

VIRAL GASTROENTERITIS

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Objectives

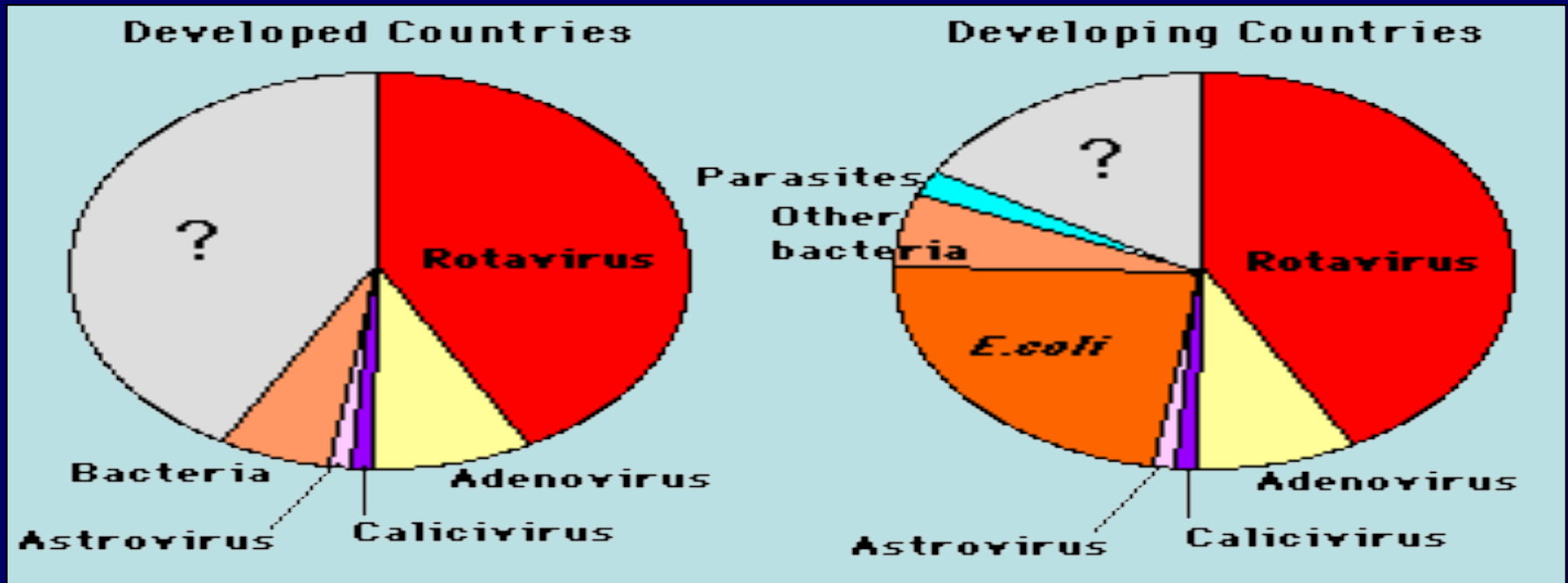
The students should be able to understand:

- Def. of GE
- Viral etiology of GE (Structures)
- Epidemiology
- Clinical Features
- Lab diagnosis
- Treatment & Prevention (Vaccine)

Gastroenteritis

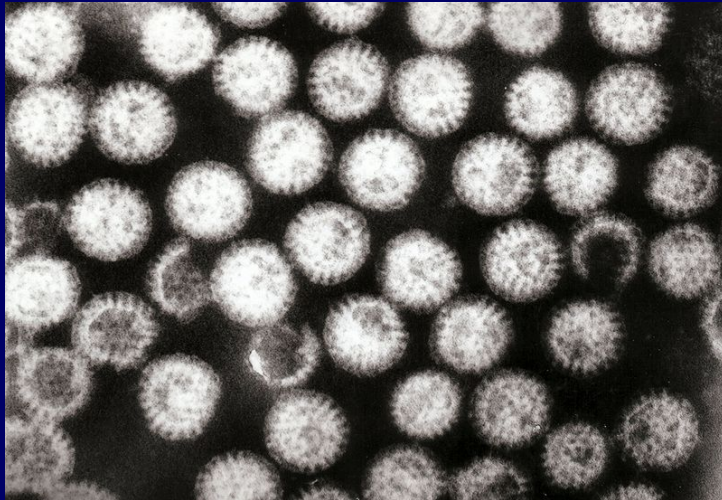
- It is inflammation of the gastrointestinal tract which involves both stomach and small intestine leading to acute diarrhea and vomiting.
- **Viral etiology include:**
 - Rotavirus.
 - Adenovirus serotype 40, & 41.
 - Caliciviruses (Norovirus).
 - Astrovirus.

