Ebola virus: from Infection to Symptom

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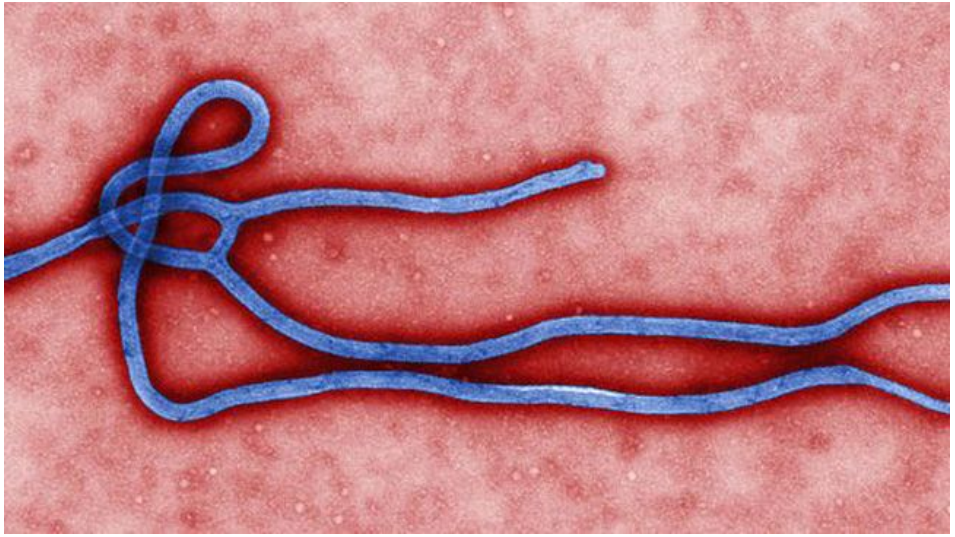
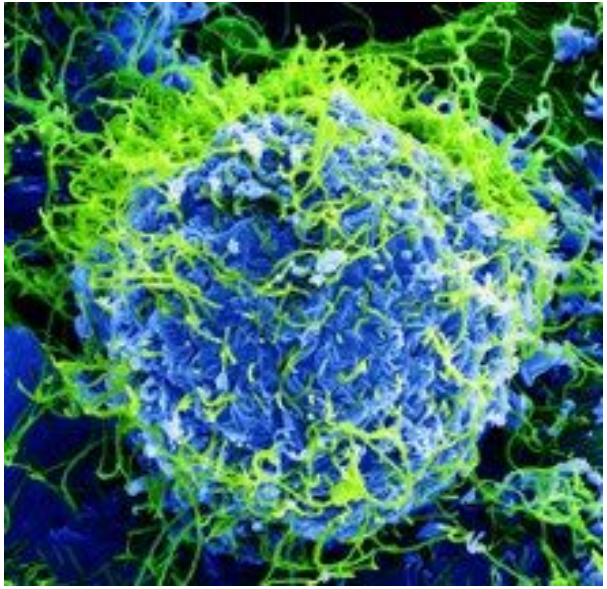
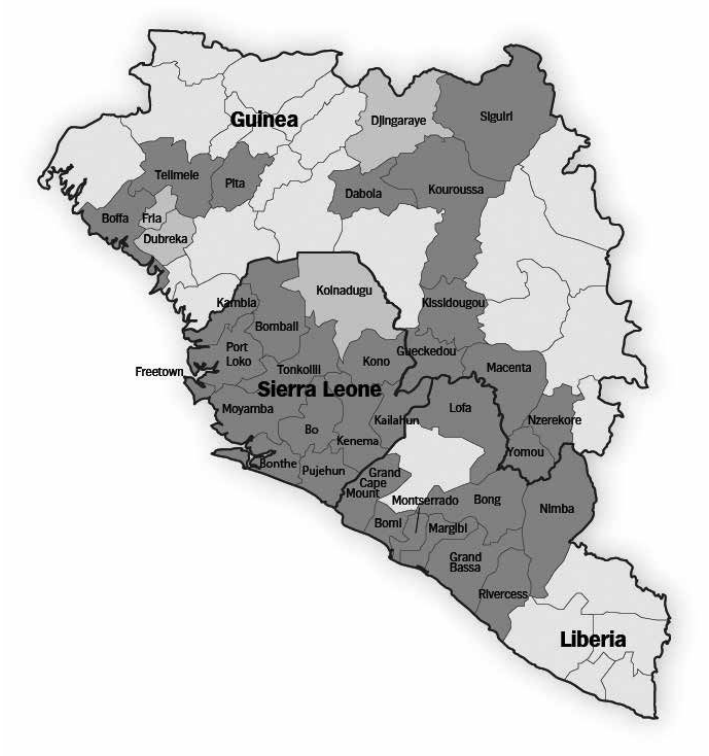
Table of Contents

