

Structure 8-

- ↳ Endotoxin (LPS) → depends on lipid (A)
- ↳ capsule (K of Vi Ag) → hydrophilic
- ↳ Antigen phase variation (O antigen, K antigen, flagellar H antigen)
- ↳ Type III secretion system.
- ↳ siderophores (بمجرد الحديد) → e.g. enterobactin and aerobactin.
- ↳ Resistance to serum killing and Antimicrobial Resistance.

MacConkey's agar

- contains :-
 1. bile salts } inhibits G+ve Bacteria
 2. violet dye } }
 3. neutral red dye → turn pink if the microbe is lactose +ve.
- Lac +ve → pink
- Non-Lac → yellow

عن أنس بن مالك رضي الله عنه قال: سمعت رسول الله
 صلى الله عليه وسلم يقول: (قال الله عز وجل: يا ابن آدم،
 إنك ما دعوتني ورجوتني فغفرت لك ما كان منك ولا أنا،
 يا ابن آدم، إنك لو أتيتني بقراب الأرض خطايا، ثم لقيتني لا
 تشرك بي شيئاً، لأتيتك بقرابها مغفرة.)

ESCHERICHIA COLI

- G⁻ Gram -ve
- Bacilli ◯
- Lac +ve (pink)
- Normal flora in the GI tract
- Enterobacteriaceae.
- one of the most important pathogens.
- cause of diarrhoeal disease, bloodstream infection and UTIs

→ E. coli strains:

1. Normal flora (colon)
2. Diarrhoeagenic → cause diarrhea syndromes.
3. Extraintestinal pathogenic (ExPEC)

→ ETEC (Enterotoxigenic E. coli) &

- ↳ person to person spread doesn't occur.
- ↳ Incubation period → 1 - 2 days.
- ↳ Traveller's diarrhea.
- ↳ Symptoms → secretory diarrhea (watery) abdominal cramps, nausea and vomiting.

↳ Toxins:

1. Heat stable → ↑ cGMP → inhibit fluid absorption.
2. Heat labile → ↑ cAMP → ↑ secretion of chloride, ↓ absorption of sodium and chloride.

→ STEC (Shiga toxin-producing E. coli)

- ↳ person to person spread can occur.
- ↳ Orally.
- ↳ From mild uncomplicated diarrhea to hemorrhagic colitis.
- ↳ bloody diarrhea and severe abdominal pain.
- ↳ Severe disease → STEC O157: H7
- ↳ Incubation → 3 to 4 days
- ↳ Complete resolution of symptoms → 4-10 days
- ↳ HUS (Hemolytic uremic syndrome) → complication in 5% of infected children (<10), symptoms: 1. acute renal failure. 2. thrombocytopenia. 3. Microangiopathic hemolytic anemia.

→ Extraintestinal infections of E. coli

1. Urinary tract infection & contaminate the urethra then to the bladder and may migrate to the kidney of prostate.

↳ 80% of UTIs cases in women → E. coli.

2. Neonatal Meningitis & E. coli and group B streptococci cause the majority of CNS infections in infants.
3. Septicemia & most commonly originates from infections in the UT and GIT.

