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Department of Biomedical Engineering

Course Name: 19GET277 – Biology for Engineers

IV Year : VII Semester

UNIT III – HUMAN DISEASES

Topic : Definition, Causes, symptoms, Diagnosis, Treatment and prevention of AIDS



HIV -Human Immunodeficiency Virus

- HIV stands for Human Immunodeficiency Virus. It's a virus that lives in human blood, sexual fluids, and breast milk. The virus breaks down certain cells in the body's immune system. When HIV damages the immune system, it's easier to get sick and even die from infections that the body could normally fight off.
- There's no cure for HIV, but medicines can help a person stay healthy.



What is the difference between HIV and AIDS?

- HIV is the virus that causes AIDS (Acquired Immune Deficiency Syndrome), a chronic life-threatening condition. AIDS is the most serious stage of HIV, and it leads to death over time. A person can have an HIV infection, with few or no symptoms, for years before it turns into AIDS.
- AIDS is diagnosed when the number of CD4 cells, which are the immune system's key infection fighters, falls below 200. Healthy adults generally have a CD4 count of 500 to 1,500 per cubic millimeter.
- A person can also be diagnosed with AIDS if they have HIV and develop an opportunistic infection or cancer that's rare in people who don't have HIV. An opportunistic infection, such as pneumonia, is one that takes advantage of a unique situation, such as HIV, and is caused by pathogens such as bacteria, viruses, fungi, or protozoa.
- With early diagnosis and effective treatments, most people with HIV will not develop any AIDS-related illnesses and will live a near-normal lifespan.



In the case of AIDS, a person is vulnerable to a wide range of illnesses, including:

- Pneumonia
- Tuberculosis
- Oral thrush, a fungal infection in the mouth or throat
- Cytomegalovirus (CMV), a type of herpes virus
- Cryptococcal meningitis, a fungal infection in the brain
- Toxoplasmosis, a brain infection caused by a parasite
- Cryptosporidiosis, an infection caused by an intestinal parasite
- Cancer, including Kaposi's sarcoma (KS) and lymphoma
- Significant weight loss, often accompanied by diarrhea, chronic weakness, and fever.
- HIV-associated neurocognitive disorders (HAND) can range from mild symptoms of behavioral changes and reduced mental functioning to severe dementia causing weakness and inability to function.
- HIV-associated nephropathy (HIVAN), an inflammation of the tiny filters in the kidneys that remove excess fluid and wastes from the blood and pass them to urine.
- Liver disease, especially in people who also have hepatitis B or hepatitis C.



Stages of HIV

- HIV progresses through three stages including
- Acute infection stage, the first few weeks after transmission.
- Clinical Latency or Chronic stage, also called Asymptomatic HIV infection or Clinical latency.
- AIDS, the most severe phase of HIV infection.

Stages



Acute infection stage,
the first few weeks after
transmission.



Clinical Latency or
Chronic stage, also called
Asymptomatic HIV infection or
Clinical latency.



AIDS, the most severe phase
of HIV infection.



Signs and symptoms of HIV

- The HIV/AIDS symptoms vary, depending on the phase of infection. During the acute infection stage, symptoms may include:
 - Fever
 - Chills
 - Swollen lymph nodes
 - Muscle aches and joint pain
 - Skin rash
 - Sore throat
 - Painful mouth sores
 - Headache
 - Nausea
 - Upset stomach
 - Weight loss
 - Cough
 - Night sweats



