ACQUIRED IMMUNODEFICIENCY SYNDROME (HIV infection, AIDS)

By:

Assistant professor

Dr.Yossra K. Al- Robaiaay

What is HIV?

- **H**uman: Infecting human beings
- **I**mmunodeficiency: Decrease or weakness in the body's ability to fight off infections and illnesses
- **V**irus: A pathogen having the ability to replicate only inside a living cell

Historical Background:

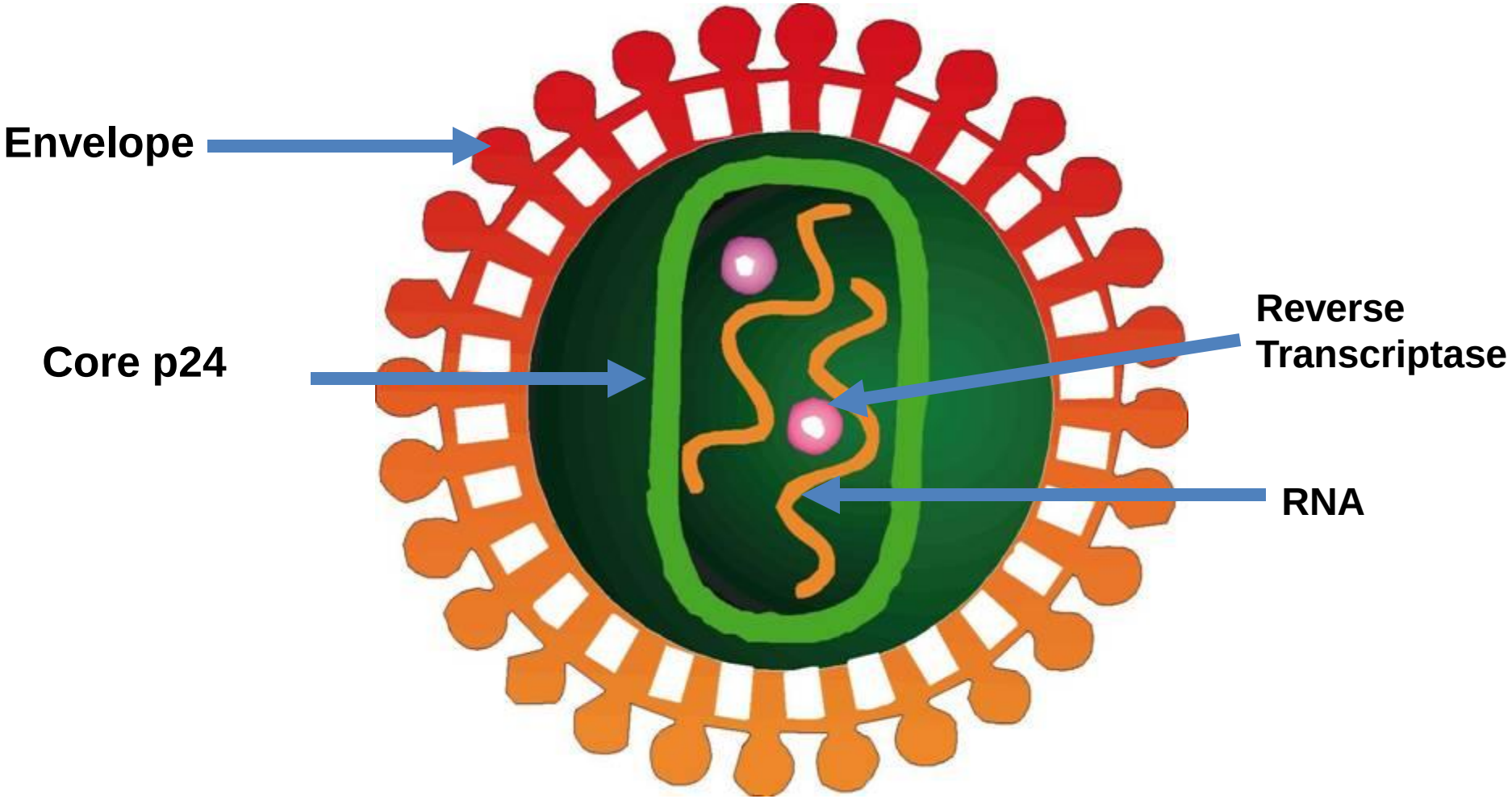
- **In 1981; Three cases of acquired immune suppression affected a previously healthy males, they were drug addict & homosexuals.**

- **In 1983; The possibility of infectious agents of viral origin & isolation of the virus were done at the same year named LAV3. or HTLV3.**

- **In 1985; Taxonomic classification Name the virus as HIV**

- **In 1987; HIV1 & HIV2**

Structure of HIV



STI & AIDS

Virology

The causative agent belong to Lenti virus belong to Retoviridae group that derived their names from their enzymes reverse transcriptaze.

