

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

VIRAL

GASTROENTERITIS

*(GI & N Block, Microbiology:
2016)*

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OBJECTIVES

- **VIRAL GASTROENTERITIS (VGE)**
 - Etiology of VGE
 - Epidemiology
 - Clinical Features
 - Lab diagnosis
 - Treatment & Prevention (Vaccine)
- **Rotavirus , Adenovirus , calicivirus & Astrovirus .**

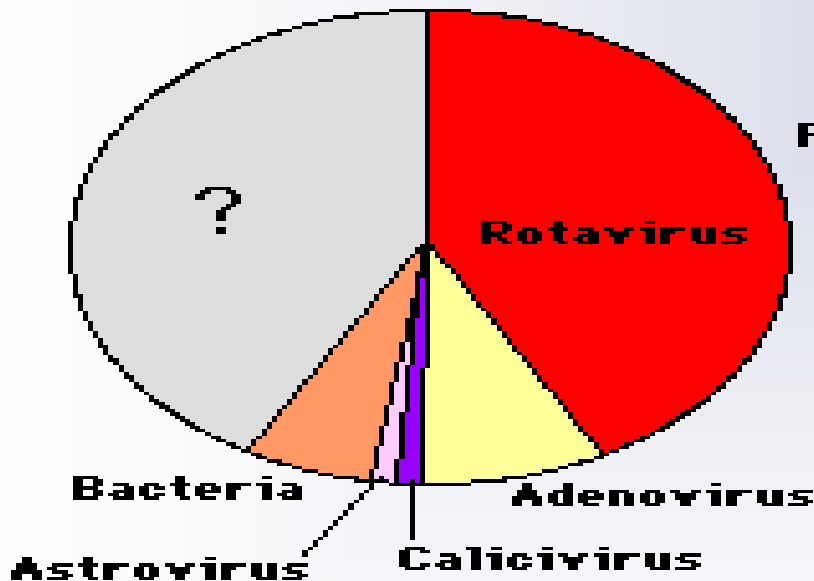


GASTROENTERITIS

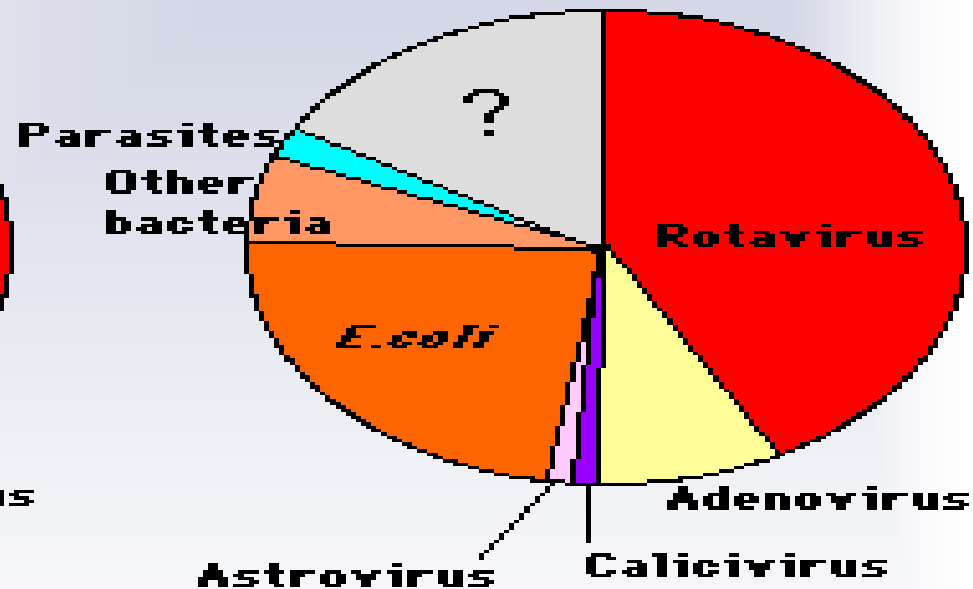
- ✦ Definition
- ✦ Causes
 - ✦ Infectious
 - ✦ Noninfectious