Viruses associated with gastroenteritis

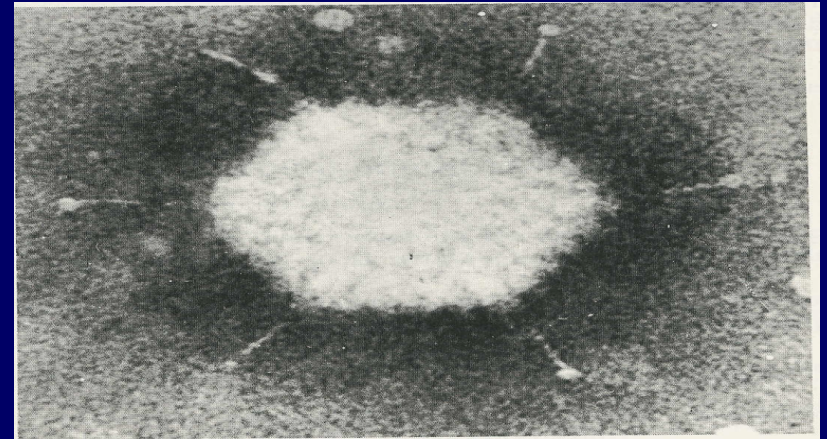


- Etiologic agents in severe diarrheal illnesses requiring hygiene and rehydration of infants & young children.
- Other viruses;
 - Coronaviruses, Toroviruses, and Enteroviruses

