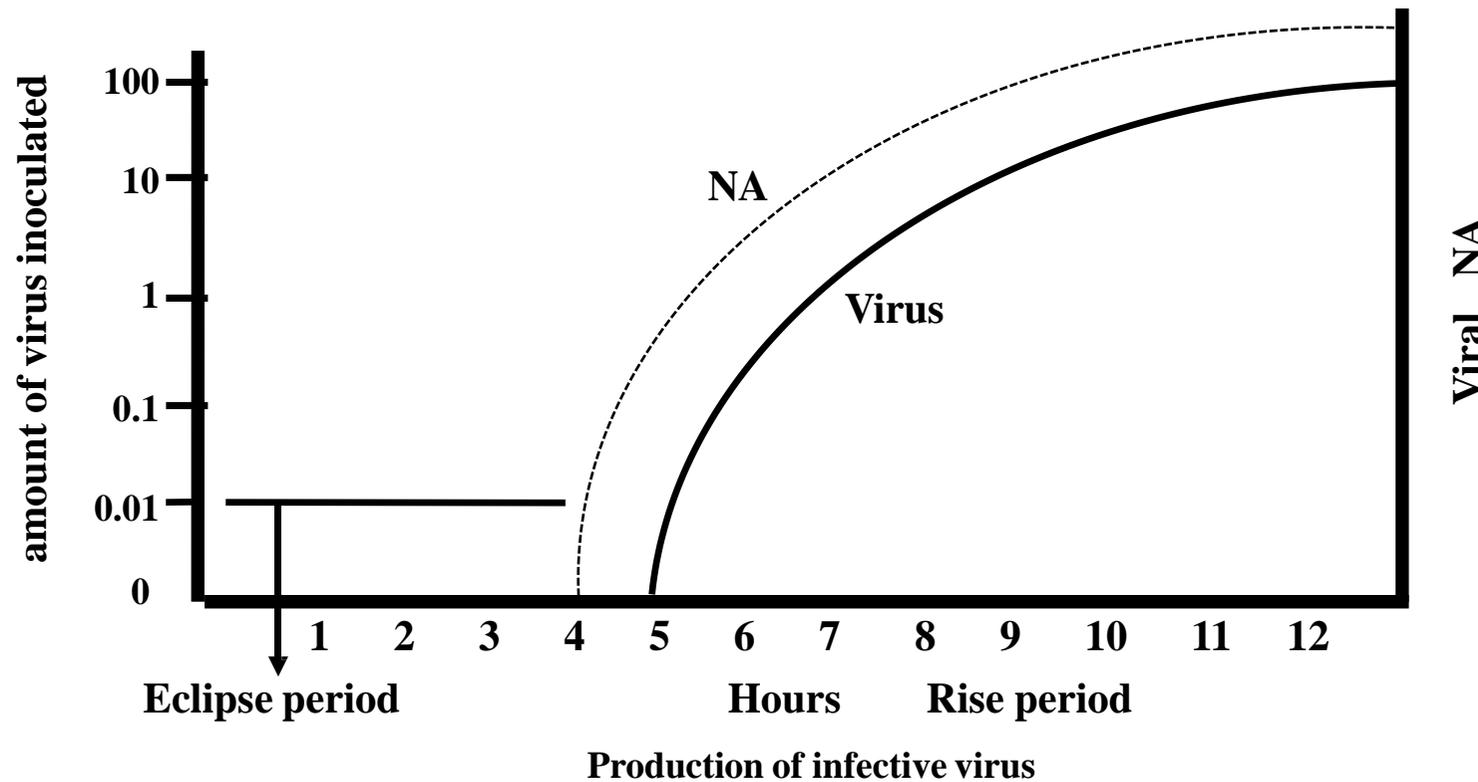


Professor Mothana Ali Khalil .Medical Virology
Viral replication

Each Family of viruses has its own characteristic of replication

Growth curve shows amount of v. at different times after infection



When the virus enter the cells → virus disappear in side host cell 3-2hr.
 This time from entrance to the appearance again called
 Eclipse Period

