



# ***VIRAL GASTROENTERITIS***

*(GIT Block, Microbiology: 2020)*

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# *OBJECTIVES*

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- **Definition**
- **Viral etiology of GE ( Structures )**
- **Epidemiology**
- **Clinical Features**
- **Lab diagnosis**
- **Treatment & Prevention (Vaccine)**
- **Rotavirus , Adenovirus , caliciviruses & Astrovirus .**



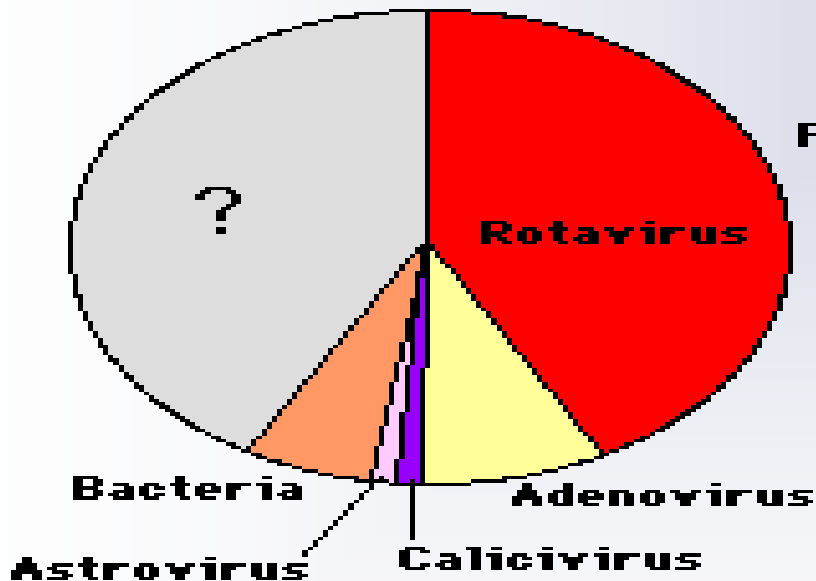
# ***GASTROENTERITIS***

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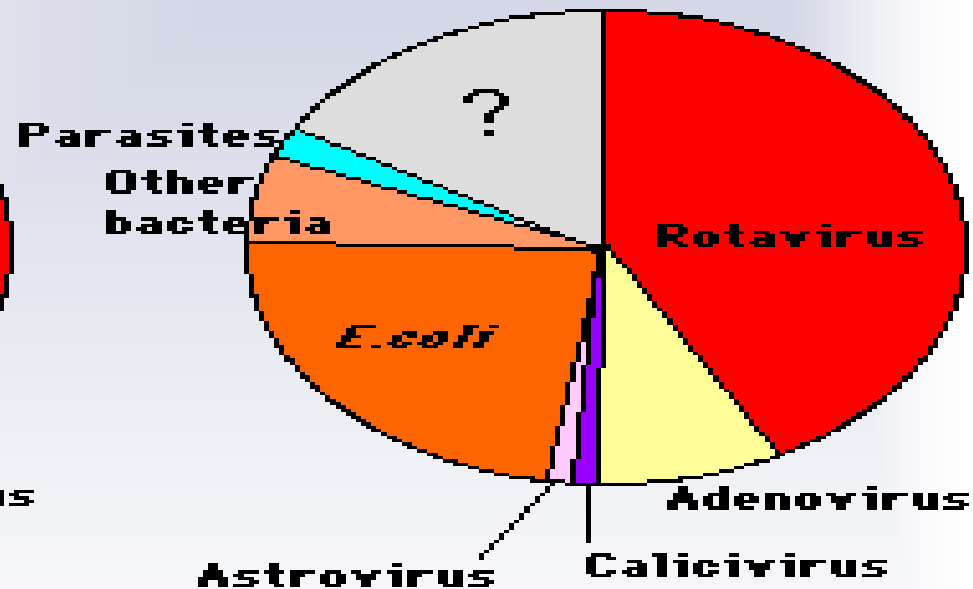
- ✚ Definition
- ✚ Causes
  - ✚ Infectious
  - ✚ Non infectious

