

Escherichia coli

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INTRODUCTION

Escherichia coli :

1. Involving human illness :

- Diarrhoea
- Haemorrhagic colitis
- Dysentery
- Bladder & kidney infections
- Surgical wound infection
- Septicaemia
- Haemolytic uraemic syndrome

→ Pneumonia

→ Meningitis

→ Death

2. Main concern of food industry

3. Indicator of Fecal contamination in water & food

4. Vero cytotoxigenic

5. Wide diversity of type

VTEC

Definition :

- Vero-cytotoxigenic *Escherichia coli*
- Type of pathogenic *E. coli*
- Main concerned in food industry
- Causing morbidity
- *E. coli* O157:H7 as the most predominant foodborne VTEC
- Other type : *E. coli* O26, O103, O111, O118 and O145

Characteristics of *E. coli*

Phenotypic characteristics :

- Gram (-)
- Non sporing rods
- Motile (peritrichate flagella)
- Easy to cultivate
- Aerobic and facultatively anaerobic
- All species ferment glucose → acid or acid & gas
- Reduce nitrates → nitrites

Characteristics of *E. coli*

Phenotypic characteristics :

- Oxidase (-)
- Catalase (+)
- Intestinal parasites of human & animals

Characteristics of *E. coli*

Genotypic characteristics :

- DNA relatedness → *E. coli* to some other genera of *Enterobacteriaceae*, particularly some notable human pathogens.
- Based on DNA homology → *E. coli* & 4 species of genus *Shigella* should be considered as a single species.
- Serogrouping → 170 different species of *E. coli* based on their somatic (O).

E. coli Types

(Depends on the virulence genes acquired)

Abv	<i>E. coli</i> strain	Level to diarrhoea
EPEC	Entero-pathogenic <i>E. coli</i>	10^5 - 10^{10}
ETEC	Entero-toxigenic <i>E. coli</i>	10^8 - 10^{10}
EHEC	Entero-haemorrhagic <i>E. coli</i>	
EIEC	Entero-invasive <i>E. coli</i>	10^8
EAEC	Entero-aggregative <i>E. coli</i>	

How is E. coli transmitted?

- undercooked or raw hamburgers
- • salami
- • alfalfa sprouts;
- lettuce
- • unpasteurized milk, apple juice, apple cider; and
- • contaminated well water.

How is E. coli transmitted?

- Unsuspecting swimmers have been infected by accidentally swallowing unchlorinated or underchlorinated water in swimming pools contaminated by human feces. People also can get infected by swimming in sewage-contaminated water.

What are the symptoms of foodborne illnesses?

- Diarrhea.
- Vomiting.
- Stomach Cramps.
- Headache.

What are the symptoms of E. coli infection?

- Nausea
- • Severe abdominal cramps
- • Watery or very bloody diarrhea
- • Tiredness
- • Vomiting (occasionally)

How does food get contaminated?

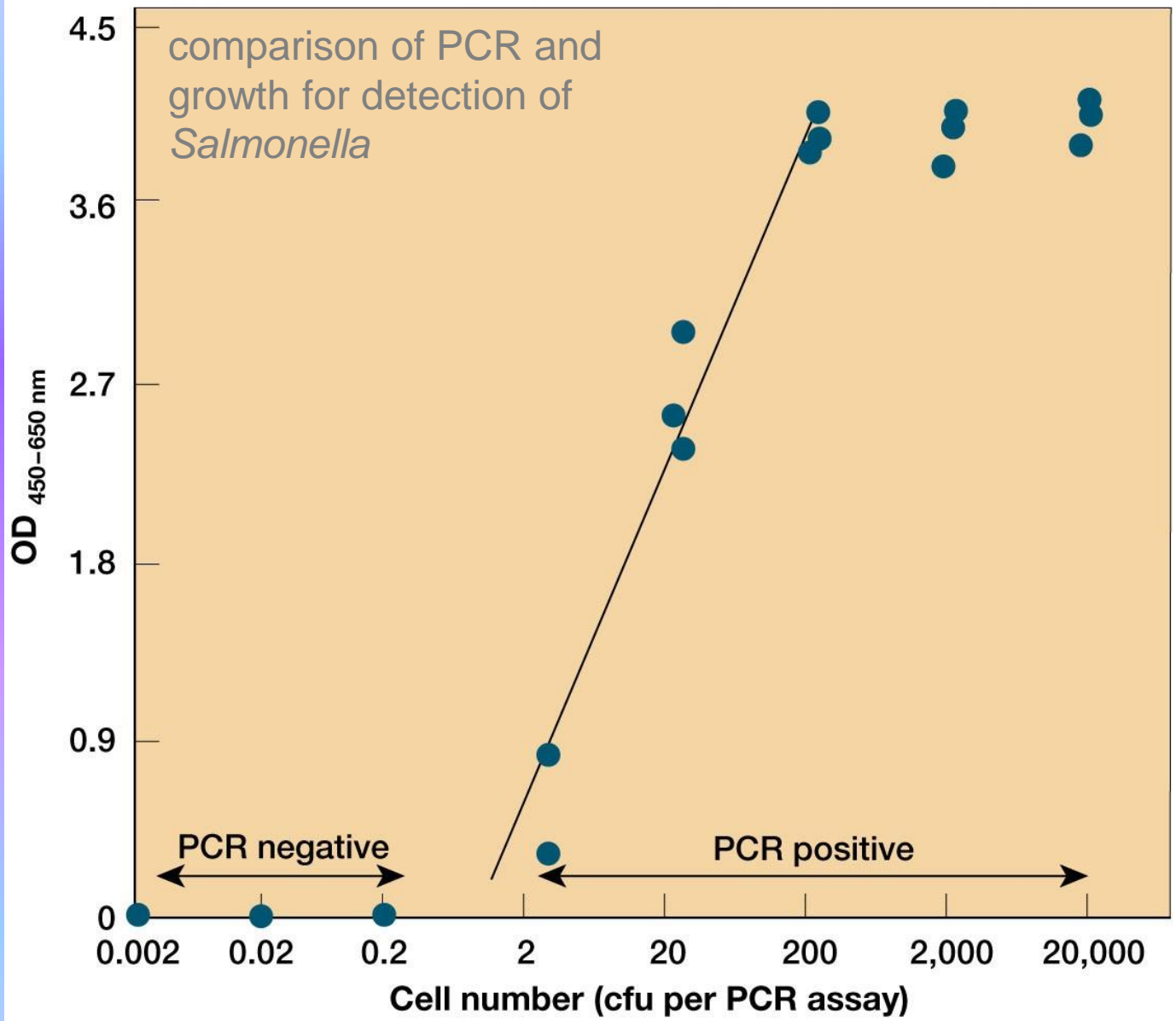
- During slaughter.
- Irrigated with contaminated water.
- Unwashed hands.
- Cross-contamination.
- Insufficiently cooked.
- Stored at the incorrect temperature.

