

Immunodeficiency

Produced by: Assistant Professor Dr. Ala'a Hassan Mirza Hussain

Immunodeficiency

Loss of normal immune response due to deficiency in either general or special defense mechanisms is called immunodeficiency.

Deficiency of general defense mechanisms like defect in inflammation, deficiency in Phagocytotic system, abnormality in the integrity of natural barriers such as skin, mucous membrane, secretion.

Deficiency in special defense mechanisms like:

- -Deficiency in humeral immunity "like B lymphocyte, immunoglobulin"
- -Deficiency in cellular immunity "T lymphocytes"
- -Deficiency in complement system.

Causes of Immunodeficiency:

1. Genetic "Inherited"

2. Acquired

Drugs

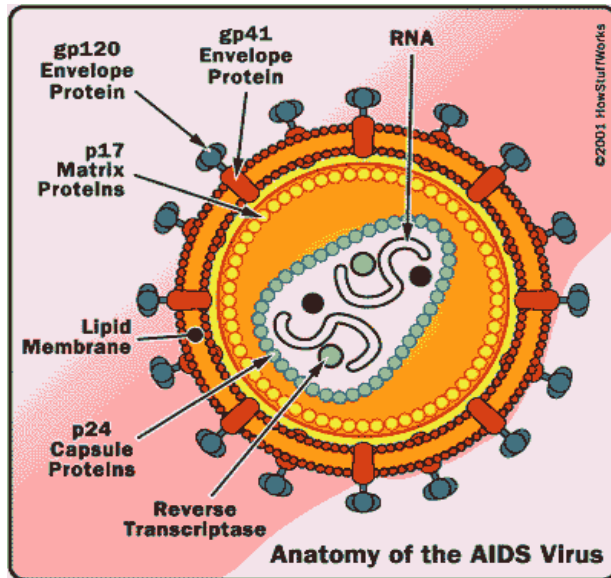
Infection

Acquired Immunodeficiency Syndrome (AIDS)

AIDS is a viral disease characterized by severe immunosuppression that leads to opportunistic infections, secondary neoplasms and neurologic manifestations.

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Anatomy of the virus

Transmission:

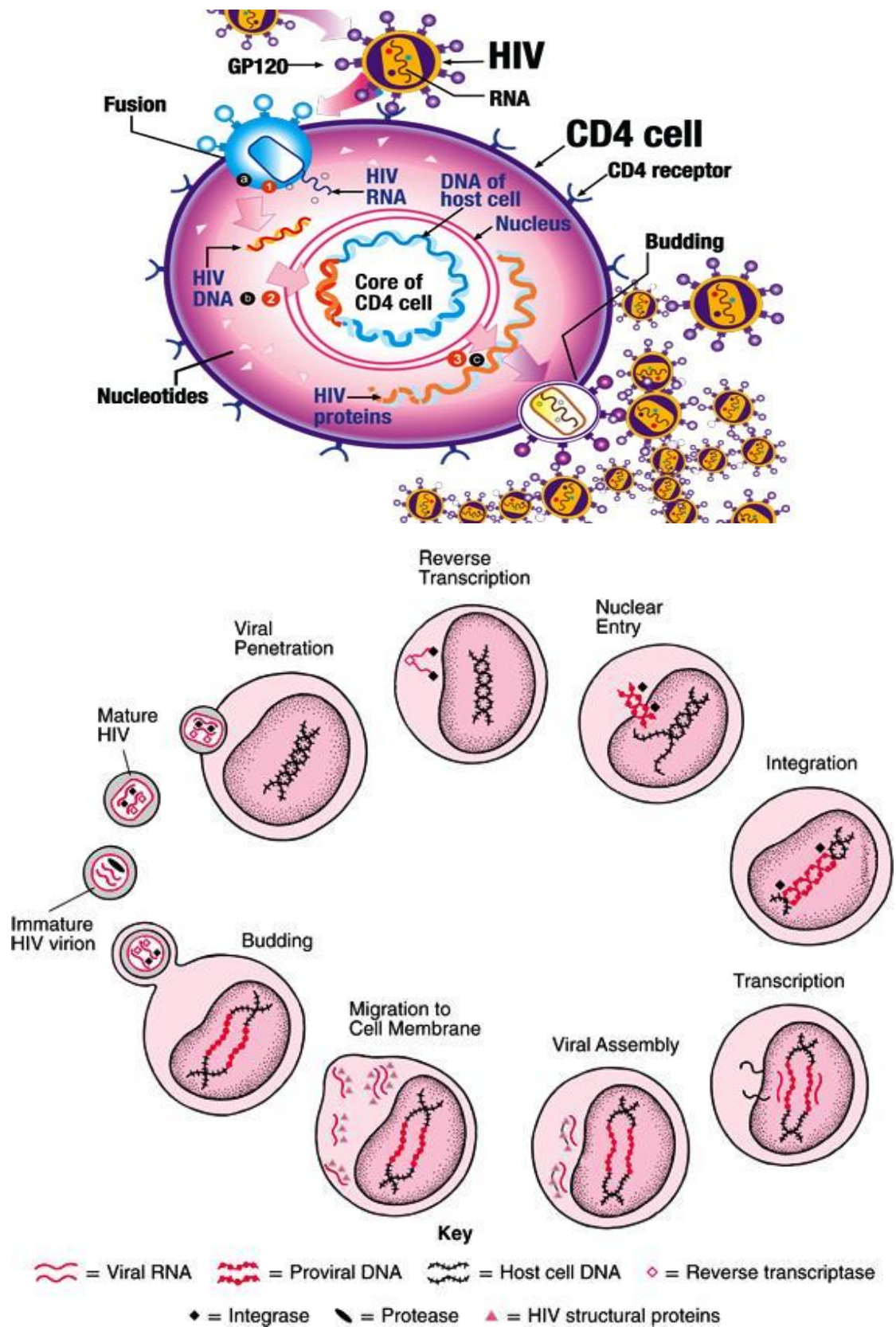
1. Sexually (homosexual or heterosexual).
2. Blood transfusion (whole blood, plasma, platelets, clotting factors).
3. Intravenous drug abuser.
4. Prenatally from mother to child (utero, during labor, and milk).
5. Virus not spread by insect vectors.

