Ashur University
College of Medicine
Grade 3
Infectious Disease
Medicine

Food poisoning

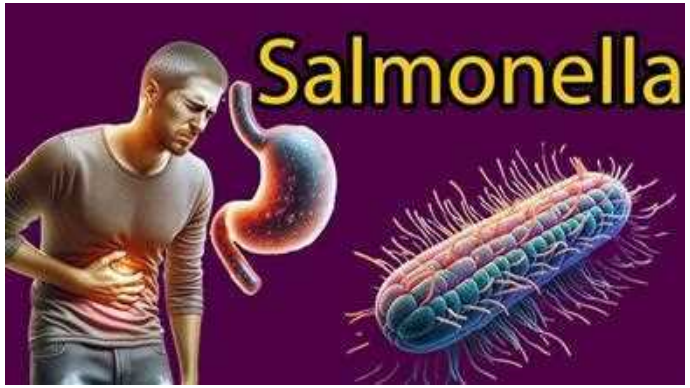
Ass. Professor Internal Medicine

Dr.Qasim Razzaq Radhi

Consultant Internal Medicine

& Gastroenterology

26/10/2025

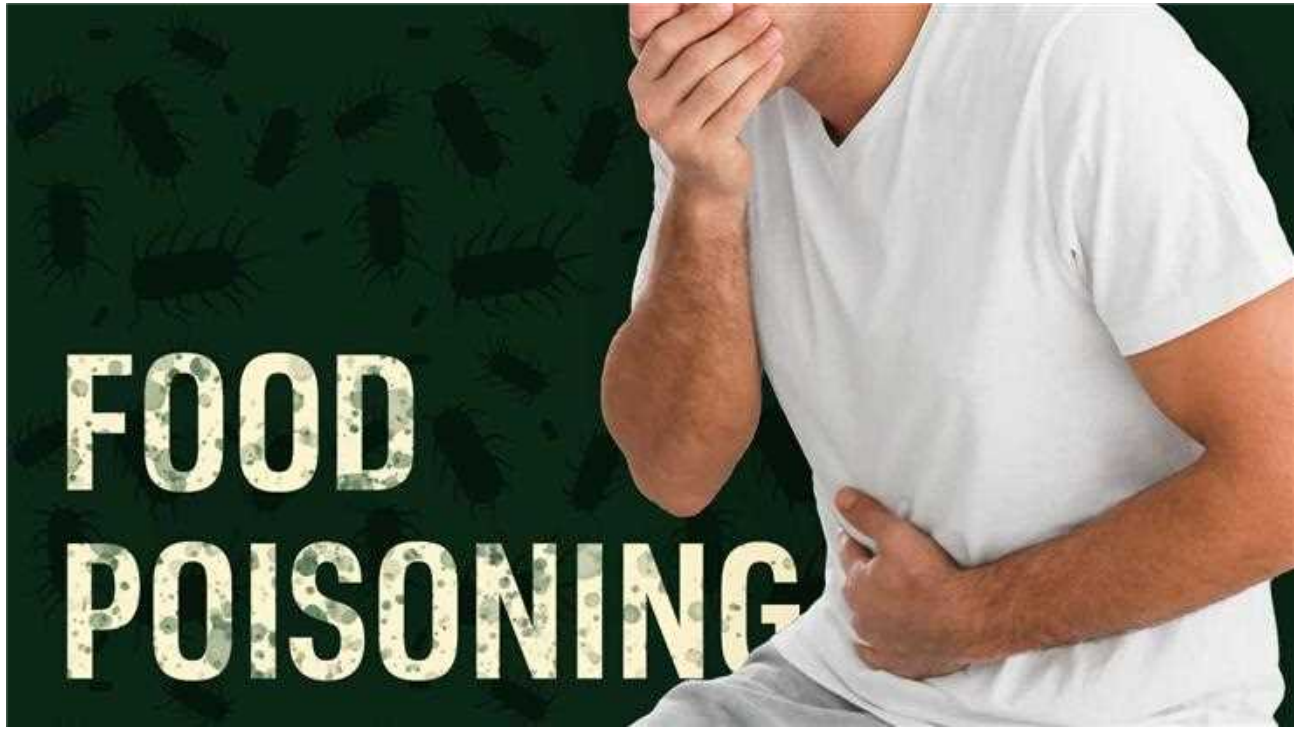




Objectives:

1. Definition of food poisoning.
2. To recognize the seriousness of food poisoning .
3. To recognize common bacteria involved in food poisoning .
4. To identify factors affecting food poisoning .
5. To identify methods of management and prevent of food poisoning

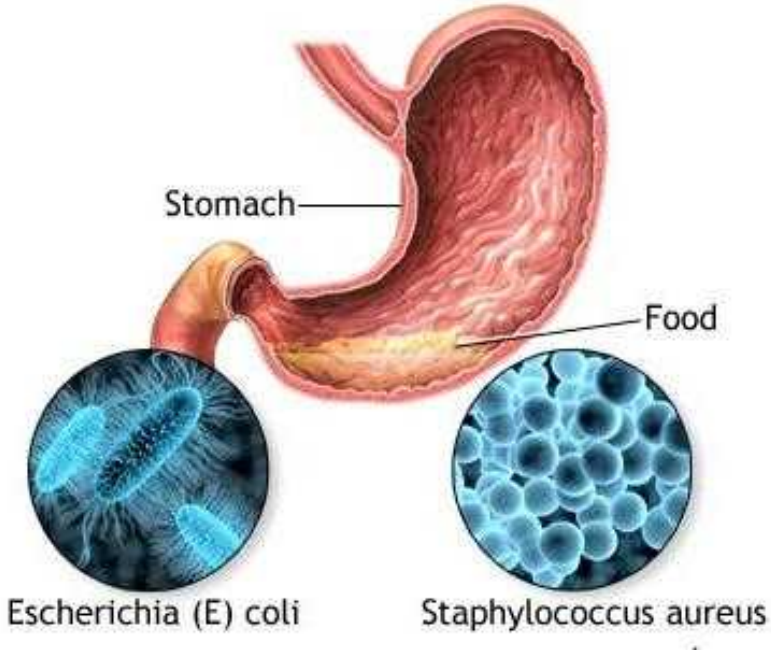
Gastrointestinal bacterial infections (Food poisoning)