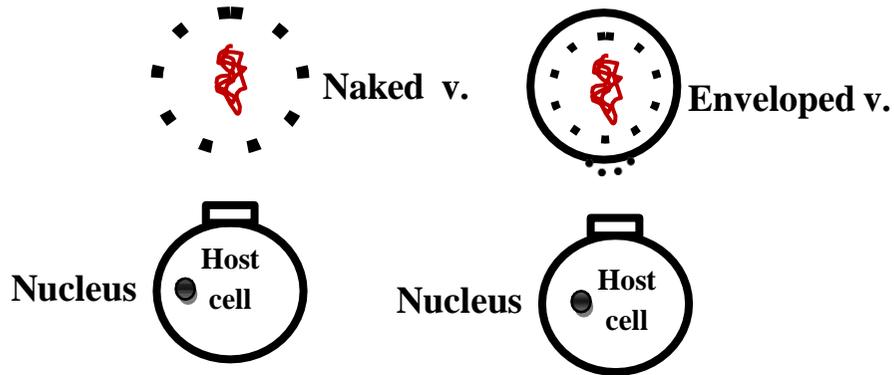
Steps of the viral Replication

① Recognition of a "target" host cell (attachment(

② internalization of the virus (penetration(

The virus recognized the cell receptor and f bind to it

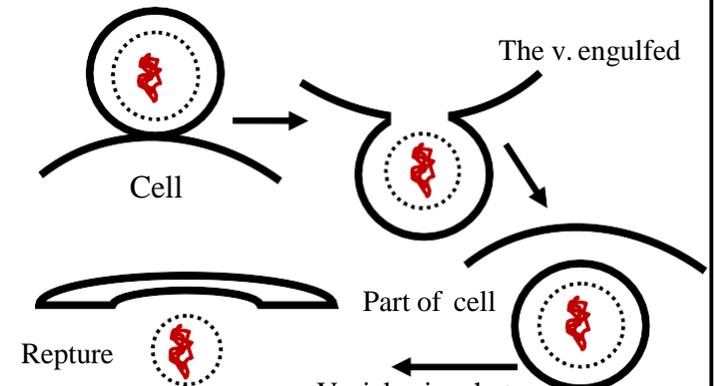
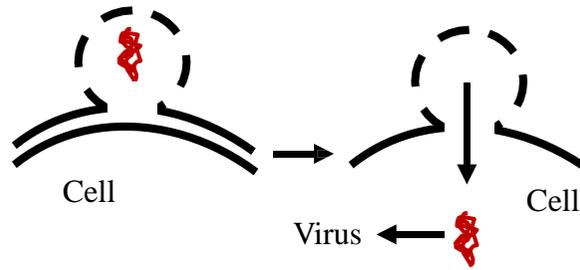
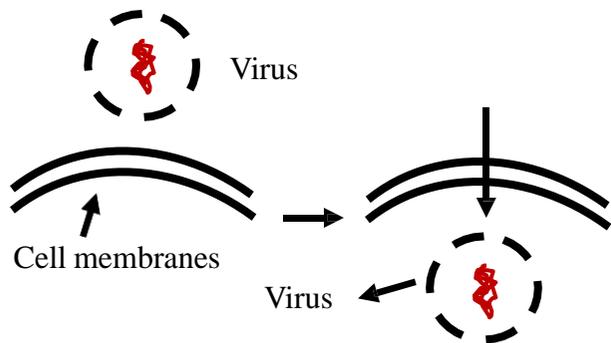
Either by



Direct translocation across cell membranes

Fusion of the viral and cell membranes

Viropexis (pinocytosis(



This in mainly for non Enveloped v.