# *Viruses associated with gastroenteritis*

**Developed Countries**



**Developing Countries**



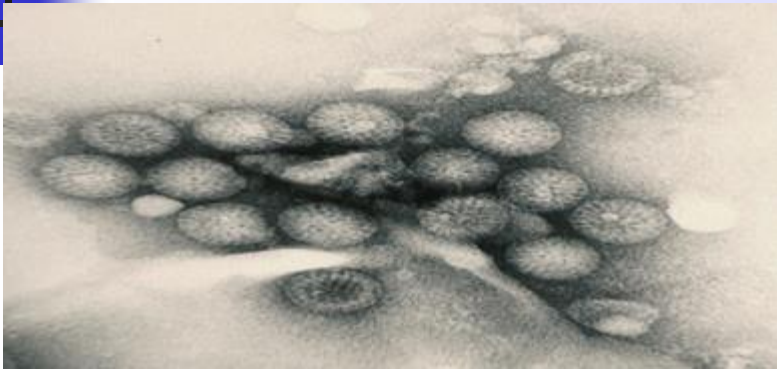
*✚ Etiologic agents in severe diarrheal illnesses requiring H of infants & young children*

*✚ Other viruses;*

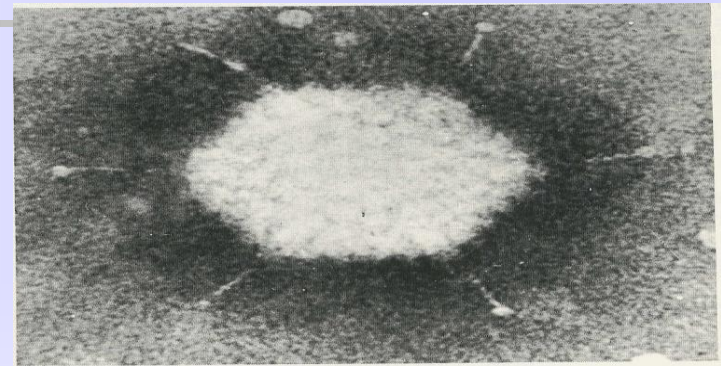
*✚ Coronaviruses , Adenoviruses & Enteroviruses....*

# Electron micrographs

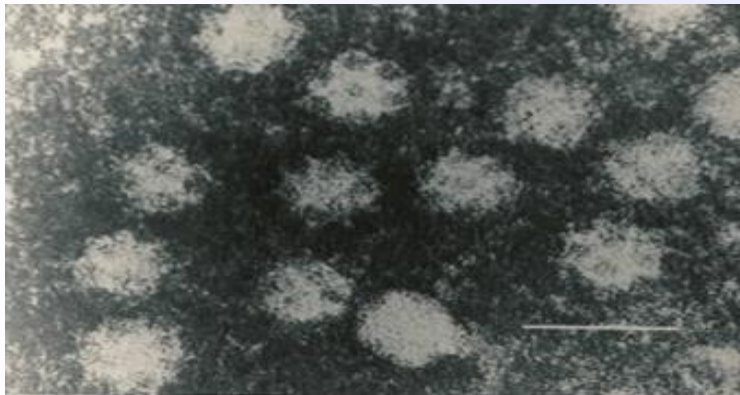
VGE



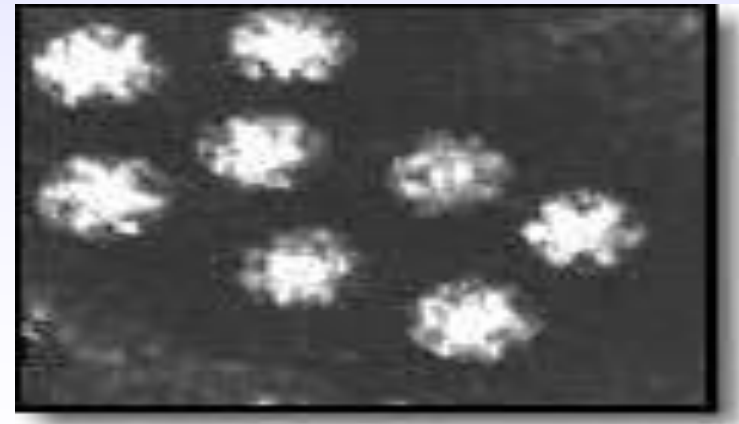
*Rotavirus*



*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*

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- ✦ 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*