How is E. coli diagnosed?

- A health care provider can use laboratory tests to identify *E. coli in the stool of an infected person.*
- How is *E. coli infection treated?*
- Most people recover from *E. coli infection within 5 to 10 days without treatment. Antibiotics are usually not helpful, and health care experts recommend against taking antidiarrheal medicines.*

Detection of Food-Borne Pathogens

- must be rapid and sensitive
- methods include:
 - culture techniques – may be too slow
 - immunological techniques - very sensitive
 - molecular techniques
 - probes used to detect specific DNA or RNA
 - sensitive and specific



How are foodborne illnesses prevented?

1. COOK.
2. SEPARATE.
3. CHILL.
4. CLEAN.
5. REPORT.



Some ways to prevent E. coli infection

- Eat only thoroughly cooked beef and beef products.
- • Cook ground beef patties to an internal temperature of 160 degrees Fahrenheit.
- • Avoid unpasteurized juices.
- • Drink only pasteurized milk.
- • Wash fresh fruits and vegetables thoroughly before eating raw or cooking.

COOK

- Thoroughly cook meat (145–165°F), poultry (165°F), and eggs (145°F).
- Use a thermometer to measure internal temperature of meat.
- Cooked food should be reheated to 165°F.
- Hot foods should be kept hot at 135°F or above.
- Cook food immediately after defrosting.

SEPARATE

- Wash hands, utensils, and cutting boards after they have been in contact with raw meat or poultry and before they touch another food.
- Put cooked meat on a clean platter.
- Use different dishes and utensils for raw and cooked foods.



CHILL

- Refrigerate leftovers promptly.
- Set refrigerator temperature at 40°F/4°C.
- Set freezer temperature at 0°F/-17°C.
- Separate large volumes of food so they will cool more quickly.
- Cold foods should be kept at a temperature of 40°F or below.
- Keep purchased food chilled until you get home from the store.

CLEAN

- Wash produce under running water.
- Remove and discard outer leaves from lettuce or cabbage.
- Wash hands before preparing food, between types of food, and after preparation.
- The *single most important* method of preventing infectious diseases is to wash your hands.
- Regularly clean and disinfect the refrigerator and freezer.
- Clean and disinfect countertops regularly.

REPORT

Report suspected foodborne illnesses to your local health department.



Ensuring Food Safety in Schools

- Hazard Analysis and Critical Control Point (HACCP).
- Child Nutrition and WIC Reauthorization Act of 2004 and Reauthorization Implementation.

Hazard Analysis and Critical Control Point (HAACP)

- A systematic approach to preventing food contamination.
- Based on seven principles.

HACCP Principles

1. Analyze potential hazards.



HACCP Principles (cont'd)

2. Determine critical control points (CCPs).



HACCP Principles (cont'd)

3. Establish critical limits.



HACCP Principles (cont'd)

4. Establish monitoring procedures.

HACCP Principles (cont'd)

5. Establish corrective actions.

HACCP Principles (cont'd)

6. Establish verification procedures.

HACCP Principles (cont'd)

7. Establish record-keeping and documentation procedures.



THANK YOU

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