

# Chapter 10 : General Virology

Virus ← 1 of the smallest inf. agents  
 Obligate I.C. parasite → GR

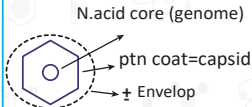
## Viruses can infect all organisms

- Animal Viruses
- Plant Viruses → Complete Viruses  
     ↳ Viroid
- Bacteriophages (bact. Viruses)

## Viruses differ from bact. in

- (1) Very small in size (20-300 nm)  
 So  
 1- Only seen by E/M (# Pox Virus)  
 2- Can pass through bact. filters  
 3- Need ultracentrifugation for Sedimentation
- (2) Contain only 1 Type of N. acids (DNA or RNA)  
 Never both
- (3) Obligate I.C. parasite (only replicate inside living cell) (and don't divide by binary fission)
- (4) Can't be cultivated in lab. on artificial culture media → only grow on tissue culture
- (5) Not susceptible to antibact. ABS

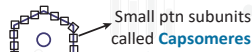
## Structure and composition



## 1 Viral nucleic acid (genome)

- Genetic material → DNA or RNA
- Most DNA viruses → double stranded
- Most RNA viruses → Single Stranded
- ssRNA → +ve sense ssRNA  
     ↳ -ve sense ssRNA
- Responsible for Virulence

## 2 Viral Capsid



### Functions

- 1- Protect genome
- 2- Attachment to host Cells (in non-enveloped Viruses)
- 3- Responsible for Viral Symmetry (morphology)

### Viral symmetry

- Icosahedral
- Helical
- Complex

### Lipoptn memb.

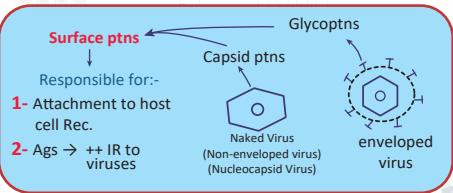
- Lipids: Derived from host cell membrane during release by budding
- Ptn → Virus Specific

### Enveloped Viruses are less stable

- (easily inactivated than naked Viruses)
- More Sensitive to Heat, drying, detergents and lipid solvents
- Being unable to survive in environment → mainly Transmitted by direct, Contact via blood and body fluids.

### may have Glycoptn Spikes

organ of attachment of enveloped Viruses to host cell Rec.  
 So, dissolving envelop → --attachment → viruses loses its infectivity



## Pathogenesis of viral Dis.

### Virus enter by

- eg. → Common cold (RhinoVirus)
- Site of pathology → Portal of entry
- I.P. → Short
- Viraemia → Absent
- Duration of imm. → Short
- Ig → Secretory IgA

### Viral infection

- Local Viral inf.**  
 eg. → Common cold (RhinoVirus)  
 Site of pathology → Portal of entry  
 I.P. → Short  
 Viraemia → Absent  
 Duration of imm. → Short  
 Ig → Secretory IgA
- Systemic Viral inf.**  
 Measles  
 At distant site (virus spread via blood or nerves)  
 Long  
 Present  
 Life-long  
 IgM and IgG

### Fate of Viral infection

- Inapparent (subclinical) Viral infection**  
 inf. without overt signs and symptoms
- Apparent infection (Dis.)**  
 inf. with clinical signs and symptoms
- Latent Viral infections**  
 Virus in dormant form  
 Flare up intermittently to produce disease (Herpes viruses)
- Persistent Viral infections (chronic)**  
 Virus is Continuously detected mild or no clinical symptoms  
 (Chronic HBV)
- Slow virus infections**  
 inf. with very Long I.P (months or years)
- Conventional viruses**  
 Variant of measles → SSPE
- Unconventional agents (Prions)**

# General Micro (11)

## Lab. diagnosis of Viral infections

### 1 Direct methods

- A- Detection of Viruses or their components in pt. specimen
- B- Virus isolation

### 2 Indirect methods

- A- Detection of anti-viral Abs pt. serum
- B- Skin test

## Ttt Viral infections

### Virus can not be ttt by ABs

(G.R)  
Lack target for action of ABs

Number of Antiviral Drugs is little (compared to anti-bact. drugs)

نعرف اسماء ال MOA وكل واحد منهم هيتاخد مع موضوعه في المنهج

### Viruses are obligate I.C. parasites

so, AntiViral drugs must Selectively inhibit viral replication without affecting host cell

