

Bacterial infections of GIT

Gastroenteritis/Food poisoning

Staphylococcus aureus

Food poisoning occurs when consuming a food that is contaminated with bacterial toxin

Clinically:

- Short incubation period of 1-6 hrs
- Mild fever
- Symptoms may last 12 hrs -2 days

Mainly diarrhea +/- vomiting.

Bacillus cereus

Ingestion of spores in contaminated meat, fish, and vegetables, raw starchy foods such as pasta, potatoes, pastries and noodles)

- fried Rice Syndrome

Clinically:

The diarrhea is caused by in vivo production of a heat-labile enterotoxin

- longer incubation (6-24 hours)
- Watery diarrhea, abdominal cramps
- vomiting (25%)
- Duration of illness ranges from 20-36 hours, with a median of 24 hours

Control

- By proper cooling and storage of food rice

Botulinium Neurotoxins

1. Foodborne botulism

Most common from home-canned foods

- Onset : 18 to 36 hours after exposure (range, 6 hours to 8 days)
- Early: nausea, vomiting, weakness, dizziness but no fever
- Late: double vision, difficulty in swallowing, and speaking
- In severe cases, death due to respiratory muscle paralysis

2. Infant botulism

Baby will develop a weak cry, decreased sucking, floppy head and decreased motor response to stimuli

- Death if not treated

C. perfringens

Cell invasion

Shigella

Fecally contaminated water

Clinically

- The infective dose is between 10-200 organisms
- Incubation of 1-7 days
- Followed by fever, cramping, abdominal pain, and watery diarrhea for 1-3 days
- This may be followed by scant stools with blood, mucous, pus, and tenesmus

Diagnosis

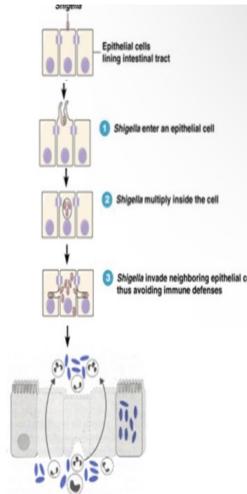
- Dehydration with fast heart rate and low blood pressure
- Abdominal tenderness
- Elevated white blood cell count
- Stool culture
- White and red blood cells in stool

Enteroinvasive E. coli (EIEC)

Similar to Shigella in pathogenesis

pathogenesis

- Destruction of endothelial cells causing hemorrhage
- Bacteria enter blood are quickly killed by phagocytes



Enterohemorrhagic E. coli (EHEC)

Consumption of contaminated food water, milk, or by contact with animals, feces and contaminated soil

Produces Shiga-like toxin (also called verotoxin).

This is most often caused by serotypes

O157:H7

- This strain of E. coli can be differentiated from other strains of E. coli by the fact that it does not ferment sorbitol in 48 hours (other strains do)

Genotyping for shiga toxin gene

Salmonella

• Salmonella (like Shigella) is never a part of the intestinal flora (always pathogenic)

Humans are infected when there is contamination of food or water with animal feces

Pathogenesis

> The bacteria remains restricted to the intestine: The inflammatory response prevents the spread beyond the GI tract and eventually kills the bacteria

Typically, the episode begins 24 to 48 hours after ingestion

- Diarrhea persists for 3 to 4 days and usually resolves spontaneously within 7 days.
- Fever (39°C) is present in about 50% of the patients.

Watery (secretory) diarrhea

Enterotoxigenic E. coli (ETEC)

- Types of toxins and pathogenesis
- A heat-stable toxin and a heat-labile toxins
 - The organism attaches to the **intestinal mucosa via colonization factors and then liberates enterotoxin**
- * **Enterotoxigenic = Travelers**
- Clinically:**
- Self-limiting diarrhea
 - Recovery within a few days, without specific treatment

Enteropathogenic E. coli (EPEC)

- Contaminated drinking water and meat products
- Contact with domestic animals
 - Typically occurs in neonates and children ≤ 2 years of age (mostly ≤6 months)
- * (pathogenic=pediatrics)
- Clinically:**
- Fever (60%)
 - Watery diarrhea that is often severe and can result in dehydration (30%); commonly lasting for as long as two weeks
 - Abdominal distension
 - Symptoms usually last for one week

V. cholera

_ Escherichia coli:

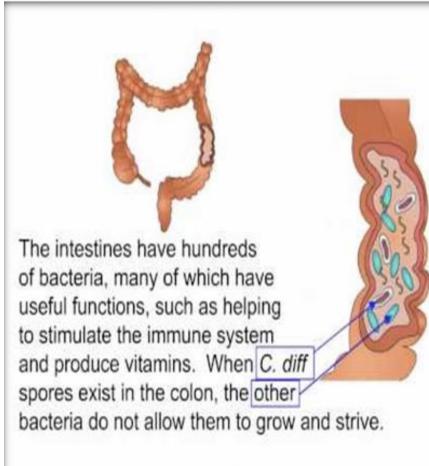
Virulence factors

- **Pili: attachment**
- **Toxins:**
 1. Shiga-like toxin (Stx)
 2. heat-Labile toxin (LT) (inactivation at 60°C for 30 minutes)
- Activation of adenylate cyclase
- Increase CL secretion which follows by Na and H₂O leading to diarrhea

3. heat-Stable toxin

Mediates the inhibition of Na⁺ absorption and stimulates chloride secretion by enterocytes.

Antibiotic associated diarrhea



Clostridium difficile

Antibiotic +treatment = Diarrhea

Pathogenic strains produce two toxins:

- Toxin A is an enterotoxin that causes excessive fluid secretion, but also stimulates an inflammatory response
- Toxin B is a cytotoxin; in tissue culture, it disrupts protein synthesis and causes disorganization of the cytoskeleton

Diagnosis

A. Clinical diagnosis

- Diarrhea occurring ≥ 3 times a day for at least 2 days
- Abdominal cramping, fever, and dehydration
- Peripheral leukocytosis
- Pseudomembranes: The membrane composed of mucus, fibrin, inflammatory cells and cell debris overlying an ulcerated epithelium, is best demonstrated by lower GI endoscopy
- Toxic megacolon (Infrequently)
- Colonic perforation/peritonitis

B. Laboratory identification

- *C. difficile* can be cultured from stools and identified by routine anaerobic procedures
- Real-time PCR and ELISA (demonstrating of toxin) ➤ Latex agglutination to detect antigen in stools

General Treatment for all:

- Usually self limiting
- Rehydration fluids
- Controlling fever (if any)

In severe cases: antibiotic except :*B.cereus*
(*B. cereus* = Be serious not to give antibiotics)