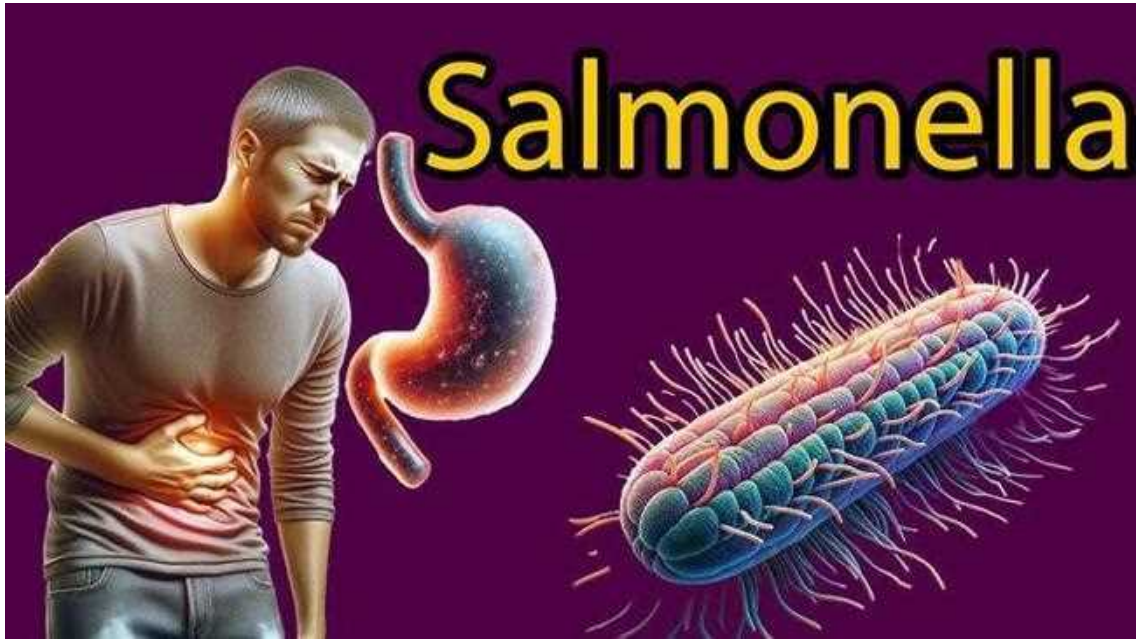




Definition

Any illness resulting from ingestion of food or water contaminated with pathogenic microorganisms (Bacteria , Viruses , Protozoa , Fungi) , their toxin and chemicals.





Types of Food poisoning

(A) Bacterial :

Caused by ingestion of foods contaminated by living bacteria or their toxins. →



(B) Non Bacterial :

Caused by chemicals such as : arsenic , certain plants and sea food.

In recent years : Fertilizers and Pesticides. →





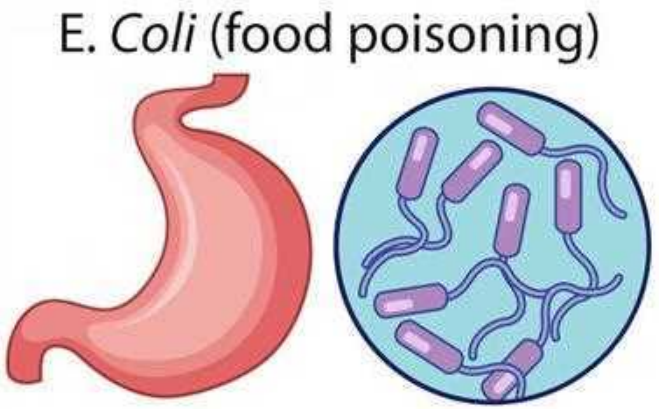
Bacterial Food Poisoning

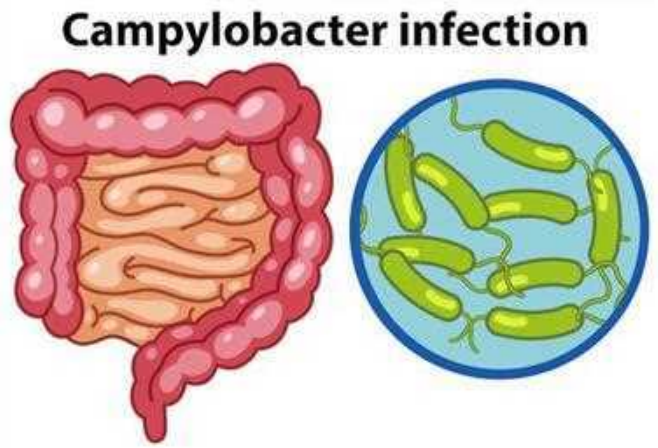
A. Food Infection :

Presence of **bacteria or other microbes** in the food

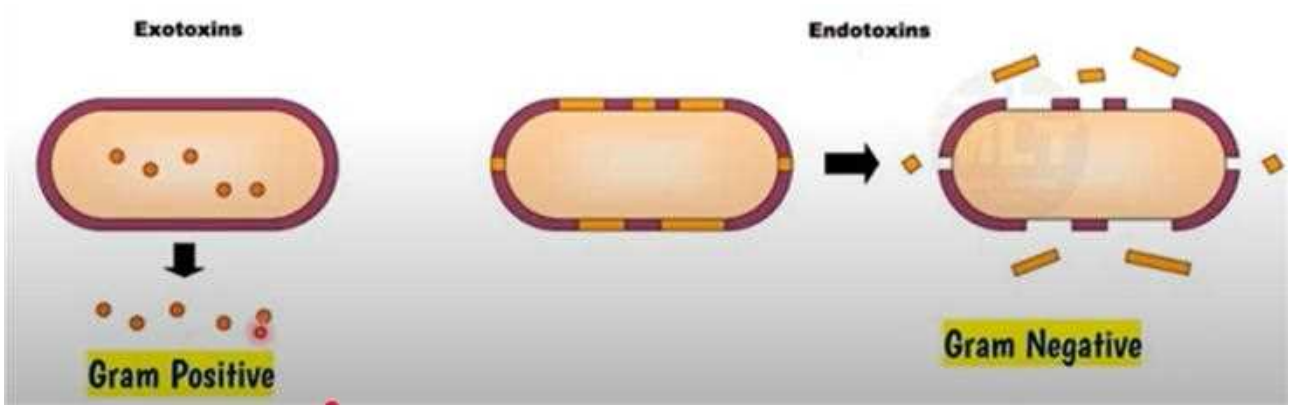
B. Food intoxication :

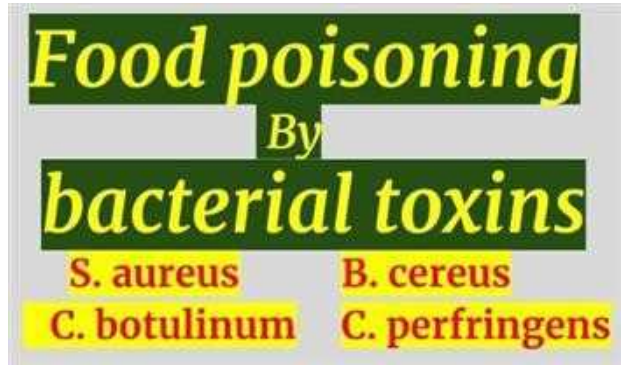
Presence of **toxins** in the food, including exotoxin produced by bacteria.