Viruses associated with gastroenteritis

Developed Countries



Developing Countries



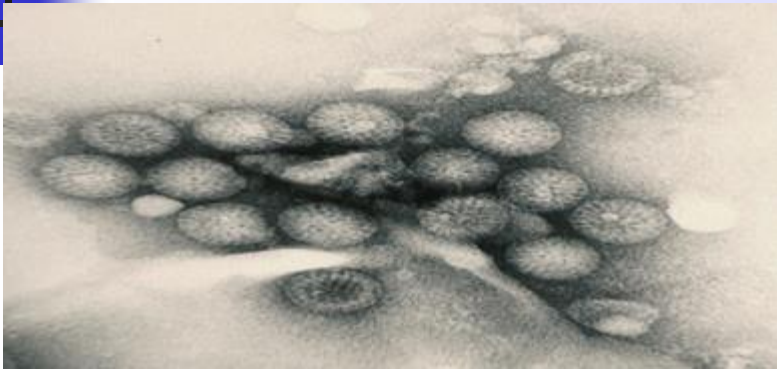
† Etiologic agents in severe diarrheal illnesses requiring H of infants & young children

† Other viruses;

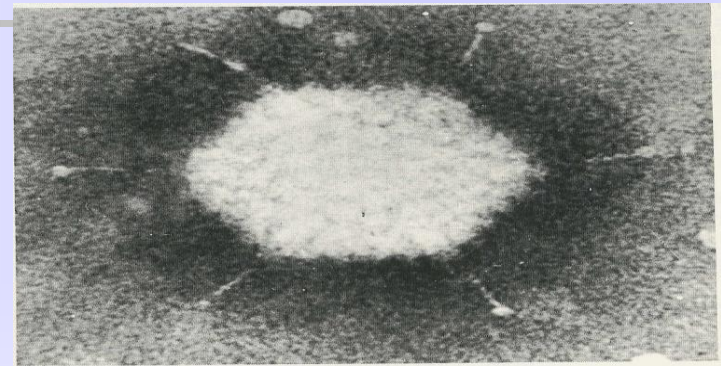
† Coronaviruses , Adenoviruses & Enteroviruses....