### 1 Fusion inhibitors

### 2 Uncoating inhibitors

### 3 Neuraminidase inhibitors

### 4 Nucleoside analogues that inhibit DNA polymerase

### 5 Inhibitors of mRNA synthesis

### 6 Nucleoside analogues that inhibit reverse transcriptase enzyme

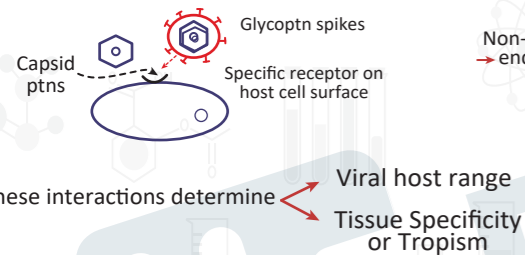
### 7 Protease inhibitors

### 8 Inhibitors of viral protein synthesis

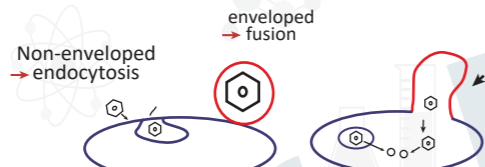
## Virus Replication

Can't replicate on their own → as they lack genes and enz. for E production

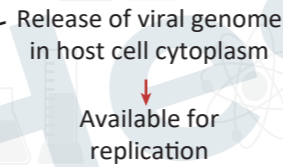
### 1 Attachment - Adsorption



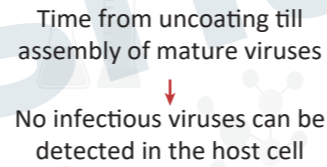
### 2 Penetration



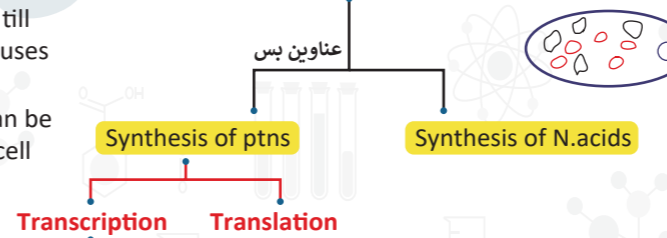
### 3 Uncoating



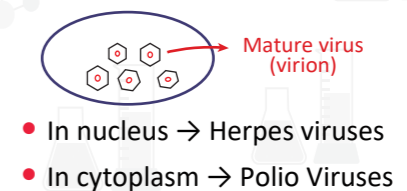
### 4 Eclipse



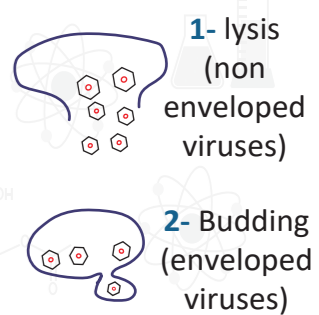
### 5 Synthesis of viral components



### 6 Assembly

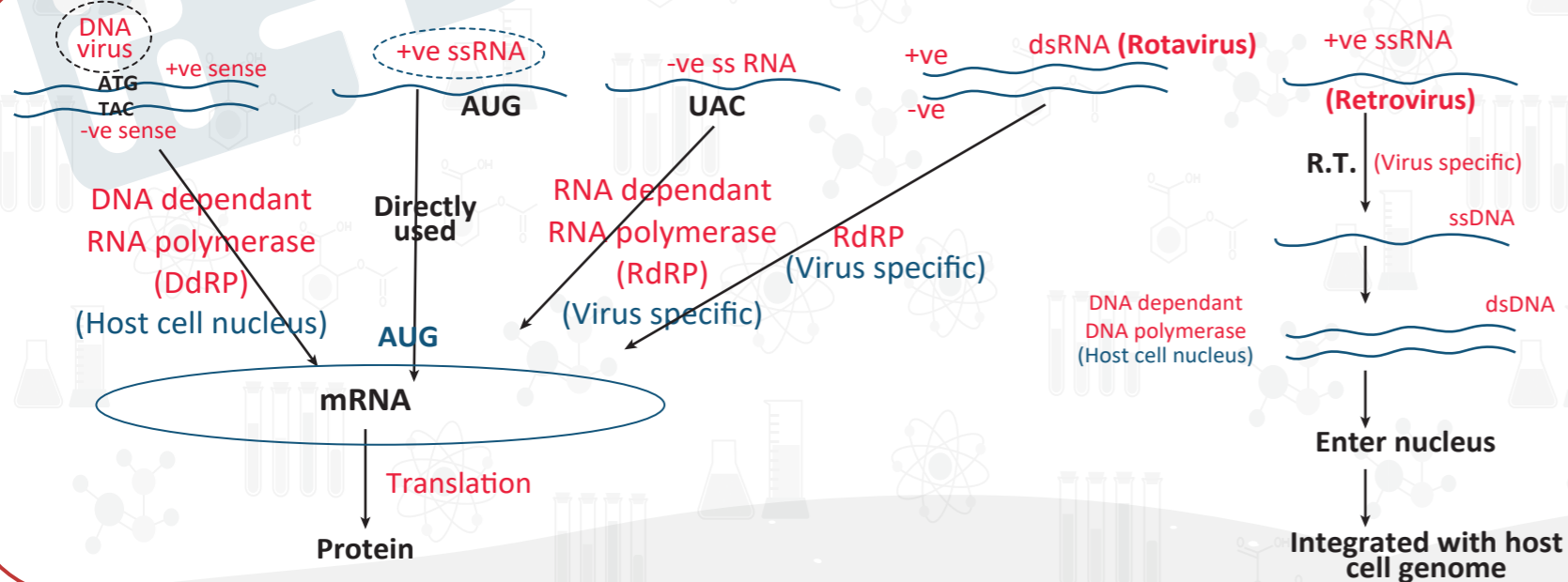


### 7 Release



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Note



- Some viruses remain latent for variable periods.
- All DNA Viruses replicate in host cell nucleus # Pox Viruses
- All RNA Viruses replicate in host cell cytoplasm # Retro viruses and orthomyxoviruses
- Rota Virus → the only dsRNA Virus
- Parvovirus → the only ssDNA Virus