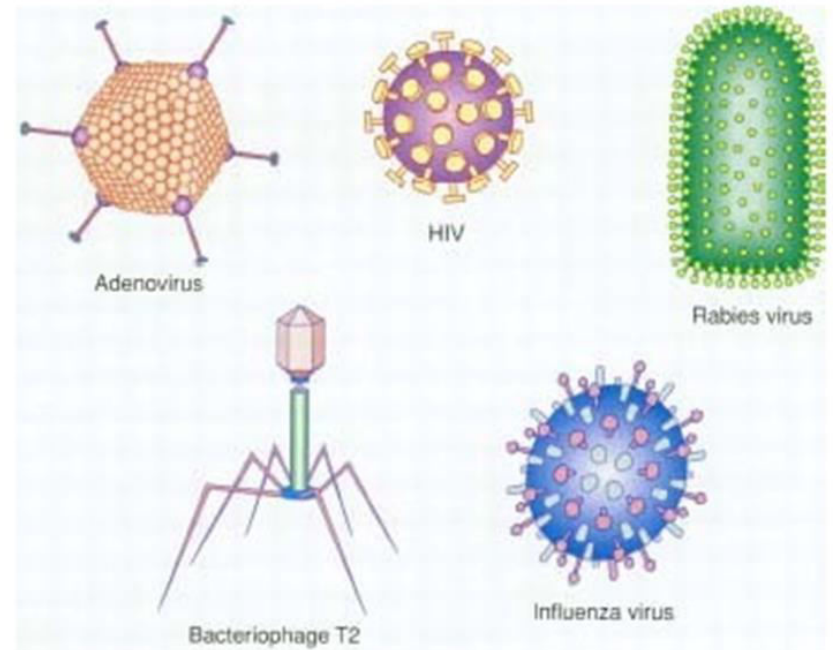


# Viruses Part I



# Viral Taxonomic Classification

- Order>> -virales
  - Family>> -viridae
  - Subfamily>> -virinae
  - Genus>> -virus
  - Species
- Order>> Picorna**virales**
  - Family>> Picorna**viridae**
  - Subfamily>> Picorna**virinae**
  - Genus>> Enterov**irus**,  
rhino**virus**, hepato**virus**

# Adenovirus

## Structure:

- Genome: double-stranded linear DNA virus.
- Capsid: Icosahedral (70 to 100 nm) is made up of 252 capsomeres (this capsid contain the double-stranded linear DNA).
- Non-enveloped viruse.
- Adenoviruses are large group of related viruses, have approximately 50 serotypes that can infect human.



= Single-stranded, linear DNA



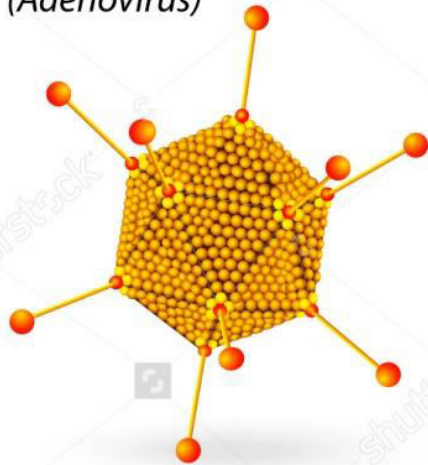
= Double-stranded, linear DNA



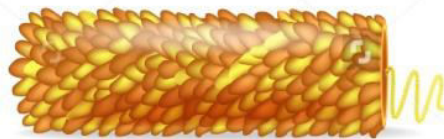
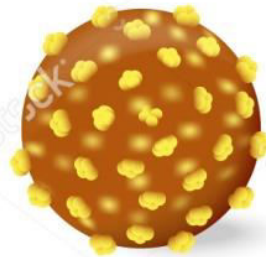
= Double-stranded, circular DNA