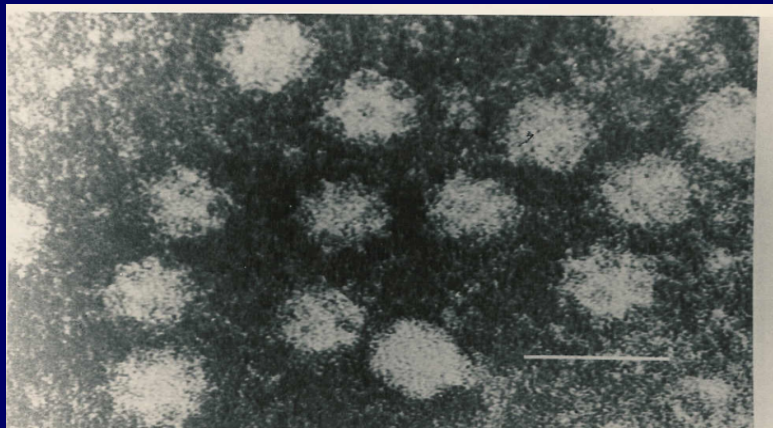
Electron micrographs of VGE



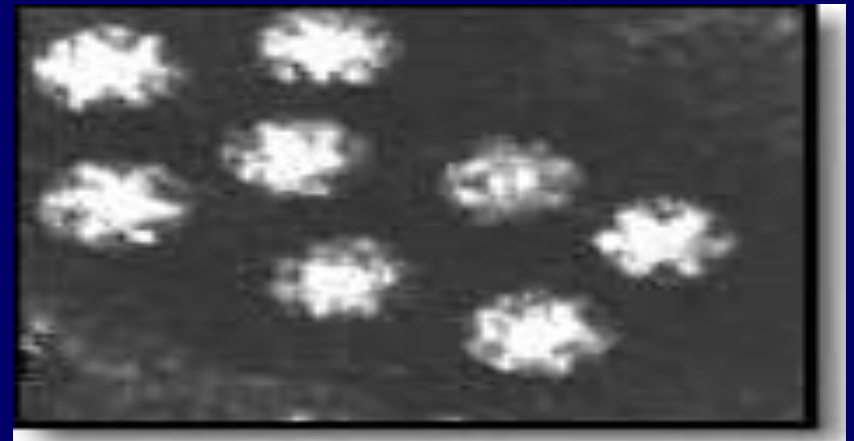
Rotavirus



Adenovirus



Caliciviruses



Astrovirus

VIRAL GASTROENTERITIS

<u>Virus</u>	<u>Genome</u>	<u>Important Morphological features</u>
• Rotavirus	dsRNA 11 Segments	Double-Shelled With Wheel-Like Structure.
▪ Adenovirus 40,41 types	dsDNA	Classical Icosahedral capsid with fibers.
▪ Calicivirus	ssRNA(+)	Cup-Like depression on its surface.
▪ Astrovirus	ssRNA(+)	5 or 6-Pointed Star on its surface.

Epidemiology

- 🏠 Distribution: Worldwide
 - ↑ in poor hygiene, over crowding, and poverty
- 🏠 Age: Infants & young children >> Older children
- 🏠 Transmission: Faecal-oral route
- 🏠 Season: Winter months
- 🏠 Endemic infection: Gp A rota & adeno 40,41
- 🏠 Epidemic infection: Norovirus

Clinical Features

- IP: Short
- Symptoms: Diarrhea, Vomiting, Fever & abdominal cramps
- Dehydration with ↓ Na → Life threatening
- Winter vomiting disease:
 - Vomiting > Diarrhea
 - Calicivirus

Lab diagnosis

🏗️ Cell culture (C/C):

🏗️ growing poorly → not used

🏗️ Electron microscopy (E.M):

🏗️ Many disadvantages → not used

🏗️ RT-PCR

🏗️ Specific test (routine test):

🏗️ ELISA / Immunochromatography for detection of viral Ag in stool samples.

[rota , adeno , astro & caliciviruses]

Management

🏠 Treatment:

- 🏠 Self-limiting

- 🏠 Rehydration and supportive

🏠 Prevention:

- 🏠 Sanitation & hygiene measures

- 🏠 No vaccines except for rotavirus

ROTA VIRUS



ROTA VIRUS

🚩 Family: *Reoviridae* [Respiratory & Enteric Orphan]

🚩 Description:

🚩 11 segments ds-RNA

🚩 Double-layered icosahedral capsid

🚩 Non-enveloped

🚩 ~ 70 nm

🚩 RNA – dependent RNA polymerase

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

Epidemiology

- Spread (or mode of transmission):