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





# *Lab diagnosis*

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- ✦ 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 ags in stool  
[rota , adeno , astro & caliciviruses]
  - ✦ Multiplex PCR



# *Management*

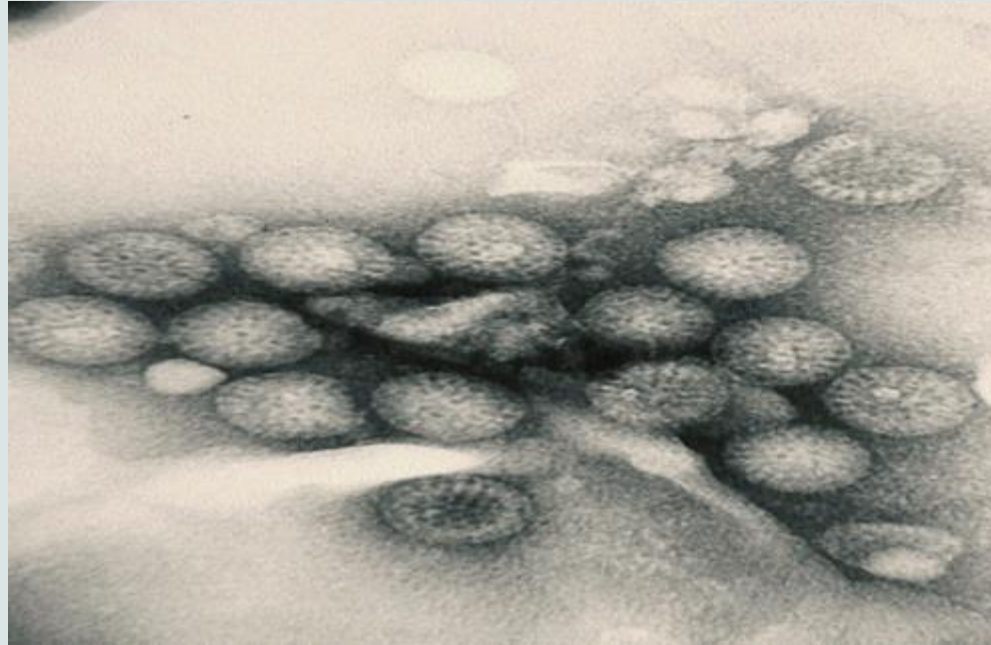
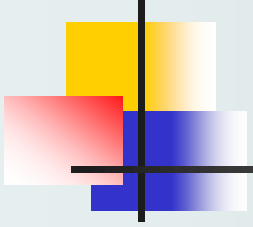
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## ✦ Treatment:

- ✦ Rehydration

## ✦ Prevention:

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





# *ROTAVIRUS*

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- ✦ 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*