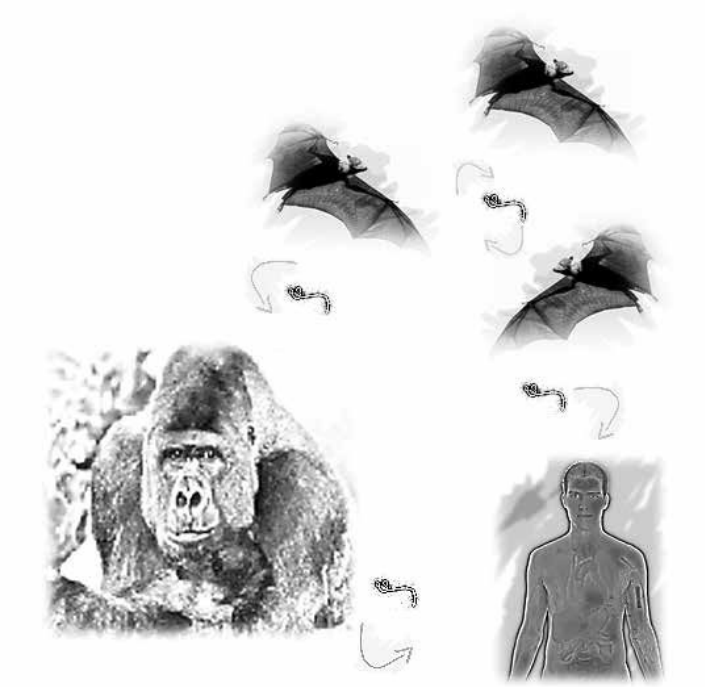
Discovery of EBOV

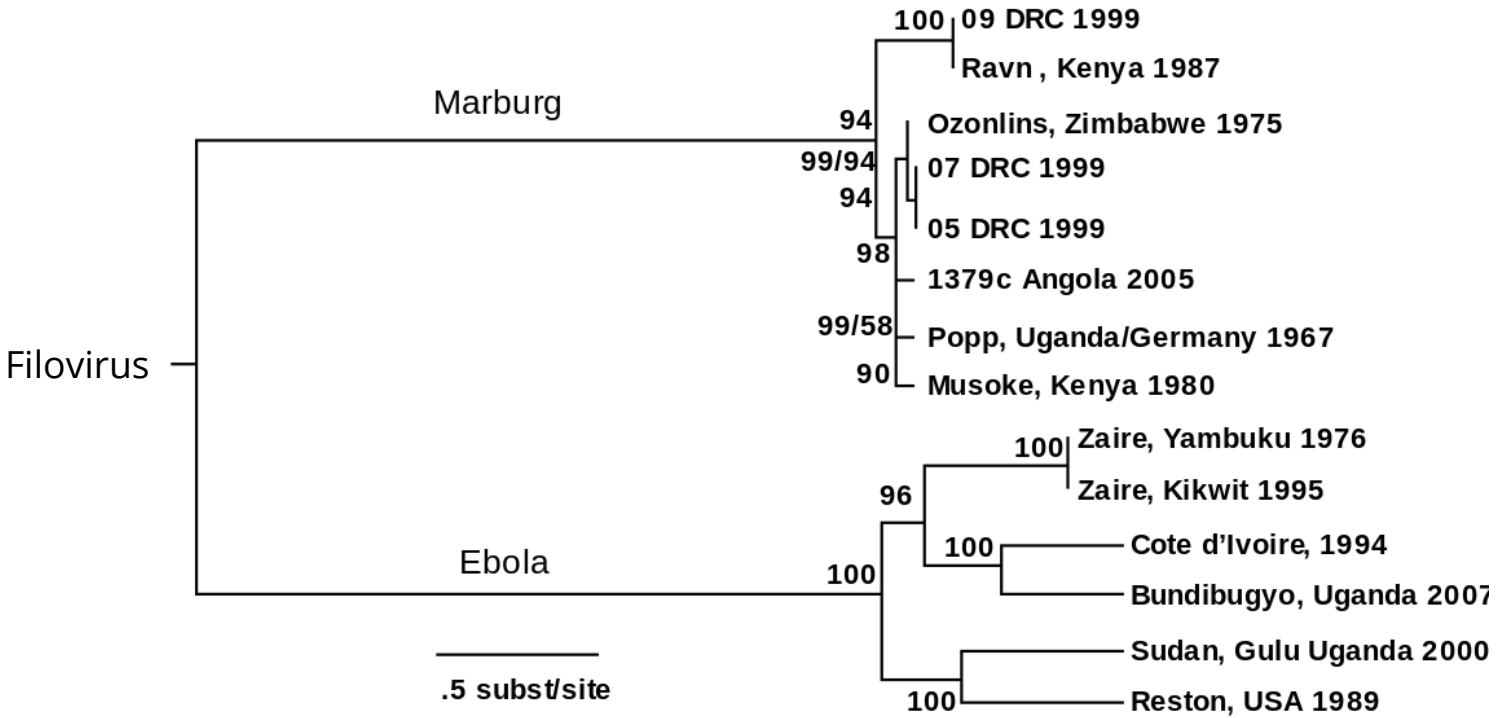




Discovery of EBOV






Filovirus
Marburg
Ebola
100
09 DRC 1999
Ravn , Kenya 1987
94
Ozonlins, Zimbabwe 1975
99/94
07 DRC 1999
94
05 DRC 1999
98
1379c Angola 2005
99/58
Popp, Uganda/Germany 1967
90
Musoke, Kenya 1980
100
Zaire, Yambuku 1976
96
Zaire, Kikwit 1995
100
Cote d'Ivoire, 1994
100
Bundibugyo, Uganda 2007
Sudan, Gulu Uganda 2000
100
Reston, USA 1989
.5 subst/site

Infection of EBOV

<How to be infected>

1. A classic zoonosis
2. Contact with animal carcass(bushmeat) (not always)
3. Human - human transmission
4. Chains of human infections short

