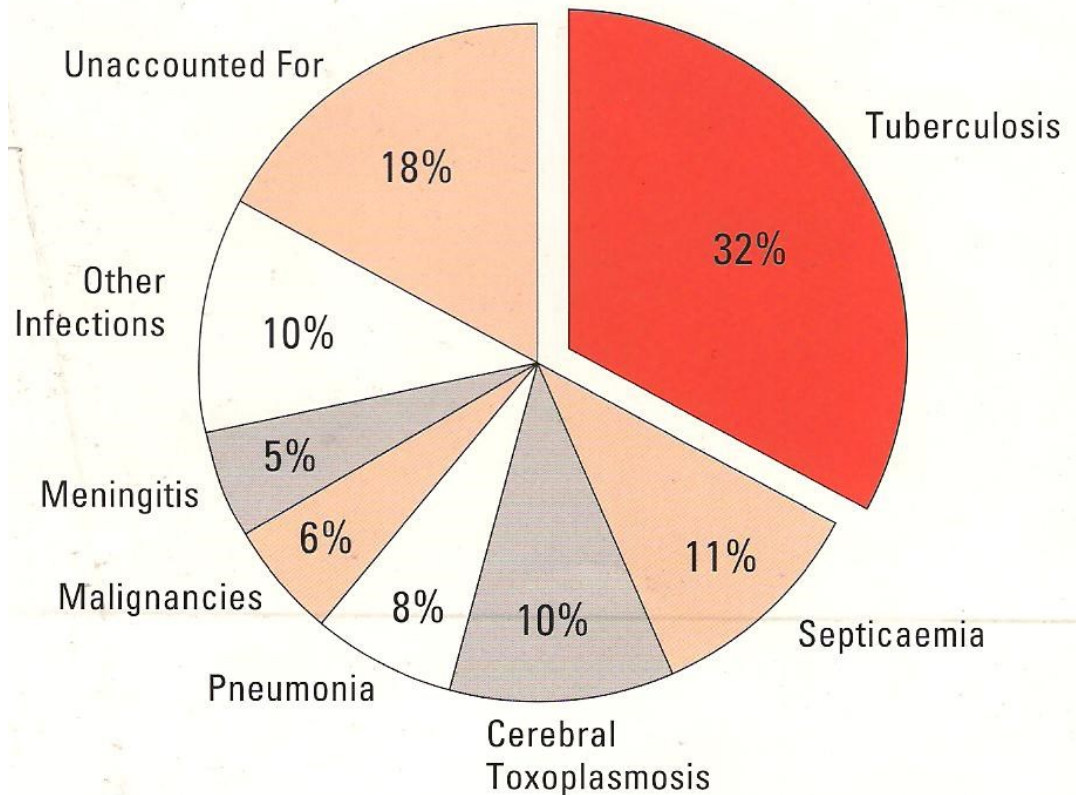
SOURCE: Kaiser Family Foundation, based on UNAIDS, How AIDS Changed Everything; 2015.

About 1/3 of the HIV positive persons are infected by *Mycobacterium tuberculosis* worldwide, accounting for 14 million people worldwide.

Globally, 9% of all TB in adults are attributed to HIV infection.

In Sub-Saharan Africa, 50%-70% of HIV positive patients are infected by TB. In SEA it is also high.

TB Is the Leading Killer of HIV-Positive People



Source: Study of prime causes of death in HIV-positive patients, Abidjan, 1991.