

### A. Classification of viruses can be based on shared features:

1. Virus family (the name ends in **viridae**). Example: Coronaviruses are classified in the family **Coronaviridae**.
2. Virus sub-family (the name ends in **virinae**). Example: SARS coronavirus 2 is classified in the subfamily **Orthocoronavirinae**.
3. Virus genus (the name ends in **virus**). Example: monkeypox virus is classified in the **Orthopoxvirus** genus.

There are shared features among the members of the same family. Similarities increase among the members of the same subfamily. The features become very similar among the members of the same genus.

### B. Virus Replication and Baltimore classification

**1. Attachment:** The virus recognizes a cell receptor and binds it. الارتباط بالخلية

**2. Penetration:** The virus enters the cell. اختراق الخلية

**3. Uncoating:** The virus genome is exposed.

إزالة غطاء الخلية لإعطاء الحمض النووي للفيروس الفرصة للتفاعل مع مكونات الخلية والبدء بإنتاج بروتينات الفيروس

**4. Early transcription and early translation:** Production of the early mRNA and its translation into early virus proteins involved in virus replication.

البدء بإنتاج بروتينات الفيروس المسؤولة عن إنتاج نُسخ من الحمض النووي

**5. Virus genome synthesis.** صناعة عدد كبير من نُسخ الحمض النووي للفيروس

**6. Late transcription and late translation:** Production of the late mRNA and its translation into late virus proteins involved in virus structure.

البدء بإنتاج بروتينات الفيروس المسؤولة عن تكوين هيكل الفيروس الذي يحمي الحمض النووي

**7. Virus assembly:** The virus genome and capsid come together. تجميع مكونات الفيروس

**8. Virus release from the infected cell.** تحرر الفيروسات المُصنعة من الخلية المُصابة وانطلاقها لتُصيب خلايا مجاورة

### C. Baltimore classification of viruses depends on genome type:

ديفيد بلتيمور حائز على جائزة نوبل واقترح نظام التصنيف المُسمى باسمه

A) DNA vs. RNA – B) double stranded vs. single stranded – C) reverse transcription

**Note:** transcription is the conversion of DNA into RNA. So, reverse transcription is the conversion of RNA into DNA.

This is the only material required for the exam. No other source is needed

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**Baltimore classification system**

Group	Description
1	Double-stranded DNA
2	Single-stranded DNA
3	Double-stranded RNA
4	Positive-sense single-stranded RNA
5	Negative-sense single-stranded RNA
6	Positive-sense single-stranded RNA with reverse transcription
7	Double-stranded DNA with reverse transcription

**D. Pathogenesis of virus infections:** The processes of virus infection involving direct virus effect and host responses.

**Pathogenic viruses** cause disease. So, non-pathogenic viruses do not cause disease.

**Virulent viruses** cause more severe disease. شديدة الفتك

What are the possible outcomes of exposure to viruses?

1. Exposure without virus attachment and without infection.
2. Virus infection but without obvious damage: Asymptomatic infection (بدون أعراض).
3. Infection with cell damage (تخريب الخلايا) or cell transformation (تحويل الخلايا إلى خلايا سرطانية). Symptomatic disease. Sometimes this can lead to fatality (وفاة).

**So, the possible clinical outcomes of acute virus infection can be:**

- A. Acute infection with complete virus clearance. شفاء بعد الإصابة
- B. Acute infection followed by chronic infection. إصابة مُزمنة
- C. Acute infection followed by silent persistence and periodic reactivation. بقاء الفيروس كامناً بدون أعراض مع نشاط دوري للفيروس من فترة إلى فترة
- D. Acute infection followed by death. وفاة نتيجة الإصابة الحادة

**How can viruses enter the body?**

- A. Direct: Skin contact. Respiratory aerosols رذاذ or droplets قطرات. Blood. Genital secretions. Saliva.
- B. Indirect: Fomites (non-living object) or Vector ناقل (e.g. insects). المواد التي من المُحتمل أن تنقل العدوى ، مثل الملابس وأدوات الطعام والأثاث

Viruses are foreign entities. Upon entry into the body, the immune system will react. The immune response to virus infection can contribute to the disease process.

**Important Note:** This is the only material required for the exam. No other source is needed. No single word out of these handouts will be needed for the exam. You can score the full mark in Virology if you understand the points and learning outcomes mentioned in these handouts. Full clarification with examples will be provided in the lecture, so attendance is highly recommended. Wishing you all the best of luck...

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