

VIRAL AGENTS CAUSING GASTROENTERITIS

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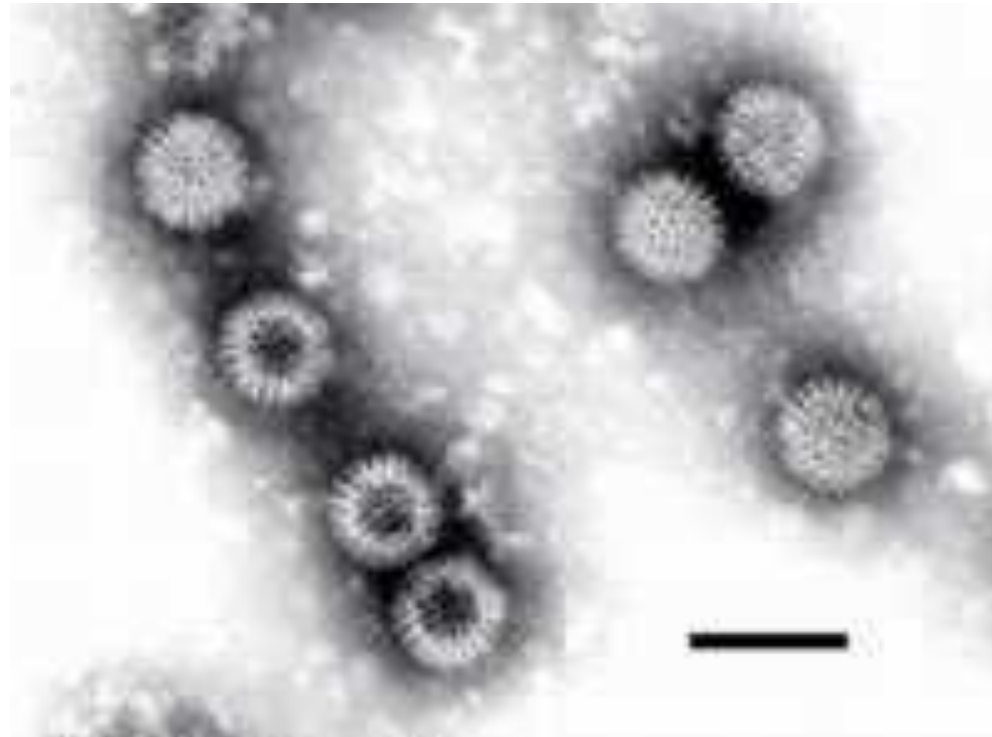
Pathogens discussed in today's lecture

- 1. Rotavirus**
- 2. Enteric adenoviruses**
- 3. Caliciviruses**
- 4. Astroviruses**
- 5. Toroviruses**