③ un coating

The virus capsid will be destroyed by enzymatic action mainly



Lead to Release of NA inside of host cell

④ Genome expression and Genome replication



synthesis of viral mRNA (Early transcription(

DNA viruses

Replicate in the nucleus use host cell DNA dependent RNA polymerase to synthesis MRNA



Except : pox viruses replicate in cytoplasm

Because the virus carry this own polymerase within virus particle

Notice

DNA are except parvo v. SS DNA



DNA dependent RNA polymerase



RNA viruses

① Single positive stranded RNA

(+ ve sense(



Positive strand RNA
Directly act as mRNA



e.g.

polio virus

② Single negative stranded RNA

(- ve sense(



Transcribed by virus
RNA dependent RNA polymerase



e.g.

influenza viruses



RNA viruses replication in cytoplasm except HIV and influenza because its replication occur in the nucleus of the host cell

③ RNA positive stranded retrovirus

(Tumor viruses) HIV



Transcribed by virus associated reverse transcriptase
(RNA dependent DNA polymerase(



C
↓
Cytoplasm

Nucleons

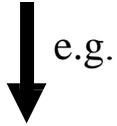


Transcription by host cal
polymerase



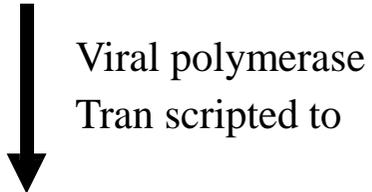
HIV tumor virus carry their
own Reverse transcription
)RNA – dependent DNA
polymerase(

④ Double stranded RNA



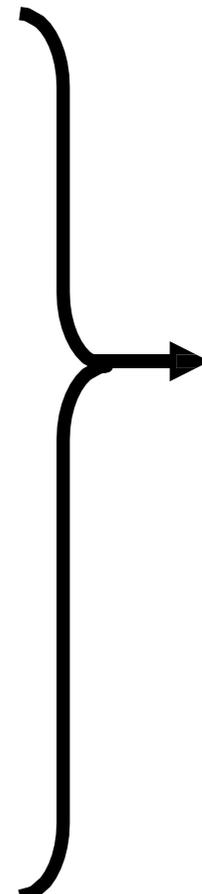
Reo viruses

| | | | |
|-----|-----|-----|---|
| GGU | CCU | UCG | + |
| CCA | GGA | AGC | - |



| | | |
|-----|-----|-----|
| GGU | CCU | UCG |
|-----|-----|-----|

+mRNA



After formation of viral mRNA for DNA of RNA
The Following step



Translation of viral mRNA (Early(





Translation of viral mRNA (Early(

Once viral mRNA of either DNA or RNA is synthesis its translated by host cell ribosome's in to viral protein which is either

Most viruses carry code for synthesis polymerase replicas that replicate the genome

Other viruses

Use host cell polymerase to replicate their own genome

رنگت اهل نصحي لامتحا ائل
مزلاوشيلاب

قونلاب رنگت اهل نصحي

e.g.

Early proteins

OR

Late protein

I.e.

i.e.

HIV

papilloma v.

parvo v.
B19

Enzyme required for replication of the viral genome so this protein produced before replication of genome and the early protein for RNA viruses polymerase that will synthesize many copies of viral NA for progeny virus particles

structural proteins of progeny viruses



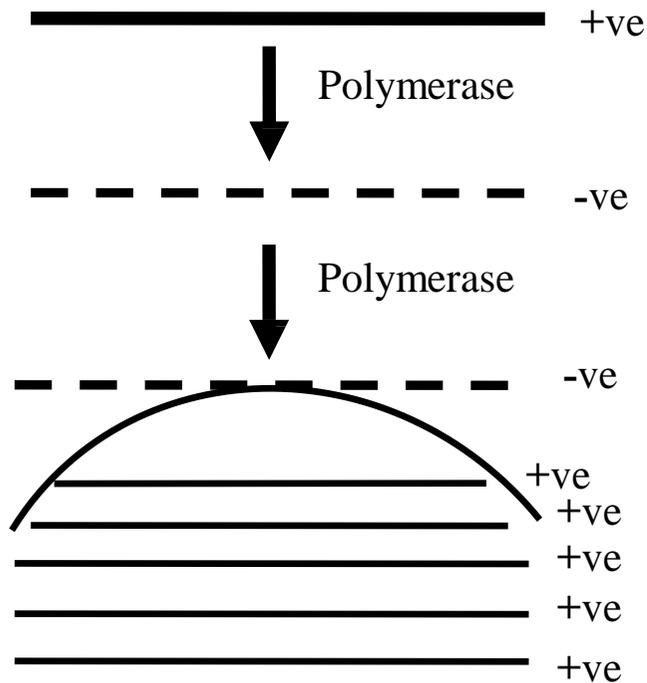
Replication of viral nucleic acids (complementarily)