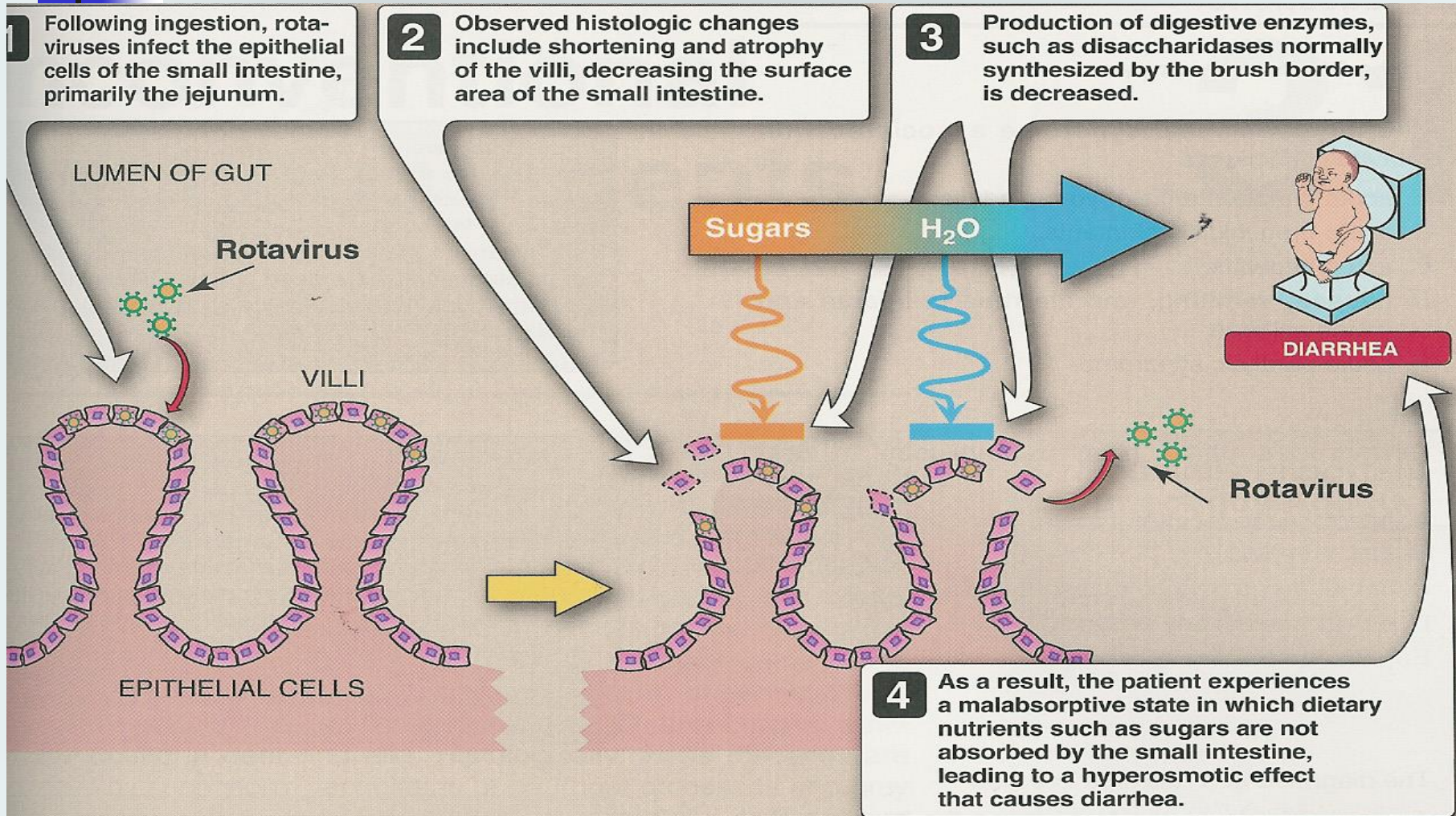
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- ✦ Spread:
  - ✦ Faecal-oral route
- ✦ Age: all age groups
  - ✦ Symptomatic inf ;  
6 -24 ms.
- ✦ Peak ; Winter months
- ✦ Inf ; Endemic



# Pathogenesis

Rota



# Clinical features

## Intestinal inf:

- Infants & young children  
**gastroenteritis or infantile GE**

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

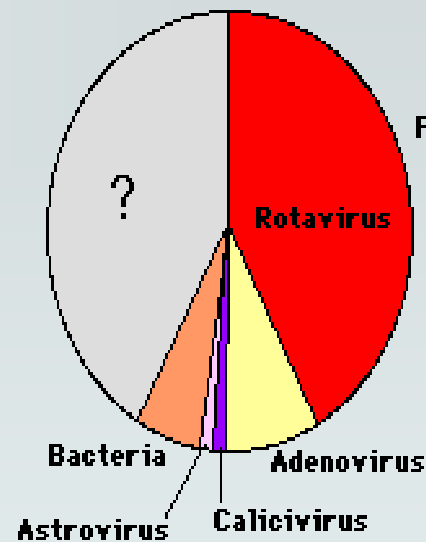
In developed count.  $\longrightarrow$  Mortality is low

In developing count.  $\longrightarrow$  Mortality is sig.