Infection of EBOV

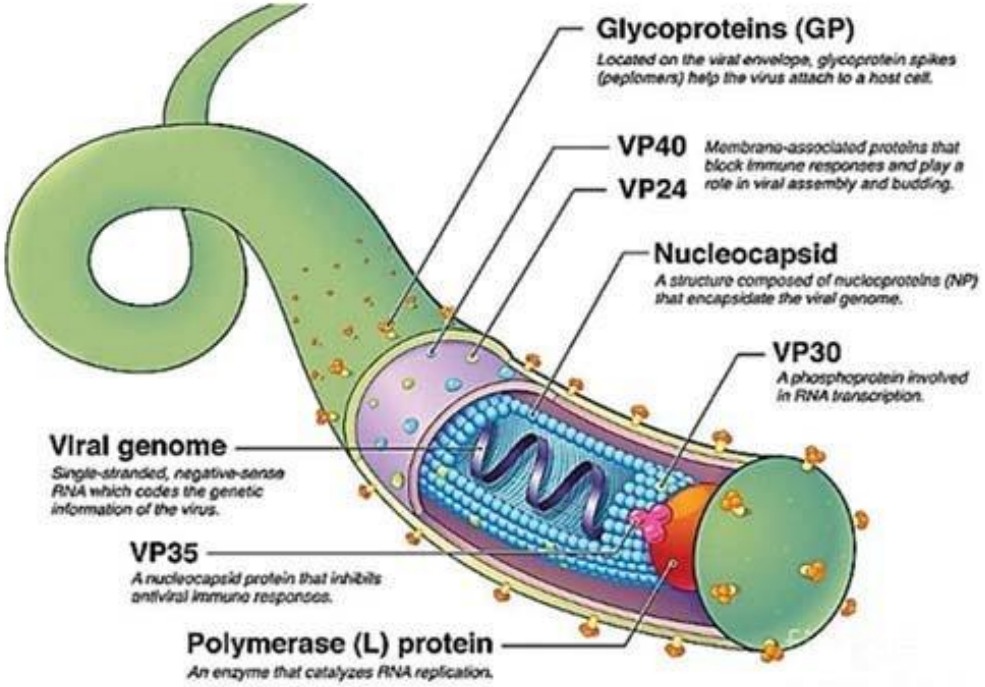
[Human - human transmission]

Contact with:

- infected blood or body fluids (urine, saliva, sweat, feces, vomit, breast milk, semen, etc) from someone who is sick or has died
- contaminated objects (needles, syringes, etc)

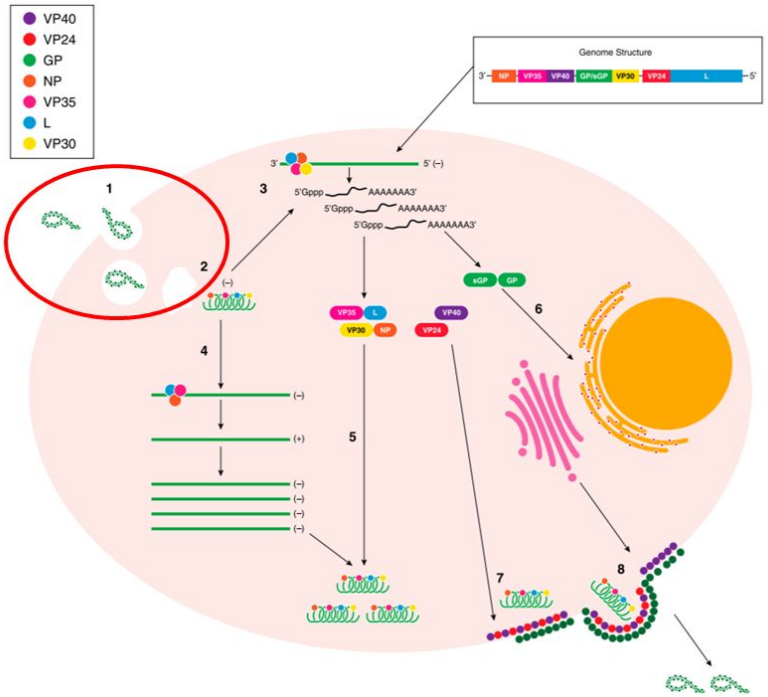
R_0=2: one sick person → 2 people are infected (on average)

Structure of EBOV



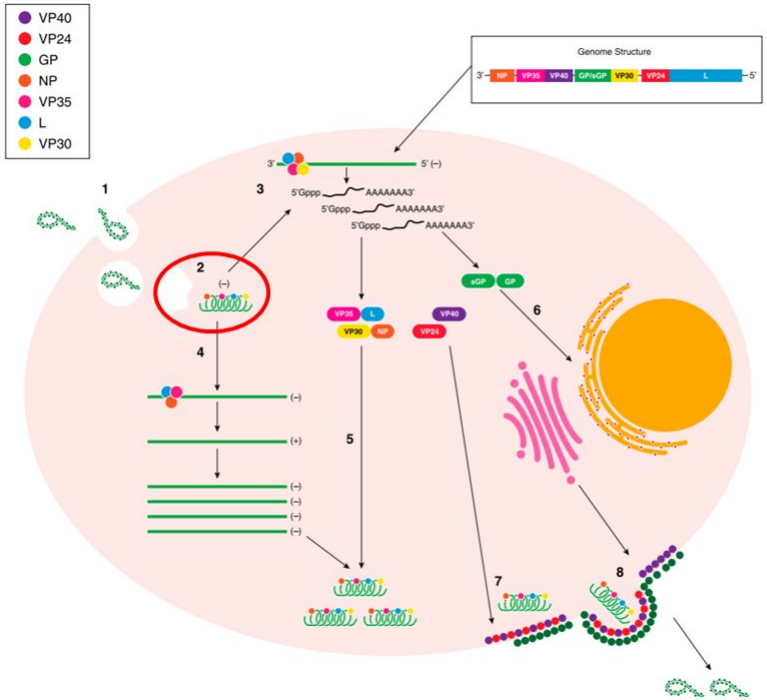
[Genome]

