

# HIV and AIDS

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# HIV and AIDS

❖ Definition: **HIV**

**Infection with Human immunodeficiency Virus**

**which leads to :**

Chronic and without treatment usually fatal infection  
characterized by :

**A} Progressive immunodeficiency**

**B} Long latency period**

**C} Opportunistic infection**

# HIV AND AIDS

- HIV:

It is an **RNA Lentivirus virus** belong to retrovirus family . It is called " **Retrovirus** " :

## **Retrovirus:**

Information in the form of RNA is transcribed into DNA in the host cell .

# HIV AND AIDS

There are two viruses

HIV1 and HIV2.

HIV1 : Predominate world wide

❖ HIV2 : closely resemble HIV-1 BUT is a much slower progression to AIDS. It Predominate in western africa.

It causes diseases by **disrupting the immune system function** as measured by CD4 cell depletion called :

**AIDS**

Acquired Immune Deficiency Syndrome.

- The hallmark of HIV Disease:
- Infection and viral replication within T-lymphocyte expressing the CD4 antigen resulting in :

**Progressive depletion in CD4 cell counts .**

This effect on CD4 (**helper-inducer lymphocyte**) will increase the risk of:

- 1) Opportunistic infections such as Pneumocystis Jiroveci
- 2) Neoplasm such as Lymphoma and Kaposi sarcoma

## History

- **1<sup>st</sup> recognised in USA 1981**

CDC reported the occurrence of :

- 1) **Unexplained occurrence of pneumocystis pneumonia** in **5 healthy homosexual** in LA
- 2) **Kaposi sarcoma** in **25 healthy homosexual** men in NY and LA.....later on ;
- 3) The disease became recognised in both male and female with (IUDs) as well as
- 4) Recipients of blood transfusion and haemophilics

# HISTORY

- 1983 :
- HIV was isolated from patient with lymphadenopathy
- 1984 :
- HIV was demonstrated to be the causative agent of AIDS
- 1985 :
- ELISA test was developed.

# Epidemiology

## ❖ Asia

- 4.9 million people living with HIV
- National HIV prevalence is highest in southeast Asia 4.0 million
- Epidemic is expanding in Eastern Europe and central asia : 1.6 million



# EPIDEMIOLOGY ..2016

**36.7 million people globally were living with HIV in**

- 1.8 million people became newly infected with HIV
- 3.5 million are children (less than 15 )
- More than 2/3<sup>rd</sup> of all people with HIV live in **sub-saharan africa**
- 1 million people died from AIDS-related illnesses..
- 76.1 million people have become infected with HIV since the start of the epidemic.
- 35.0 million people have died from AIDS-related illnesses since the start of the epidemic.

- HIV is a fragile virus .It cannot live for very long outside the body
- HIV is primerly found in the blood,semen,or vaginal fluid of an infected person , so it is transmitted through :

# HIV and AIDS

## Transmission

❖ **Sexual** (heterosexual ,msm ,others)

Heterosexual is the most common mode of transmission worldwide.

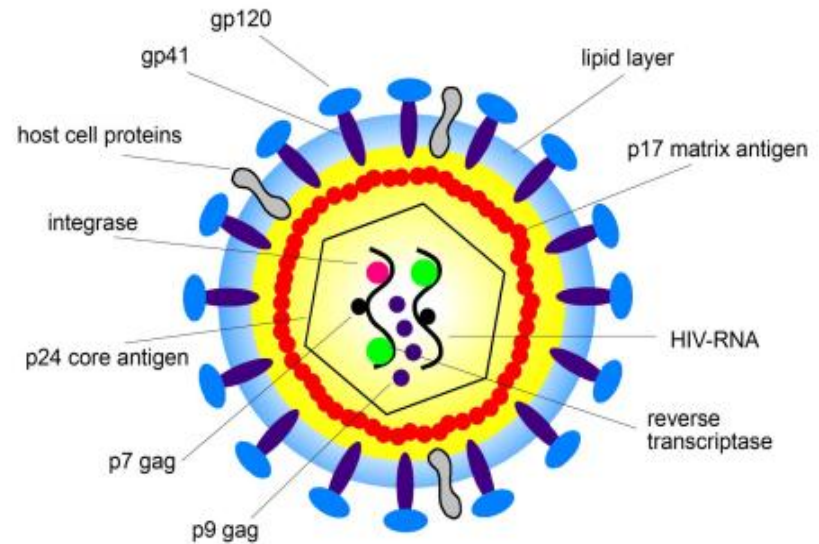
❖ **Vertical transmission** from pregnant woman to the newborn (MTCT) is the main mode of infection in children.

