

Course: Clinical Microbiology

Microorganisms and Human Disease – An Overview

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TYPING OF BACTERIA

1. Biotyping

2. Serotyping

NORMAL MICROBIOTA IN DIGESTIVE SYSTEM

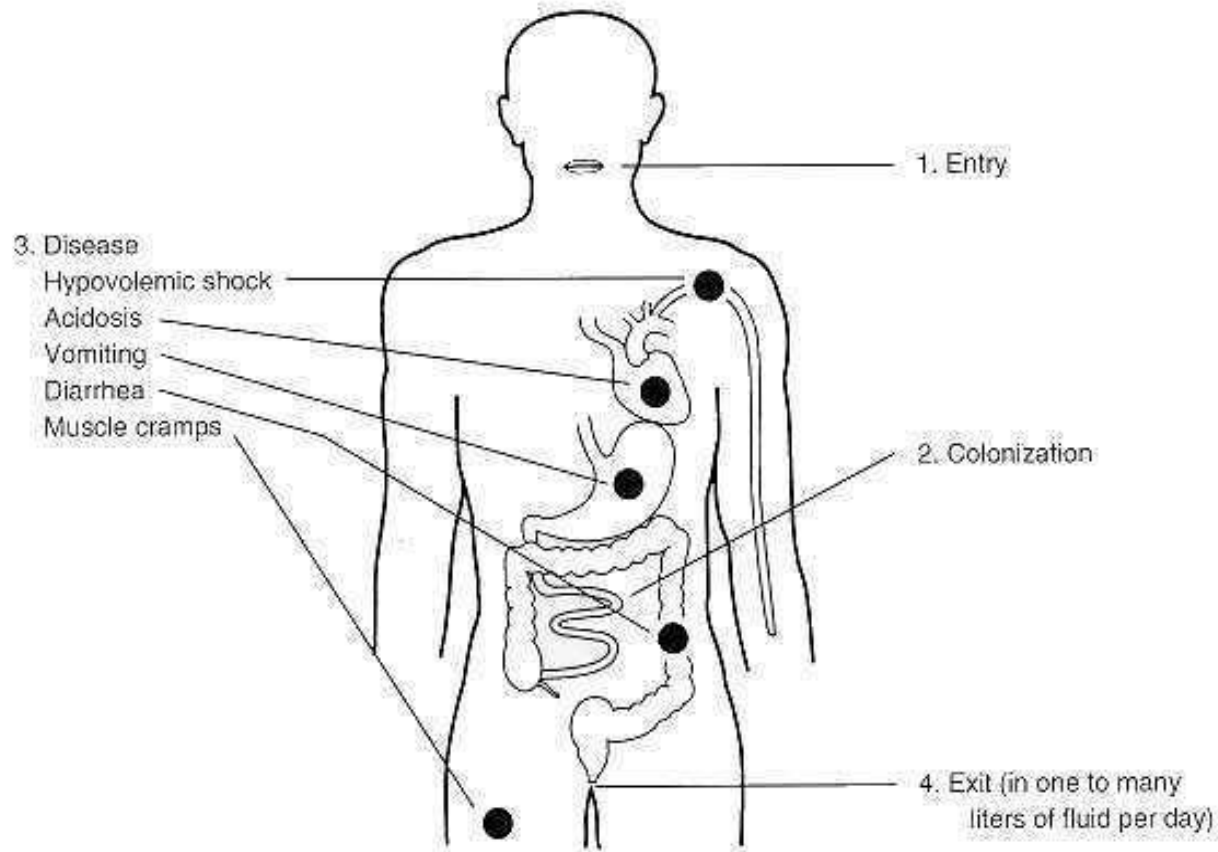
- Large numbers of bacteria colonize the mouth (Discovery)
- Stomach and small intestine have few resident forms (Indigenous)

BACTERIAL DISEASES OF THE LOWER DIGESTIVE SYSTEM

- A gastrointestinal infection is caused by the growth of pathogens in the intestine.
- Incubation 12 h to 2 weeks.
- Infections and intoxications cause diarrhea, dysentery or gastroenteritis.