Life cycle of EBOV (1)



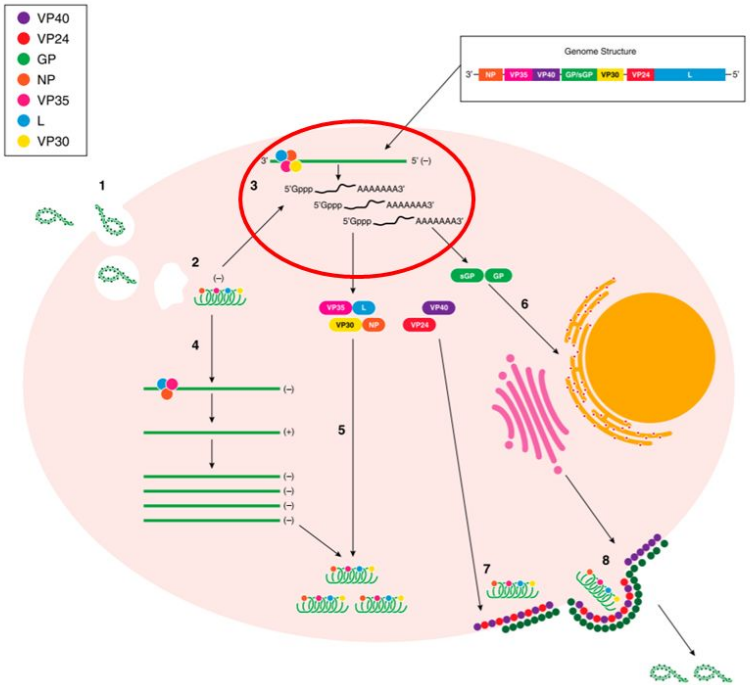
EBOV gains cell entry by receptor mediated endocytosis.

Life cycle of EBOV (2)



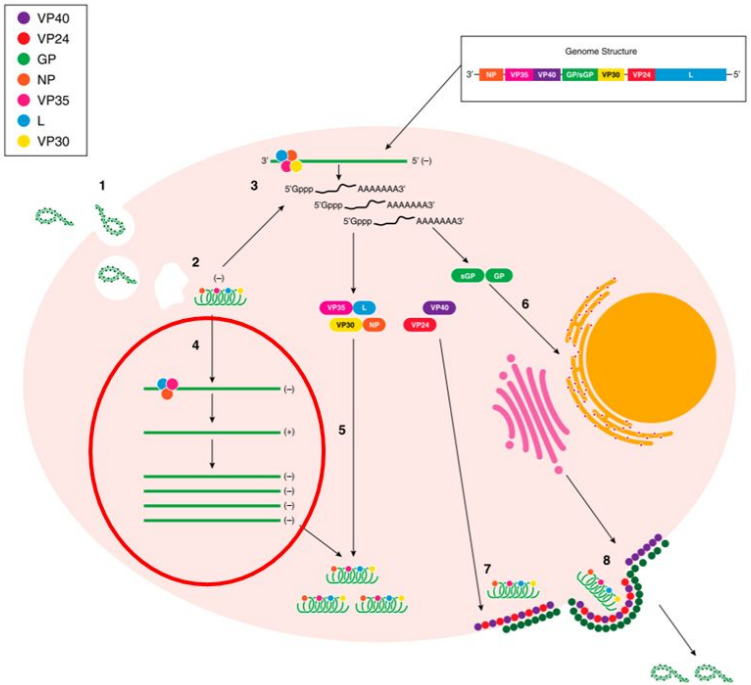
Acidification of the endocytic vesicle
→ release nucleocapsid

Life cycle of EBOV (3)



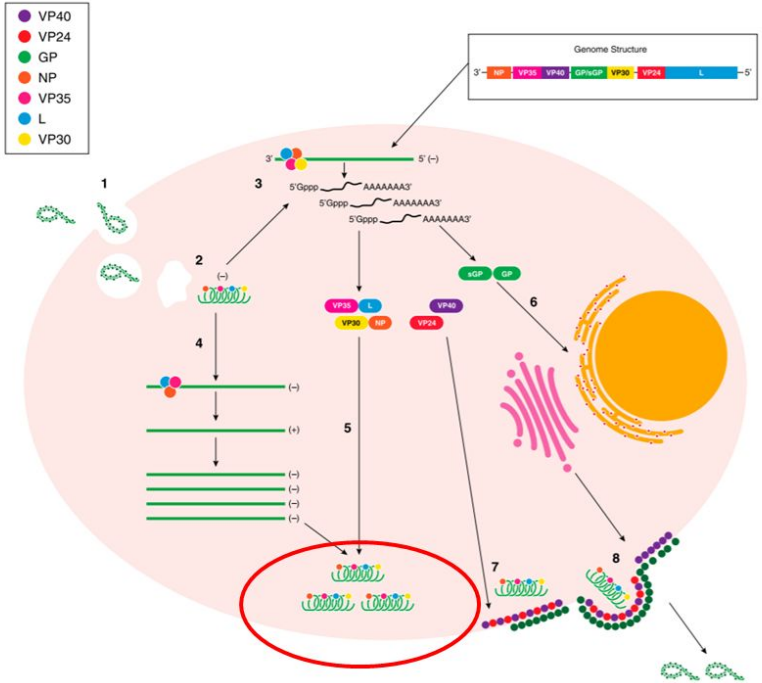
RNA polymerase transcribes mRNA.