 - Faecal-oral route

- Age: all age groups

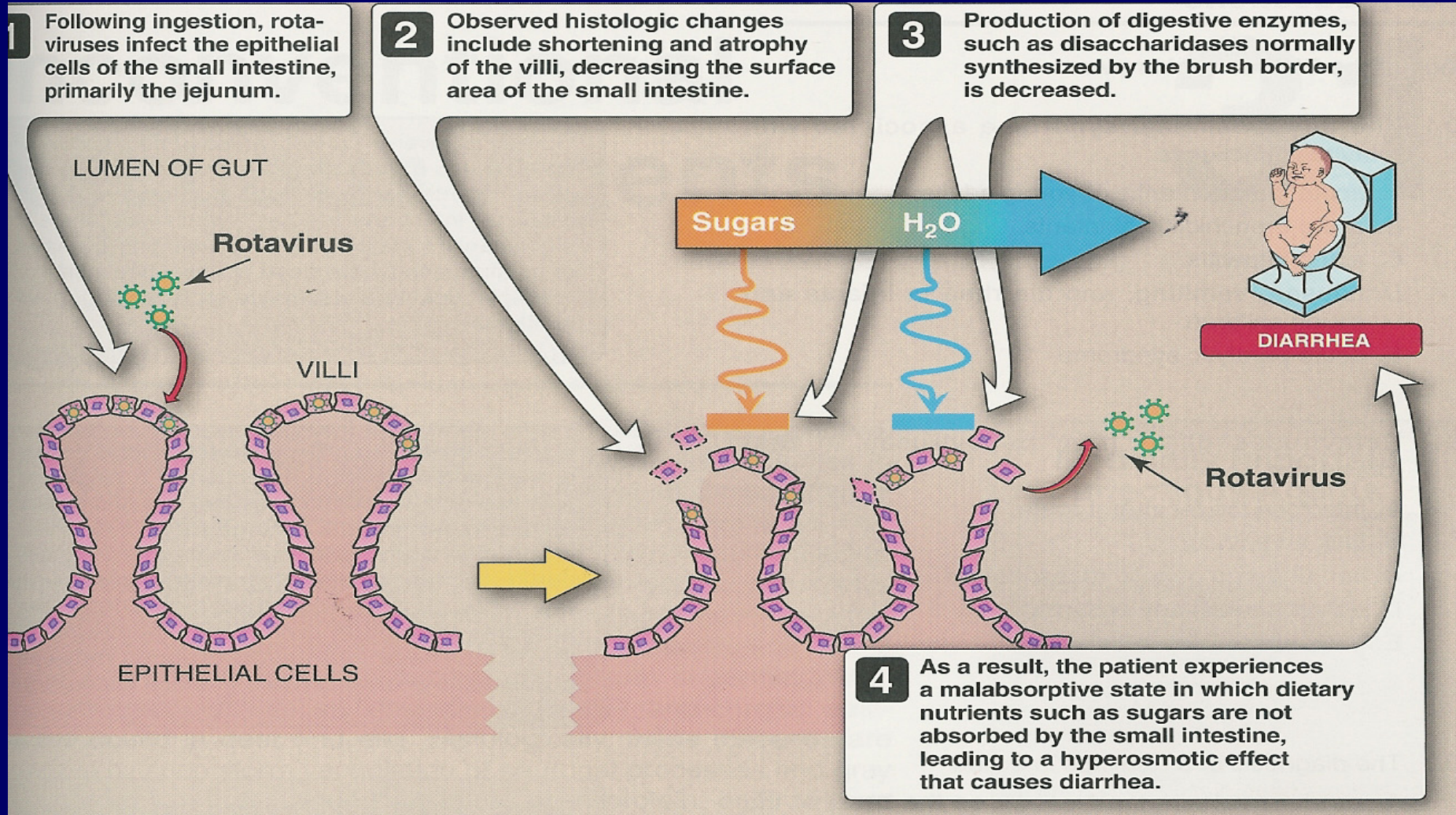
 - Symptomatic infection

 - mostly in infant 6 -24 ms.

- Peak: Winter months

- Infection: Endemic

Pathogenesis



Clinical features

Intestinal infection:

Infants & young children
gastroenteritis or infantile GE

IP = 1-2 dys

Watery, non-bloody diarrhea, vomiting & fever

Dehydration

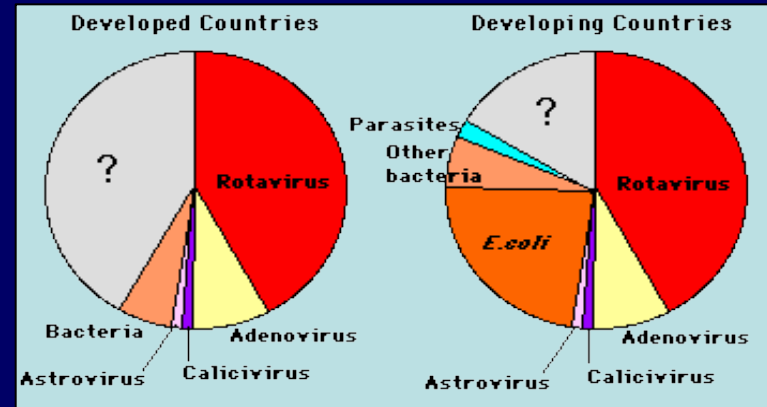
Outcomes \longrightarrow Vary

~1/2 of all GE cases \longrightarrow Admission

In developed count. \longrightarrow Mortality is low

In developing count. \longrightarrow Mortality is significant

Deaths \longrightarrow reported



Clinical features

Intestinal infection:

Infants & young children → GE

Older children + adults → asymptomatic

Low Immune hosts → chronic diarrhea

Extra-intestinal infection:

Encephalitis → small number of cases.