Vibrio cholerae – A view

CLINICAL MANIFESTATIONS



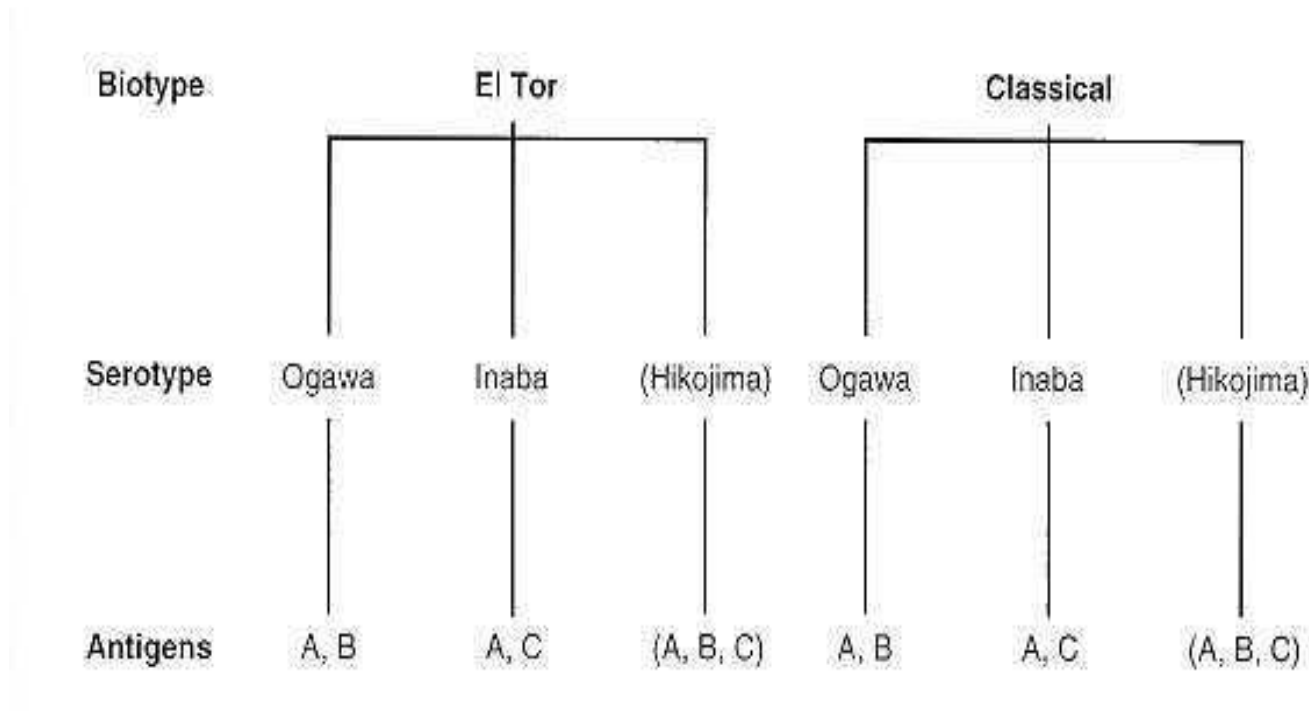
CHOLERA - SYMPTOMS

- Cholera begins with the abrupt onset of watery diarrhea.
- The initial stool may exceed 1 L, and several liters of fluid may be secreted within hours.
- Muscle cramps may occur as water and electrolytes are lost from body tissues
- Death can occur from hypovolemic shock, metabolic acidosis

***Vibrio cholerae* - Types:**

- **Serotype : O1 & Non – O1**
- **Sub-Serotype : Ogawa, Inaba & Hikojima**
- **Biotype : El Tor & Classical**
- **New Serotype: O139 & Non – O139**
(Ramamurthy *et al.*, 1992)
- **Cholera causing serotype : O1 & O139**

CLASSIFICATION & ANTIGENIC TYPES of *V. cholerae*



PATHOGENESIS OF *Vibrio cholerae*

- Sensitive to acid and most die in the stomach
- Survivors may adhere to and colonize the small intestine
- Secrete potent cholera enterotoxin (CT or Cholera toxin)
- Toxin binds plasma membrane of intestinal epithelial cells
- Then releases an enzymatically active subunit that causes rise in cAMP (cyclic Adenosine 3',5'-monophosphate) production