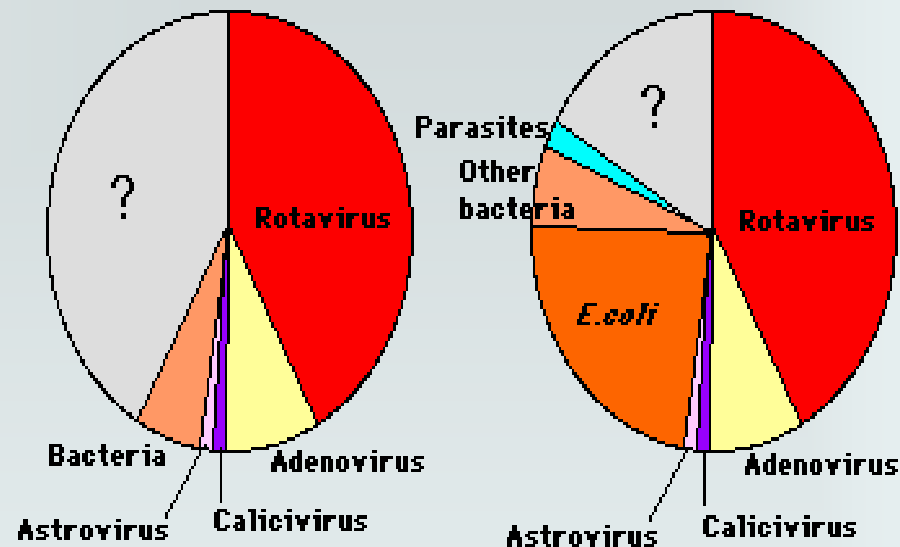
~1/2 of all GE cases  $\longrightarrow$  Admission

- Deaths  $\longrightarrow$  reported

Developed Countries



Developing Countries





# *Clinical features*

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## 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*