It is 100nm in diameter it has an outer bilayered envelope marked by studs of :

glycoprotein 120 gp & 41 gp.

- **The virus can be easily destroyed by heat or ordinary Chemicals, but relatively resist IR & UVR.**
- **Present in All body fluids, blood, semen,vaginal …..**

STI & AIDS

Virology

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- The core of the virus contain dense core protein P17 & P24 inside a dense nucleocapsed containing diploid RNA genome (2 single stranded RNA)
- The virus can be easily destroyed by heat or ordinary Chemicals, but relatively resist IR & UVR.
- Present in All body fluids, blood, semen,vaginal …..

EPIDEMIOLOGY

- **It is a major & global public health problem it has social, economic, cultural & political impact.**

- **It is the most serious rapid pandemic happened in the 20th century, 16000 infected /day, 1/10 second, 7 million/year**

Global situation and trends:

- Since the beginning of the epidemic, **85.6** million people have been infected with the HIV virus.

- About **40.4** million people have died of HIV.

- **Almost 1 million people die from HIV/AIDS each year; in some countries, it's the leading cause of death**

- Globally, The latest statistics on HIV around the world from WHO include: Number of People living with HIV—There were approximately **39** million people across the globe with HIV in 2022. Of these, **37.5** million were adults, and **1.5** million were children (<15 years old). In addition, **53%** were women and girls.

- The WHO African Region remains most severely affected, with nearly **1 in every 25** adults living with HIV and accounting for more than two-thirds of the people living with HIV worldwide.

- **For each case of AIDs ,there is around 10 cases subclinical**

(AIDS)

Acquired Immunodeficiency syndrome (AIDS) is a term first used by epidemiologists in 1981 concerned about the emergence of a cluster of diseases associated with loss of cellular immunity in adults who had no obvious reason for presenting such immune deficiencies.

- **AIDS is the late clinical stage of infection with the human immunodeficiency virus (HIV)**
- **Within weeks to months after infection with HIV, many persons develop an acute self-limited mononucleosis-like illness lasting for a week or two.**
- **They may then be free from clinical signs or symptoms for months or years before other clinical manifestations develop.**

More than a dozen of opportunistic infections and several cancers were considered to be sufficiently specific indicators of the underlying AIDS.

Other Presentations

Includes:

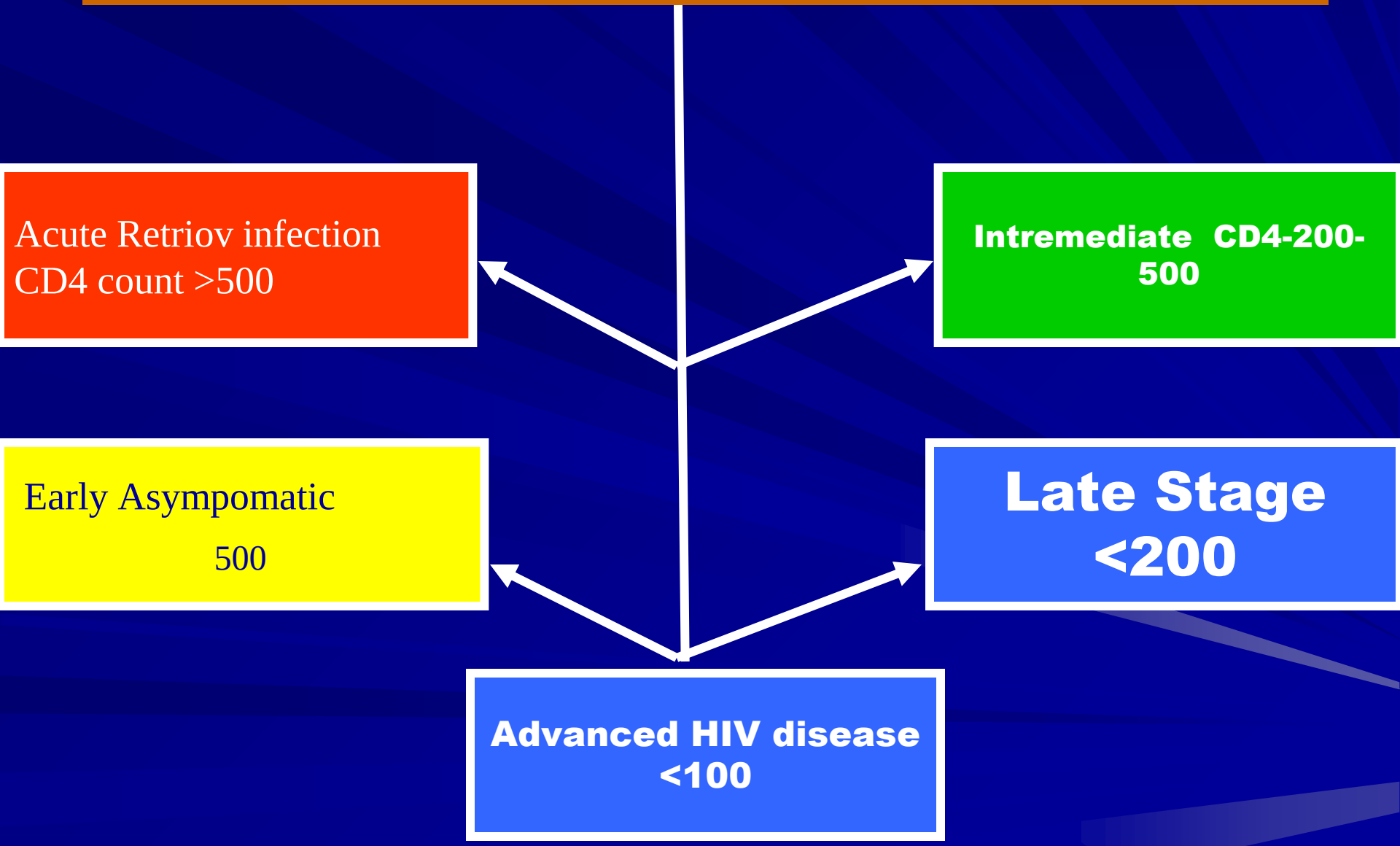
- **Tuberculosis, pneumococcal disease and non- typhoid salmonellosis, which are not diseases of high virulence.**
- **Bacterial pneumonia is one of the commonest presentations.**

Diagnosis

All HIV-infected persons are regarded as AIDS cases if: CD4 (cluster of differentiation 4) is a glycoprotein that serves as a co-receptor for the T-cell receptor (TCR).

1. **CD4 cell count of under 200/mm3 or**
2. **CD4 T-lymphocyte percentage of total lymphocytes under 14%, regardless of clinical status.**

Laboratory Spectrum of AIDs



Diagnosis

The most commonly used screening test:

1. **EIA or ELISA is highly sensitive and specific .**
2. **Western blot test.**

detectable antibodies within 1- 3 months after infection

3. HIV antigen

4. PCR tests to detect viral nucleic acid sequences..

Diagnosis

Passively transferred maternal anti-HIV antibodies often cause falsely positive anti-HIV EIA tests in those children even up to the age of 15 months.

Case-fatality

- **In the absence of effective anti-HIV treatment, the AIDS case-fatality rate is high.**
- **Survival time in many developing country studies is often under 1 year.**
- **In industrialized countries 80%–90% of untreated patients die within 3–5 years after diagnosis.**

Infectious agent

Human immunodeficiency virus (HIV), a retrovirus.

Two serologically and geographically distinct types with similar epidemiological characteristics‹