Electron micrographs

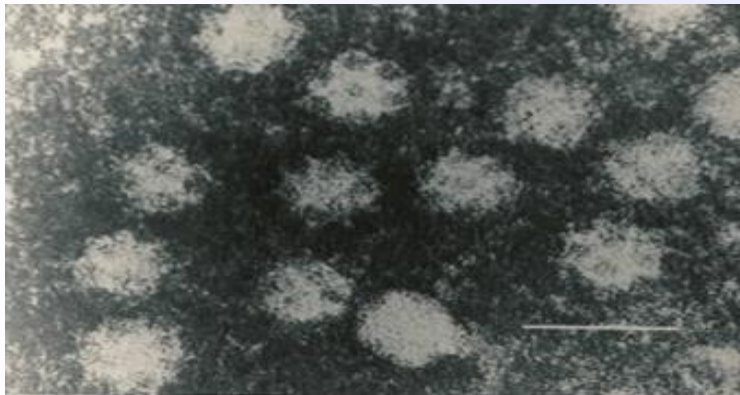
VGE



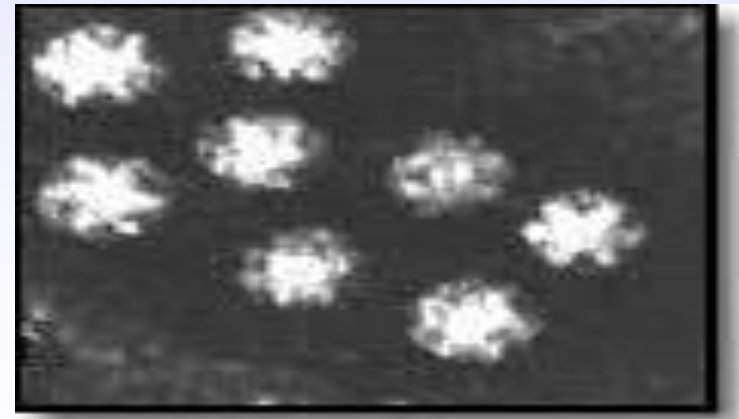
Rotavirus



Adenovirus



Calicivirus



Astrovirus

VIRAL GASTROENTERITIS

<u>Virus</u>	<u>Genome</u>	<u>Important Morphological features</u>
■ Rotavirus	ds RNA 11 Segments	Double~Shelled With Wheel~Like Structure.
■ Adenovirus 40,41 types	ds DNA	Classical Icosahedron with fibers.
■ Calicivirus	ss RNA(+)	Cup~Like depression on its surface .
■ Astrovirus	ss RNA(+)	5 or 6~Pointed Star on its surface .



Epidemiology

- ✦ Distribution ; Worldwide
 - ↑ in poor hygiene, overcrowding, and poverty
- ✦ Age ; Infants & young >> Older children
- ✦ Transmission ; Faecal-oral route
- ✦ Season ; Winter months
- ✦ Endemic inf ; Gp A rota & adeno 40,41
- ✦ Epidemic inf ; Norovirus



Clinical Features

- ✦ IP ;Short
- ✦ Symptoms:
 - ✦ D, V, Fever & abdominal cramps
- ✦ Dehydration → Life threatening
- ✦ Winter vomiting disease:
 - ✦ Vomiting > Diarrhoea
 - ✦ Calicivirus



Lab diagnosis

- ✦ Cell culture: [c/c]
 - ✦ Fastidious → growing poorly → not used
- ✦ Electron microscopy: [EM]
 - ✦ Catch all tech
 - ✦ Many disadvantages → not used
- ✦ Specific test:
 - ✦ ELISA for detection of viral Ag in stool
[rota , adeno , astro & caliciviruses]



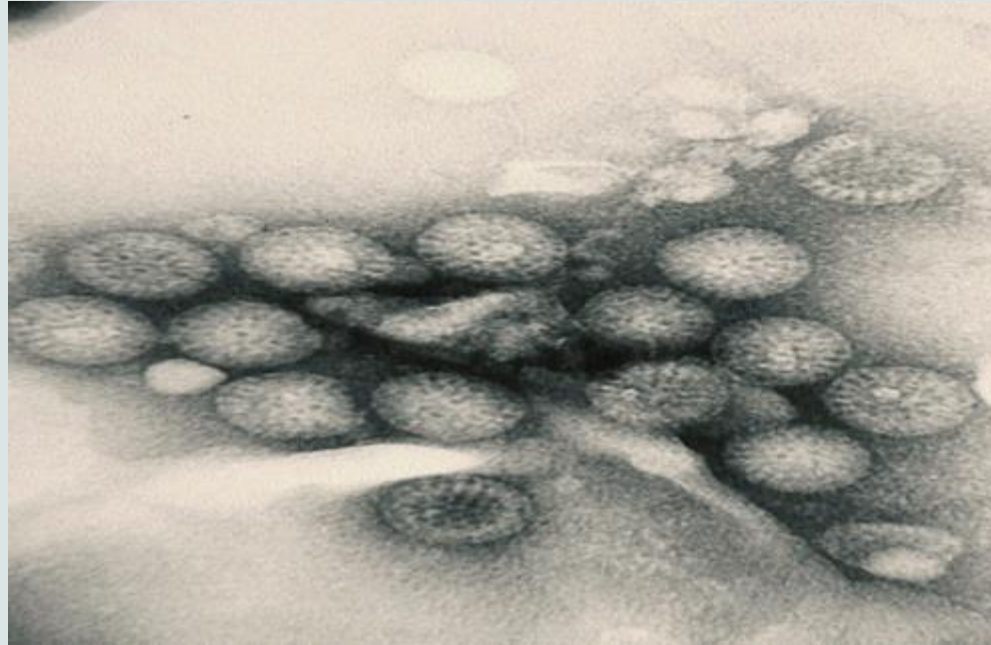
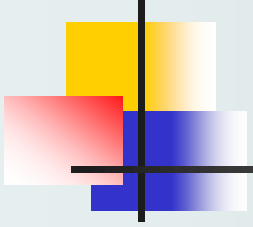
Management

