

B. Sc. (H) Biochemistry

Paper- Molecular Basis of Infectious Diseases (Sem VI)

Dr. Usha Yadav
Assistant Professor

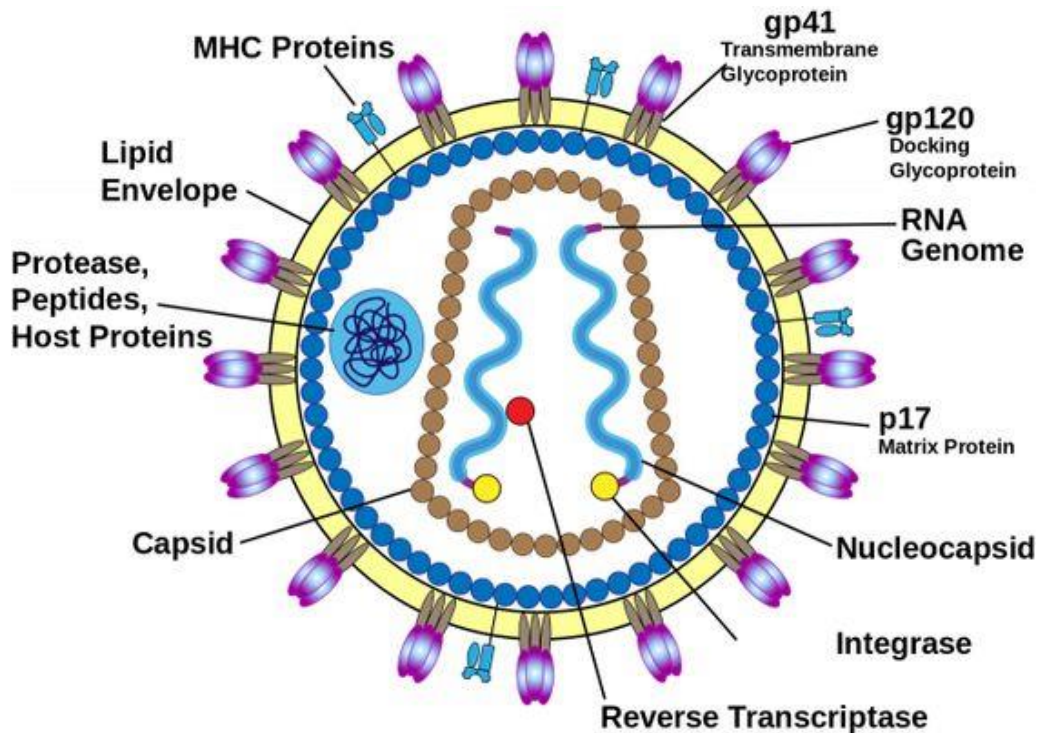


Figure: Structure of HIV

1. When was HIV first recognized in the U.S.?

1981.

2. A person has AIDS when which of these occurs?

The CD4⁺ count is lower than 200 or opportunistic infections develop in an HIV-infected person. An HIV-infected person has AIDS when he or she has fewer than 200 CD4⁺ cells. These cells are an important part of the body's immune system and help to fight off infection. The definition of AIDS also includes developing one or more of 26 health conditions. These include opportunistic infections like recurrent pneumonia and Kaposi sarcoma, a cancer like disease affecting the skin, even if that person doesn't meet the CD4⁺ criteria. Many of these conditions don't affect healthy people. But someone with AIDS has poor defense against infection because the immune system is weakened.

4. What does HIV-positive mean?

Either antibodies against HIV or the virus particles themselves are present in the blood.

When you have HIV in your body, your immune system makes antibodies (a kind of protein) to fight the infection. These antibodies can be measured by a blood test. It usually takes 2 to 8 weeks after infection before HIV antibodies can be detected. For some people, it may take longer, but most people will develop antibodies within the first 3 months after infection.

5. What is the CD4 T-cell count at which AIDS is considered to have developed?

A normal count is 600 or more CD4 positive T cells per cubic milliliter of blood. Below 200 per cubic milliliter means a person infected with HIV has developed AIDS.