Pathophysiology of AID

- Human infectious Virus belong retrovirus (RNA virus).
- Human infectious virus infects a limited number of cells including:
 1. Lymphocytes "T4"
 2. Monocytes/ Macrophages
 3. Dendritic cells
- Lymphocyte (T4), monocyte and dendritic cells have receptor which is called CD4.
- Human Infectious virus (HIV) has affinity to binds to the CD4 receptors.
- After HIV binding to the CD4 receptors the virus enter the lymphocyte and sheds its protein coat. Proviral DNA is integrated into DNA of the host cell.
- The infected person remains asymptomatic although serologic can identify antibodies to HIV within 2 weeks to three months.

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Clinical manifestation

1. Acute stage "associated with primary infection".
2. Asymptomatic stage "prolonged"
3. Advanced stage "AIDS".

Acute stage:

- This stage appears within 3-6 weeks after infection, fever, sweat, myalgia, arthralgia, malaise, sore throat, nausea, headache, vomiting, general lymphadenopathy, hepatic and splenic enlargement, and transient macular erythematous rashes.
- These symptoms last for one to several weeks and usually subside as an immune response to HIV develops and the level of plasma viremia decreases.

Asymptomatic stage:

- The median time for untreated patients is about 10 years.
- In this stage the number of virus is increased and there is low level decline (unapparent decline) in the count of T4 cell.
- The average rate of T4 cell decline is about 50 cell /ml per years.

Advanced stage (AIDS):

This stage appears when the T4 cell count under 200 cell/ ml, therefore opportunistic infections and tumors can be seen in many organs in the body.

Respiratory infections:

- Pneumonia due to infection with *pneumocystis carinii*. This microorganism can cause pneumonia in immune-suppressed people, but relatively rare in healthy people.
- Pneumonia occurs due to other infection like: *Mycobacterium tuberculosis* TB, Streptococcus, Cytomegalovirus.

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Digestive system:

1. **Esophagitis** inflammation of the lower end of the esophagus. Characterized by painful swallowing.

occurs due to:

1. fungal infection (candidiasis)
2. viral (herpes simplex-1 or cytomegalovirus) infection
3. In rare cases, it could be due to *Mycobacterium*.



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2. Diarrhea occurs due to bacterial infection like *Salmonella*, *Shigella*, *Listeria*, and *Compylobacter*, and rarely due to virus infection.

Nervous system:

- The clinical findings arise from the direct effects of the retrovirus on the CNS and from opportunistic infections like toxoplasma encephalitis (caused by *Toxoplasma gondii*) and cryptococcal meningitis (caused by *Cryptococcus neoformans*). It can cause fever, headache, fatigue, nausea, vomiting, memory loss, difficulty in concentrating, euphoria, then develop to dementia, ataxia, tremor, paraplasia. Patients may also develop seizure and confusion than death can be occurs.

Tumors and malignancies:

- Patients with HIV infection have substantially increased incidence of several cancers. This is primarily due to co infection with an oncogenic DNA virus, especially Epstein –Bar virus, Kaposi sarcoma and human papilloma virus.

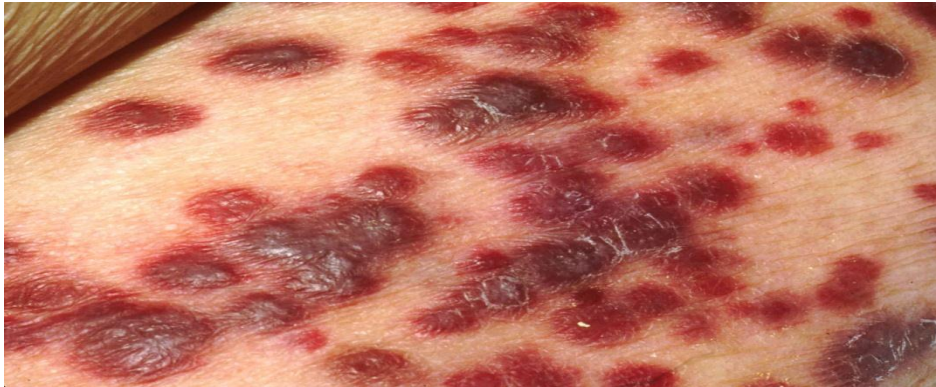
Kaposi's sarcoma:

It is a malignancy of endothelial cells that line small blood vessels. •

- Kaposi's sarcoma occurs in immunosuppressed people (e.g. organ transplanted patients and people with AIDS).
- The disease is usually begins as one or more macules or violate lesions that enlarged and become darker. They are usually in painless in the early stages; Kaposi's sarcoma appears mainly on the trunk, neck, head. But may be invaded internal organs including the lungs and GIT.

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Diagnosis: Detect antibodies against HIV.

Treatment: acts by

1. Blocking CD4 receptors to prevent virus attachment with cell
2. Anti reverse transcriptase to prevent RNA conversion to DNA.