✦ Treatment:

- ✦ Rehydration

✦ Prevention:

- ✦ Sanitation & hygiene measures
- ✦ No vaccines except for rotavirus





ROTAVIRUS

- ✦ **Family:**

- ✦ Reoviridae [Respiratory & Enteric Orphan]

- ✦ **Description:**

- ✦ 11 segments dsRNA

- ✦ Double-layered icosahedral

- ✦ Nonenveloped

- ✦ ~ 70 nm

- ✦ RNA – dependent RNA polymerase

- ✦ 7 groups [A-G]----- GpA → most common

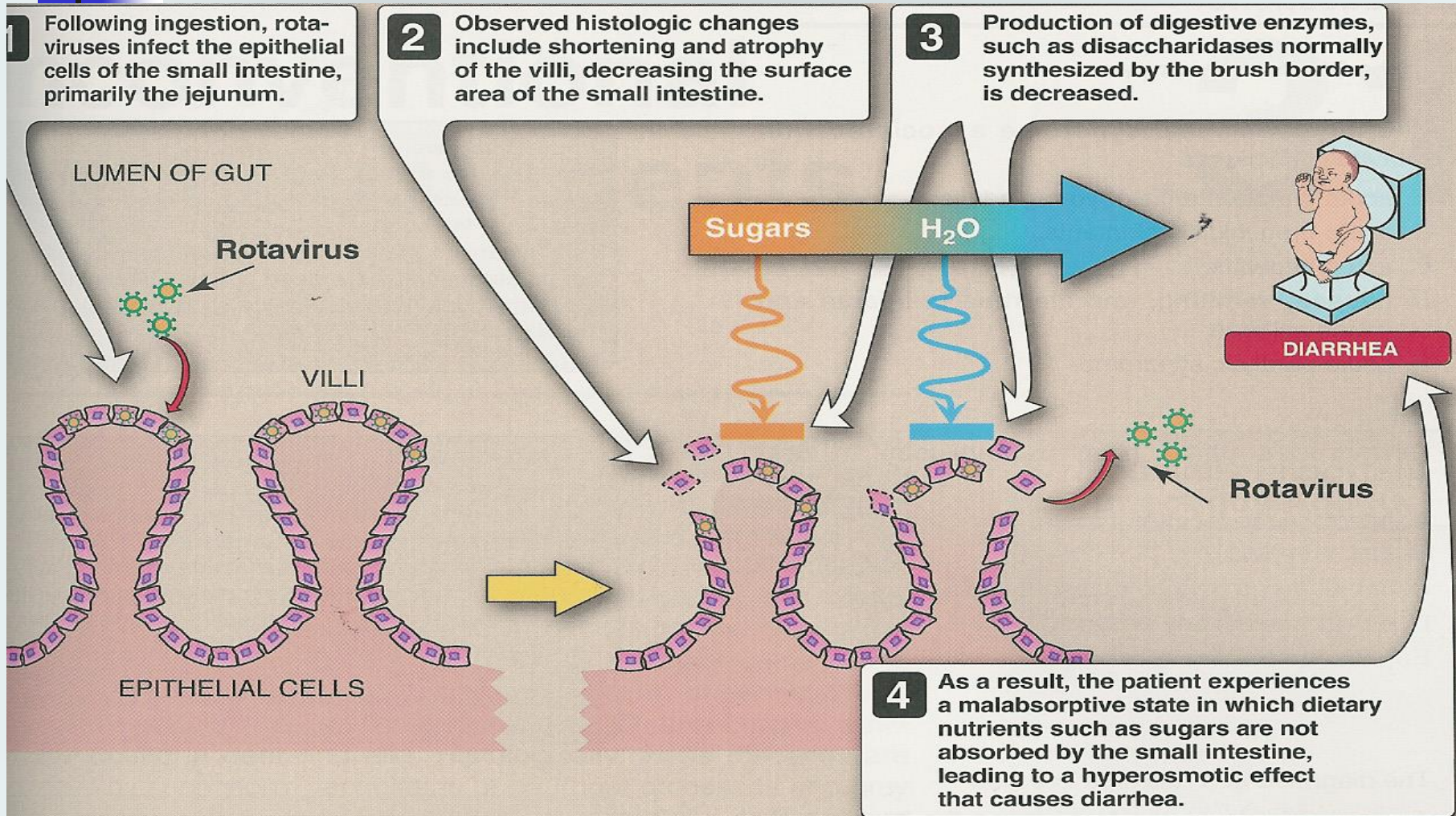


Epidemiology

- ✦ Spread:
 - ✦ Faecal-oral route
- ✦ Age: all age groups
 - ✦ Symptomatic inf ;
6 -24 ms.
- ✦ Peak ; Winter months
- ✦ Inf ; Endemic

Pathogenesis


Rota




Clinical features

Intestinal inf:

- Infants & young children
gastroenteritis or infantile GE

