

**Virology is the bioscience for study of viral nature, and the relationship between viruses and hosts.**

**❑ Viruses often cause serious diseases, relate to some cancers and congenital deformities, also can be used as tool for genetic engineering.**

➤ Viruses are the smallest and simplest form of life on Earth.

□ They consist of a set of nucleic acid genes enclosed in a protein coat or **capsid**

□ in some cases is surrounded by a lipid membrane or **envelope**.

➤ Viruses can replicate only within living cells.

❑ Viruses are **obligatory intracellular parasites** because:

❑ They lack basic elements required for replication, which are presented in all living cells:

## Basic Elements

- ❑ Enzyme systems that produce the basic chemical building blocks of life: nucleotides, amino acids, carbohydrates, and lipids.
- ❑ Enzyme systems that generate usable chemical energy, usually in the form of adenosine triphosphate (ATP), by photosynthesis or by metabolism of sugars and other small molecules.

	Growth on artificial media	Division by binary fission	Contain DNA and RNA	Contain protein synthesis machinery	Contain muramic acid	Sensitive to antibiotics
Bacteria	often	yes	yes	yes	often	yes
Viruses	never	no	Either DNA or RNA	no*	no	no

Genomes are either DNA or  
RNA but NOT both

❑ In fact Viruses are the only known  
form

of life that can have RNA genome.

➤ 2 problems:

❑ a. How to synthesize mRNA from an  
RNA template?

❑ b. How to replicate their genome RNA

## Why study Viruses

- ❑ Important disease-causing agent
  - ❑ Can infect all form of life
  - ❑ Most abundant form of life on Earth
  - ❑ Has led to numerous discoveries in Molecular and cell biology:
- ❑ Promoters for euk RNAPase,
  - ❑ DNAREP-enz,
  - ❑ RNA splicing and cellular oncogenes

# Consequences of viral infections

- ☐ Suffering, followed by recovery
- ☐ Persistent disease
- ☐ Fatal disease
- ☐ Congenital disease
- ☐ Contributory factor in cancer
- ☐ Contributory factor in other diseases



# Viral Properties

## Viruses:

- ☐ Are obligate intracellular parasites
- ☐ Cannot make energy or proteins independent of a host cell
- ☐ Do NOT Respond to stimuli in the external environment
- ☐ Reproduce and pass on their organization to their offspring
- ☐ Evolve and adapt to the environment

# Basic virus structure