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

# Basic Immunization Schedule

# جدول التطعيمات الأساسية

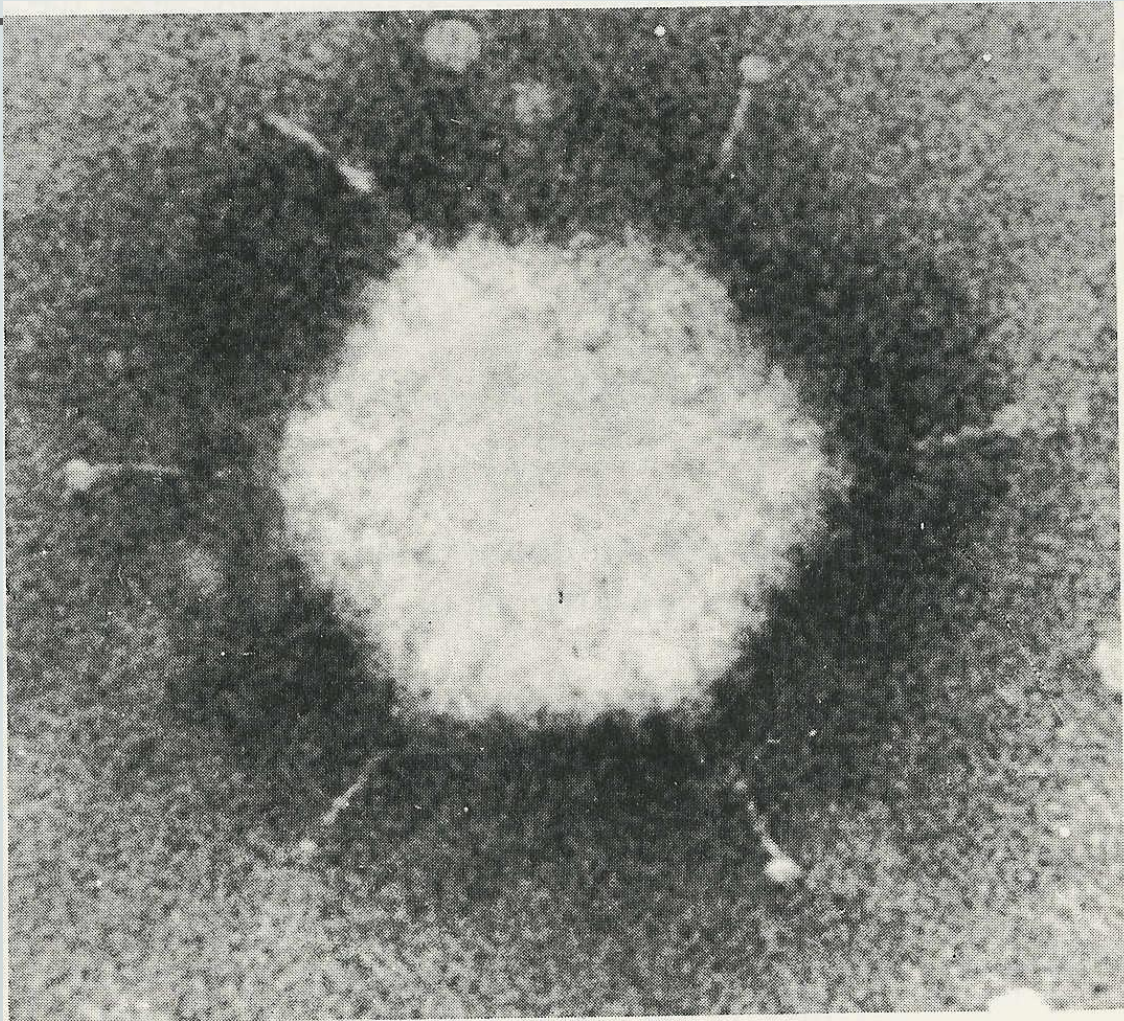
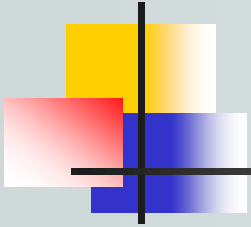
تاريخ الزيارة القادمة Next Visit	الختم Stamp	التوقيع Sign.	التاريخ Date	التطعيم Vaccine	الزيارة Visit
				• B.C.G • Hepatitis B • درن • التهاب كبدى ( ب )	عند الولادة At Birth
				• IPV • DTaP • Hep B • Hib • Rota • Pneumococcal Conjugated Vaccine (PCV13) • شلل اطفال • الثلاثي البكتيري • التهاب الكبدى ( ب ) • المستدمية النزلية • الروتا • البكتيريا العقدية الرئوية	عمر شهرين 2 Months
				• IPV • DTaP • Hep B • Hib • Rota • Pneumococcal Conjugated Vaccine (PCV13) • شلل اطفال • الثلاثي البكتيري • التهاب الكبدى ( ب ) • المستدمية النزلية • الروتا • البكتيريا العقدية الرئوية	عمر 4 شهور 4 Months
				• IPV • DTaP • Hep B • Hib • Rota • Pneumococcal Conjugated Vaccine (PCV13) • شلل اطفال • الثلاثي البكتيري • التهاب الكبدى ( ب ) • المستدمية النزلية • الروتا • البكتيريا العقدية الرئوية	عمر 6 شهور 6 Months
				• Measles • MCV4 • الحصبة المفرد • الحمى الشوكية المدمج (المطور)	عمر 9 شهور 9 Months
				• MMR • Varicella • Pneumococcal Conjugated Vaccine (PCV13) • MCV4 • الثلاثي الفيروسي • الجدري المائي • البكتيريا العقدية الرئوية • الحمى الشوكية المدمج (المطور)	عمر 12 شهر 12 Months
				• IPV • DTaP • Hib • Hepatitis A • شلل الاطفال • الثلاثي البكتيري • المستدمية النزلية • التهاب الكبدى ( ا )	عمر 18 شهر 18 Months
				• Hepatitis A • التهاب الكبدى ( ا )	عمر 2 سنة 2 Years
				• IPV • DTaP • MMR • Varicella • شلل الاطفال • الثلاثي البكتيري ( الثلاثي البكتيري ) • الثلاثي الفيروسي • الجدري المائي	جرعات التطعيم عند دخول الصف الاول الابتدائي من المدارس Vaccination on entry first class of primary school