- IP = 1-2 ds
- Watery, nonbloody D, V & F
- Dehydration
- Outcomes  Vary

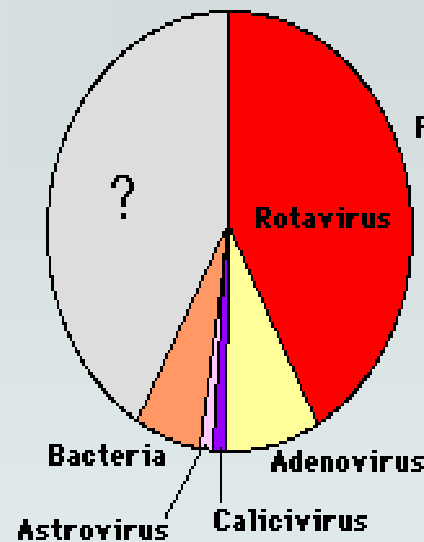
In developed count.  Mortality is low

In developing count.  Mortality is sig.

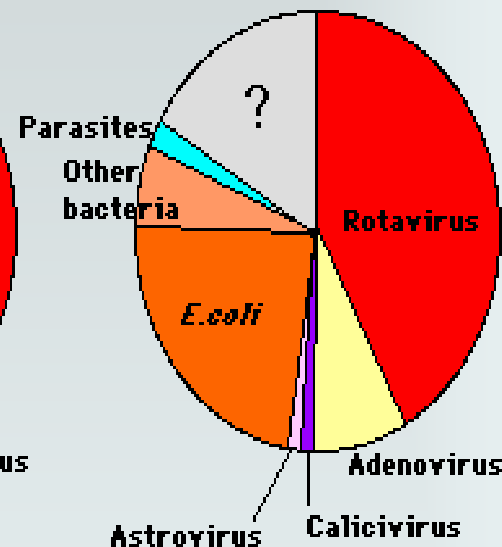
~1/2 of all GE cases  Admission

Deaths  reported

Developed Countries



Developing Countries





Clinical features

Intestinal inf:

Infants & young children  GE

Older children+ adults  asymptomatic


Immuno↓ed hosts  chronic D

Extra-intestinal inf:

Encephalitis  small n.

Diagnosis

Rota

- Sample; stool
- Immunoassay  Most used
 - ELISA , ICT& latex agglutination
- EM
- Gel electrophoresis
- RT.PCR
- Cell culture



Immunochromatography Tech.