# VIRAL SHAPES

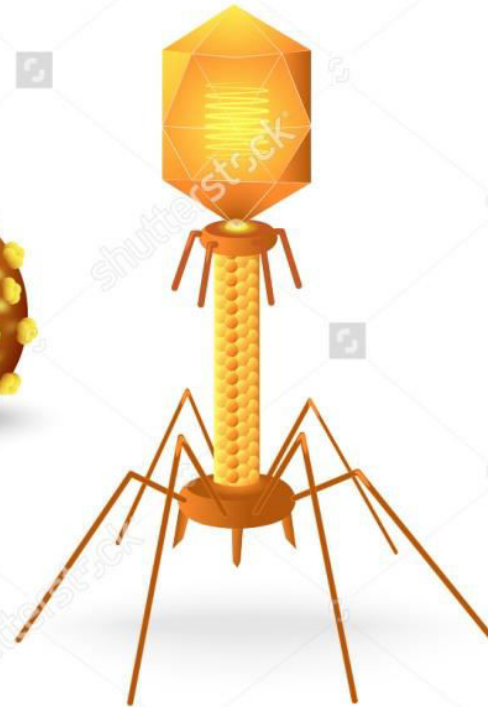
**Polyhedral**  
(Adenovirus)



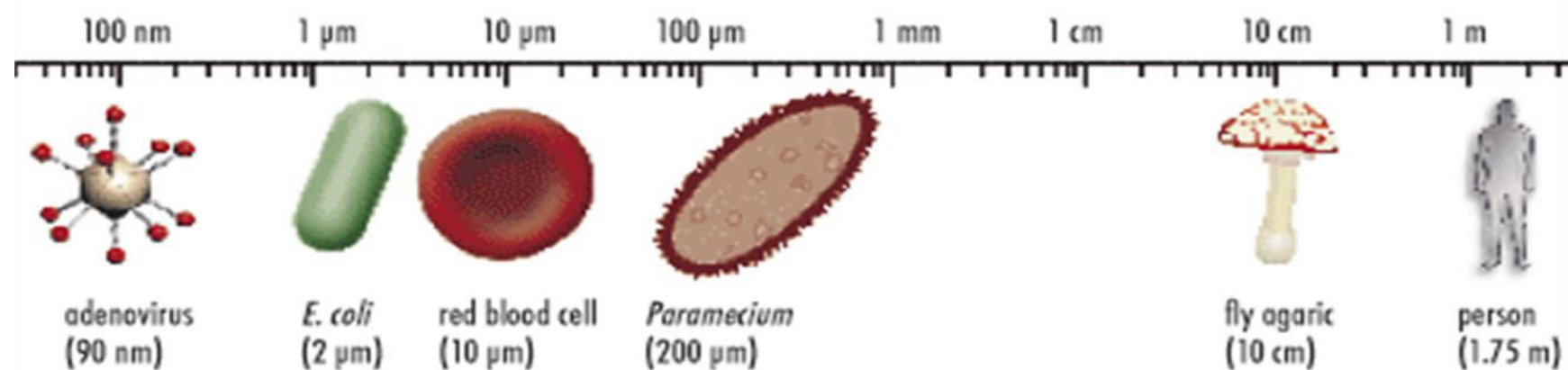
**Spherical**  
(Influenza)



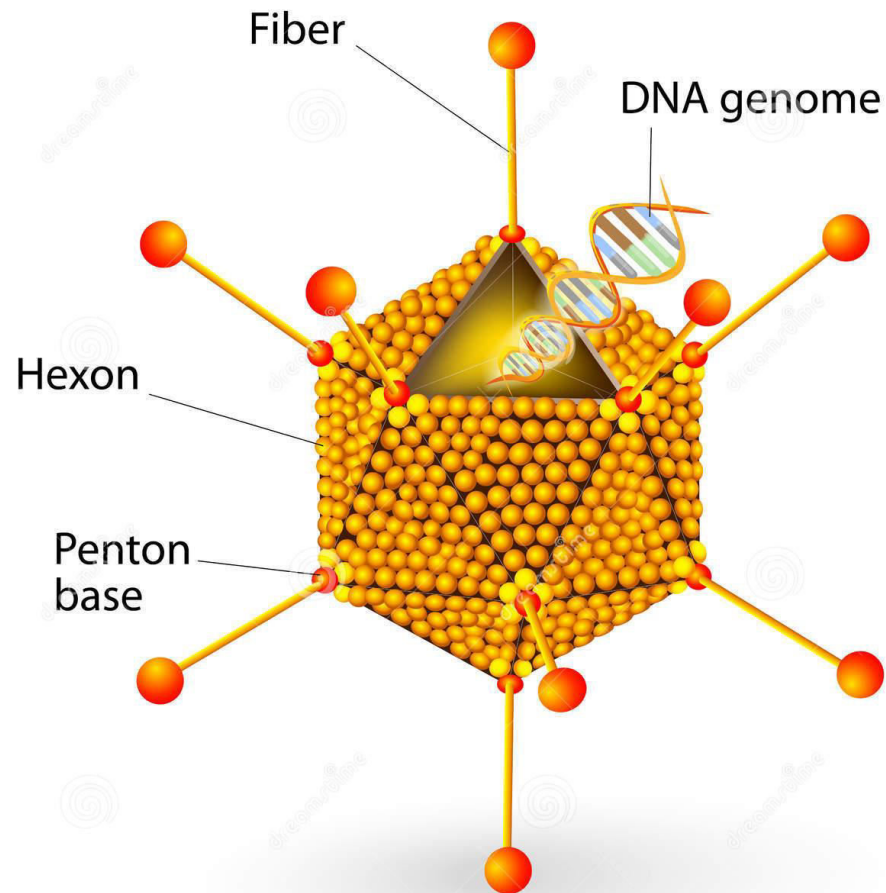
**Helical**  
(Tobacco mosaic virus)