During the acute infection stage, symptoms



Fever



Chills



Swollen lymph nodes



Muscle aches and joint pain



Skin rash



Sore throat



Painful mouth sores



Headache



Nausea



Upset stomach



Weight loss



Cough



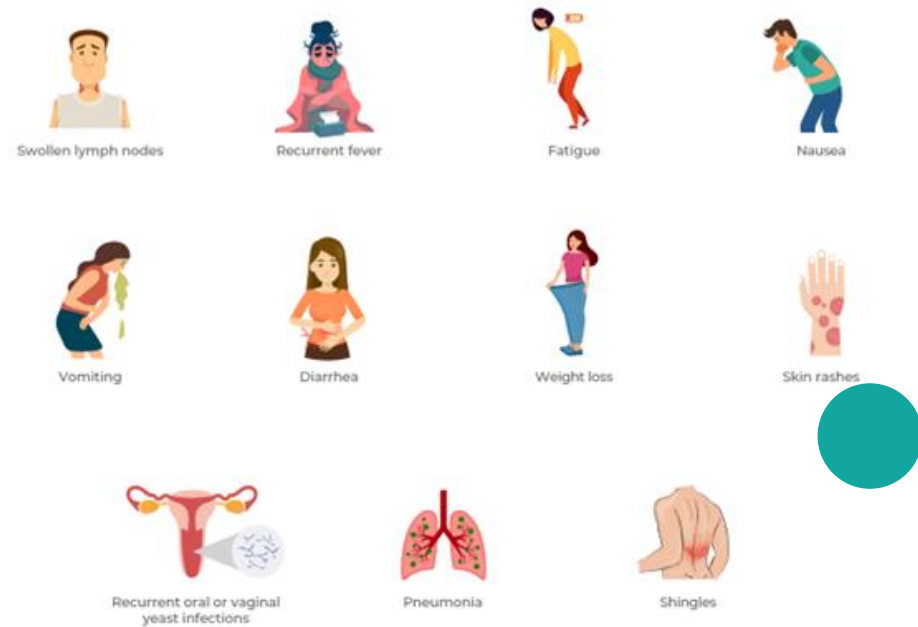
Night sweats





- During the clinical latency stage, symptoms may
- Swollen lymph nodes
- Recurrent fever
- Fatigue
- Nausea
- Vomiting
- Diarrhea
- Weight loss
- Skin rashes
- Recurrent oral or vaginal yeast infections
- Pneumonia

During the clinical latency stage, symptoms

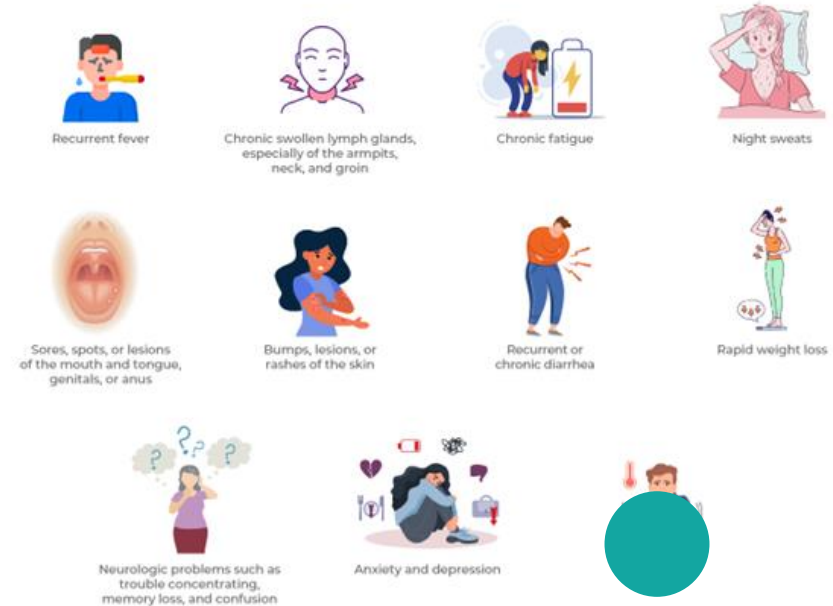




AIDS, symptoms

- In the case of AIDS, symptoms may include:
- Recurrent fever
- Chronic swollen lymph glands, especially of the armpits, neck, and groin
- Chronic fatigue
- Night sweats
- Sores, spots, or lesions of the mouth and tongue, genitals, or anus
- Bumps, lesions, or rashes of the skin
- Recurrent or chronic diarrhea
- Rapid weight loss
- Neurologic problems such as trouble concentrating, memory loss, and confusion

Anxiety and depression





- How does a person get HIV?
- HIV is transmitted through bodily fluids including:

- Blood
- Semen
- Vaginal fluids
- Breast milk



Blood



Semen



Vaginal fluids



Breast milk





Causes of HIV/AIDS



- The causes of HIV/AIDS include:
- Having unprotected sex
- Sharing needles or syringes for drugs, piercings, tattoos, etc.
- Getting stuck with a needle that has HIV-infected blood on it
- Getting HIV-infected blood, semen, or vaginal fluids into open cuts or sores on the body
- Blood transfusion of infected blood
- HIV can also be passed to babies during pregnancy, birth, or breastfeeding.

A person can get HIV from:



Having unprotected sex



Sharing needles or syringes for drugs, piercings, tattoos, etc.