SS RNA

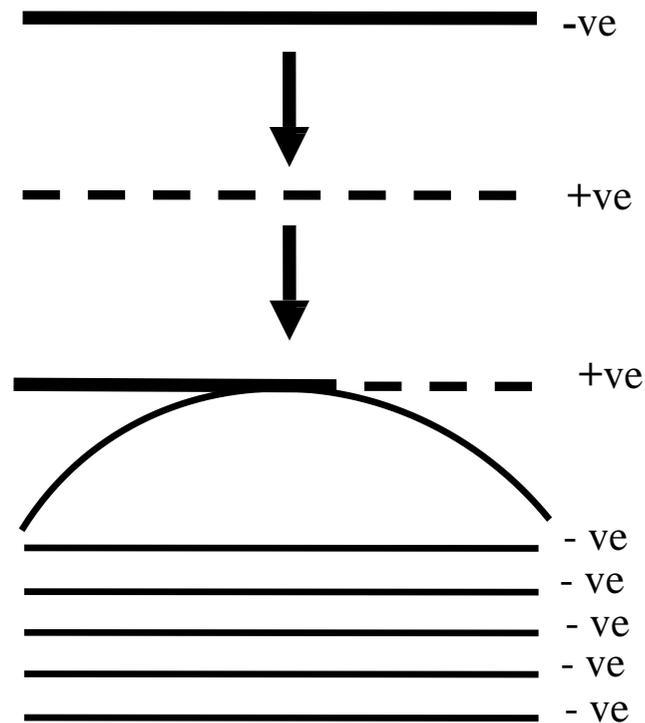
DS RNA

RNA + ve sense

RNA - ve sense