❖ **Blood and body fluid.**

❖ **IVDU.**

No evidence of spread by : casual contact .

# Structure of the virus



❖ It is an **RNA virus**

❖ It is an icosahedral متعدد السطوح structure of :

1) **Lipid Envelope** (env) derived from infected cell, containing numerous external spikes formed by two major envelope proteins :

a) **The external gp 120**

b) **The trans membrane gp 41**

2) **Nucleocapsid (gag)** with P24 major core protein .

The core contains two single strands of RNA.

3) **Polymearse** (pol)

# HIV life cycle & replication

- 1) Binding of Viral gp120 protein to CD4 receptor containing cells

T cell, Macrophages, and Microglial cells:

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then ...

gp 120 and gp41 bind to the chemokines :

**CCR5** and **CXCR4**

- 2) Fusion between cell membrane and the virion.

# HIV life cycle & replication

**3) Penetration**

**4) Upcoating**

**5) Reverse transcription**

**Formation of cDNA**

**6) Integration**

**7) Transcription of proviral DNA**

A) formation of genomic RNA

b) formation of structural mRNA

# HIV life cycle & replication

## 8) Translation of structural m RNA

- a) Formation of viral structural protein
- b) Packaging of genomic RNA of structural protein

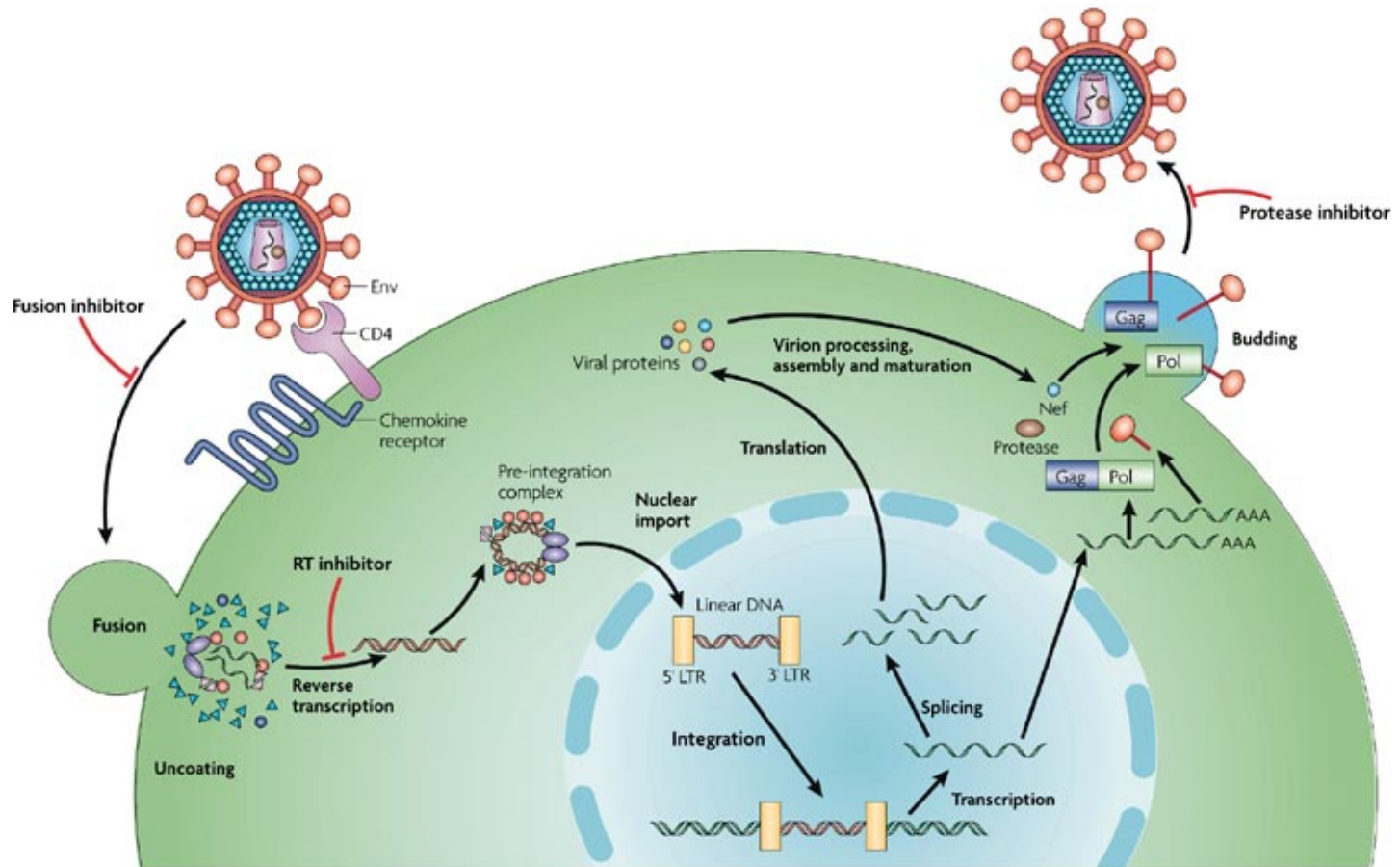
## 9) Final assembly

- a) insertion of viral specific glycoprotein into plasma membrane
- b) Budding
- c) Release of mature virions

## 10) Final maturation

BY cleavage of gag and pol by protease enzyme