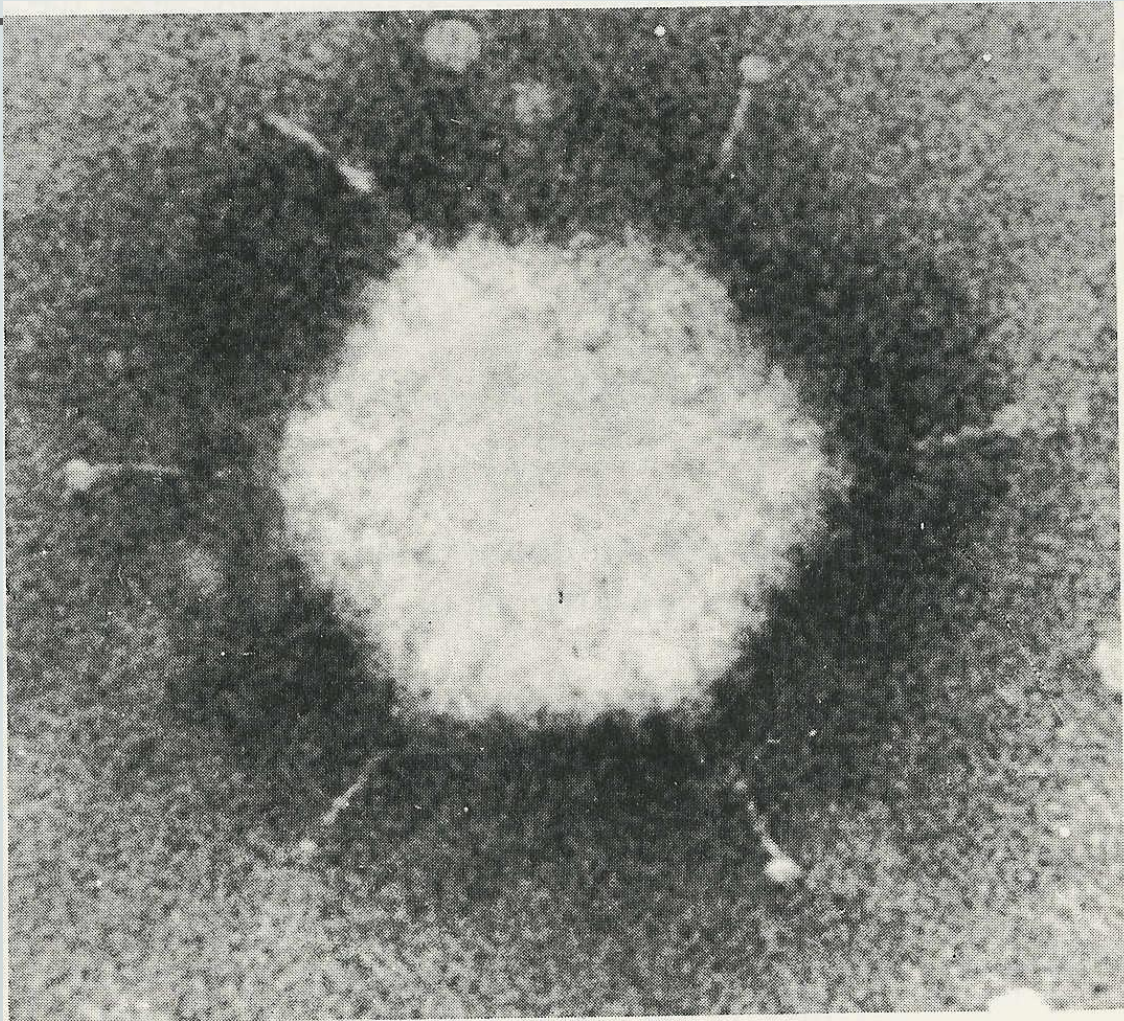
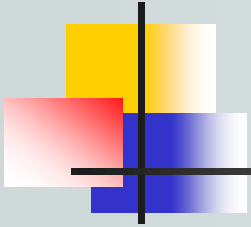
Management