6. What are the hurdles for HIV vaccine development?

The major hurdle is extensive genetic variation in HIV that is caused by a highly replicating and rapidly mutating virus.

7. Does an “undetectable” HIV viral load result mean I am now HIV- negative?

Regular monitoring of HIV viral load determines when ART is working well. But it is critical to remember that “undetectable” (or “target not detected”) does not mean HIV-negative although it may mean “untransmittable”.

PLAGUE

Plague is a disease that affects humans and other mammals. It is caused by the bacterium, *Yersinia pestis*. Humans usually get plague after being bitten by a rodent flea that is carrying the plague bacterium or by handling an animal infected with plague. Plague is infamous for killing millions of people in Europe during the Middle Ages. Today, modern antibiotics are effective in treating plague. Without prompt treatment, the disease can cause serious illness or death. Presently, human plague infections continue to occur in rural areas in the western United States, but significantly more cases occur in parts of Africa and Asia. Many types of animals, such as rock squirrels, wood rats, ground squirrels, prairie dogs, chipmunks, mice, voles, and rabbits can be affected by plague. Wild carnivores can become infected by eating other infected animals.

Transmission

The plague bacteria can be transmitted to humans in the following ways:

Flea bites. Plague bacteria are most often transmitted by the bite of an infected flea. During plague epizootics, many rodents die, causing hungry fleas to seek other sources of blood. People and animals that visit places where rodents have recently died from plague are at risk

of being infected from flea bites. Dogs and cats may also bring plague-infected fleas into the home. Flea bite exposure may result in primary bubonic plague or septicemic plague.

Contact with contaminated fluid or tissue. Humans can become infected when handling tissue or body fluids of a plague-infected animal. For example, a hunter skinning a rabbit or other infected animal without using proper precautions could become infected with plague bacteria. This form of exposure most commonly results in bubonic plague or septicemic plague.

Infectious droplets. When a person has plague pneumonia, they may cough droplets containing the plague bacteria into air. If these bacteria-containing droplets are breathed in by another person they can cause pneumonic plague. Typically, this requires direct and close contact with the person with pneumonic plague. Transmission of these droplets is the only way that plague can spread between people. This type of spread has not been documented in the United States since 1924, but still occurs with some frequency in developing countries. Cats are particularly susceptible to plague, and can be infected by eating infected rodents. Sick cats pose a risk of transmitting infectious plague droplets to their owners or to veterinarians. Several cases of human plague have occurred in the United States in recent decades as a result of contact with infected cats.

Plague can take different clinical forms, but the most common are bubonic, pneumonic, and septicemic

Bubonic plague: Patients develop sudden onset of fever, headache, chills, and weakness and one or more swollen, tender and painful lymph nodes (called buboes). This form usually results from the bite of an infected flea. The bacteria multiply in the lymph node closest to where the bacteria entered the human body. If the patient is not treated with the appropriate antibiotics, the bacteria can spread to other parts of the body.

Septicemic plague: Patients develop fever, chills, extreme weakness, abdominal pain, shock, and possibly bleeding into the skin and other organs. Skin and other tissues may turn black and die, especially on fingers, toes, and the nose. Septicemic plague can occur as the first symptom of plague, or may develop from untreated bubonic plague. This form results from bites of infected fleas or from handling an infected animal.

Pneumonic plague: Patients develop fever, headache, weakness, and a rapidly developing pneumonia with shortness of breath, chest pain, cough, and sometimes bloody or watery mucous. Pneumonic plague may develop from inhaling infectious droplets or may develop from untreated bubonic or septicemic plague after the bacteria spread to the lungs. The pneumonia may cause respiratory failure and shock. Pneumonic plague is the most serious

form of the disease and is the only form of plague that can be spread from person to person (by infectious droplets).

Although plague has been responsible for widespread pandemics throughout history, including the Black Death that caused over 50 million deaths in Europe during the fourteenth century, today it can be easily treated with antibiotics and the use of standard preventative measures.

Plague is found on all continents except Oceania but most human cases since the 1990s have occurred in Africa. Democratic Republic of Congo, Madagascar and Peru are the three most endemic countries.