Life cycle of EBOV (4)



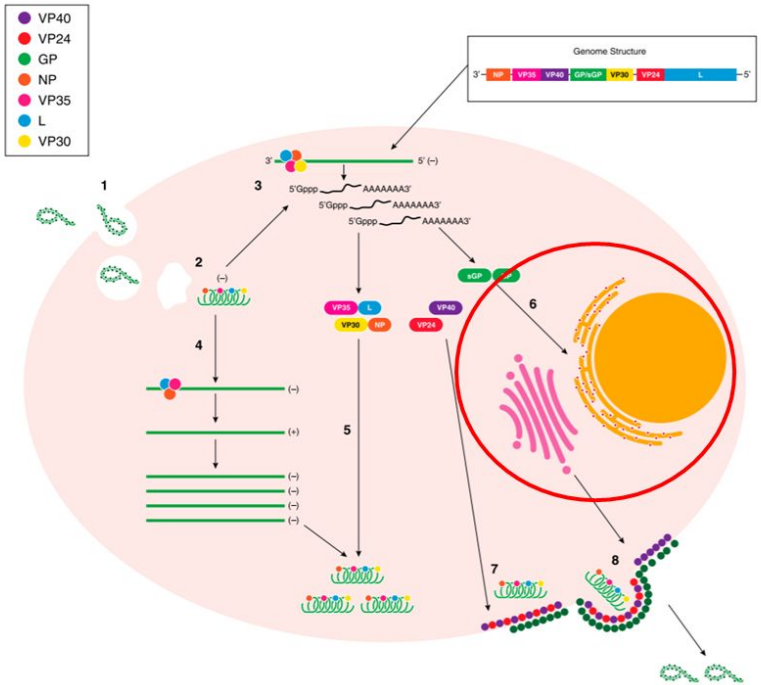
During replication, promoter produce positive sense RNA, and negative sense genome for progeny.

Life cycle of EBOV (5)



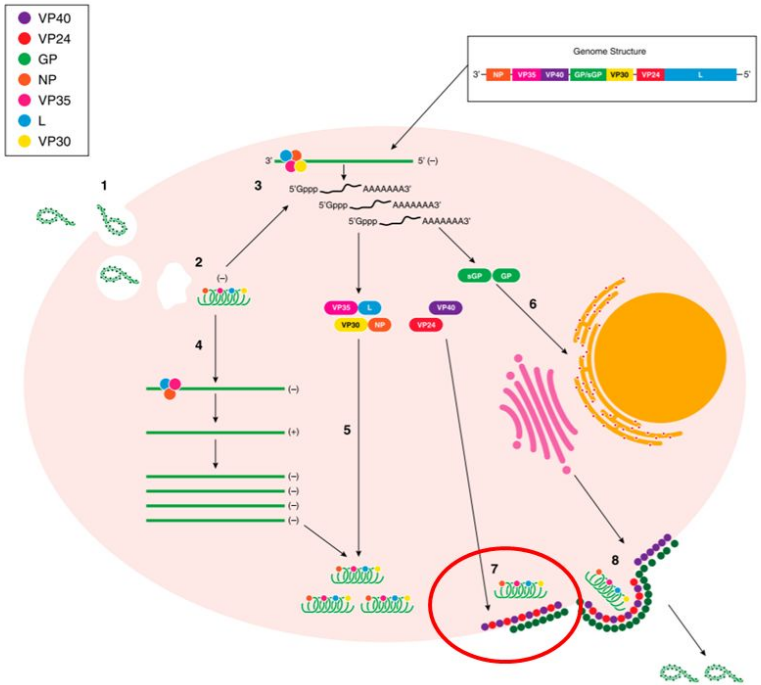
Nucleocapsid protein associates with progeny.

Life cycle of EBOV (6)



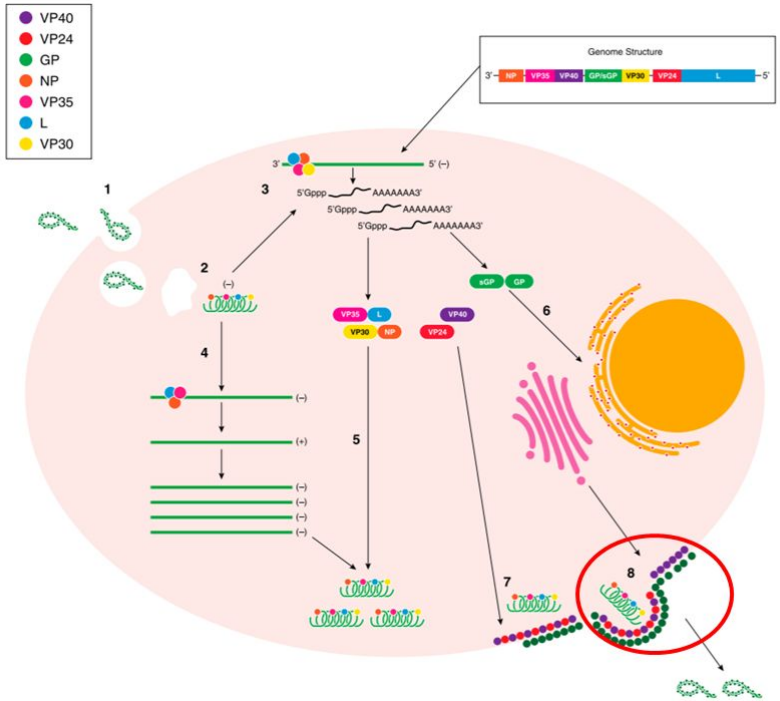
GP and sGP are modified in golgi body and endoplasmic reticulum.