- ✦ Treatment:
 - ✦ Rehydration
- ✦ Prevention:
 - ✦ Sanitation & hygiene measures
 - ✦ Vaccine; LAV, oral
 - ✦ Rotarix
 - ✦ RotaTeq*





Rotavirus

- **Structure**
- **Epidemiology**
- **Clinical Features**
- **Lab diagnosis**
- **Treatment**
- **Prevention (Vaccine)**




ENTERIC ADENOVIRUSES

- ✦ Family: Adenoviridae
- ✦ Description:
 - ✦ Nonenveloped, icosahedral , dsDNA
 - ✦ Only V with a fiber protruding from each of the vertices of the capsid
- Fiber  Attachment
  Type-specific ag

ENTERIC ADENOVIRUSES


✚ Classification:


✚ Adenoviruses  7 subgenera[A-G]

 > 50 serotypes

 Grow in C/C

✚ Enteric adenoviruses  Subgenus F

.  40&41 serotypes

.  Fastidious

ENTERIC ADENOVIRUSES

Clinical feature:

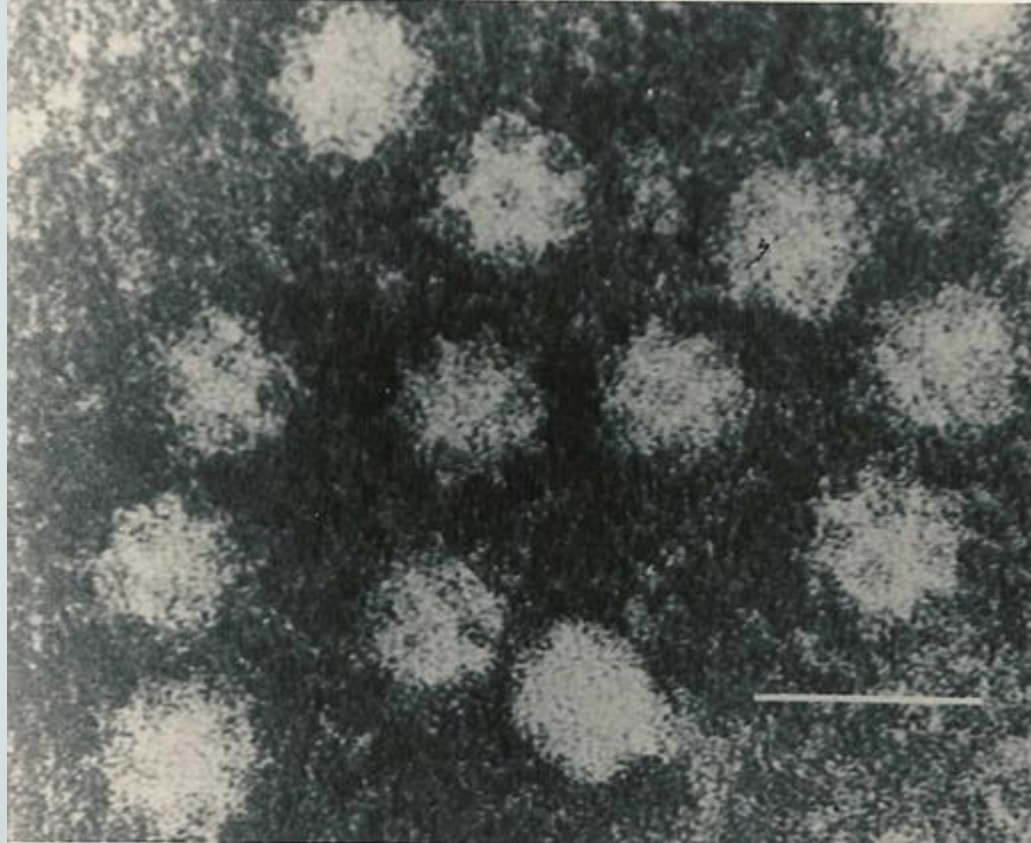
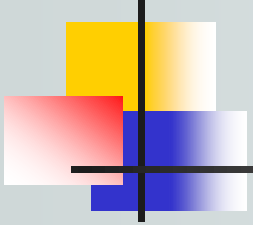
- Longer IP
 - Less severe
 - Prolonged illness
- } than rotavirus

Diagnosis:

- Ag detection in stool by
ELISA

Immunochemistry Tech.







