

❖ Learning Outcomes

- 5th Example of Human Specific Disease:
 - Ebolavirus
 - Classification
 - morphology and structure.
 - Laboratory diagnosis.
 - Treatment and Prevention

Classification

- **Order:** Mononegavirales
- **Family:** Filoviridae
- The family Filoviridae contains **three genera**, Marburgvirus, **Ebolavirus**, and Cuervavirus
- **Five species** in the genus Ebolavirus:
 - Zaire ebolavirus, Sudan ebolavirus, Reston ebolavirus, Tai Forest ebolavirus and Bundibugyo ebolavirus

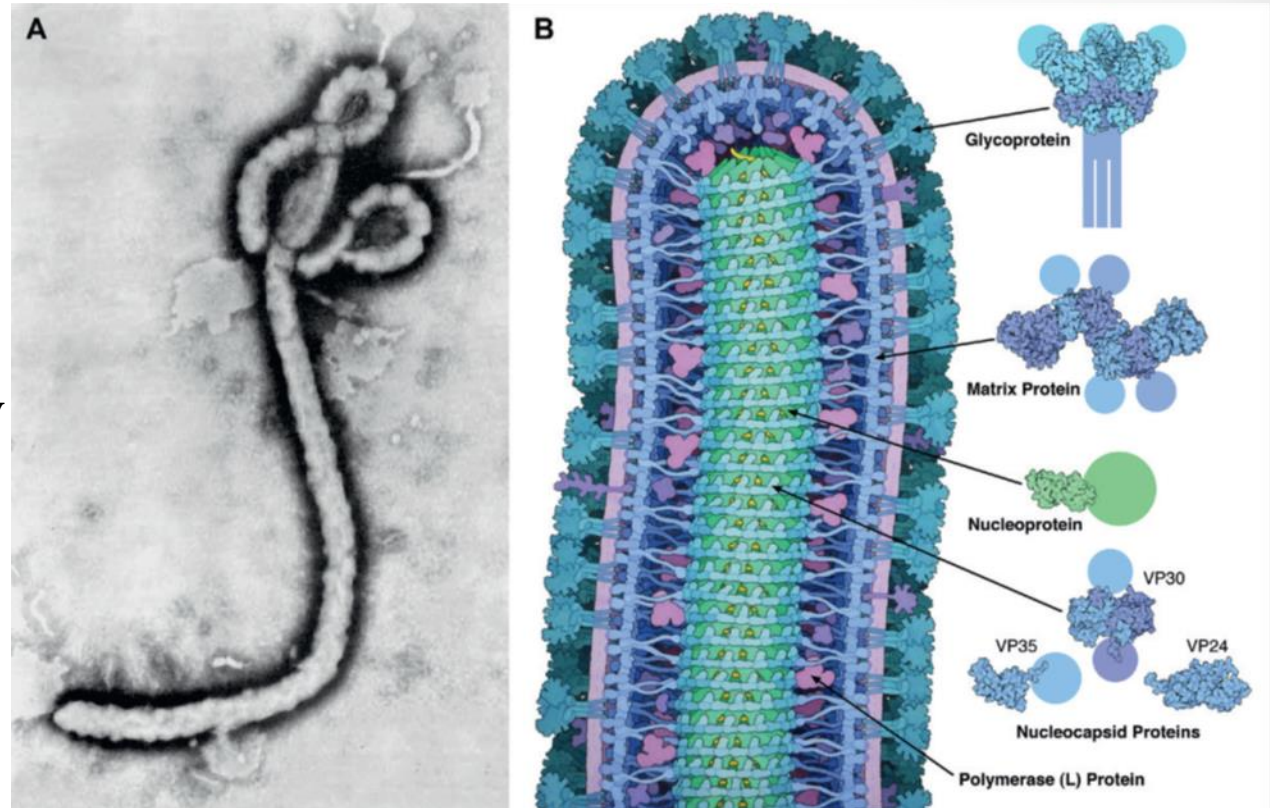
What is Ebolavirus?

- The virus causes an extremely severe hemorrhagic fever in humans and other primate.
- It is mostly fatal disease and causes blood vessel bursting.
- The virus is transmitted to people from wild animals and spreads in the human population through human-to- human transmission.
- Fruit bats are considered to be the natural host of the Ebola virus.

morphology and structure

Filovirus virions

- Filamentous, sometimes branched forms, or as “Ushaped, “6”-shape or circular.
- Single stranded , linear, non-segmented Negative-sense RNA
- Genome is approximately 19 kb in length.
- Structural proteins:**
 - nucleoprotein (NP)
 - Viron protein (VP35, VP40 ,VP 30,VP24)
 - glycoproteine (GP)
 - (VP30, VP35,NP)require for transcription
 - RNA polymerase (L)
 - Associated with the membrane VP40,VP27,GP



(A) Negative contrast electron microscopy of Ebola Zaire virus, from the original outbreak in 1976 in Yambuku, Zaire. (B) Section through part of an Ebola virion, showing proteins in blue, green and magenta, the RNA genome in yellow, and the membrane-virus envelope in light purple.