Life cycle of EBOV (7)



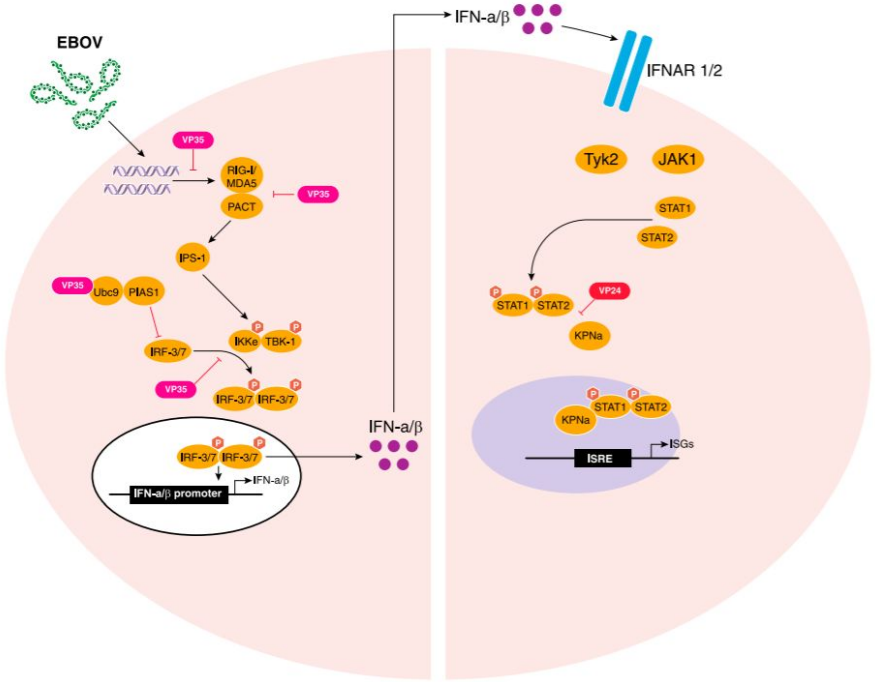
When enough genome and viral proteins are produced, they assemble at membrane.

Life cycle of EBOV (8)



Comple virion bud at cell surface

EBOV evasion of immune response

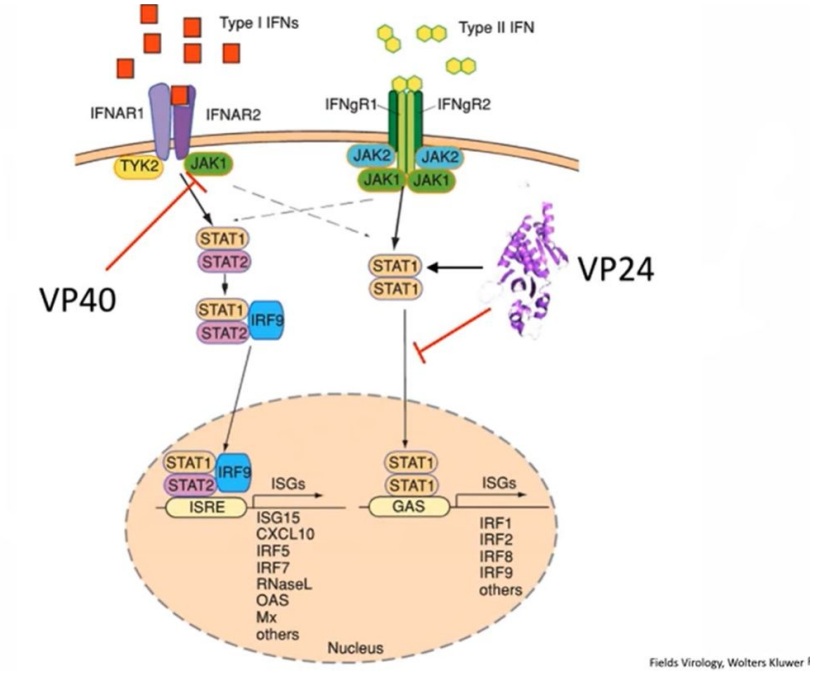


-VP35, can attach to dsRNA or PACT.

- It blocks cell from synthesizing IFN alpha and beta, which are signal for interferon response.

-VP24, attaches to KPNa, and block the signals of interferon response.

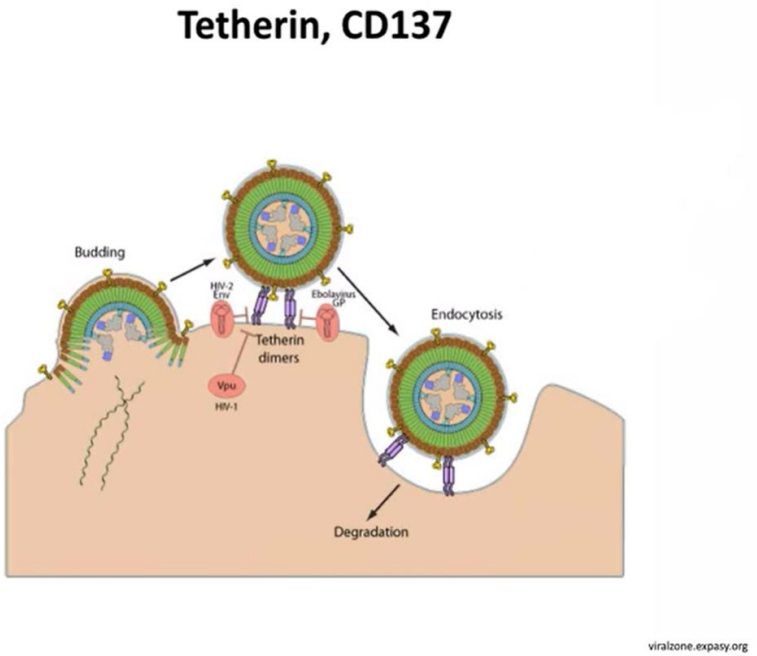
EBOV evasion of immune response



-VP 40, disturbs ISGs synthesis by attaching to kinases JACK 1.