HIV-1 and HIV-.2

The pathogenicity of HIV-2 may be lower than that of HIV-1

Types of HIV Virus

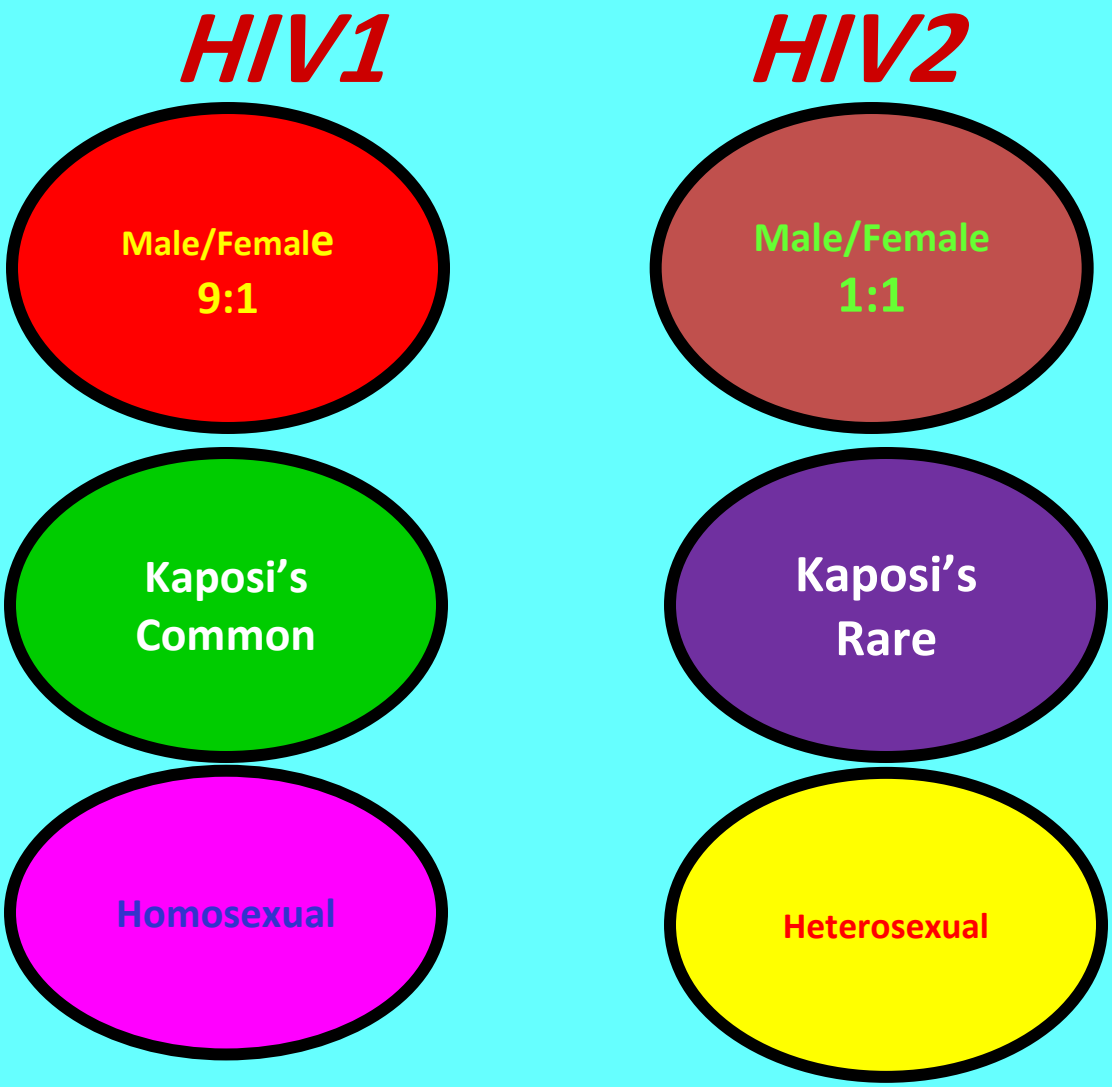
HIV 1 •
- Most common in sub-Saharan Africa and throughout the world
- Groups M, N, and O
- Pandemic dominated by Group M
  - Group M comprised of subtypes A - J

HIV 2 •
- Most often found in West Central Africa, parts of Europe and India.

- Both produce the same patterns of illness. HIV2 causes a more slow progress of disease than those with HIV 1

- It is important for tests to detect the HIV subtypes that are circulating in the region. Otherwise, testing may lead to false negative results.