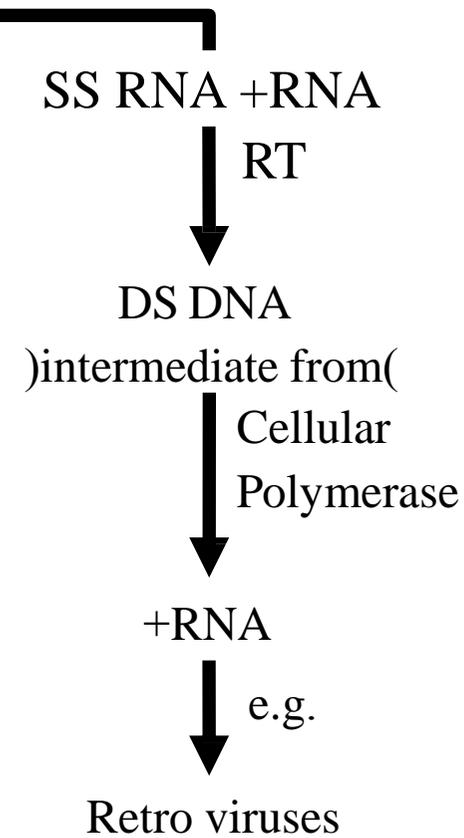
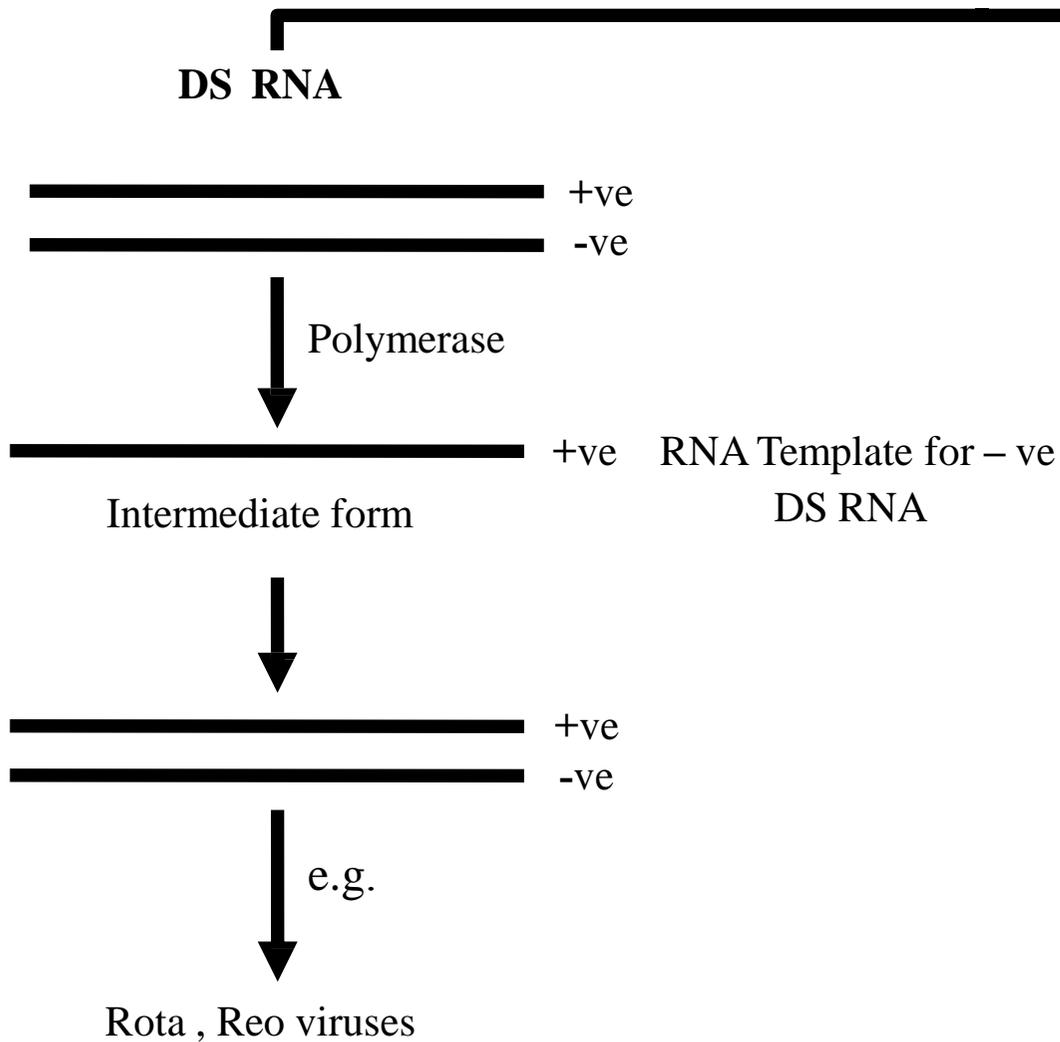