ROTAVIRUS

Family *Reoviridae*

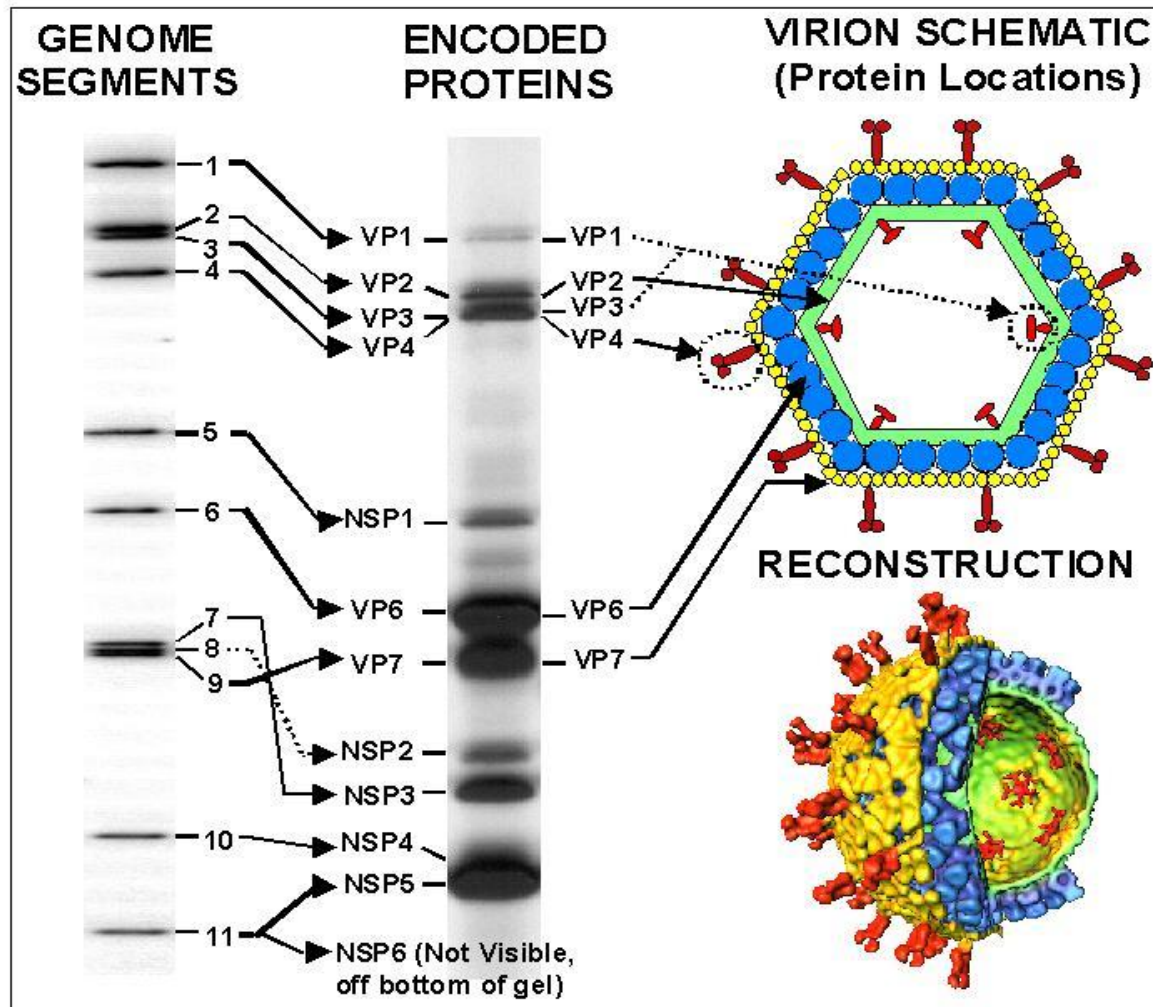
Genus *Rotavirus*



STRUCTURAL FEATURES OF ROTAVIRUS

- 65-75nm in size
- Non-enveloped virus (naked)
- EM appearance of a wheel with radiating spikes
- Icosahedral symmetry
- Double capsid (outer and inner capsid)
- Double stranded (*ds*) RNA in 11 segments
- Core with genome
- Capsid is cleaved by trypsin to form ***ISVP***
[intermediate/infective sub-viral particle]

Rotavirus structure



VIRAL STRUCTURAL PROTEINS (VP)

- Outer structural proteins - VP7 and VP4

VP7 - Glycoprotein, lost after protease cleavage

VP4 - protease-cleaved, P protein, viral hemagglutinin;
forms spikes from the surface