HIV & AIDS


HIV1
HIV2
Male/Female
9:1
Male/Female
1:1
Kaposi's
Common
Kaposi's
Rare
Homosexual
Heterosexual
USA , Europe
Africa

Occurrence

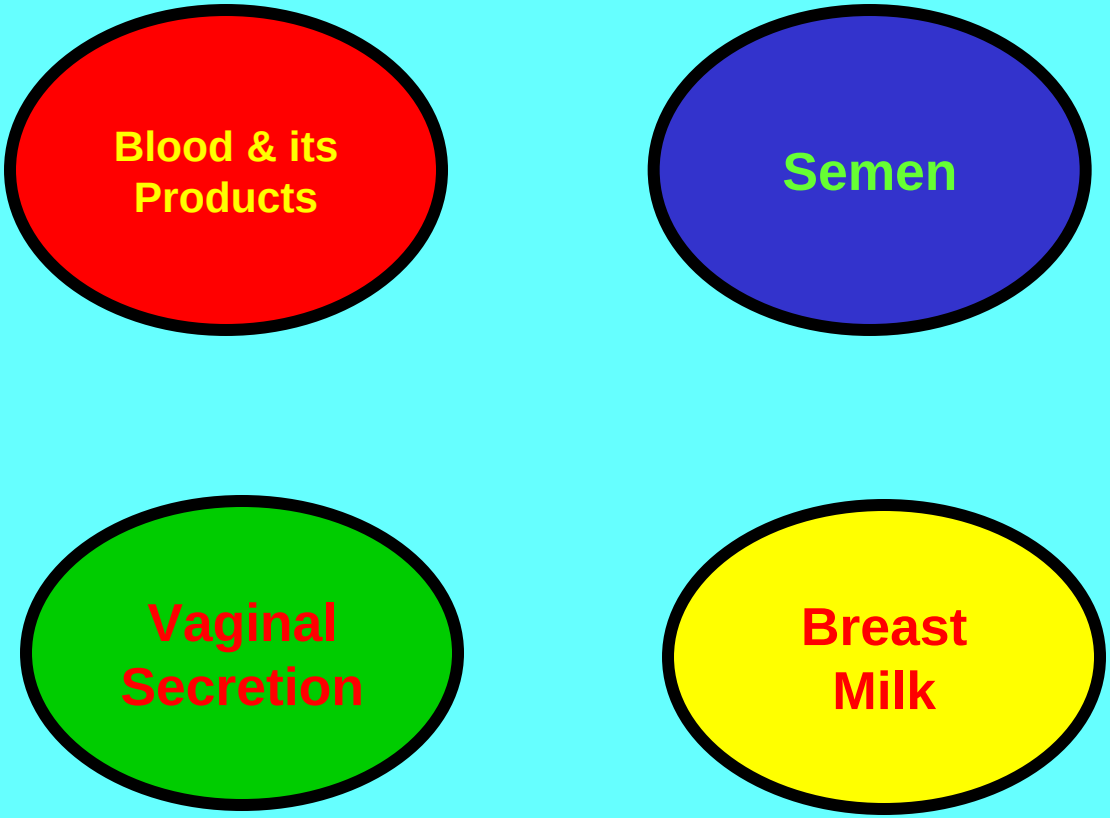
- **AIDS was first recognized as a distinct clinical entity in 1981.**
- **Of the estimated 40 million persons living with HIV infection or AIDS worldwide, 25–28.2 million case in sub-Saharan Africa.**
- **In sub-Saharan Africa, AIDS is called "slim disease."**