**Complex**  
(Bacteriophage)



# Adenovirus



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# Adenovirus

## Adenoviruses causes:

- Acute respiratory disease (*usually*).
- Pneumonia (*occasionally*).
- Acute follicular conjunctivitis, epidemic keratoconjunctivitis, cystitis, and gastroenteritis (*occasionally*).
- In infants, pharyngitis and pharyngeal-conjunctival fever are common



**A. Respiratory diseases:**

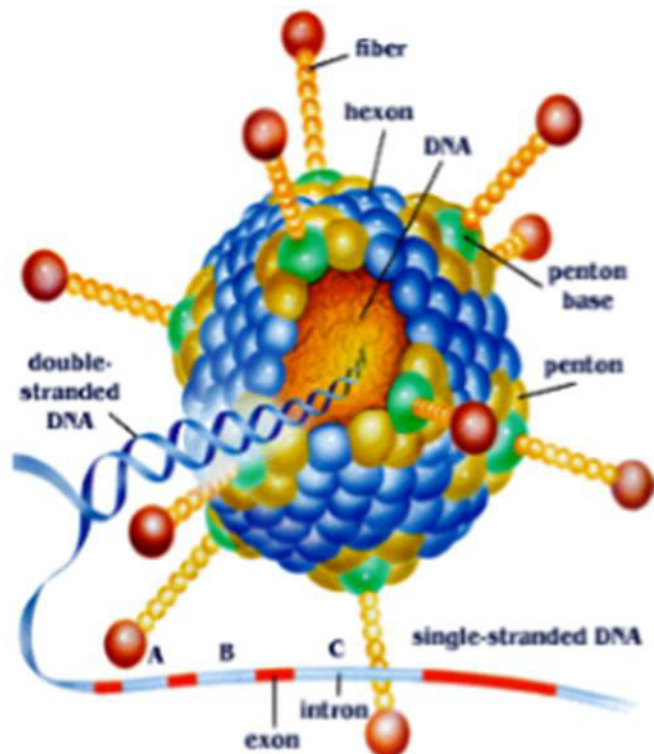
**B. Eye infections:**

**C. Gastrointestinal disease**

**D. Other diseases:**

**E. Adenoviral infections of the immune compromised host**

---



# Properties of Adenovirus

- Stable in the environment.
- Relatively resistant to disinfection inactivated by formaldehyde and chlorine.
- Stable in GI tract- can withstand low pH, bile acids and proteolytic enzymes.

# Adenovirus

## Pathogenesis:

- Virus **attachment** to host cell receptor.
- Viral **entry** into the host cells.
- Viral **un-coating**, **replication** and **assembly** inside the cell nucleus.
- This productive cycle of virus kills the host cell as cellular DNA, RNA, and protein synthesis are all shut off during the course of infection.
- Infectious virus is **released** from dying host cells.

# Adenovirus

## Host Defense:

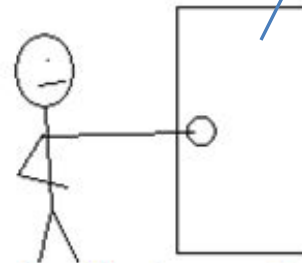
- ✓ In adolescents and adults a high prevalence of circulating neutralizing antibodies contributes to widespread immunity against adenovirus infections.
- ✓ Cytotoxic T lymphocytes also recognize and destroy adenovirus-infected cells.