Intermediate form



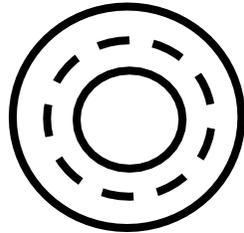
e.g.
Polio virus

e.g.
Influenza measles , rabies viruses



DNA viruses replication

DS DNA circular



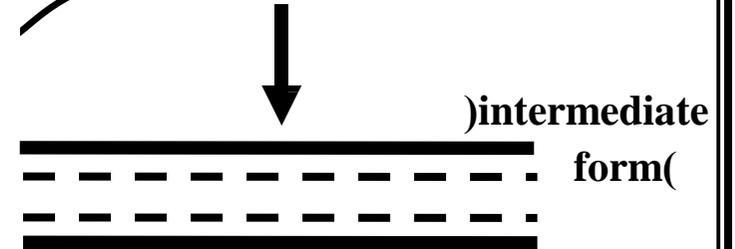
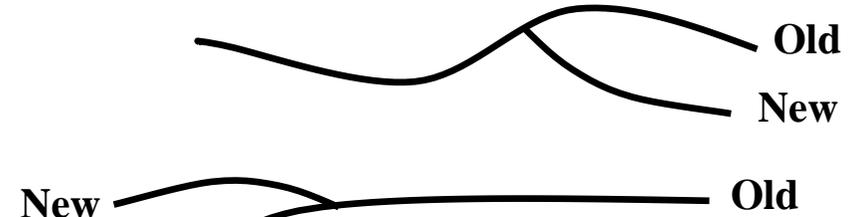
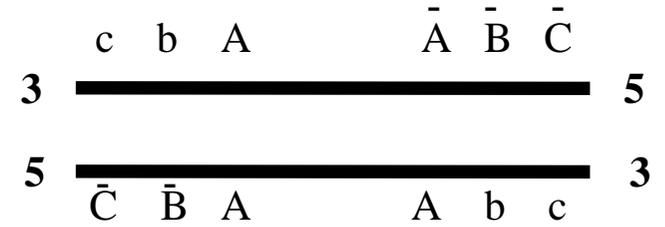
SS.DNA (intermediate from(Act as temple for DS DNA



e.g.

Hepatitis B virus

DS DNA linear



e.g.

Herpes virus

⑤ Late viral mRNA
synthesis
)transcription(
قبل تر و كتملا غير طلائف

⑥ late viral protein
synthesis
)transcription(
↓

Structural protein
(Capside(

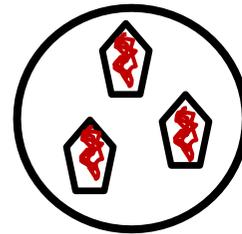
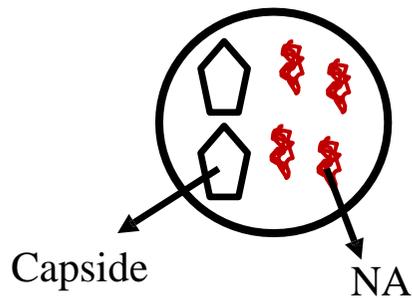
⑦ Assembly and Release

The progeny particles are
assembled by packing
the viral NA within the
capside protein either in