TYPES OF *E. COLI*

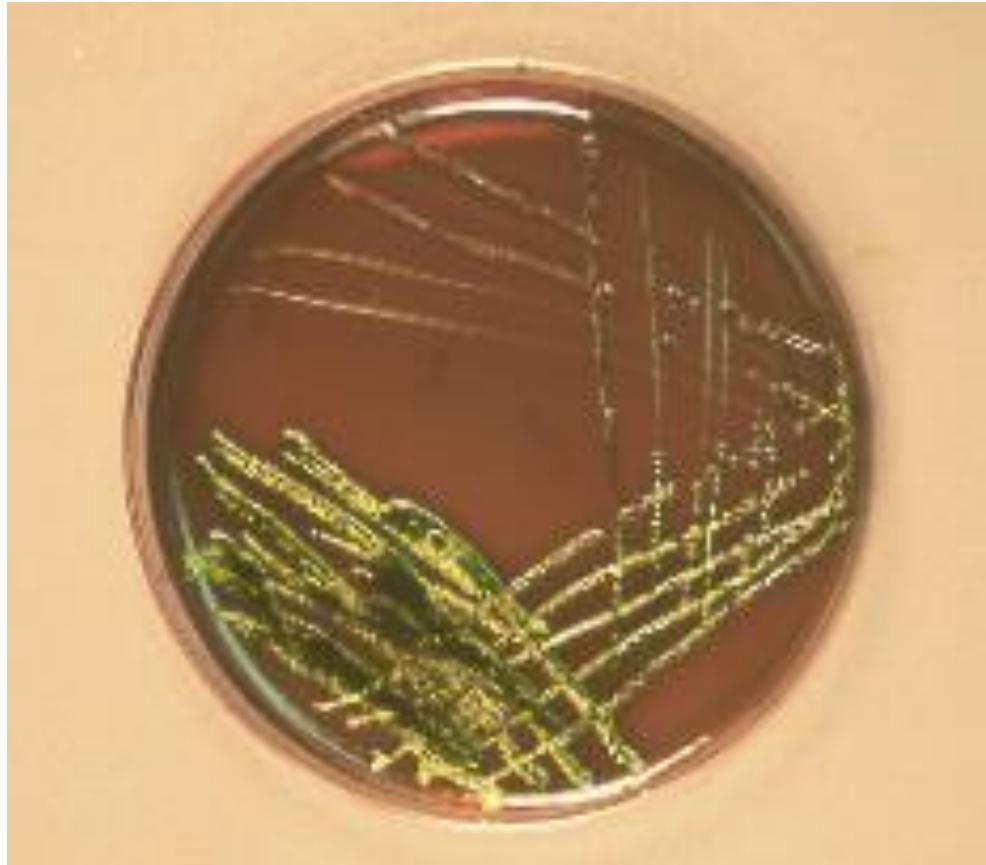
5 Types

1. ETEC – Enterotoxigenic *E. coli*
2. EIEC – Enteroinvasive *E. coli*
3. EHEC – Enterohemorrhagic *E. coli*
4. EPEC – Enteropathogenic *E. coli* &
5. EAggEC – Enteroaggregative *E. coli*

DISEASES OF *E. coli*

1. Travelers diarrhea in under developed countries.
2. Infant diarrhea in poor countries.
3. EHEC O157 serotype cause serious diarrhea with bloody discharge.

TYPICAL *E. COLI* GROWTH ON E.M.B AGAR PLATE



TYPICAL *MYCOBACTERIUM*



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SALMONELLA

TYPES

Typhoidal *Salmonella*:

<i>Salmonella typhi</i>	}	Typhoid
<i>S. paratyphi</i>		

Non - Typhoidal *Salmonella*:

***S. enteritidis* - Gastroenteritis**

PATHOGENESIS OF *SALMONELLA*

—Disease

- Disease depends on age of the host—more severe in newborns, infants and the elderly
- Disease also depends on the serovar and type of host

DISTRIBUTION

- Natural aquatic environment
- Sea foods especially in shrimp and crabs
- Copepods (Chitnoclastic in nature)

REFERENCE LABORATORIES

- **NICED (National Institute of Cholera and Enteric Diseases, Kolkatta, INDIA)**
- **ICDDR (International Centre for Diarrheal Research, Dhaka, BANGLADESH)**

SOME IMPORTANT VIRAL DISEASES - DIGESTIVE SYSTEM

- a) Hepatitis A virus (HAV) - Available vaccine**
- b) Hepatitis B virus (HBV) - Available vaccine**
- c) Hepatitis C virus - No vaccine**
- d) Hepatitis D virus - HAV vaccine – Protective**
- e) Hepatitis E virus - Under development**

CLINICAL SPECIMENS

1. Stool

2. Urine

3. Blood

4. Sputum

5. Pus

**6. Cerebarospinal
fluid**

CHEMOTHERAPY – PROBLEMS

- **Development of resistance a serious concern.**
- **Transfer of antibiotic residues from a edible tissue (Live stock and sea Foods) to human.**

CHEMOTHERAPY - SUGGESTION

- Indiscriminate usage of antibiotics should be avoided in animal & human
- Have to complete full dosage of antibiotics prescribed by the physician

DRUG RESISTANCE

- Due to transferable 'R' plasmids.
- Enzymatic destruction of a drug by microbes leads to prevention of penetration of the drug.

FUTURE CHEMOTHERAPEUTIC AGENTS

- Chemicals from plant and animal including microbes provides new antimicrobial agents.
- Bacteriophage products may be antimicrobials (Phage therapy).

AWARENESS

- New organisms will be emerged from the earth
- All life are existing in the earth
- Avoid disturb them
- Otherwise human community will be in trouble

NEW SPECIES

- 3 new species of bacteria isolated from “Stratosphere” (15 km above the earth) by ISRO Scientists

1. *Janibacter hoylei*

2. *Bacillus isronensis*

3. *Bacillus aryabhata*

Highly Resistant to
UV rays

Thank you