# Adenovirus Transmission

Direct contact like incase of eye infections. (virus-contaminated hands, ophthalmologic instruments, towels)



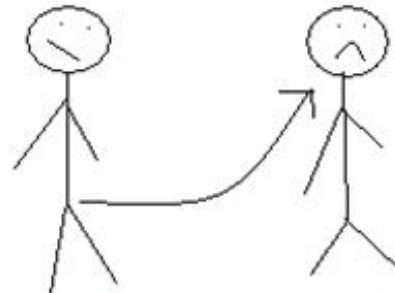
**respiratory transmission**



**fomite transmission**



**water-borne transmission**



**fecal-oral transmission**

# Acute Adenovirus Conjunctivitis

It cause follicular conjunctivitis can be seen as:

- ✓ Pharyngoconjunctival Fever

Or

- ✓ Epidemic Keratoconjunctivitis

# Pharyngoconjunctival Fever

- Kids 5-15.
- Swimming pool conjunctivitis.
- Systemic signs, and **lymphadenopathy** is characteristic singe for the disease.
- Self limiting disease no treatment is needed, but topical antibiotics should be given to control secondary bacterial infection.





# Epidemic Keratoconjunctivitis

- Young adults.
- No systemic manifestations
- Starts unilateral, then spread to other eye in a week or less
- Especially contagious, and often occurs in epidemic especially in crowded living conditions.
- Involves the corneal epithelium, and may be followed by corneal opacity lasting several years.

# Prophylaxis

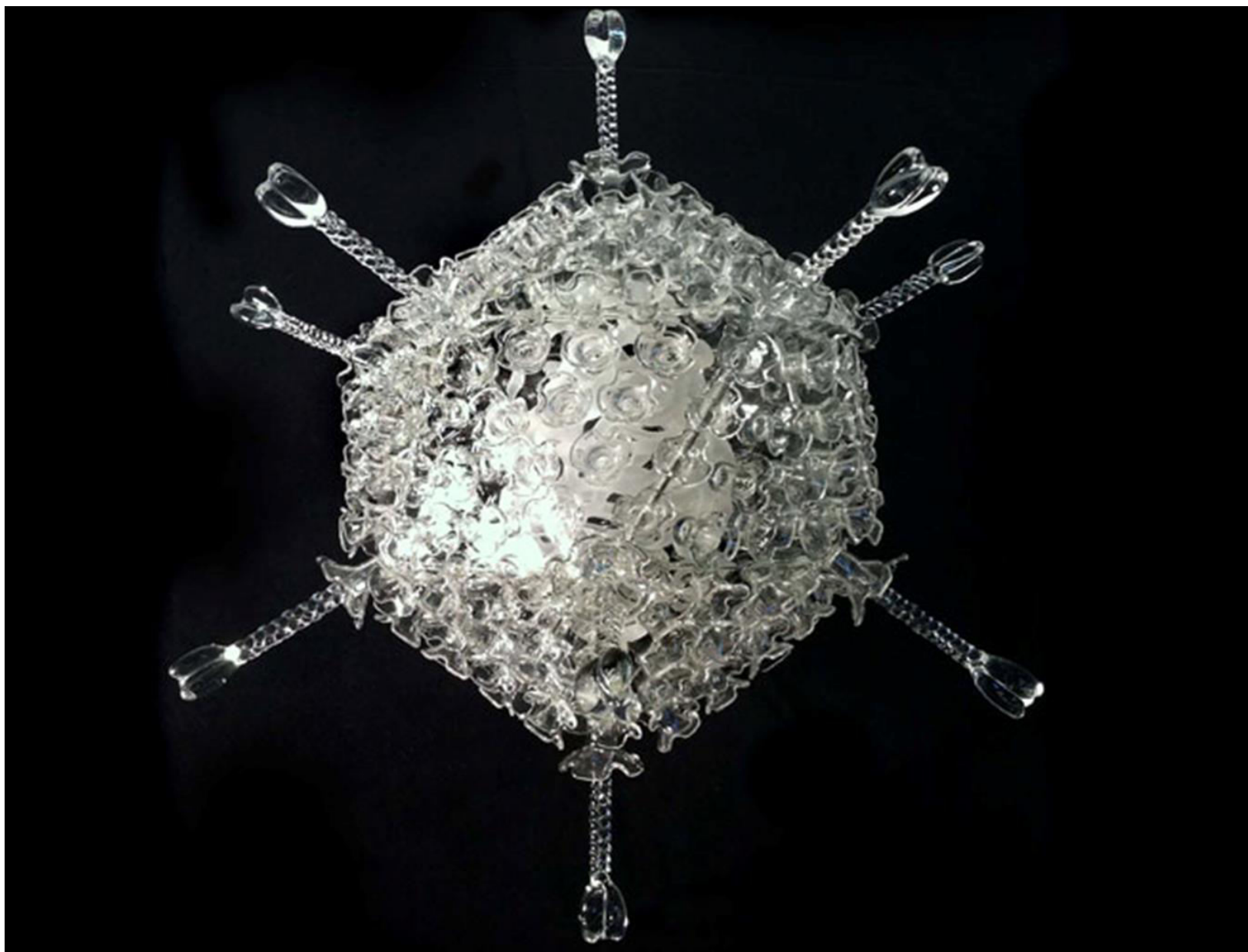
- Cleaning and sterilization of all instruments that touch the patient's eye.
- Proper cleaning and chlorination of swimming pools.
- Frequent hand washing.
- General cleaning and good hygiene practice.