Lab Diagnosis

- Sample: stool
- Immunoassay \Rightarrow Most used
 - ELISA , Immunochromatography & latex agglutination
- EM
- Gel electrophoresis
- RT-PCR
- Cell culture



Immunochromatography assay.

Management

Treatment:

-  Self-limiting

-  Rehydration

Prevention:

-  Sanitation & hygiene measures

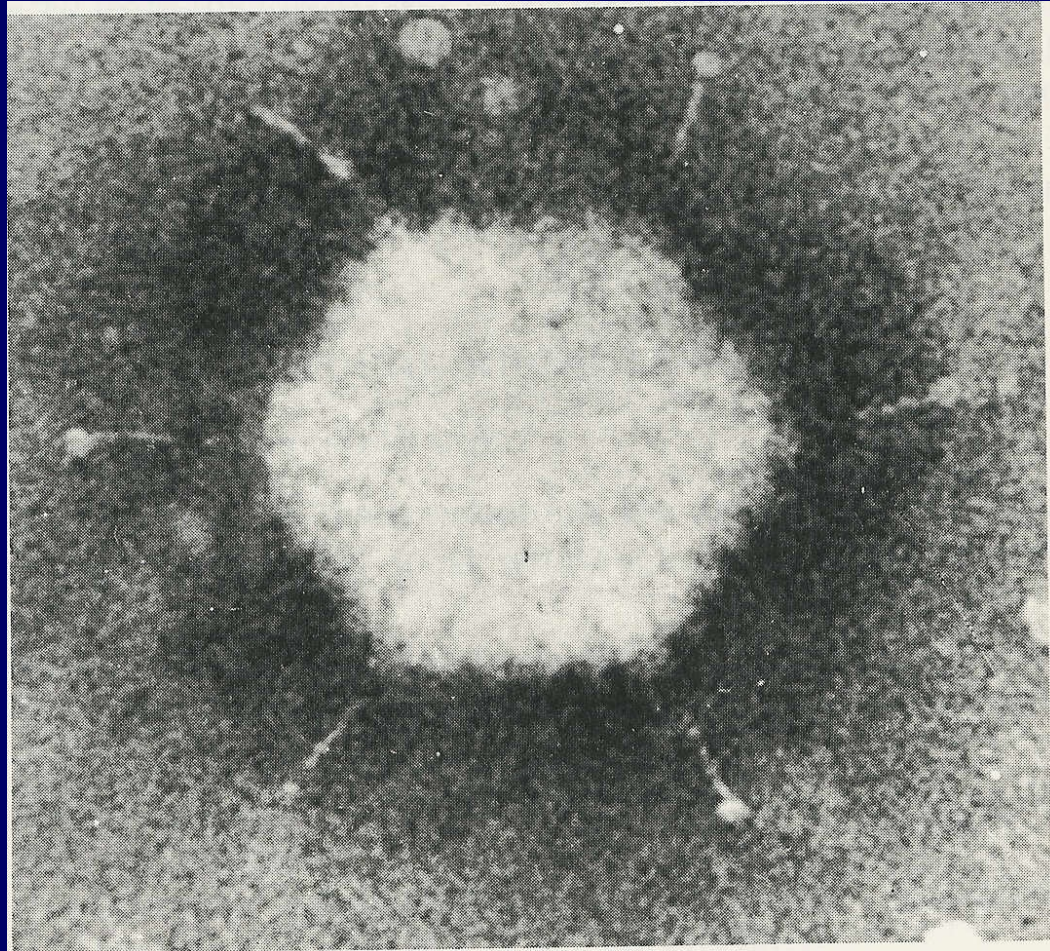
-  Vaccine: live attenuated vaccine, oral