# HIV life cycle & replication





# pathophysiology

- Early stage:
- Massive replication of the virus in the lymphatic tissues  
.subsequently
- Chronic immune system activation determine the course of the illness.
- Permanent viral reservoirs containing proviral DNA are established in the latent T cell or macrophages.

# Acute infection

- Acute HIV infection: (exposure to symptoms: 2-4 wks)
- It resembles infectious mononucleosis with :
- **Fever , Pharyngitis , Adenopathy**
- **Rash , myalgia, fatigue, oral ulcer**
- **Diarrhoea, anorexia.**
- **THEN.....**
- HIV RNA level falls and the symptoms resolve.
- CD4 cell count rebounds but remains below the baseline

# Chronic HIV infection

- **Asymptomatic chronic phase:**
- Active viral replication is ongoing and progressive.
- Patient with high HIV RNA may progress to symptomatic disease than those with low HIV RNA level.
- Chronic immune activation lead to increase in various inflammatory markers.
- This increase the risk of Non-AIDS related comorbidities: CVD, Renal dysfunction and cancer

# Diagnosis:

- ❖ ELISA: is the screening test ,used to screen blood products and patients.
- ❖ Combo test : will detect HIV1 and HIV2 and P24 antigen.  
Sensitivity of more than 99.5%

# Diagnosis:

- **Confirmation :**
- The INNO-LIA™ (HIV I/II) Score is a Line Immuno Assay (LIA®), to confirm : antibodies against the human  
(HIV-1) and (HIV-2)
- Also differentiates between HIV-1 and HIV-2
- Sensitivity 100% ... specificity : 96%