Nucleus

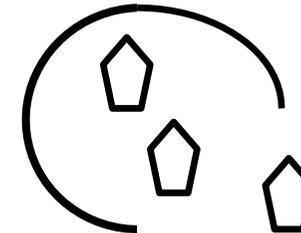
OR

Cytoplasm



Release by one of two
route

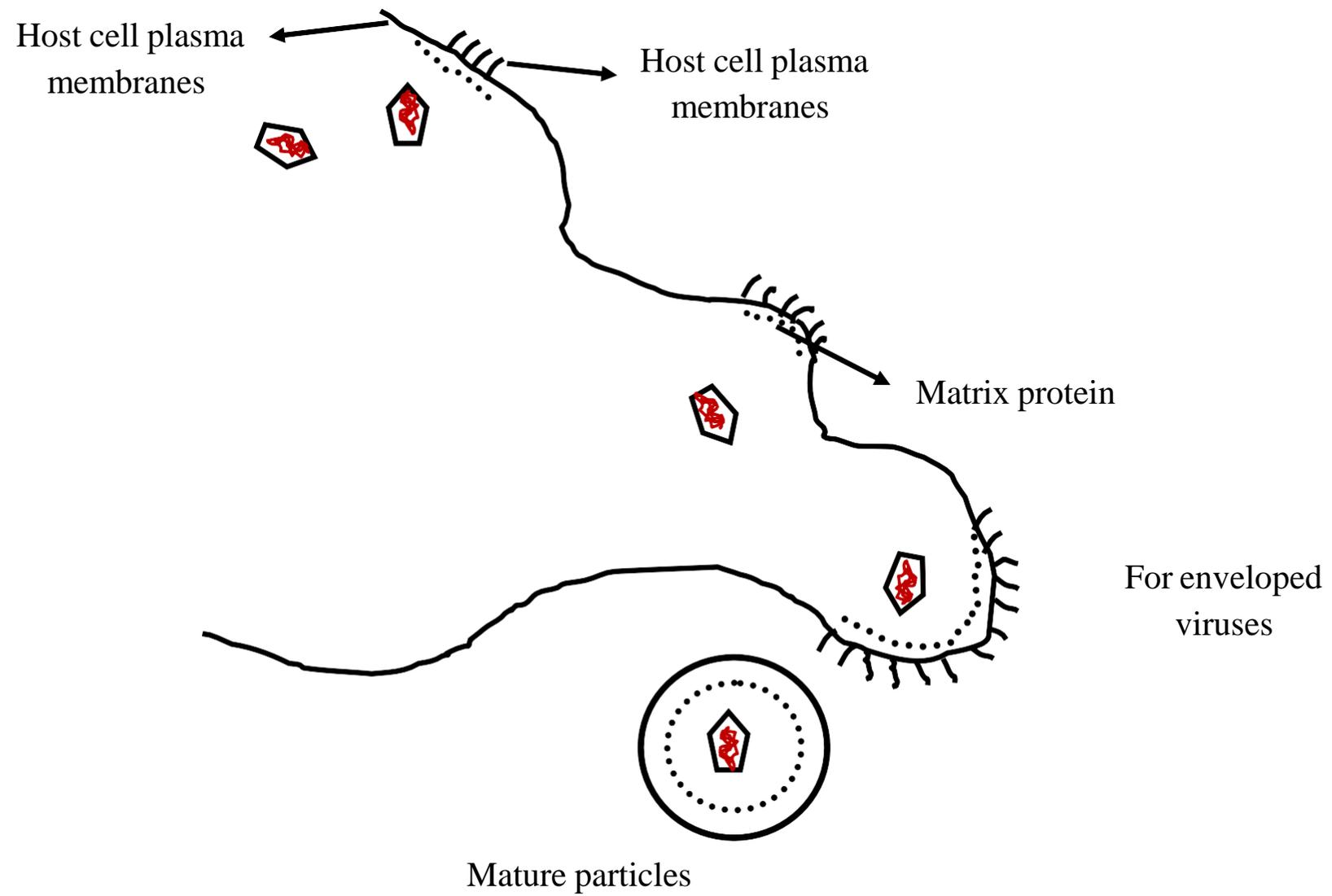
① Rupture of the cell
membrane and release of
mature particles
(undeveloped viruses(