# ***Rotavirus***



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





# ***ENTERIC ADENOVIRUSES***

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- ✦ 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*

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✚ Classification:


✚ Adenoviruses  7 subgenera[A-G]

 > 50 serotypes

 Grow in C/C

✚ Enteric adenoviruses  Subgenus F

.  40&41 serotypes

.  Fastidious

# ***ENTERIC ADENOVIRUSES***

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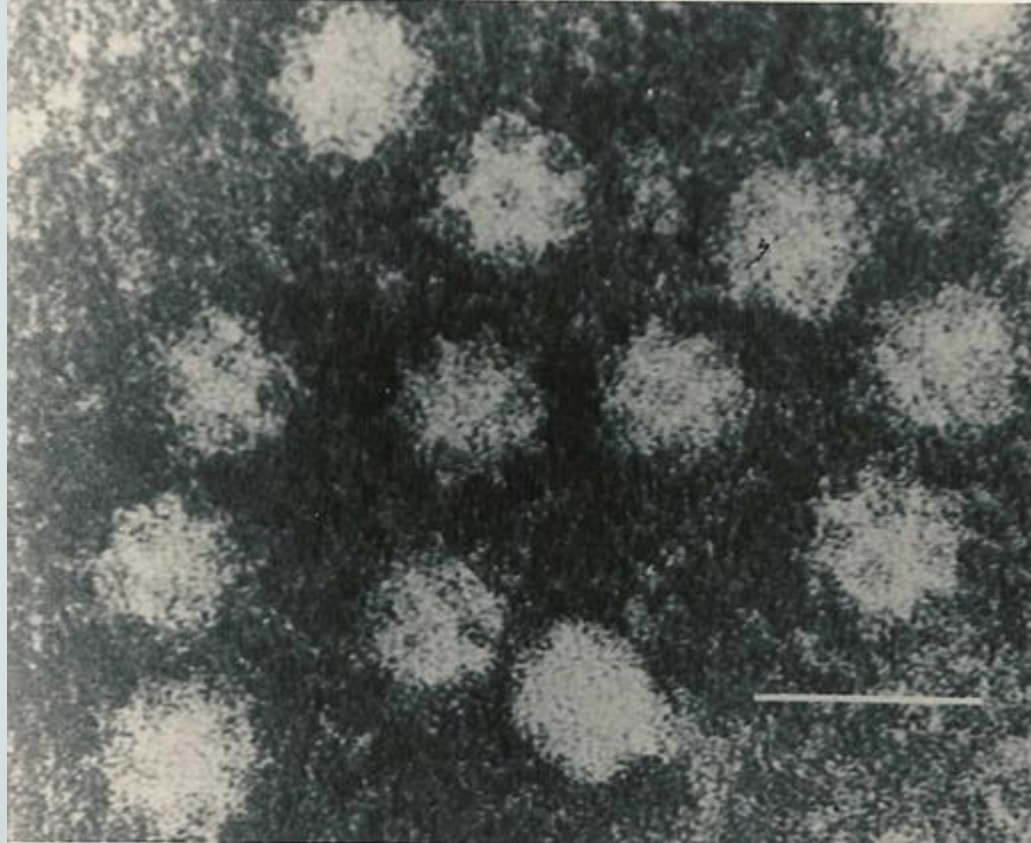
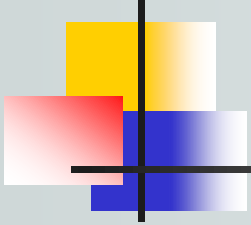
## ***+*** Clinical feature:

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

## ***+*** Diagnosis:

- +*** Ag detection in stool by  
ELISA  
Immunochromatography Tech.
- +*** **RT-PCR**







# *Caliciviruses*

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

- ✦ *Description* :

- ✦ Nonenveloped

- ✦ ssRNA,+ve polarity

- ✦ Icosahedral capsid

- ✦ *Two morphologic types*

- ✦ Typical caliciviruses (Sapoviruses)

- ✦ Small Rounded Structured Viruses  
(Noroviruses)



# ***NOROVIRUS***

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## + **Epidemiology**

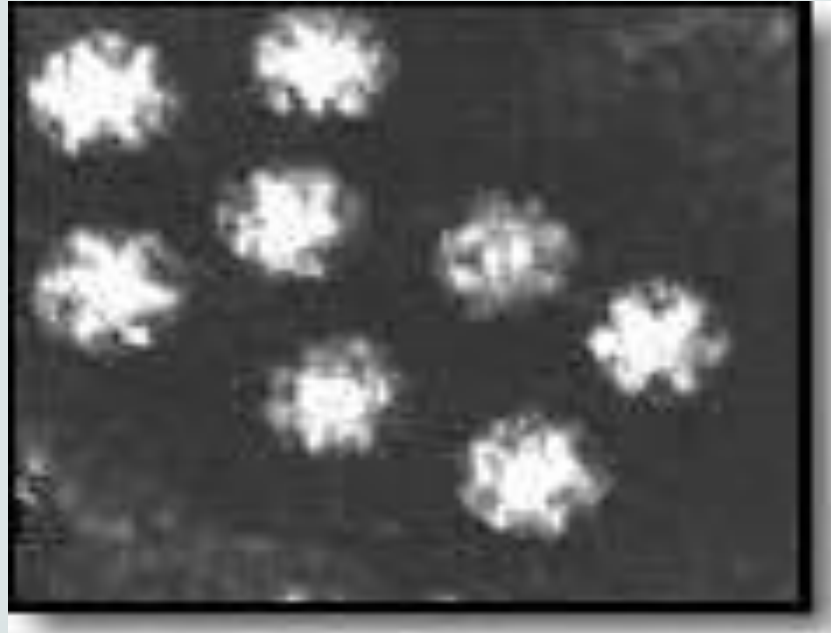
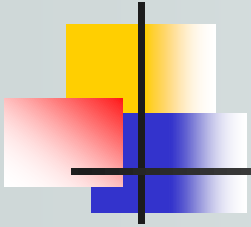
- + Faecal-oral route [water, shellfish]
- + Outbreaks of GE in schools, camps & cruise
- + All age gps

## + **Clinical features**

- + Children → vomiting
- + Adults → diarrhea

## + **Diagnosis**

- + Viral Ag in stool by ELISA
- + RT-PCR





# ***Astroviruses***

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

- ✦ ***Description***:

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



# ***Astroviruses***

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## ***+ Clinical features;***

***+ Mild GE***

***+ Outbreak of diarrhea <5 ys***

## ***+ Lab. Diagnosis;***

***+ Ag detection in stool by ELISA***

***+ RT-PCR***

■ عن أبي هريره رضي الله عنه

■ أن رسول الله صلى الله عليه وسلم قال:

} كلمتان خفيفتان على اللسان , ثقيلتان في الميزان  
حبيبتان إلي الرحمن :

سبحان الله وبحمده ,

سبحان الله

{ العظيم

# Reference books

& the relevant page numbers

## *Notes on Medical Microbiology*

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

(2002)

**Pages; 338 - 344**



## *Medical Microbiology.*

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

17<sup>th</sup> Edition, 2007.

**Pages;545-551,565-571**