 -  Rotashield (withdrawn)

 -  Rotarix

 -  RotaTeq

ENTERIC ADENOVIRUSES



ENTERIC ADENOVIRUSES

Family: *Adenoviridae*

Description:

Non-enveloped, icosahedral capsid, ds-DNA

Only a virus with a fiber protruding from each of the vertices of the capsid

– Fiber → Attachment

→ Hemagglutinin

→ Type-specific Ag

ENTERIC ADENOVIRUSES

Classification:

 Adenovirus  6 subgenera[A-F]

 51 serotypes

 Grow in C/C

 Enteric adenoviruses  Subgenus F

 40 & 41 serotypes

 difficult to grow in C/C

ENTERIC ADENOVIRUSES

🏠 Clinical feature:

🏠 Longer IP

🏠 Less severe

🏠 Prolonged illness

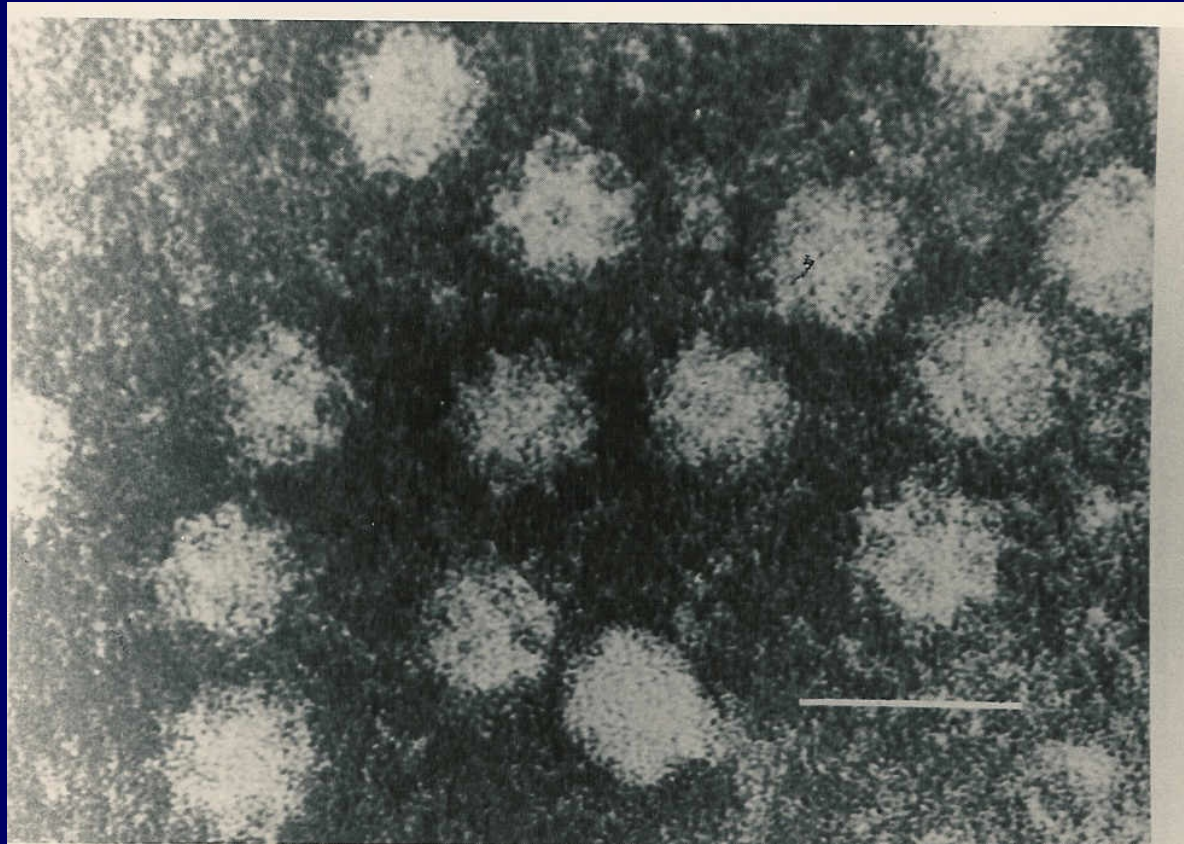
} than rotavirus

🏠 Diagnosis:

🏠 Routine test: detection of viral Ag in stool samples by ELISA or Immunochromatography Tech.