Symptoms of Food Poisoning

The most common symptoms of food poisoning include :

- **Diarrhea**
- **Abdominal pain**
- **nausea, vomiting**
- **Fever**

Other less common

- **Headache**
- **Fatigue**
- **Weakness in upper or lower limbs**



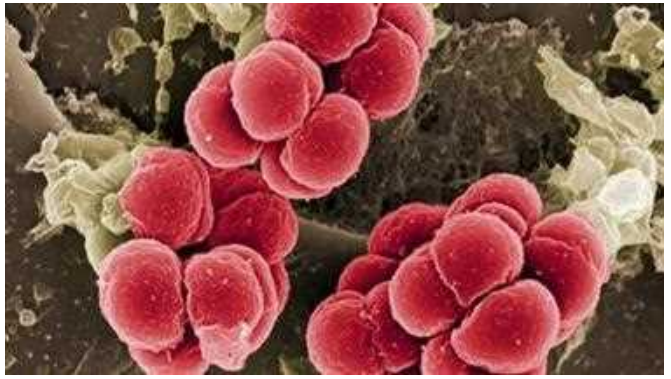
Bacterial Food Poisoning .. cont.

1. Staphylococcal food poisoning
2. Bacillus cereus
3. Clostridium perfringens
4. Campylobacter jejuni
5. Salmonella spp.
6. Escherichia coli

Bacterial Food Poisoning .. cont.

7. Clostridium difficile infection
8. Yersinia enterocolitica
9. Cholera
10. Vibrio parahaemolyticus
11. Bacillary dysentery (Shigellosis)

Staphylococcal food poisoning:



- **It is caused by eating food contaminated with toxin produced by Staphylococcus aureus**.
- The most common way for Staphylococcus aureus contamination is through food workers , food handlers to dairy products, including cheese, and cooked meats.
- Examples of Staph. Food poisoning :

  Sliced meat , puddings (Sweets) , some pastries and sandwiches.
- **Staphylococcus toxins (Enterotoxin) are resistant to heat** and can not destroyed by cocking.
- **Nausea and vomiting develop within 1–6 hrs**.
- **Treatment : fluid replacement and anti emetics**

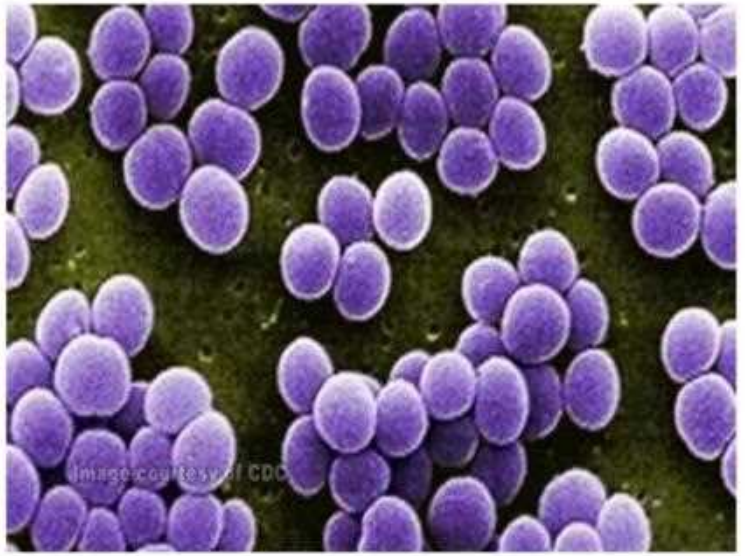
Staphylococcal food poisoning . . cont.

Pathogenesis:

Staphylococcal food poisoning pathogenesis involves ingesting a preformed **heat-stable enterotoxin** produced by Staphylococcus aureus in contaminated food.

The toxin's antigen properties lead to rapid

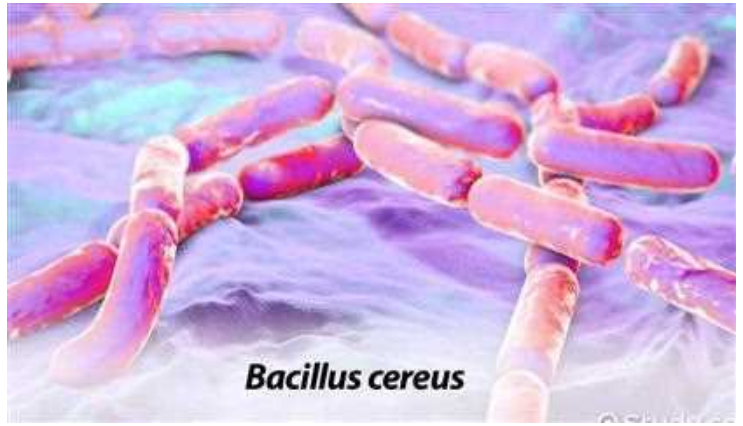
T-cell activation in the small intestine, causing a massive **release of pro-inflammatory cytokines that disrupt the gut lining and trigger vomiting and diarrhea.**



Staph Food Poisoning



Bacillus cereus



Ingestion of pre-formed heat-stable exotoxins of B. cereus causes **rapid onset, 1- 4 hrs after ingestion,** brisk vomiting and some diarrhoea occur, resolves within 24 hours.

Fried rice and freshly made sauces are frequent sources; the organism grows and produces enterotoxin during storage. If viable bacteria are ingested and toxin formation takes place within the gut lumen, then the **incubation period is longer (12–24 hours)** and **watery diarrhoea and cramps are the predominant symptoms.**

The disease is self-limiting but can be severe.



Management : fluid replacement and public health notification

Bacillus cereus .. cont.