Reservoir

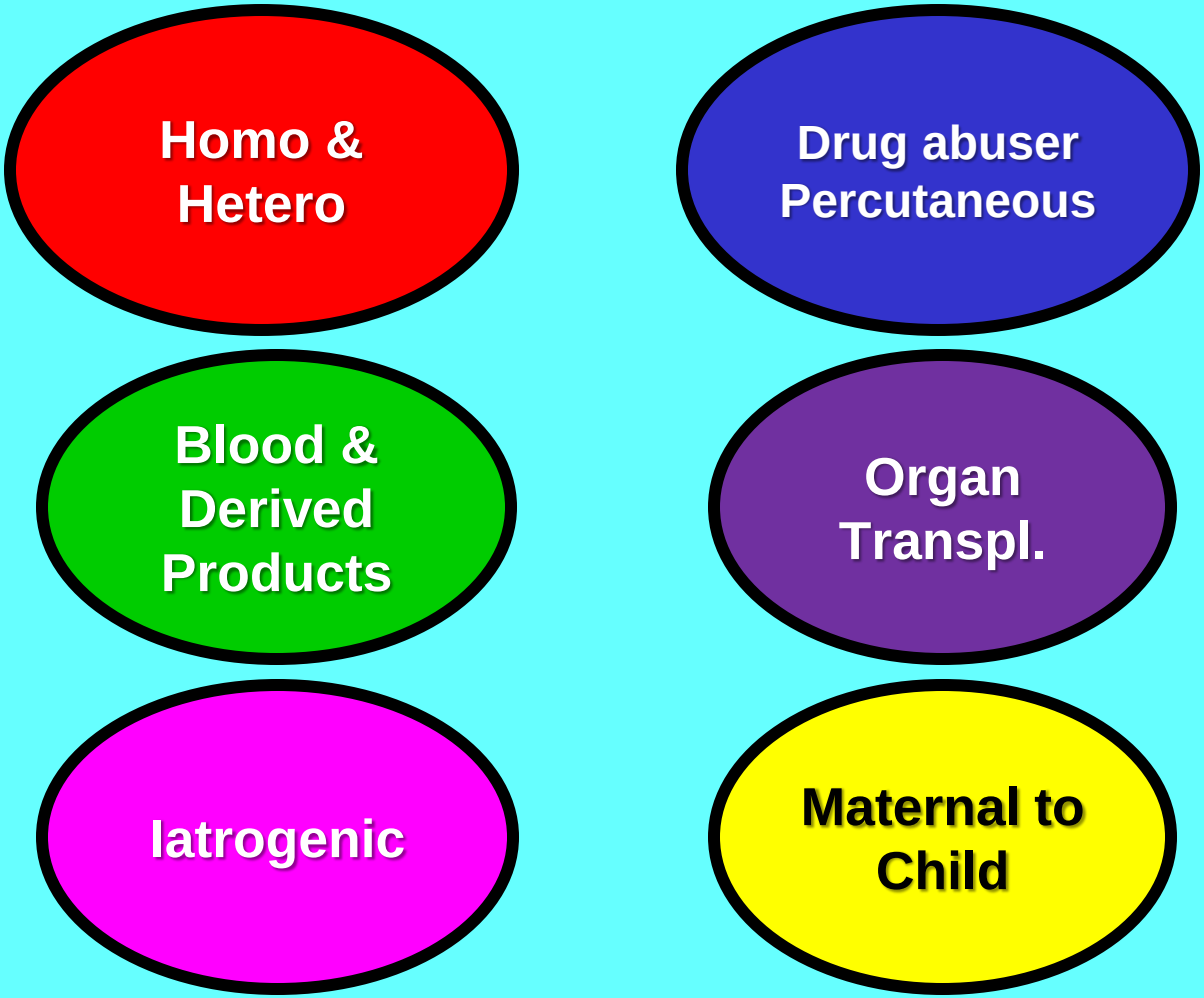
Humans HIV is thought to have recently evolved from chimpanzee viruses.

HIV & AIDS-Reservoir

Present in All body fluids



HIV & AIDS-Transmission



Mode of transmission

Person to person transmission through

1 Unprotected (heterosexual or homosexual) intercourse

2 Contact of abraded skin or mucosa with body secretions such as blood, CSF or semen.

3 The use of HIV- contaminated needles

4 Transfusion of infected blood or its components

5 The transplantation of HIV-infected tissues or organs.

Mode of transmission

6- HIV transmitted from mother to child

- **From 15% to 35% of infants born to HIV-positive mothers are infected through placental processes at birth.**
- **HIV-infected women can transmit infection to their infants through breast-feeding.**

Mode of transmission

- **the presence of a concurrent sexually transmitted disease, (ulcerative) can facilitate HIV transmission.**

Incubation period

- **Variable.**
- **The time from infection to the development of detectable antibodies is generally 3-8 weeks.**
- **The time from HIV infection to diagnosis of AIDS range from less than 1 year to 15 years or longer.**

Window Period

The time from initial infection with HIV until antibodies are detected by a single test.

Usually 3-8 weeks before antibodies are detected may test false-negative for HIV antibodies during this time period.

Can still pass the virus to others during this period

Represents the stage when the person have been infected with HIV, but his body hasn't created antibodies.

"Seroconversion" is a term used to describe the change when antibodies are produced and the blood is tested positive.

Seroconversion occurs when the body first begins to produce antibodies to HIV. In other words, the blood may be negative to HIV antibodies during a time period after infection, but may convert to positive to HIV antibodies after a certain period. Generally 3-8 weeks after the initial infection.

HIV infection, AIDS

The only factor that has been shown to affect progression from HIV infection to the development of AIDS is age at initial infection:

Adolescent and adults (males and females) who acquire HIV infection at an early age progress to AIDS more slowly than those infected at an older age.