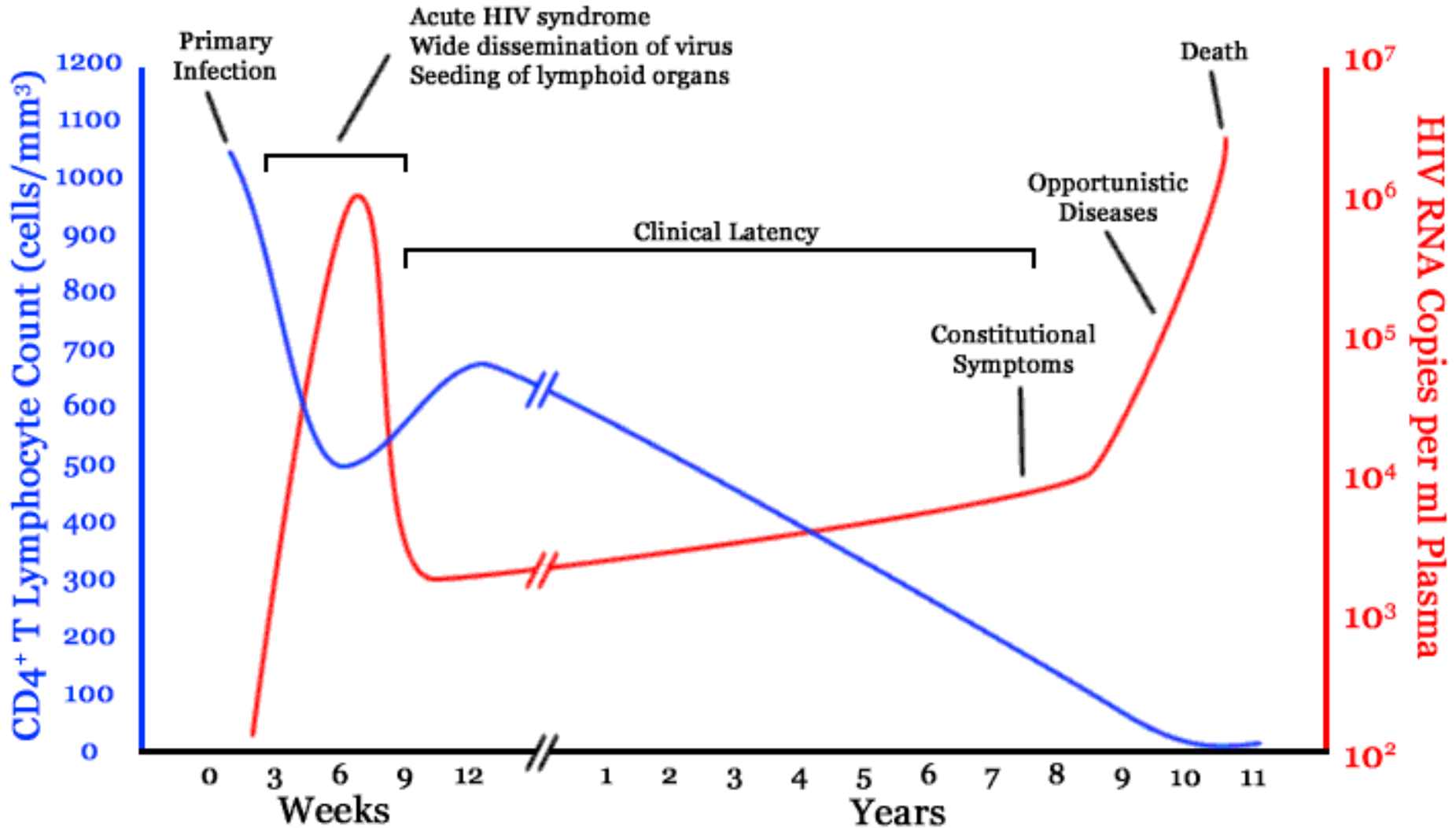
# Diagnosis

- ❖ **PCR: (polymerase chain reaction)** for quantitative RNA assay and used as :
  - 1) Confirmatory test for undetermined cases.
  - 2) To assess the viral load .
  - 3) Babies born to HIV-positive mothers, because their blood contains their mother's HIV antibodies for several months.
  - 4) Blood supplies

## **Not for routine testing:**

- a) Decreased sensitivity at lower viral load
- b) Significant cost.