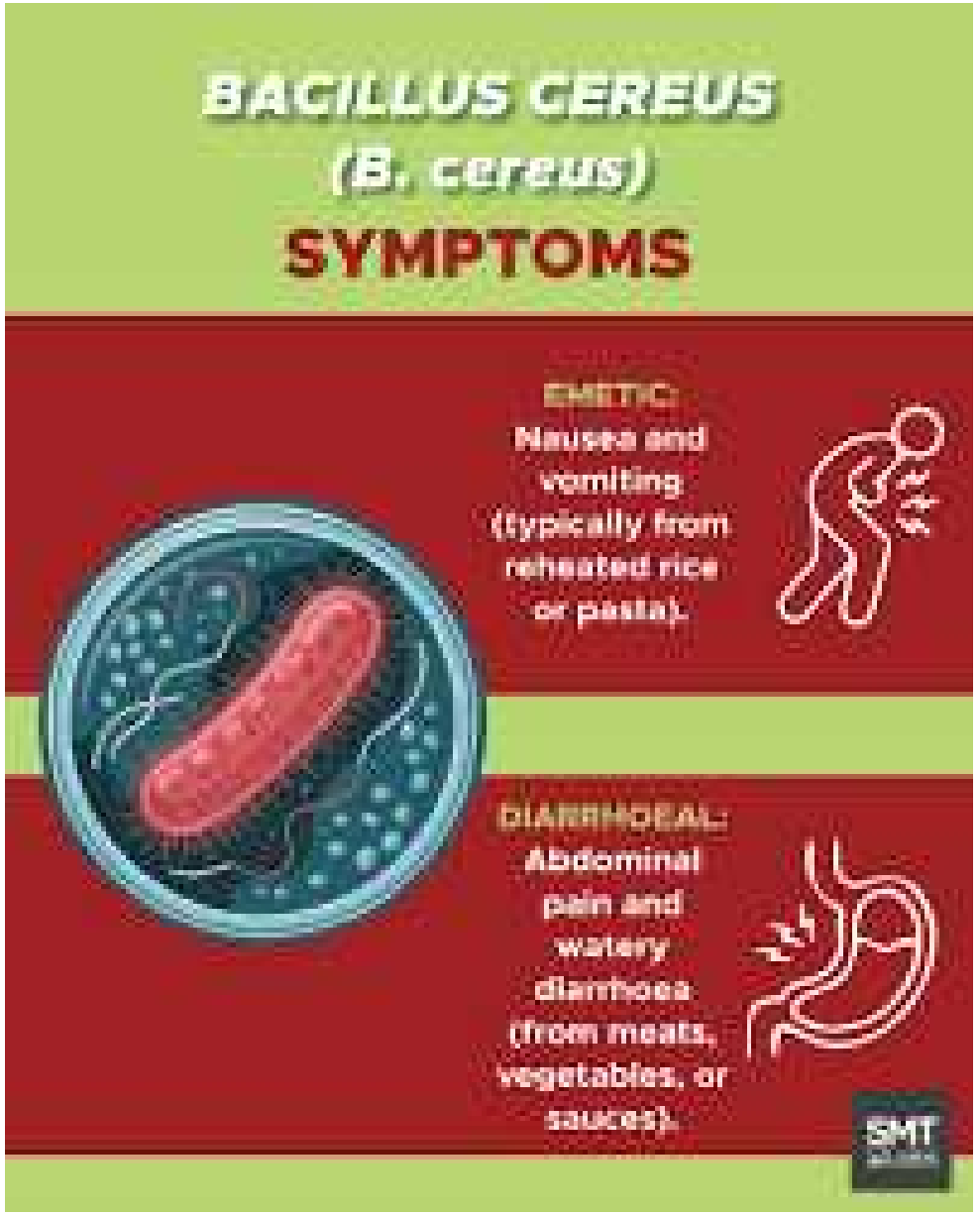
Bacillus cereus food poisoning presents in two forms:

1- Emetic form :

caused by the **heat-stable toxin** cereulide, leads to **rapid onset (1-5 hours)** of nausea and vomiting, **often associated with improperly refrigerated rice dishes**.

2- Diarrheal form :

results from **heat-labile enterotoxins**, causing diarrhea and abdominal pain **8-16 hours after ingestion**, and is linked to **meat, vegetable, and dairy products**.



Clostridium perfringens:



Clostridium perfringens

Spores of C. perfringens are widespread

in the guts of large animals and in soil.

If **contaminated meat products** are incompletely cooked and stored in anaerobic conditions, C. perfringens spores germinate and viable organisms multiply. Subsequent **reheating of the food causes release of enterotoxin**.

Symptoms (diarrhoea and cramps) occur 6–12 hours following ingestion. The illness is usually self-limiting.

Clostridial enterotoxins are potent and most people who ingest them will be symptomatic.

Clostridium perfringens ..cont.

- **'Point source' outbreaks:**

in which a number of cases all become symptomatic following ingestion, **classically occur after school or canteen lunches where meat meals are served.**

- **Clostridial Necrotising Enteritis (CNE) or pigbel :**

is an often-fatal type of food poisoning caused by a β-toxin of C. perfringens, type C.

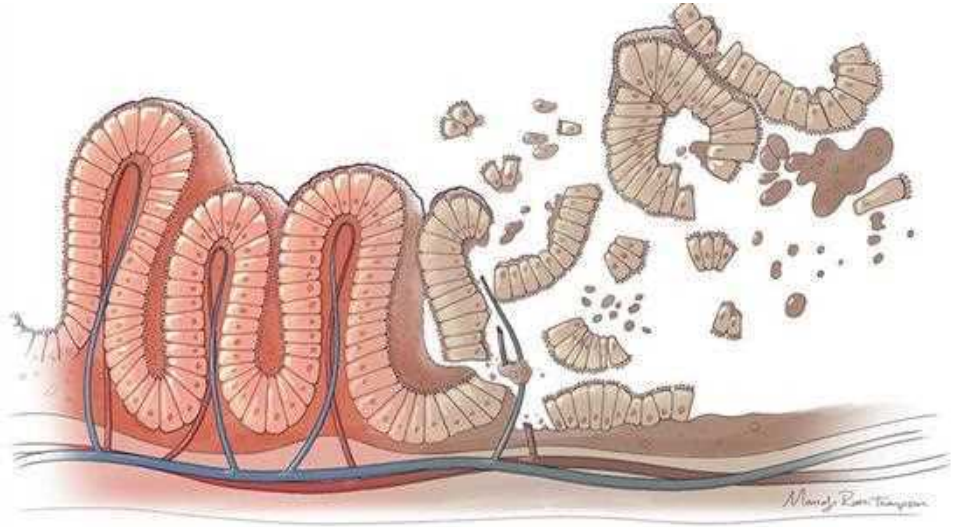
CNE →→

Clostridium perfringens is known as



'catering germ' or 'cafeteria germ'





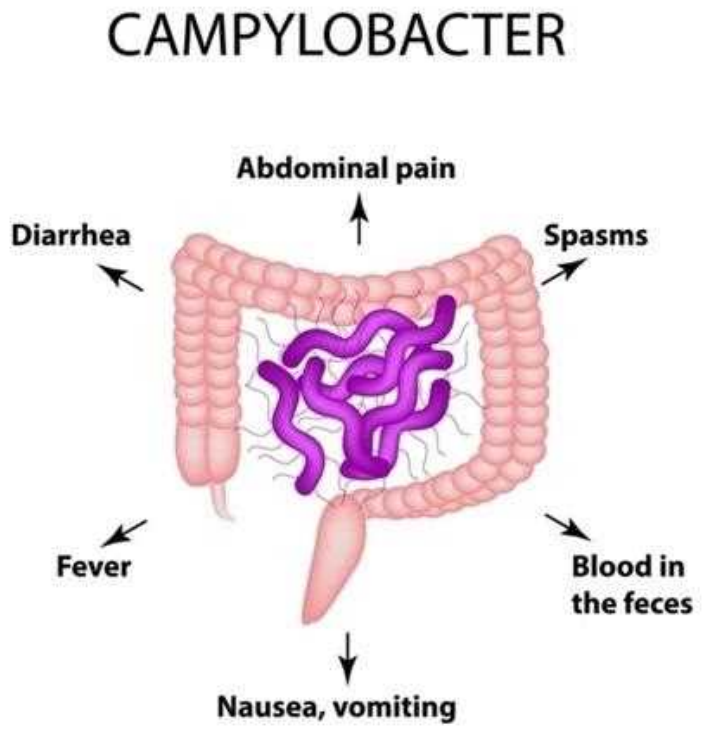
Campylobacter jejuni:

- This infection (caused by **Campylobacter jejuni** or **C. coli**) is essentially a zoonosis.
- The most common sources of the infection are **chicken, beef and contaminated milk products.** →
- **The incubation period is 2–5 days.** Colicky abdominal pain may be severe and **mimic acute appendicitis** or other surgical pathology.