## Diagnosis:

- Cell culture technique: growing of the virus in cell culture.
- ELIZA: detecting of virus antigen ELIZA.
- PCR.

## Treatment:

- Broad-spectrum antibiotics to prevent secondary infections.
- Topical corticosteroids can be given for patients with conjunctival pseudomembrane or photophobia.



# Coxsackie viruses & Enterovirus

- ✓ Belong to **family Picornaviridae**

## Characteristics of Picornaviridae Family:

- This family comprises five main genera: Enteroviruses (>70 subgroups including: Poliovirus, Enterovirus, Coxsackie viruses), Rhinoviruses, Hepatoviruses (Hepatitis A), Cardioviruses and Aphthoviruses.
- Genome: Single-stranded linear RNA.
- Capsid: Small icosahedral (22-30 nm)
- Non-enveloped
- Replicate in cytoplasm.

**Picornaviridae family causes a wide range of illnesses. Infection with various picornaviruses may be asymptomatic or may cause clinical syndromes such as:**

- Aseptic meningitis.
- Encephalitis.
- Common cold.
- Conjunctivitis.
- Myocarditis.
- Hepatitis.
- Poliomyelitis.

# Transmission of Picornaviridae Family

- By ingestion of contaminated food or water.
- From person to person usually on unwashed hands that touched feces or surfaces contaminated with feces.
- Diaper-changing tables, and toys in day-care may transmit the virus.
- Inhalation of infectious aerosols.
- Cockroaches in sewage and flies that settle on excreta may act as transient vectors.

# Acute Hemorrhagic Conjunctivitis

## Etiology:

- ✓ Enterovirus 70 & Coxsackie virus A 24.

## Clinical Features:

- ✓ Affects all age groups but mostly seen in young patients.
- ✓ Contagious and transmission appears to be hand-to-eye.
- ✓ Sudden onset.
- ✓ Peak incidence: **summer & fall**
- ✓ At first unilateral & quickly become Bilateral.
- ✓ Watering, redness & painful swelling in the eyelids.
- ✓ Conjunctivitis is more severe than adenovirus conjunctivitis and often accompanied by *Sub-conjunctival haemorrhages*.
- ✓ May cause transient blurring of vision.



# Acute Hemorrhagic Conjunctivitis

## Treatment:

- Only symptomatic treatment, it has a self-limiting course. Usually lasts for 7 to 14 days.
- Broad spectrum antibiotics should be used to prevent secondary bacterial infection and cross infection.

# Assignment

Compare between viral conjunctivitis and  
Bacterial conjunctivitis



GOOD HEALTH  
IS IN YOUR HANDS.

**Hand hygiene is the single most important way  
that you can prevent the spread of infection.  
Protect yourself with good hand hygiene!**

[www.cdc.gov/handhygiene](http://www.cdc.gov/handhygiene)