# HIV Progression



# HIV and AIDS

- **Immunological staging:**

**CD4 positive T lymphocytes** level is the main method of assessing the immune status of the HIV positive patient.

1.  $>500$  cells/mm<sup>3</sup> normal immunity.
2. 350-500 cells/mm<sup>3</sup> mild deficiency.
3. 200-350 cells/mm<sup>3</sup> moderate immune deficiency.
4.  $<200$  cells/mm<sup>3</sup> severe immune deficiency



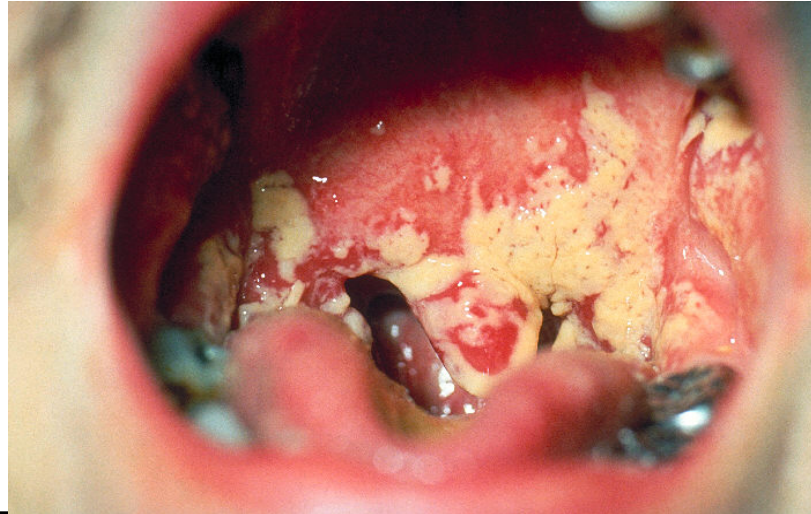
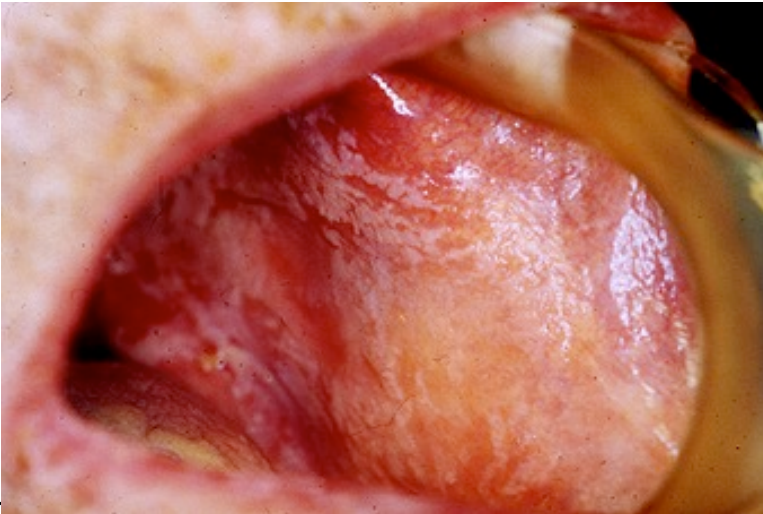
# Clinical manifestation

Physical examination:

- **Skin:** condition associated with HIV  
seborrheic dermatitis,
- **Oropharynx:**
  - 1) oral thrush
  - 2) hairy leukoplakia
  - 3) mucosal kaposi sarcoma
- **Lymph node:**  
Generalized lymphadenopathy (TB , Lymphoma).
- **Eyes:**  
Fundoscopy : CMV retinitis . ( CD4 less than 50 ).
- **Genital exam:** ulcers, condylomatous lesions ..