② Budding



② Budding through outer cell membrane



Atypical viruses

Defective viruses

pseudo virions

viriods

prions

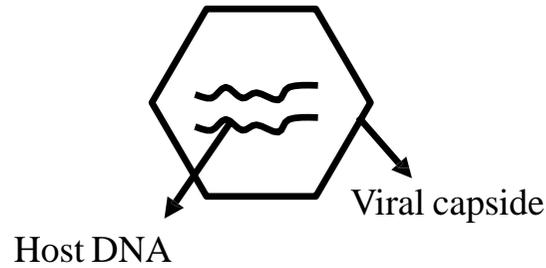
Consist of

Viral NA + Protein

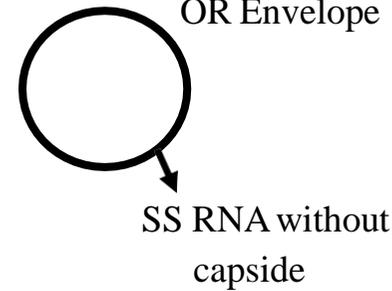
But

Usually have mutation or delation of part of their genetic material

Contain host cell DNA instead of viral DNA within the capsid



Consist of single molecules of circular RNA without protein coat

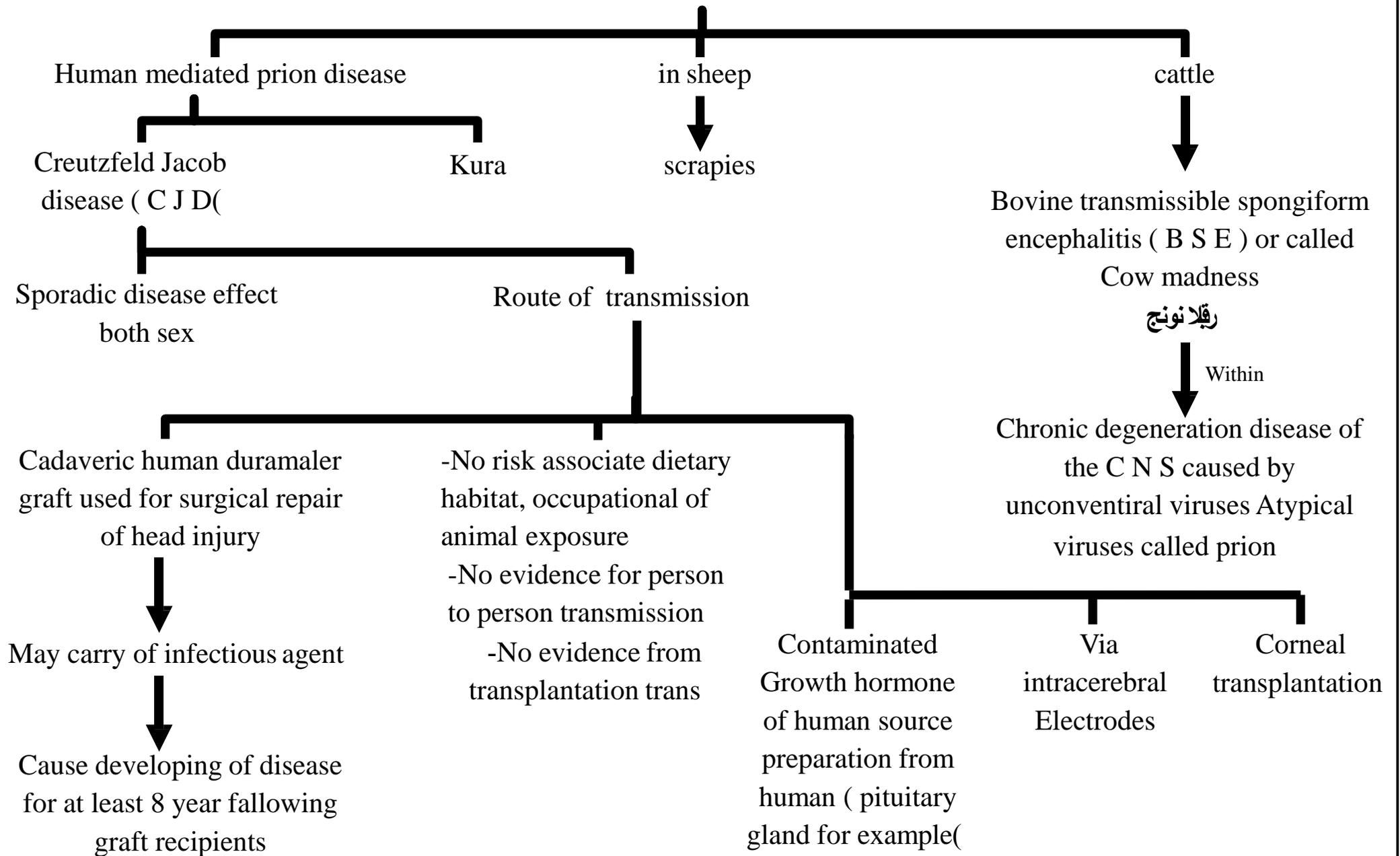


① Infectious particles consist of only protein without detectable NA

② Prions responsible for production of slow diseases include

page 14

② Prions



They found that

C J D prions in very similar to prions isolated from mad cow disease and also similar to scrapies protein in Brain tissue infected sheep

Human can get infection by eating un well cooked beef of infected cattle can get infection by eating of brain of infected sheep with scrapie

Clinical finding of C J D

Dementia

Ataxia

blindness

%80die with year age % 50-70

DX of C J D

Histological examination of Brain Biopsy

To see

Spongiform change

)cheese like hole in Brain tissue resembling lesion of B S E in cattle and serapes in sheep

Serology

No serological

No culture

No RX

Drug

or

vaccine

DX only by monoclonal Ab staining of Brain tissue