

# Gastrointestinal viruses

## Rotavirus

- **Learning Outcomes**

- 6th Example of Human Specific Disease:
- Rotavirus
- Classification
- morphology and structure.
- Laboratory diagnosis.
- Treatment and Prevention

# Gastrointestinal viruses

- \*It is inflammation of the gastrointestinal tract which involves both stomach and small intestine and leading to acute diarrhea and vomiting.

# The Classification

- **Family:** Reoviridae
- **1-Subfamily** Spinoreovirinae contains 9 genera, including Orthoreovirus and Coltivirus that infect humans.
- **2- Subfamily** Sedoreovirinae contains 6 genera, including Rotavirus and Orbivirus that infect humans.

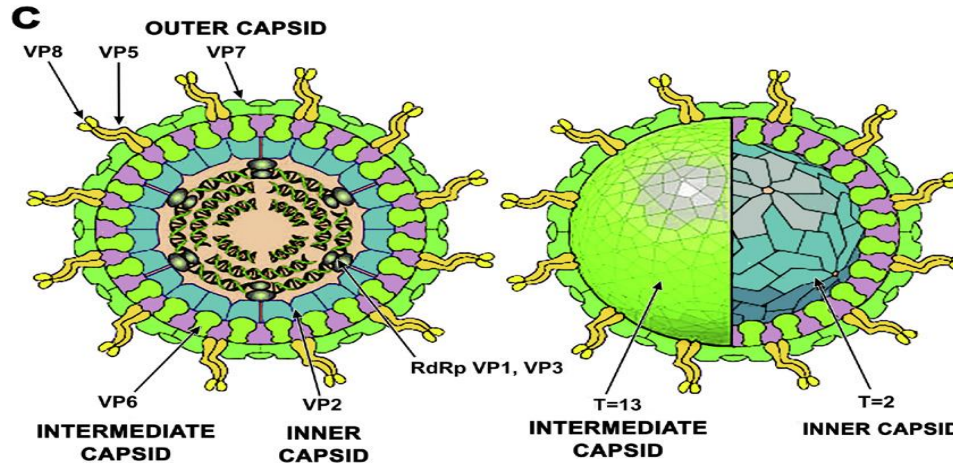
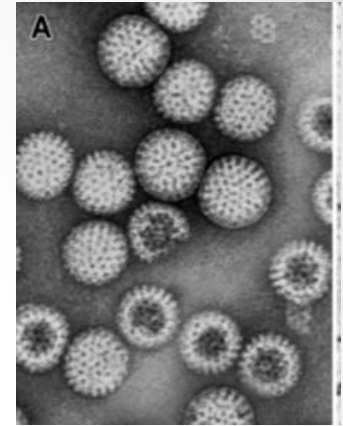
# What is Rotavirus?

- \*Rotavirus is one of viruses that cause diarrheal disease in man and animals.
- \*The name rotavirus comes from the wheel-like appearance of the virus under the microscope
- \* infects the intestines and cause of severe diarrheal disease in infants and young children worldwide
- \*Rotavirus is not the only cause of diarrhea, several other agents may also cause diarrhea

# Structure and genome

Double-stranded RNA  
11 segments genome.  
icosahedral capsid Non-  
enveloped

Negative contrast  
electron microscopy  
of human rotavirus,  
showing the multiple  
capsid layers



Model of rotavirus virion, showing its triple capsid layer construction, about 80 nm in total diameter. The inner capsid has  $T = 2$  icosahedral symmetry; the intermediate capsid has a  $T = 13$  symmetry and the outer capsid has viral protein projections that serve as cell binding ligands.

# Laboratory diagnosis

- Sample: feces ,blood
- Rotaviruses were discovered by **electron microscopy**, which remains one approach to rapid diagnosis.
- **The most widely used procedure is:**
- **1- Negative staining**
- Virus-containing fluid is placed on a carbon grid
- Virions adhere to the surface and become “negatively stained” when an electron-dense fluid is added and surrounds the virions
- **immune electron microscopy**
- Virus-specific antibody is used to agglutinate virus particles together and thus making them easier to recognize, or to capture virus particles onto the EM grid.

- The sensitivity and specificity of EM may be enhanced by immune electron microscopy.
- There are two variants:-
- **Classical Immune electron microscopy (IEM)** - the sample is treated with specific anti-sera before being put up for EM. Viral particles present will be agglutinated and thus congregate together by the antibody.
- **Solid phase immune electron microscopy (SPIEM)** - the grid is coated with specific anti-sera. Virus particles present in the sample will be absorbed onto the grid by the antibody.



2- ELISA

3- RT- PCR

4- Cell Culture

\* Primary rhesus monkey kidney cells (PRMK), the monkey kidney cell line MA104, and the human colon carcinoma line CaCo-2 are the most commonly used.

# Prevention and Treatment

- Good Sanitation & hygiene
- many lives can be saved by fluid .A suitable mixture of glucose and electrolytes by mouth .
- In the mid-2000s, the live vaccines RV5 (RotaTeq) and RV1 (Rotarix) were licensed for use in many countries of the world. The vaccines are given as two (RV1) or three (RV5) oral doses beginning at two months of age.