# ORAL TRUSH



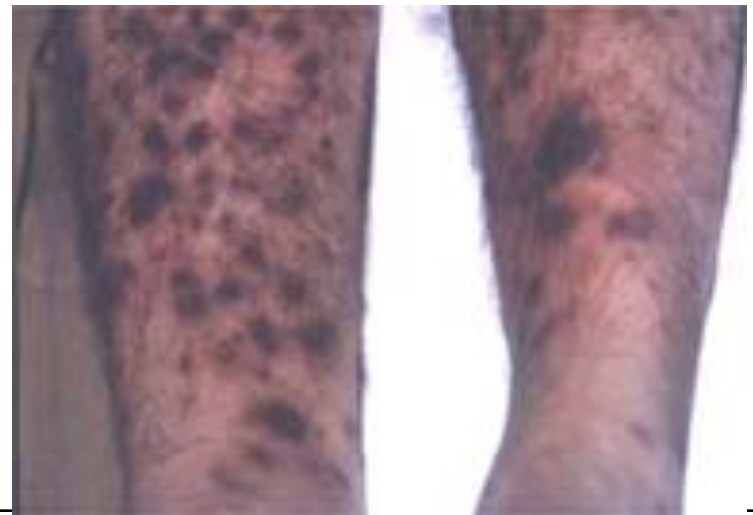
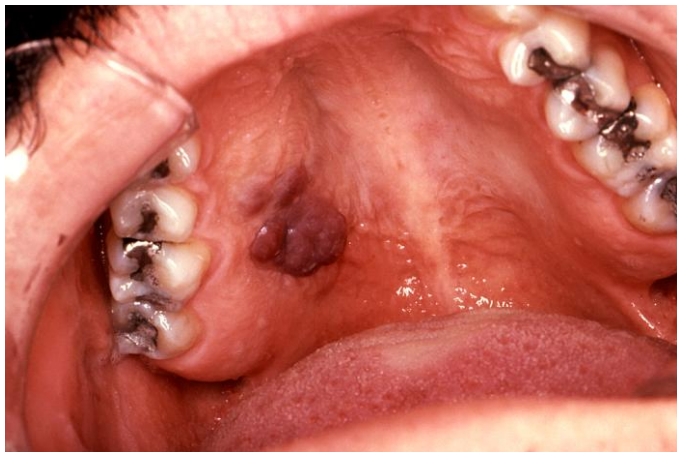
oral Trush  
Leukoplakia



Oral Hairy



# KAPOSI SARCOMA



## Condyloma acuminatum

- Condylomatous lesions: genital wart



A pointed papilloma typically found on the skin or mucous membranes of the anus and external genitalia, caused by :

**human papillomavirus ..HPV**

Transmitted through sexual contact ..

# HIV and AIDS

- ▶ Natural history:
- ▶ The **average time** from HIV to an AIDS- is **about 10 yrs**...then survival averages **1-2 yrs**.....**BUT**
- ▶ There is tremendous individual variability in these time intervals:
- ▶ Patients progress from acute HIV infection to death within 1-2 yrs.....and others
- ▶ Not manifesting HIV- related immunosuppression for 20 yrs

# Stages of HIV infections

## □ Stages of HIV infections:

### **A] Viral Transmission :**

The mode of transmission does not affect the natural history of HIV disease .

### **B] Acute HIV infection :**

Acute HIV occurs 1-4 wks after transmission .

Most patient manifest a symptomatic mononucleosis like-syndrom which is usually overlooked.

# Stages of HIV infections

## **C] Seroconversion :**

Development of a positive HIV antibody test within 4 wks and always by 6 months.

## **D] Asymptomatic HIV infection**

It lasts variable amount of time

average 8-10 yrs and is accompanied by a gradual decline in CD4 counts..



# COMPLICATION OF HIV/AIDS

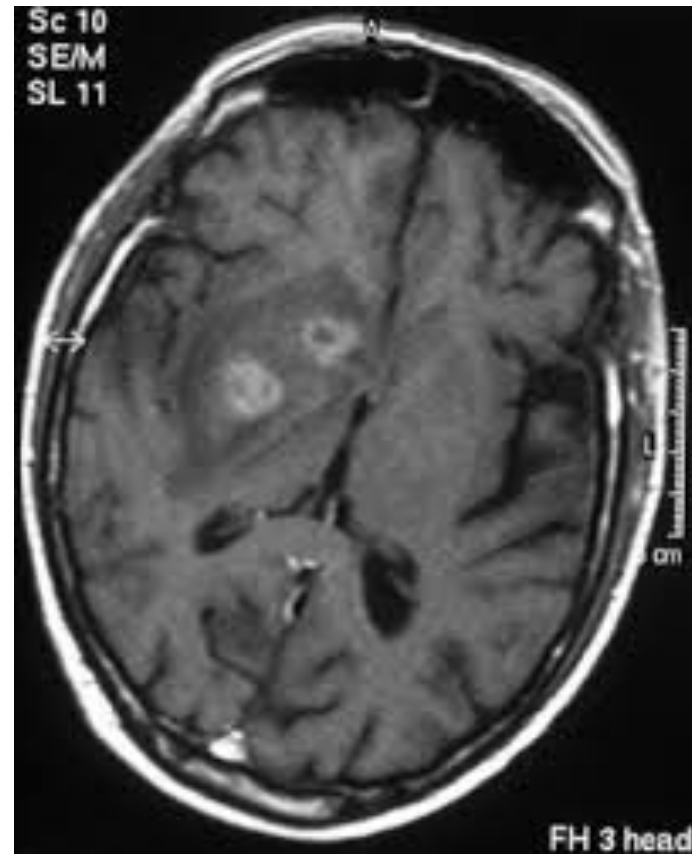
- **Tuberculosis (TB).** TB is the most common opportunistic infection and a leading cause of death .