-VP24, binds to STAT1, and prevents its translocation to nucleus.

EBOV evasion of immune response

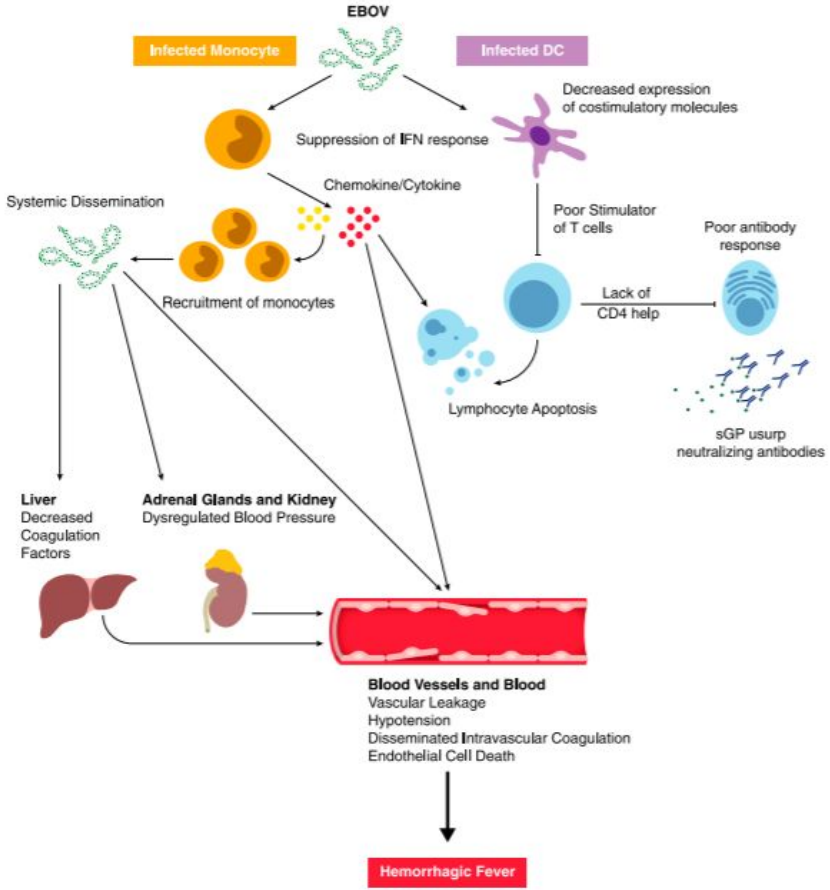


-Tetherin is anti-viral cell protein.

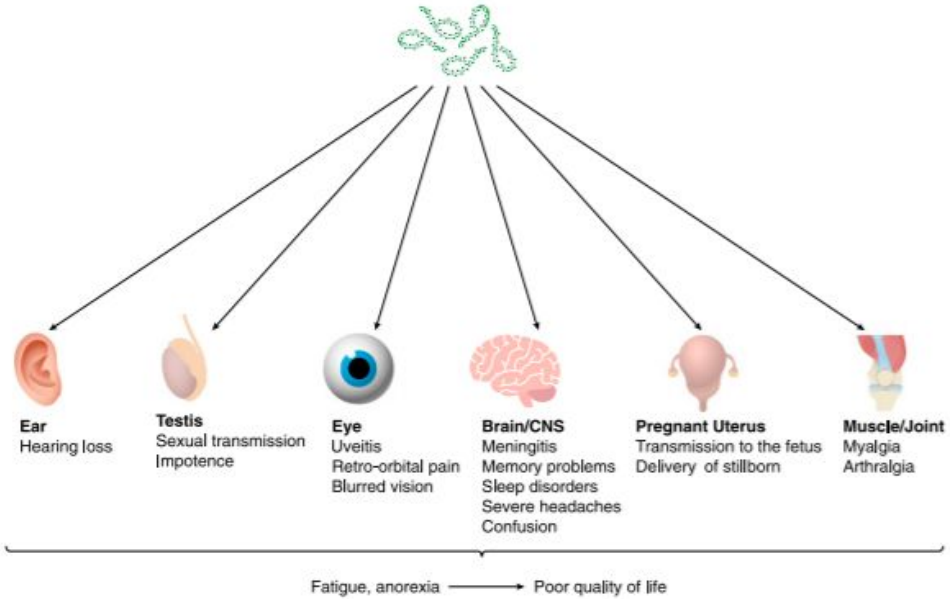
-Ebola virus GP attaches to Tetherin and let Ebolavirus budding able.