Campylobacter jejuni .. cont.

The majority of Campylobacter infections are self-limiting after 5–7 days. About 10%–20% will be prolonged, occasionally require **treatment with a macrolide, most often azithromycin**, as many organisms are resistant to ciprofloxacin.

Campylobacter spp. have been linked to **Guillain–Barré syndrome** →→

and

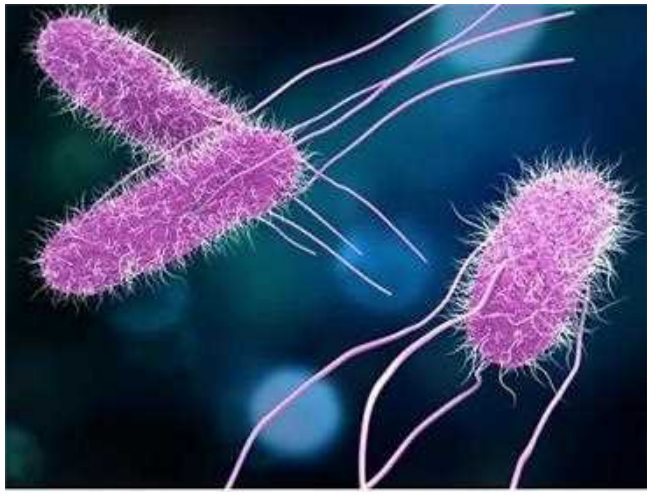
post-infectious reactive arthritis.





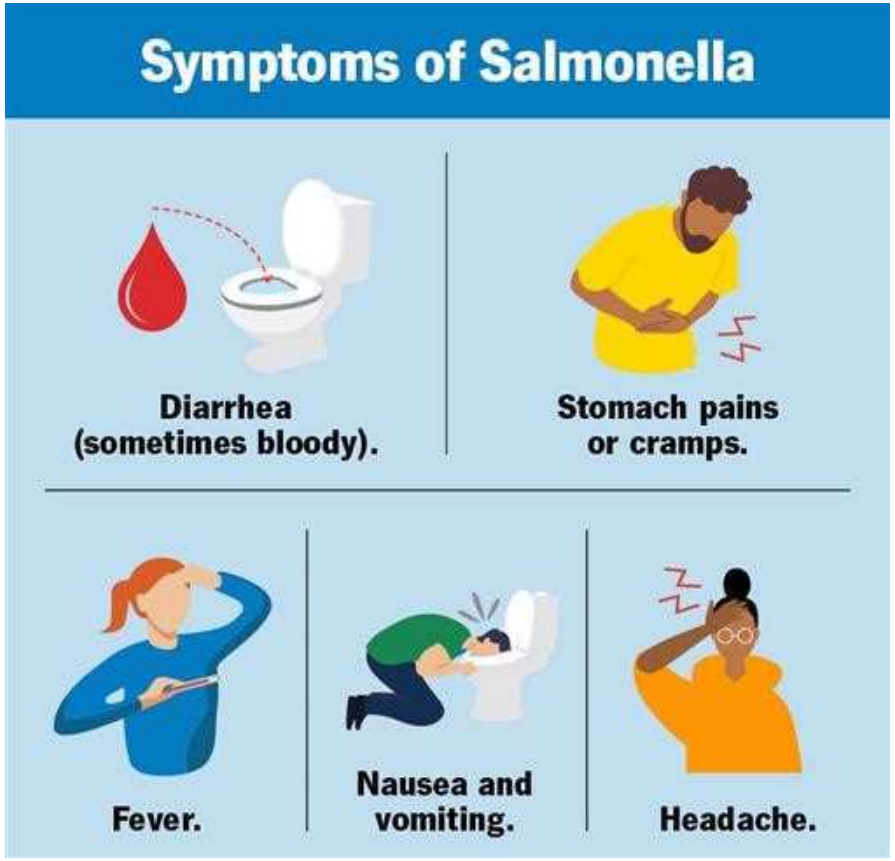
Guillain–Barré syndrome

Salmonella spp. infection



- **S. enteritidis and S. typhimurium are the most important.**
- **Transmission is by contaminated water or food, particularly poultry, egg products and related fast foods.**
- **The incubation period of Salmonella gastroenteritis is 12–72 hrs.**
- The predominant feature is **diarrhoea**, sometimes containing blood. **Vomiting** may be present at the outset (onset).
- Antibiotics are not indicated unless there is bacteremia, which is a clear indication for antibiotic therapy, as salmonellae are known for persistent infection and **often colonise endothelial surfaces such as an atherosclerotic aorta or a major blood vessel**.

Salmonella Food Poisoning .. ..cont.





Escherichia coli (E.coli) infection

At least five different clinico-pathological patterns of diarrhoea are associated with specific strains of E. coli :



1- Enterotoxigenic E. coli (ETEC)

2- Entero-invasive E. coli (EIEC)

3- Enteropathogenic E. coli (EPEC)

4- Entero-aggregative E. coli (EAEC)

5- Enterohaemorrhagic E. coli (EHEC)

1- Enterotoxigenic E. coli (ETEC):

- **Cause most cases of travellers' diarrhoea in developing countries.**
- The organisms produce either a heat-labile or a heat-stable enterotoxin, causing marked **secretory diarrhoea and vomiting after 1–2 days' incubation.**
- The illness is usually mild and self-limiting after 3–4 days.
- **Ciprofloxacin** has been used to limit the duration of symptoms but benefit is unproven.
- Source :

