



Enterobacteriaceae : *ESCHERICHIA COLI*

- Large family of gram-negative rods –
- Occur as free-living in nature **OR**
- As part of normal flora of colon of human and animals.

Four metabolic characteristics:

1. Facultative anaerobic
2. Ferment glucose
3. Oxidase - negative
4. Nitrate - positive

Grouping on the basis of lactose fermentation:

A. Lactose fermenters

Produce pink-red colonies on MacConkey agar:

- *Escherichia*
- *Klebsiella*
- *Citrobacter*
- *Enterobacter*
- *Serratia*

B. Non-lactose fermenters

Pale-colour colonies on MacConkey agar

- *Salmonella*
- *Shigella*
- *Proteus*.

ESCHERICHIA COLI

- *Gram-negative bacilli*
- *Motile*
- *Some strains capsulated*
- *Normal flora of colon in man and animals*
 - *Excreted in stool*
 - *contamination of water supplies – used as indicator to test faecal contamination of water*
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ANIGENIC STRUCTURE

1. ***Somatic (O) antigen***
2. ***Capsular (K) antigen***
3. ***Flagellar (H) antigen***
4. ***Pili : help in attachment and virulence***

- *Bind to D-mannose residues on surface of cells.*
- *Pyelonephritis associated pili (Pap) and*
- *Intestinal colonization factor antigen*

Virulence factors for UTI:

- *Adherence to uroepithelial cells by Pap pili*
- *Capsule (K-antigen)*
- *Siderophore – help survival of E.coli in iron-poor environment of human body fluids*

DISEASES CAUSED BY E.COLI**1. Urinary Tract Infection (UTI)**

- *Commonest cause (70-90%)*
- *More common in females due to shorter urethra*
- *10⁵ bacteria / ml of urine is significant*
- *Common cause of hospital-acquired UTI*

due to urinary catheters

Cystitis (infection of bladder)

- *Pain (dysuria)*
- *Frequency of micturation*
- *More common in females due to shorter urethra*

Pyelonephritis (infection of kidney)

- *Fever (chills)*
- *Flank pain*

2. INTESTINAL INFECTIONS**a) Enterotoxigenic E.coli (ETEC)**

- *Virulence due to enterotoxins*
- *Act on small intestine*
- *Watery diarrhoea (common cause of traveler's diarrhoea)*
- *Transmitted by contaminated food and water*

b) Enteropathogenic E.coli (EPEC)

- *Adhere to enterocytes, cause destruction of microvilli of small intestine.*
- *Infantile and childhood diarrhoea (20% of bottle-fed)*
- *Stool : watery, non-purulent, no blood*

c) Enteroinvasive E.coli (EIEC)

- *Cause invasion of enterocytes in large intestine*
- *Necrosis, ulceration and inflammation.*
- *Stool : scanty, purulent & blood stained*

d) Enterohaemorrhagic E.coli (EHEC)

- *Due to verotoxin – causes destruction of microvilli in large intestine.*
- *Produced by E.coli O157 : H7*
- *Haemorrhagic colitis with copious bloody stool without pus cells.*

e) Enteroaggregative E.coli (EAEC)**3. Meningitis in newborns**

From mother's genital tract (colonized with E.coli)

4. Opportunistic Infections

- *Peritonitis due to intestinal trauma*

- *Wound infections*
- *Bacteremia gram-negative septic shock*
- *Beta-lactam antibiotics are not recommended?*

5. Hospital-acquired infections

- *Common cause*

LAB IDENTIFICATION OF E. COLI

Specimens : urine, stool, pus

Culture on:

- *MacConkey agar – lactose fermenter*
- *EMB agar – green metallic sheen*
- *Indole +ve*
- *Citrate –ve*
- *TSI: Slant acid, Butt-acid*

Serotyping for enteric pathogens

Coliform Count and Public Health?

TREATMENT OF E. COLI DISEASES

UTI : use antibiotics after C/S

Trimethoprim-sulphamethoxazole

Diarrhoea

- *Oral rehydration + ciprofloxacin*

Meningitis

- *Ceftriaxone (3rd generation cephalosporin)*

Others diseases : C/S

- *Increasing Resistance in E.coli ?*