- Inner core structural proteins VP 1, 2, 3, 6

- VP6 is an important antigenic determinant

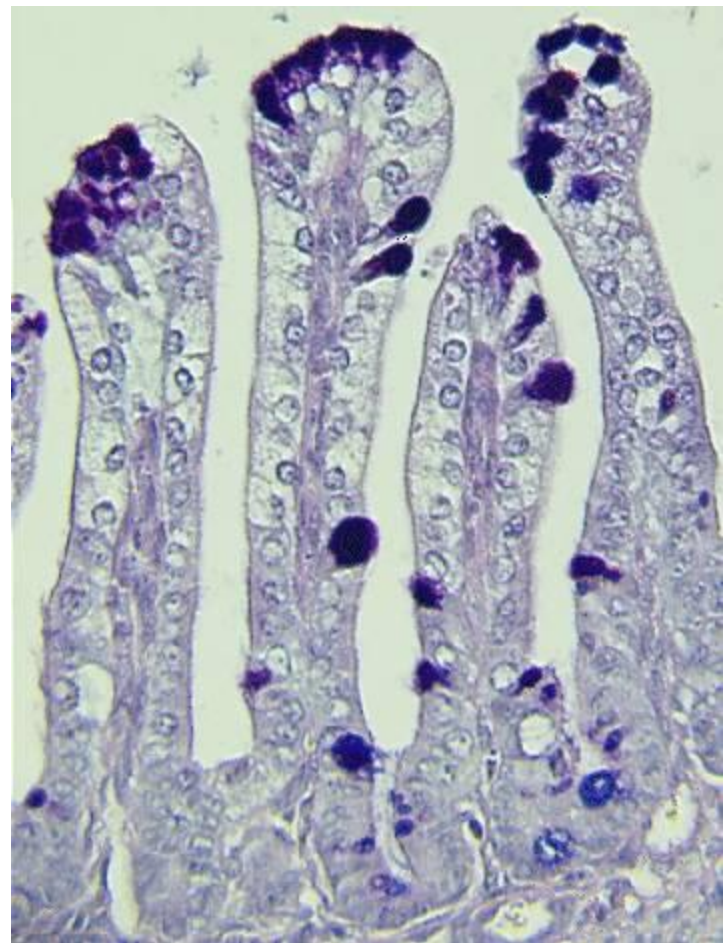
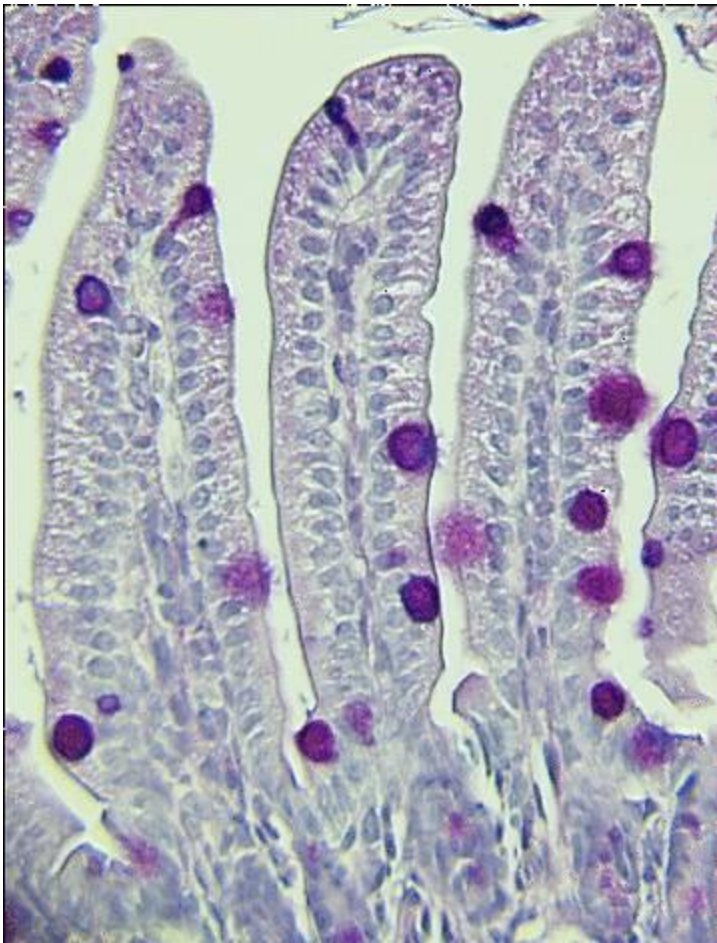
PATHOGENESIS

- Targeted host cells - mature enterocytes lining the tips of intestinal villi
- Intermediate/infective sub-viral particle (ISVP) produced through proteolysis
- Enter host cell by endocytosis
- Virus replicates in the host cell cytoplasm

HISTOPATHOLOGY

- Mature enterocytes lining the tips of intestinal villi are affected
- Villous atrophy and blunting
- Death of the mature enterocytes
- Infiltration of lamina propria with mononuclear cells
- Repopulation of the villous tips with immature secretory cells
[*crypt hyperplasia*]