Symptoms of EBOV

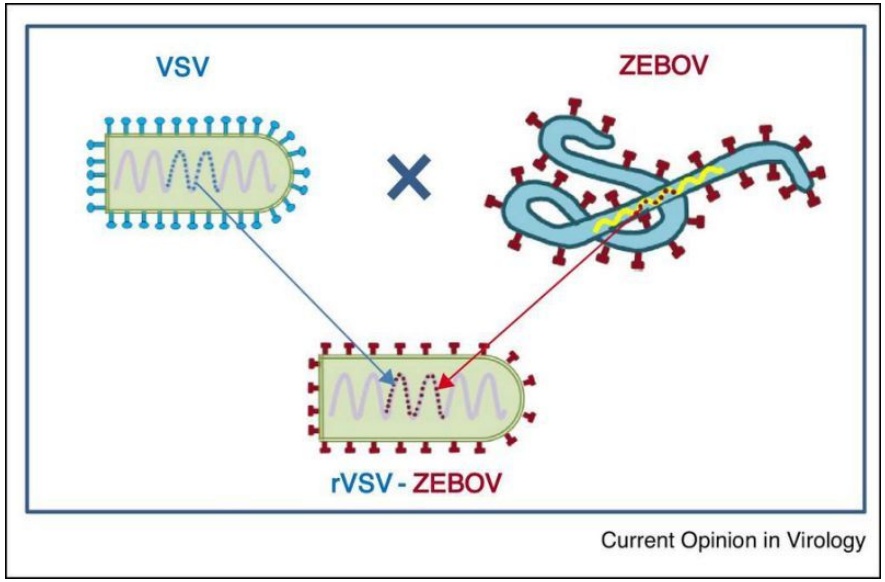
EBOV mainly infect DC & Monocytes those causes diverse symptoms on human bodies,immune repression, hypotension, endothelial cell death.



Symptoms of EBOV



Vaccine of EBOV



[rVSV - ZEBOV]

Recombinant, replication competent vaccine

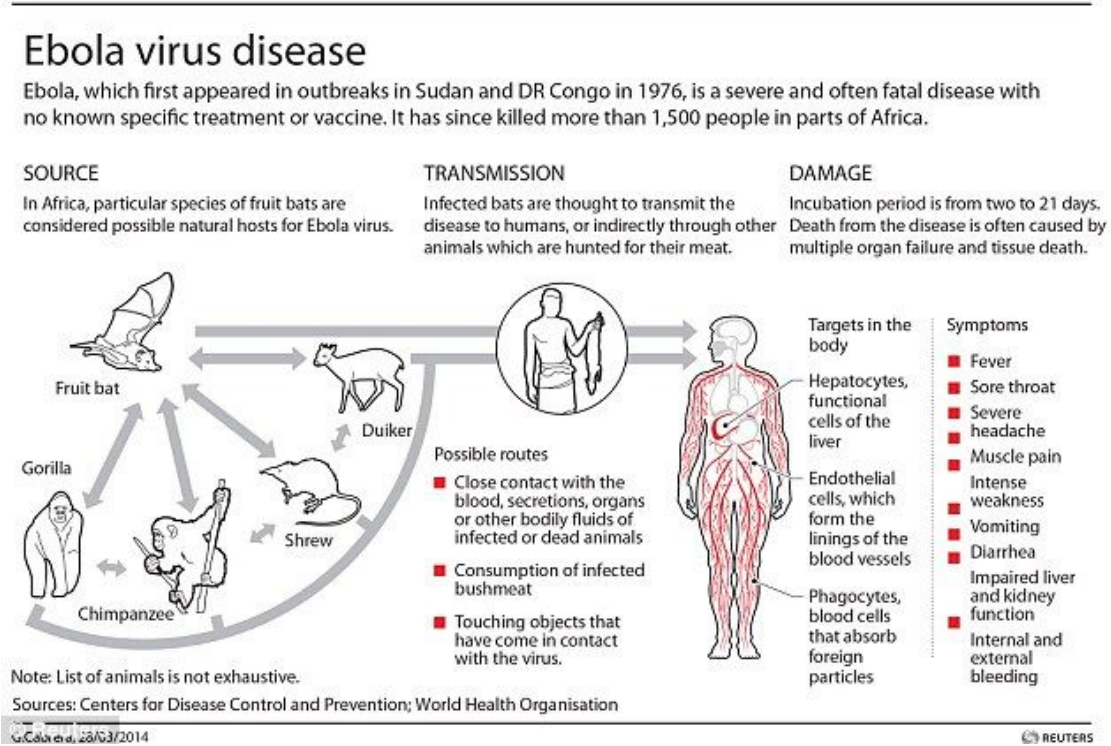
VSV: vesicular stomatitis virus

Gene is replaced:
P03522(native envelope glycoprotein) →
P87666(glycoprotein from ZEBOV)

To provoke a neutralizing immune response

→ Shown a high level of protection
+ mild to moderate side effects

Summary


Ebola virus disease
Ebola, which first appeared in outbreaks in Sudan and DR Congo in 1976, is a severe and often fatal disease with no known specific treatment or vaccine. It has since killed more than 1,500 people in parts of Africa.
SOURCE
In Africa, particular species of fruit bats are considered possible natural hosts for Ebola virus.
TRANSMISSION
Infected bats are thought to transmit the disease to humans, or indirectly through other animals which are hunted for their meat.
DAMAGE
Incubation period is from two to 21 days. Death from the disease is often caused by multiple organ failure and tissue death.
Fruit bat
Duiker
Gorilla
Shrew
Chimpanzee
Possible routes
Close contact with the blood, secretions, organs or other bodily fluids of infected or dead animals
Consumption of infected bushmeat
Touching objects that have come in contact with the virus.
Targets in the body
Hepatocytes, functional cells of the liver
Endothelial cells, which form the linings of the blood vessels
Phagocytes, blood cells that absorb foreign particles
Symptoms
Fever
Sore throat
Severe headache
Muscle pain
Intense weakness
Vomiting
Diarrhea
Impaired liver and kidney function
Internal and external bleeding
Note: List of animals is not exhaustive.
Sources: Centers for Disease Control and Prevention; World Health Organisation
Updated: 28/03/2014
REUTERS

Ending comments

-EBOV has not disappeared

-in Congo, it’s still going on

-Still we need caution

References

rVSV-ZEBOV fig:
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https://en.wikipedia.org/wiki/Zaire_ebolavirus

Thank you

감사합니다