Undercocked Beef – **Hamburger** →→

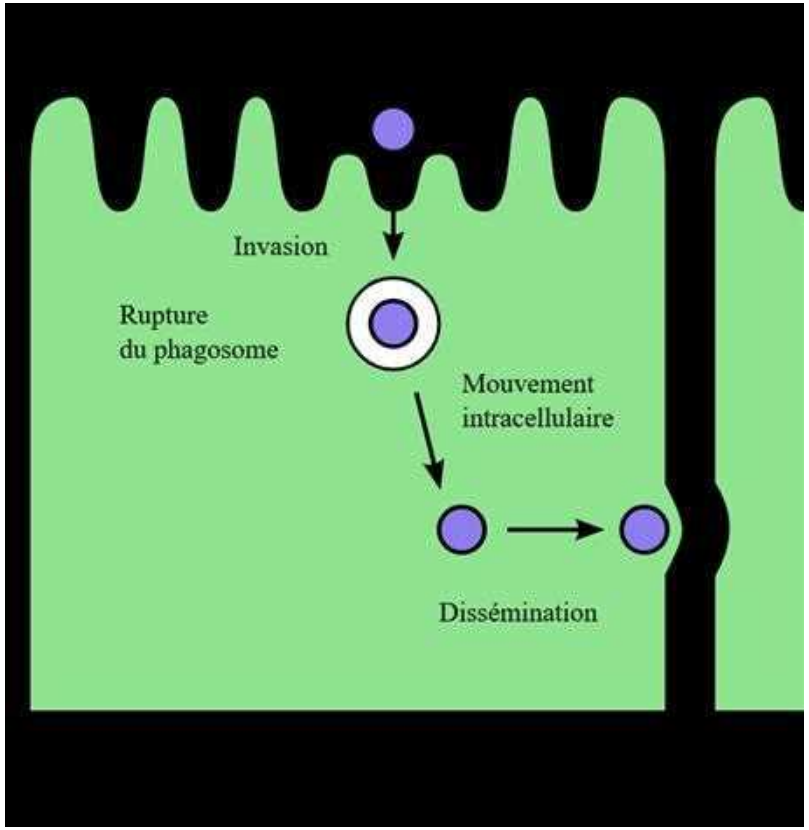
Unpateurized Milk →→



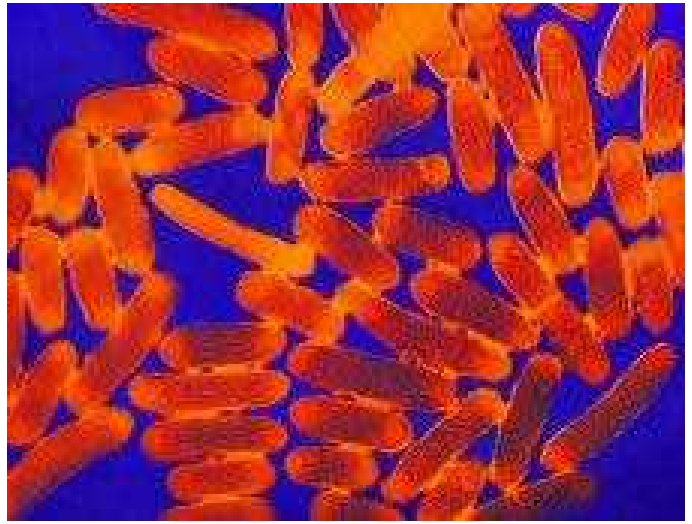


2- Enteroinvasive E. coli (EIEC):

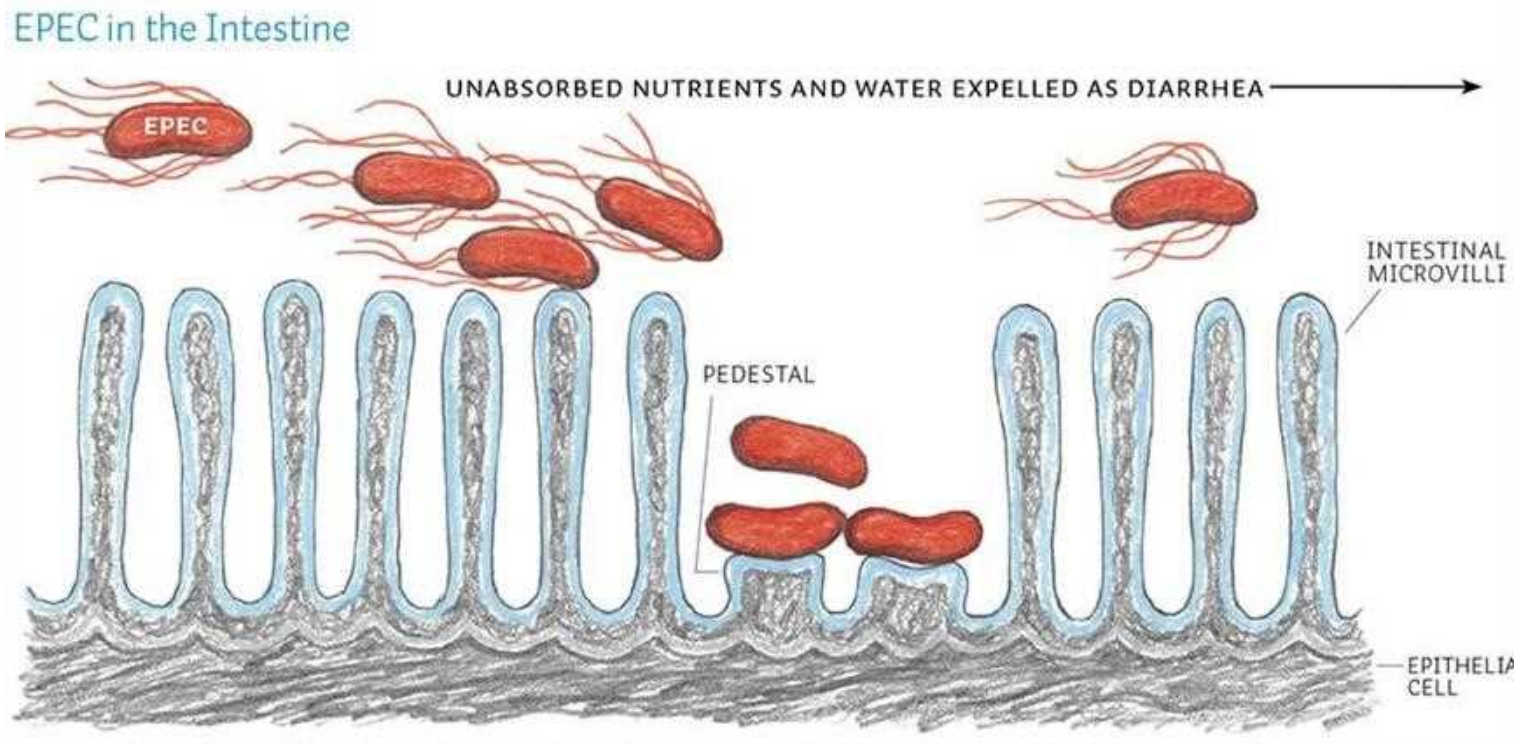
- **This illness is very similar to Shigella dysentery.**
- **Caused by invasion and destruction of colonic mucosal cells.**
- **No enterotoxin is produced.**
- **Acute watery diarrhoea, abdominal cramps** and some scanty blood-staining of the stool are common.
- The symptoms are rarely severe and are usually self-limiting.