Caliciviruses

- ✦ *Family* ; Caliciviridae [Calyx =cup]

- ✦ *Description* :

- ✦ Nonenveloped

- ✦ ssRNA,+ve polarity

- ✦ Icosahedral capsid

- ✦ *Two morphologic types*

- ✦ Typical caliciviruses (Sapoviruses)

- ✦ Small Rounded Structured Viruses
(Noroviruses)



NOROVIRUS

Epidemiology

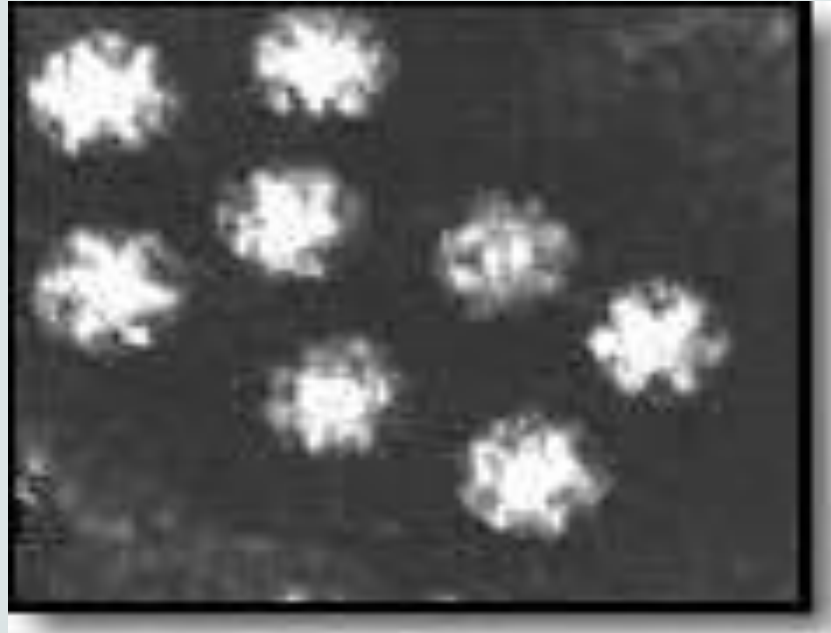
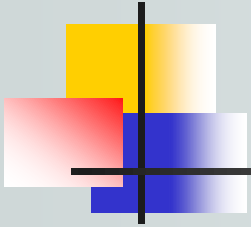
- ✦ Faecal-oral route [water, shellfish]
- ✦ Outbreaks of GE in schools, camps & cruise
- ✦ All age gps

Clinical features

- ✦ Children → vomiting [projectile]
- ✦ Adults → diarrhea

Diagnosis

- ✦ Viral Ag in stool by ELISA





Astroviruses

✦ ***Family***; Astroviridae [astro= a star]

✦ ***Description:***

- ✦ Nonenveloped
- ✦ ssRNA, +ve polarity
- ✦ Icosahedral capsid



Astroviruses

+ Clinical features;

+ Mild GE

+ Outbreak of diarrhea <5 ys

+ Lab. Diagnosis;

+ Ag detection in stool by ELISA

Reference books

& the relevant page numbers

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By ; Morag C. Timbury, A. Christine McCartney,
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Pages; 338 - 344



Medical Microbiology.

By: David Greenwood ,Richard Slack,
John Peutherer and Mike Barer.

17th Edition, 2007.

Pages;545-551,565-571



■ عن أبي هريره رضي الله عنه

■ أن رسول الله صلى الله عليه وسلم قال:

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