- **Candidiasis.** It causes inflammation and a thick, white coating on the mucous membranes of the mouth, tongue, esophagus or vagina.

# COMPLICATION OF HIV/AIDS

- **Toxoplasmosis.** This potentially deadly infection is caused by *Toxoplasma gondii*, a parasite spread primarily by cats. It causes meningoencephalitis.
- DX: Serology and MRI.
- **Treatment:**
- **Combination of :**
- pyrimethamine plus  
sulfadiazine
- **Respond very well.**



# Complication OF HIV/AIDS

- **Cancers common to HIV/AIDS**
- **A] Kaposi's sarcoma.** A tumor of the blood vessel walls, common in HIV-positive patients. Rare in none.

Kaposi's sarcoma usually appears as pink, red or purple lesions on the skin and mouth and can also affect the internal organs, including the digestive tract and lungs.

- **B] Lymphomas.** NHL.

# Goals of Antiretroviral Therapy (ART)

## **Eradication of HIV?**

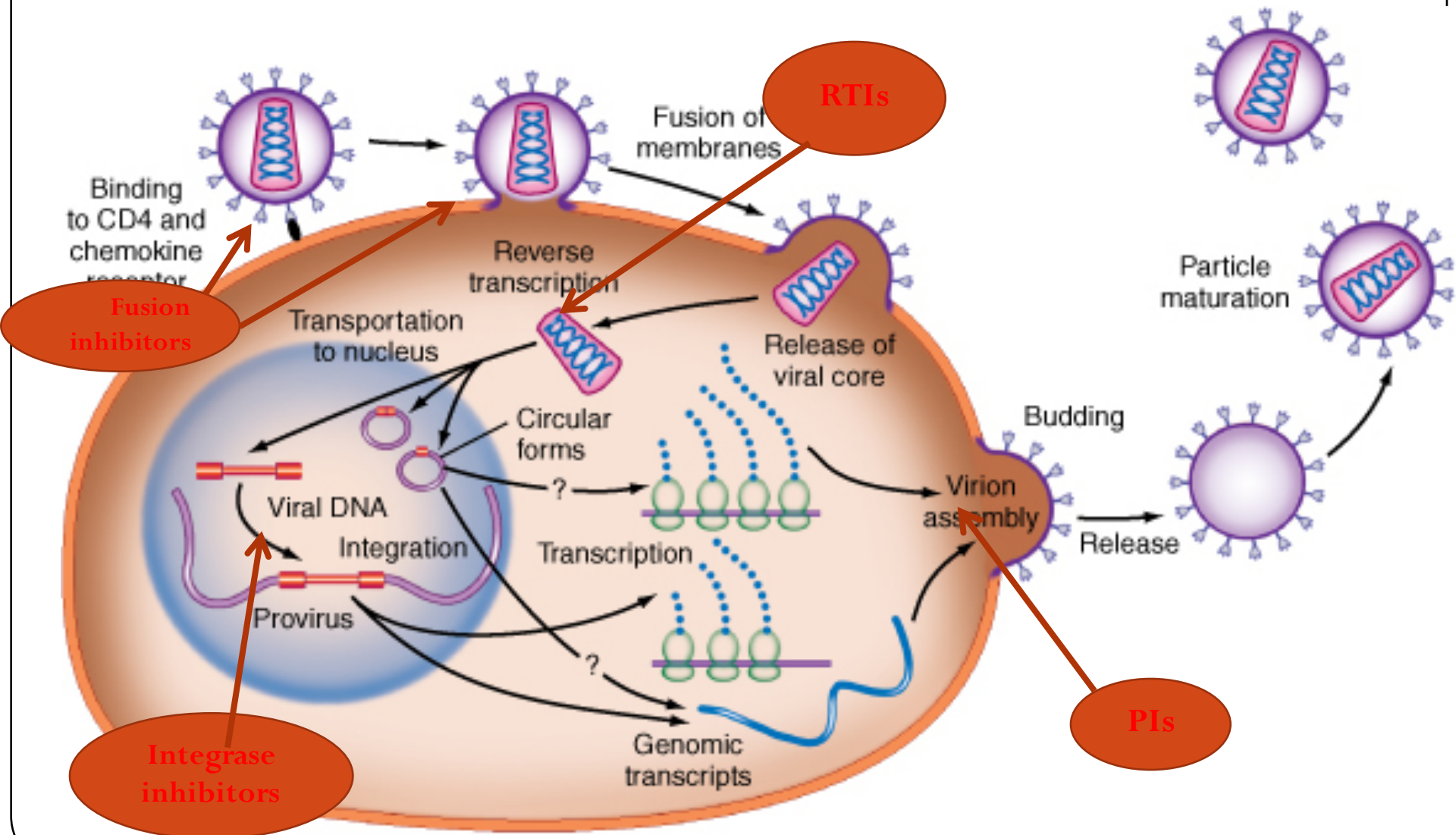
**Not possible with currently available antiretroviral medications.**