Period of communicability

Begins early after HIV infection and extends throughout life. Infectivity increases:

1- During the first months
2- With viral load
3- With worsening clinical status
4- With the presence of other STI

Susceptibility

Factors increase susceptibility

1. **Presence of other STIs (ulcerative)**
2. **Not being circumcised for males, a factor possibly related to the general level of genital hygiene.**

Interaction with other infections

1-The major interaction is with Mycobacterium tuberculosis infection.

- **Persons with latent tuberculous infection who are infected with HIV develop clinical tuberculosis at an increased rate.**
- **Lifetime risk of developing tuberculosis is multiplied by a factor of 6–8**

Interaction with other infections

2- Other adverse interactions with HIV infection

- **include pneumococcal infection**
- **non-Typhiod salmonellosis**
- **falciparum malaria**
- **visceral leishmaniasis.**

Methods of control

A- Preventive measures:

1. Public and school health education must stress that having multiple and especially concurrent and/or multiple sexual partners or sharing drug both increase the risk of HIV infection.

- **Programs for school-age youth should address the needs and developmental levels of both students and those who do not attend school.**

Preventive measures

2- The only absolutely sure way to avoid infection through sex to abstain from sexual intercourse or to engage in mutually monogamous sexual intercourse only.(avoid promiscuous sex)

In other situations, latex condoms must be used correctly

Preventive measures

3- Expansion of facilities for treating drug users reduces HIV transmission.

Preventive measures

4- HIV testing and counselling for:

a) persons who are ill or involved in high-risk behaviors.

b) attenders at antenatal clinics, to diagnose maternal infection

c) couple counselling (marital or premarital)

d) confidential HIV counselling and testing for the "worried well."

Preventive measures

5- All donated units of blood must be tested for HIV antibody, only donations testing negative can be used.

People who have engaged in behaviors that place them at increased risk of HIV infection should not donate plasma, blood, organs for transplantation, tissue or cells (including semen for artificial insemination)

Preventive measures

6- Care must be taken in handling, using and disposing of needles or other sharp instruments. Health care workers should wear latex gloves, eye protection and other personal protective equipment in order to avoid contact with blood or with fluids

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Preventive measures

7- WHO recommends immunization of asymptomatic HIV infected children with the EPI vaccines.

Those who are symptomatic should not receive BCG vaccine.

B. Control of patient, contacts and the immediate environment:

1) **Report to local health authority:**

2) **Isolation: Isolation of the HIV-positive person is unnecessary, ineffective and unjustified.**

B. Control of patient, contacts and the immediate environment:

3- Notification of contacts and source of infection: The infected patient should ensure notification of sexual and needle sharing partners whenever possible.

Notification by the health care provider is justified only when the patient, after counselling, still refuses to notify his/her partner(s), and this will not harm the index case.

B. Control of patient, contacts and the immediate environment:

Prior to the development of relatively effective antiretroviral treatment

1 Prophylactic use of oral trimethoprim-sulfamethoxazole, with aerosolized pentamidine is recommended to prevent *P. carinii pneumonia.*

***2All HIV infected persons* should do tuberculin skin tests and be evaluated for active TB.**

B. Control of patient, contacts and the immediate environment:

3- If active TB is found, anti tuberculosis treatment should be given.

If no active TB is found, patients who are tuberculin-positive or were recently exposed should be offered preventive treatment with isoniazid for 12 months

Treatment

AIDS must be managed as a chronic disease,

antiretroviral treatment is complex

involving a combination of drugs:

resistance will rapidly appear if a single drug is used.

The drugs are toxic and treatment must be lifelong.

Treatment

A successful treatment is not a cure, although it results in suppression of viral replication.

In general, a protease inhibitor and two non-nucleoside reverse transcriptase inhibitors should be used initially.

Post Exposure Prophylaxis

The factors to consider before recommending post exposure prophylaxis (PEP) includes:

1. **The nature of the exposure**
2. **Whether the exposed worker might be.**

   pregnant
3. **The local occurrence of drug resistant**
4. **HIV strains.**

Post Exposure Prophylaxis

- **Include a basic 4-week regimen of two drugs (zidovudine and lamivudine) for most HIV exposures**
- **An expanded regimen that includes the addition of a protease inhibitor (indinavir or nelfinavir**

Thank You