3- Enteropathogenic E. coli (EPEC):

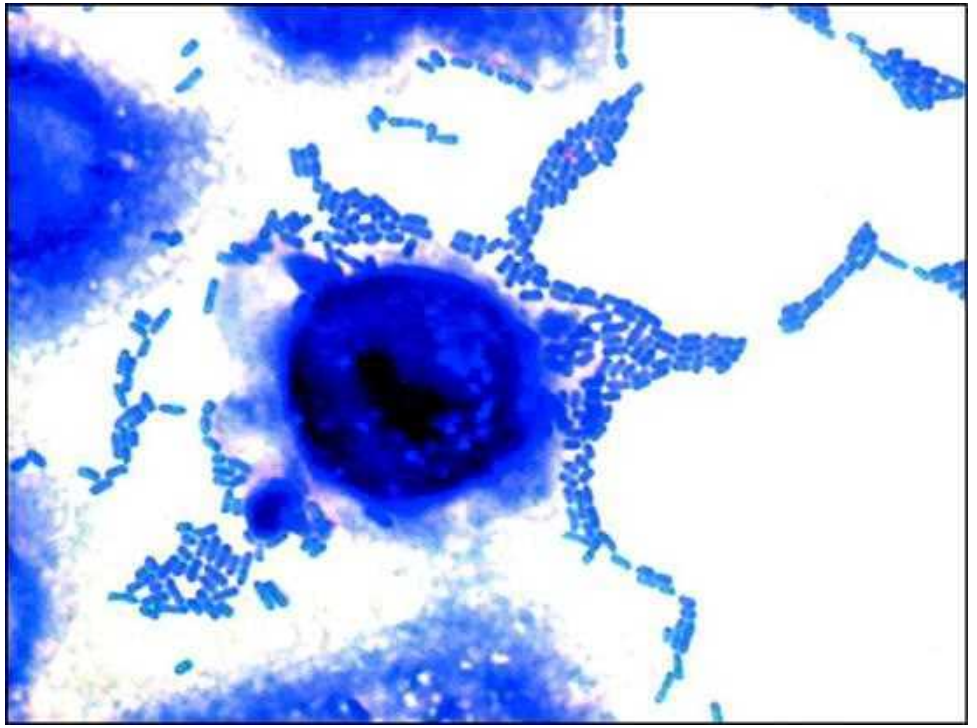


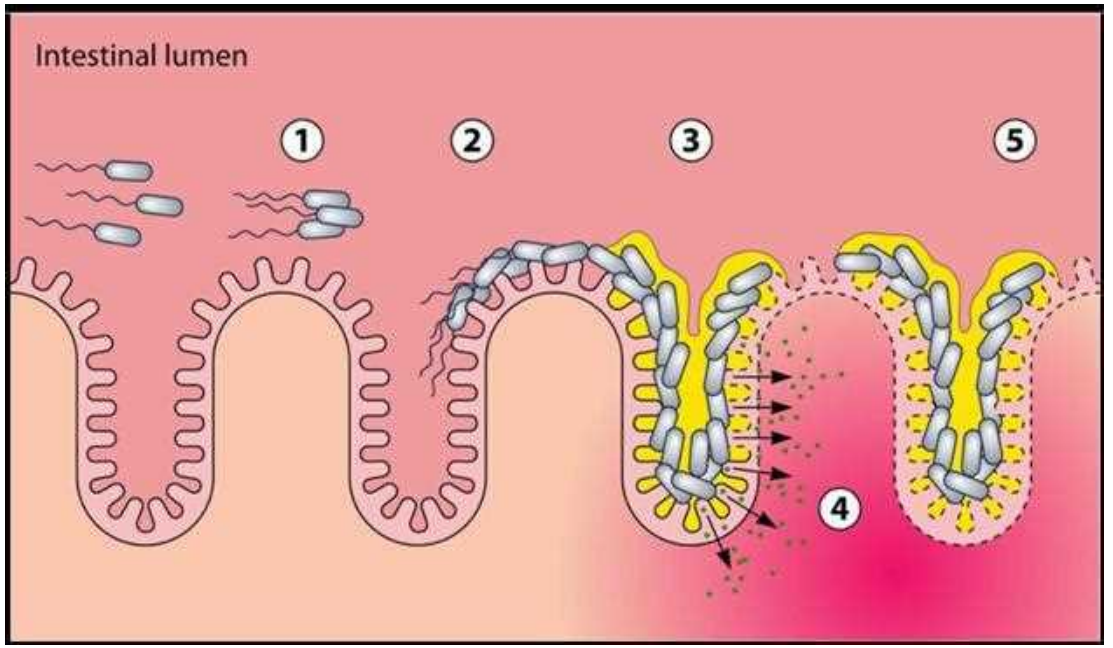
- **Very important in infant diarrhoea.**
- Ability to attach to the gut mucosa is the basis of their pathogenicity.
- **This causes destruction of microvilli and disruption of normal absorptive capacity. →**
- The symptoms vary from mild non-bloody diarrhoea to quite severe illness.



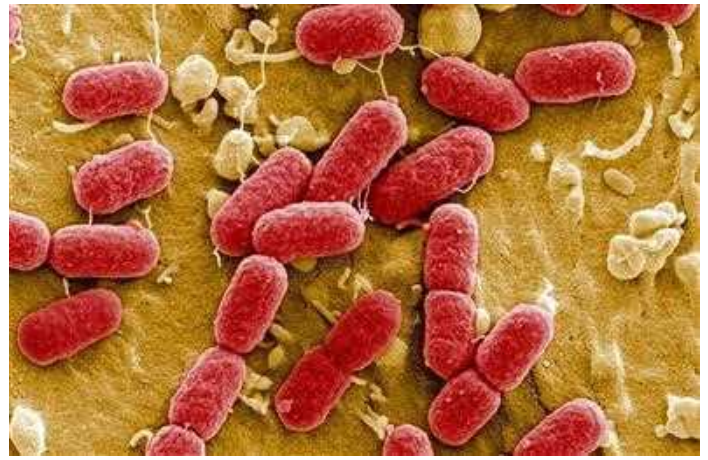
4-Enteroaggregative E. coli (EAEC)

- These strains adhere to the mucosa and produce a locally active enterotoxin.
- **A ‘stacked brick’ aggregation is seen in the small bowel. →**
- They have been associated with prolonged diarrhoea in children.





5- Enterohaemorrhagic E. coli (EHEC)



- **Produce verocytotoxin which are identical to toxins produced by Shigella (‘shiga toxins 1 and 2’).**
- **E. coli O157:H7** is perhaps the best known of these **Verocytotoxigenic E. coli (VTEC).**
- Has an extremely low infecting dose (10–100 organisms).
- **The reservoir of infection is in the gut of herbivores** (an animal that feeds exclusively or primarily on plants)
- **Contaminated milk and meat products, such as hamburgers**.
- The incubation period is between 1 and 7 days.