HISTOPATHOLOGY

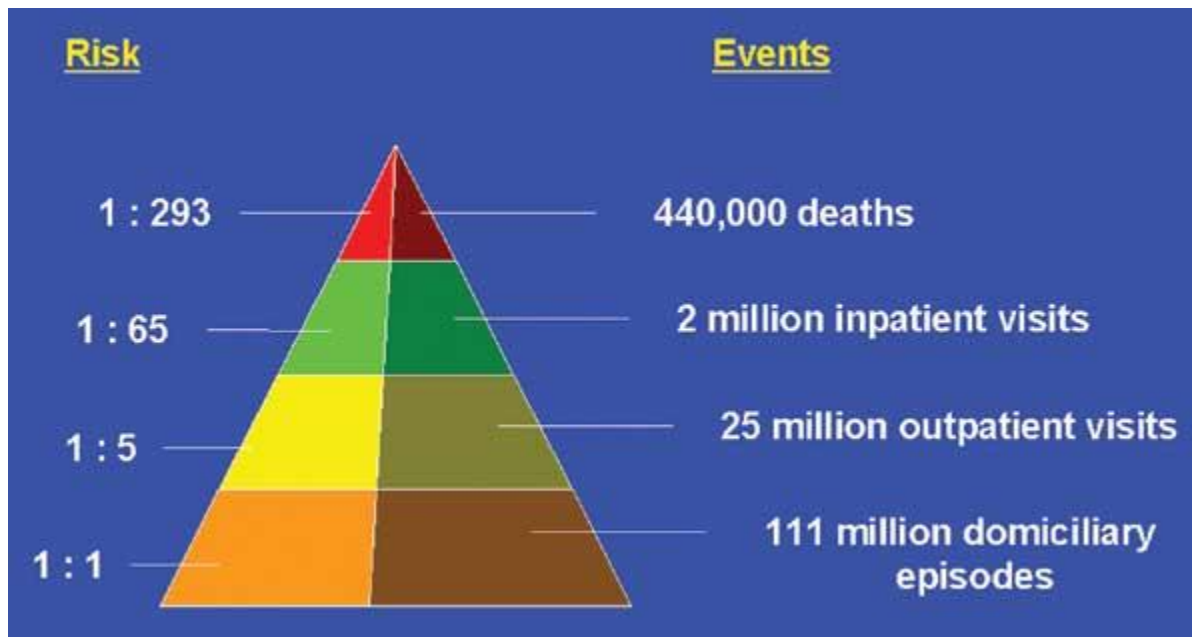


EPIDEMIOLOGY

- A major cause of diarrhea-associated hospitalizations and deaths
- Sero-prevalence studies show that antibody is present in most by age 4yrs 90%

ROTAVIRAL DISEASE BURDEN

Worldwide



EPIDEMIOLOGY

- ▶ Age- children 4mo - 2 years are most affected
Protection of younger infants through through transplacental antibody transfer
- ▶ Asymptomatic infections are common, especially in adults
- ▶ Nosocomial infections
- ▶ Outbreaks
- ▶ Severe Disease young, immunocompromised
- ▶ Seasonality Winter months
- ▶ Incubation period – 1-3 days

TRANSMISSION

- Mainly person to person via fecal-oral route
- Food and water-borne spread is possible
- Fomites
- Spread via respiratory route is speculated

EPIDEMIOLOGY - spread

- Contagious from before onset of diarrhea to a few days after end of diarrhea
- Large amounts of viral particles are shed in diarrheal stools 2-12 days
- Infective dose 10-100 pfu

CLINICAL FEATURES

- ▶ Incubation period - thought to be <4 days
- ▶ Fever- can be high grade (>39C in 30%)
- ▶ Vomiting, nausea precede diarrhea
- ▶ Diarrhea
 - usually watery (no blood or leukocytes)
 - lasts 3-9 days
 - longer in malnourished and immune deficient individuals.
 - NEC and hemorrhagic GE seen in neonates
- ▶ *Dehydration* is the main contributor to mortality
- ▶ *Secondary malabsorption* of lactose and fat, and chronic diarrhea are possible

DIAGNOSIS

- Antigen detection in stool

ELISA

- EM- non-Group A viruses also
- Culture- Group A rotaviruses can be cultured in monkey kidney cells
- Serology for epidemiologic studies

TREATMENT AND PREVENTION

- ▶ **Treatment**

Supportive- oral, IV rehydration

- ▶ **Prevention**

Hand hygiene and disinfection of surfaces

- ▶ **Vaccine**

RotaTeq (Merck)

- Live oral vaccine licensed 2006 in US
- 3-dose schedule – age 2,4,6 month
- Minimum age of first doses is 6 weeks
- First dose should be administered between 6 and 12 weeks of age (until age 13 weeks)
- Do not initiate series after 12 weeks of age