- **Improvement of quality of life**
- **Reduction of HIV-related morbidity and mortality**
- **Restoration and/or preservation of immunologic function**
- **Maximal and durable suppression of viral load**

# Treatment:

- Prophylaxis:
- If CD4 is below 200 :
- Patient at high risk to develop :
  - 1) *Pneumocystis jirovecii*: *Causing Pneumonia*  
*Prophylaxis:* co-trimoxazole 1 ds OD
  - 2) *Mycobacterium Avium-Intracellulare*:CD4 count less than 50 cells/mm<sup>3</sup>  
*Prophylaxis:* clarithromycin 500 mg orally twice a day.

# HIV life cycle



# Treatment

- Indication of initiation of antiretroviral drugs

- ❖ **Chronic infection**

- a) Symptomatic disease .

- b) A symptomatic disease with

- 1) CD4 count less than 350

- 2) Pregnancy

- ❖ **Post exposure prophylaxis.**

# Prevention

- ▶ The only absolute way to Prevent sexual transmission of HIV infection is ::  
اتباع قول الله تعالى

{ وَلَا تَقْرَبُوا الزَّانِيَ إِنَّهُ كَانَ فَاحِشَةً وَسَاءَ سَبِيلًا }

- ❖ **Abstinence from sexual relation completely**
- ▶ **Safer sexual contact :**  
Use of condom...10% failure rate .
- ▶ **Circumcision** : results in **50% reduction of HIV acquisition**
- ▶ **Stop using IDUs**
- ▶ **Screen all blood** and blood products





# Prevention

- The corner stone of an HIV prevention strategy is :
  - ❖ **Education**
  - ❖ **Counseling**
  - ❖ **Behaviour modification**
- ❖ If more than 25% of infected patient does not know . What to do ?
  - ..Routine testing between 13 and 64 ys..(CDC recommendations without written consent)

# Pregnancy and HIV infection

Pregnant women infected with HIV infection carries risk to infect her baby by:

- 1) **In utero ...25-40%**
- 2) **Intrapartum ...60-75%**
- 3) **Breast feeding :**
  - 1) Established infection 14%
  - 2) Primary infection 29%

Current evidence suggests **most transmission** occur during the **intrapartum period** .

Overall risk for mother to child transmission (MTCT) is **16- 25 %**  
( without antiretroviral Rx)

# Perinatal hiv transmission

- Today the risk of perinatal transmission is :

Less than 2% with :

- ✓ **Effective antiretroviral therapy (ART)**
- ✓ **Elective caesarean section when appropriate**
- ✓ **Formula feeding**

Thank you

Any Q