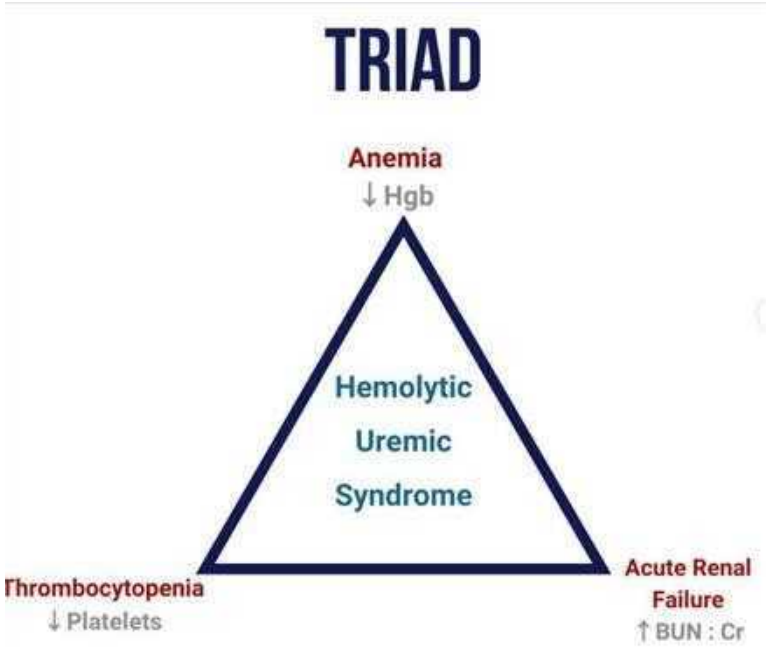
Enterohaemorrhagic E. coli (EHEC)

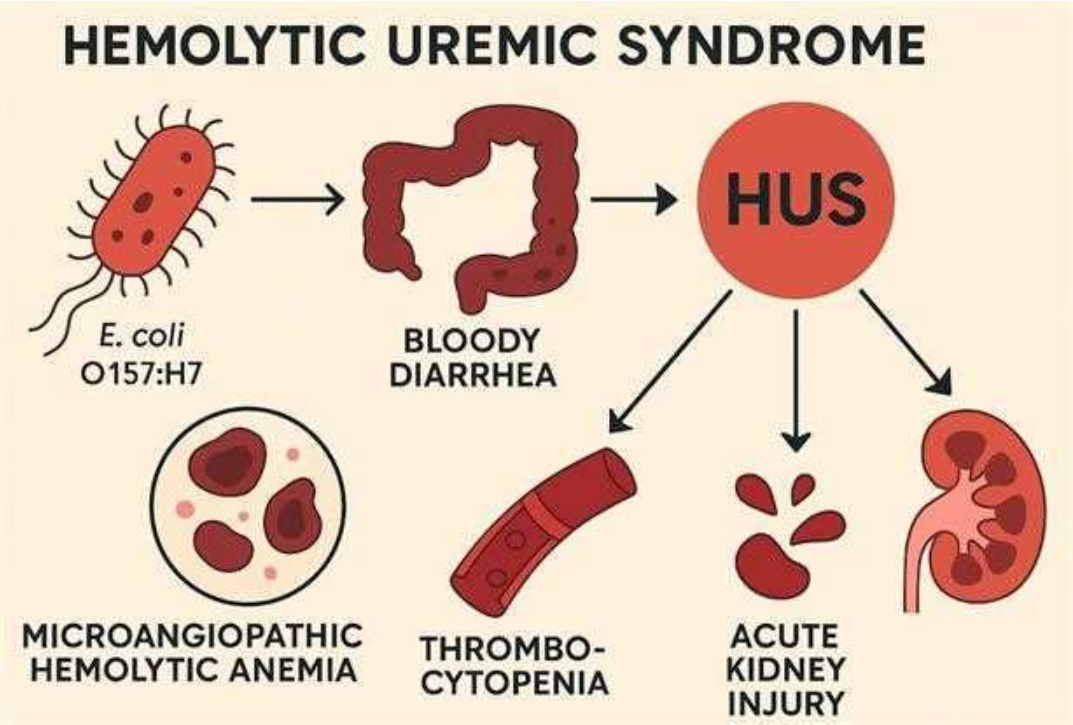
- Initial watery diarrhoea becomes blood-stained in 70% of cases and is associated with constant abdominal pain. There is little systemic upset, vomiting or fever.
- Enterotoxins causes:

1. Local effect on the bowel.

2. Distant effect on particular body tissues such as glomerular apparatus, heart and brain. The potentially life-threatening **Haemolytic Uraemic Syndrome (HUS)** occurs in 10–15% of patients, arising 5–7 days after the onset of symptoms. →

- **HUS is treated by dialysis if necessary** and may be averted by active intervention with processes such as **plasma exchange**.





Management of Food Poisoning

• Most cases of acute gastroenteritis are self-limited, specific treatment is not necessary.

• **The main objective is adequate rehydration and electrolyte supplementation**. This can be achieved with either an **Oral Rehydration Solution (ORS) →**

or **intravenous solutions** (eg, isotonic sodium chloride solution, lactated Ringer solution)

• Oral rehydration is achieved by administering clear liquids and sodium-containing and glucose-containing solutions.





Management of Food Poisoning ..cont.

- **Antisecretory agents**, such as bismuth subsalicylate , may be useful.
- **Antiperistaltics** (opiate derivatives) should not be used in patients with fever, systemic toxicity, or bloody diarrhea .
- **Diphenoxylate with atropine** (Lomotil) is available in tablets and liquid.
- **Loperamide** (Imodium) is available over the counter as 2-mg capsules and as a liquid (1 mg/5ml) .



Management of Food Poisoning ..cont.

Diet :

During episodes of acute diarrhea, patients often develop an **acquired disaccharidase deficiency** due to washout of the brush-border enzymes. For this reason, **avoiding milk, dairy products, and other lactose containing foods.**

Prevention of Food Poisoning

- **No vaccine is available** that can prevent norovirus infection .
- Best way to prevent food poisoning caused by infectious agents is to practice strict personal hygiene, cook all foods adequately, avoid cross contamination of raw and cooked foods, and keep all foods at appropriate temperatures (ie, < 40°F for refrigerated items and >140°F for hot items).
- Avoiding eating wild mushrooms prevents mushroom poisoning.





Prevention of Food Poisoning ..cont.

- **Prevention of fish poisoning requires avoidance of large tropical fish (ciguatera poisoning)**
- **Raw or undercooked milk, poultry, eggs, meat, and seafood are best avoided.**
- The use of low-temperature gas plasmas in the food industry may potentially reduce the incidence of foodborne disease
- **Prophylaxis for traveler's diarrhea is not recommended routinely** because of the risk of adverse effects from the drugs (eg, rash, anaphylaxis, vaginal candidiasis)


Thank you!