Laboratory diagnosis

- **Sample:** blood
- 1- RT- PCR
- 2- ELISA
- 3- **Cell Culture:** Initially the diagnosis of filovirus infections was based upon virus isolation from blood or tissues in cell culture, such as Vero (African green monkey kidney) cells or MA-104 (fetal rhesus monkey kidney) cells. As wild-type filoviruses do not induce a florid cytopathic effect in cell cultures, the presence of virus was detected by immunofluorescence.

4- Immunofluorescence.(IF)

There are two ways of doing IF staining :

1- Direct IF:

1-Antigen is fixed on the slide

2-Fluorescein labeled antibodies are layered over it

3-Slide is washed to remove unattached antibodies

4-Examined under UV light in a florescent microscope

The site where the antibodies attaches to its specific antigen will show apple green fluorescence

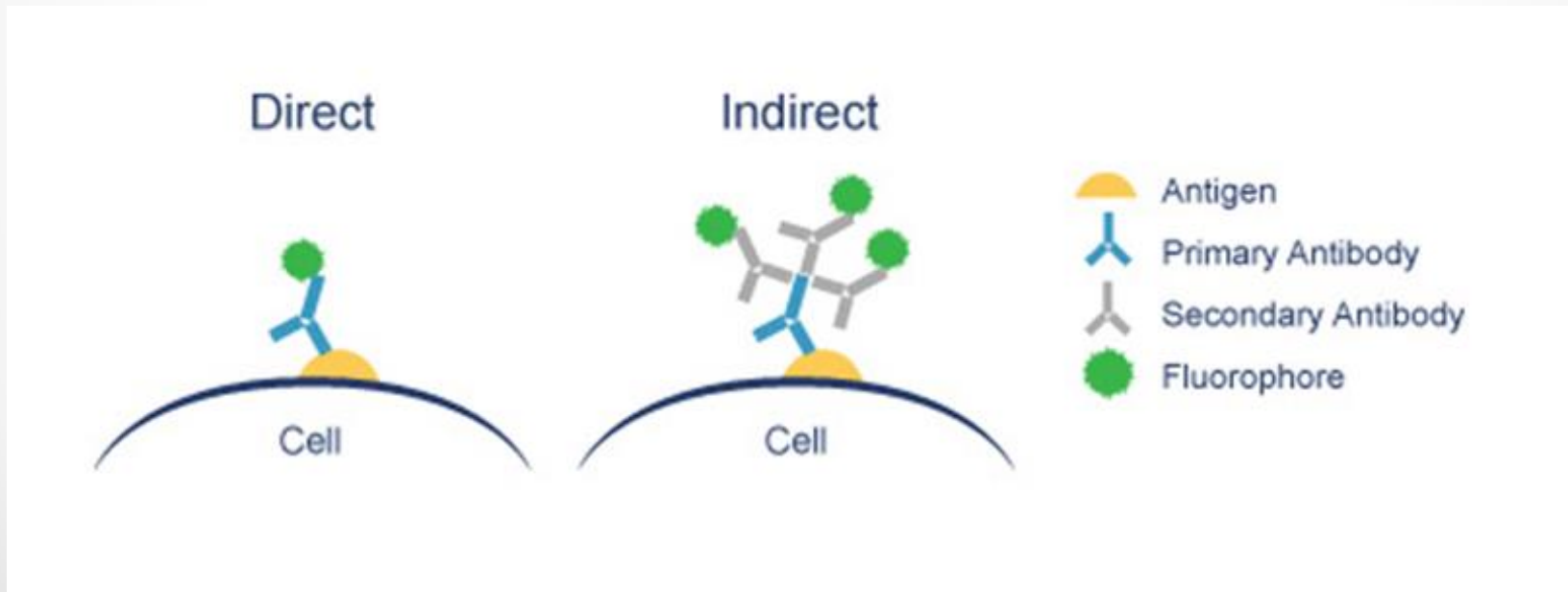
Use : direct detection of Pathogens or their antigen in tissues or in pathological samples

- indirect IF:

1-Indirect test is a double –layer technique

2-The unlabelled antibody is applied directly to the tissue substrate

3-Treated with a fluorochrome – conjugated anti-immunoglobulin serum.



Treatment

No ebolavirus-specific treatment exists:

- For people with Ebola, treatment involves providing relief of Ebola symptoms while the body fights the infection
- Supportive Care
- intravenous fluids, antibiotics, and oxygen. Treatment may also include the use of medications to control fever, help the blood clot, and maintain blood pressure
- DNA vaccines, adenovirus- based vaccines, and VSIV- based vaccines have entered clinical trials

Prevention

- avoiding direct contact with the body fluid of infected people. Also, its important to avoid direct contact with the body of an Ebola victim who has died
- Those who are infected should be isolated in order to prevent further infection.
- wearing protective clothing including masks, gloves, gowns and goggles.
- Hand washing .
- A researcher working with the Ebola virus while wearing a BSL-4 positive pressure suit to avoid infection .