🏠 PCR

Caliciviruses



Caliciviruses

Family: *Caliciviridae* [Calyx =cup]

Description:

Non-enveloped

ss-RNA with +ve polarity

Icosahedral capsid

Two morphologic types

Typical caliciviruses (Sapoviruses)

Small Rounded Structured Viruses (Noroviruses)

NOROVIRUS (Norwalk virus)

■ Epidemiology

- Faecal-oral route [water, shellfish]
- Outbreaks of GE in schools, camps & cruises
- All age groups

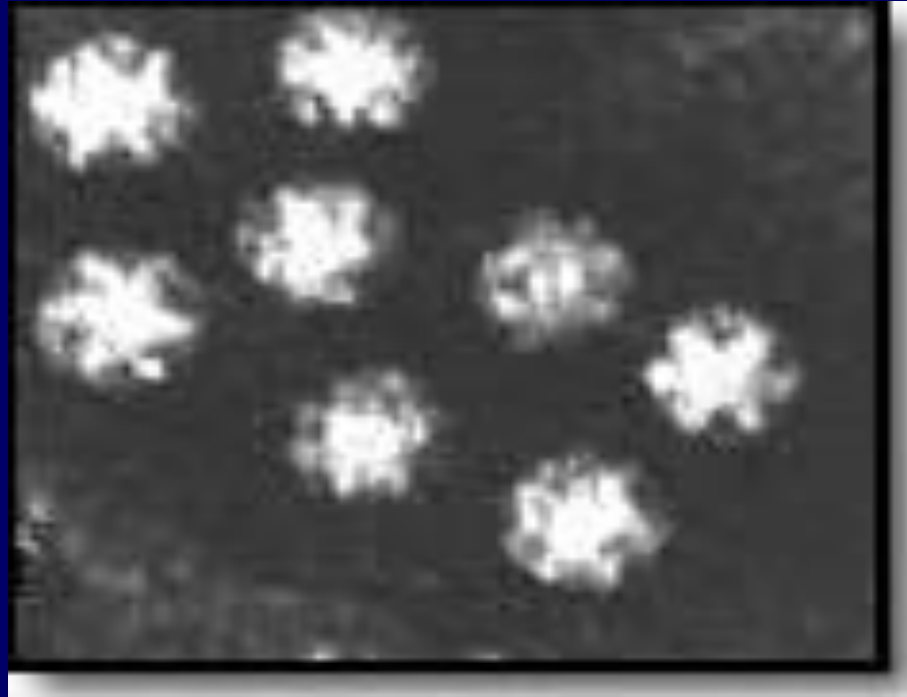
■ Clinical features

- Children → vomiting [projectile]
- Adults → diarrhea

■ Diagnosis

- Routine test: detection of viral Ag in stool samples by ELISA.
- RT-PCR

Astroviruses



Astroviruses

🏗️ Family: *Astroviridae* [astro= a star]

🏗️ Description:

🏗️ Non-enveloped

🏗️ ss-RNA with +ve polarity

🏗️ Icosahedral capsid

🏗️ 8 serotypes


Astroviruses

Clinical features:

-  Mild GE

-  Outbreak of diarrhea <5 ys.

Lab Diagnosis:

-  Routine test: detection of viral Ag in stool samples by ELISA.

-  RT-PCR

Reference books & the relevant page numbers

Notes on Medical Microbiology

By ; Morag C. Timbury, A. Christine McCartney, Bishan Thakker and Katherine N. Ward
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Pages; 338 - 344



Medical Microbiology.

By: David Greenwood ,Richard Slack,
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17th Edition, 2007.

Pages;545-551,565-571



Thank you for your attention !

Questions?