Getting stuck with a needle that has HIV-infected blood on it



Getting HIV-infected blood, semen, or vaginal fluids into open cuts or sores on the body



Blood transfusion of infected blood



HIV can also be passed to babies during pregnancy, birth, or breastfeeding.



- It is important to understand that HIV does not spread through:

- Skin-to-skin contact
- Hugging, shaking hands, or kissing
- Air or water
- Sharing food or drinks
- Saliva, tears, or sweat
- Sharing a toilet, towels, etc
- Mosquitoes or other insects

HIV does not spread through:



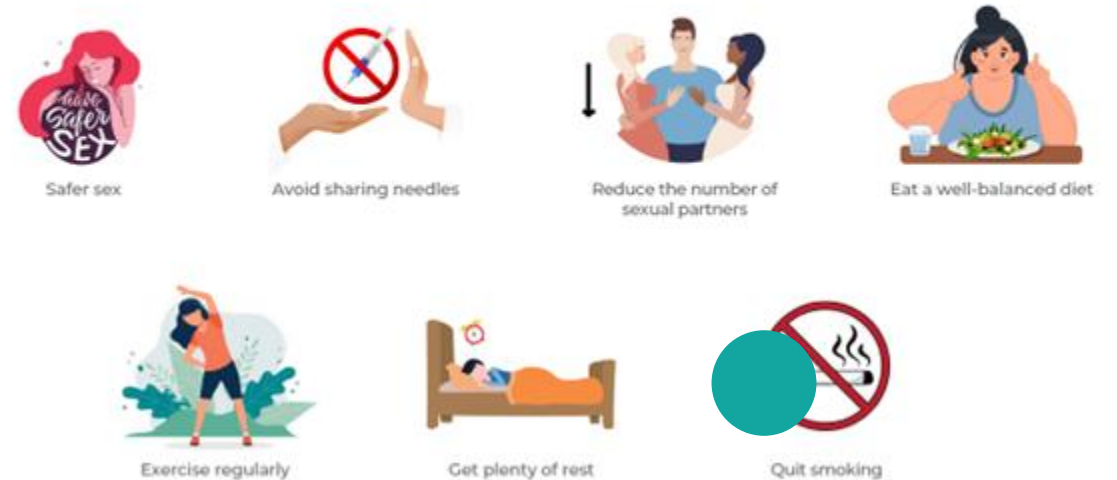


PREVENTION



- How can HIV be prevented?
- There is currently no vaccine available to prevent the transmission of HIV. However, taking certain steps can help prevent the spread of HIV.
- Safer sex: The most common way for HIV to spread is through unprotected sex.
- Avoid sharing needles: HIV is transmitted through blood and can be contracted by using contaminated materials.
- Reduce the number of sexual partners.
- Eat a well-balanced diet. It is important to have a healthy intake of fiber, vitamins and minerals, and proteins.
- Exercise regularly. A healthy diet coupled with daily exercises such as cardio, aerobics exercise, resistance training, and flexibility training can increase stamina, build muscles, and keep bones strong.
- Get plenty of rest.
- Quit smoking.

How can HIV be prevented?





- How is HIV diagnosed?
- Diagnosis of HIV/AIDS symptoms is done by several types of tests. These tests as stated below check the blood or other body fluids for HIV/AIDS diagnosis.
- Antigen/antibody combination tests: These tests usually involve drawing blood from a vein. These tests check for HIV antigen, a protein that's part of the virus, and HIV antibodies.
- Antibody tests: These tests look for antibodies to HIV in blood or saliva. They're also called immunosay or ELISA tests.
- Nucleic acid test (NAT): This test looks for the actual virus in the blood and is also known as the RNA test.

Diagnosis



Antigen/antibody combination tests



Antibody tests



Nucleic acid test (NAT)





How is HIV/AIDS treated?



- There is no cure for HIV or AIDS, but medications are effective in fighting HIV and its complications.
- The main treatment for HIV is antiretroviral therapy, a combination of daily medications that stop the virus from reproducing. This helps reduce the HIV virus in the body, keep the immune system healthy and decrease complications. Antiretroviral therapy also helps keep HIV from progressing to AIDS and reduces the risk of transmitting HIV to others.
- Early diagnosis and treatment is especially important for pregnant women, people who have other infections such as tuberculosis or hepatitis, and people who have symptoms of AIDS.