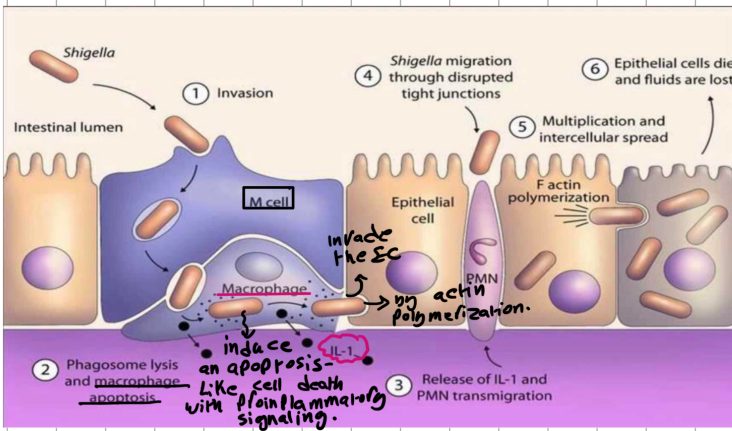
SALMONELLA

- colonize virtually all animals.
- Salmonella Typhi and S. Paratyphi are highly adapted to humans (don't cause disease in non human hosts).
- Attach to the mucosa of the small intestine and invade into the M cells.
- Can transport across the cytoplasm and release into the blood or lymphatic circulation
- Inflammatory response → release of prostaglandins and stimulates cAMP and activate fluid secretion
- virulence dependent on pathogenicity island
- typhoid and paratyphoid fevers.
- large inoculum is required for symptomatic disease.
- S. Typhi → Infection dose is low → person to person spread is common.
- Gastroenteritis, nausea, vomiting and nonbloody diarrhea
- All Salmonella species can cause bacteremia (septicemia)
- S. Typhi and paratyphi more commonly lead to a bacteremic phase.
- S. Typhi → typhoid fever.
- other salmonella → paratyphoid fever.
- The bacteria responsible for enteric fever: cells lining the intestines → macrophages → liver, spleen, and bone marrow → replicate.
- After 10-14 days → fever, headache, myalgias, malaise and anorexia.

سبحان الله وبحمده
سبحان الله العظيم

SHIGELLA

- S. dysenteriae, S. flexneri, S. boydii and S. sonnei.
- These 4 species are actually biotransformers within E. coli.
- It causes disease by invading and replicating in cells lining the colon.
- S. dysenteriae strains produce Shiga toxin (such as STEC).
- The A subunit in the toxin cleaves the 28S rRNA in the 60S ribosomal subunit → preventing binding of aminoacyl-tRNA and disrupting protein synthesis.
- Primary toxin activity → damage the intestinal epithelium.
- May cause HUS.



- In the end PMN phagocytose and kill Shigella.
- Humans is the only reservoir for Shigella.
- Shigellosis is primarily a pediatric disease.
- Transmitted person to person by fecal-oral route.
- Symptoms: 1. abdominal cramps. 2. Diarrhea. 3. fever. 4. bloody stools.
- symptoms appear after 1 to 3 days.
- generally self-limited, although antibiotics are used to reduce the risk of secondary spread to family.

KLEBSIELLA

- Normal flora in nose, mouth and GI tract.
- Klebsiella pneumoniae
 - ↳ can cause community of hospital-acquired lobar pneumonia.
 - ↳ Also cause wound, soft-tissue infections and UTIs.
- A major factor in the spread of hospital-acquired infections.

PROTEUS

- P. mirabilis produces infections of urinary tract.
- P. mirabilis produces large quantities of urease.
- ↑ the urine pH, precipitating magnesium and calcium in the form of struvite and apatite crystals, and formation of renal (kidney) stones.
- ↑ alkalinity of the urine → toxic to uroepithelium.

YERSINIA

- Y. pestis → best-known human pathogen.
- All Yersinia infections are zoonotic → حيوانية.
- 2 forms of Y. pestis infections:
 1. Bubonic plague → rats.
 2. Septicemic plague → infections in squirrels, rabbits, field rats and cats.
- Bubonic plague caused by Y. pestis:
 - ↳ incubation period no more than 3 days.
 - ↳ high fever and painful bubo (swelling of the lymph nodes).
 - ↳ it develops rapidly without treatment.
 - ↳ 75% die.
 - ↳ person to person spread occurs by aerosols in case of pneumonic plague.
- 3 major pandemics that shaped history.

قال رسول الله صلى الله عليه وسلم: (الطوبى لشطر الإيمان، والحمد لله تملأ الميزان، وسبحان الله، والحمد لله تملأ ما بين السموات والأرض، والصلوة نور، والصدقة برهان، والمبرضياء، والقرآن حجة لك أو عليك، كل الناس يغدو، فبائع نفسه، فمعتقها، أو موبقها.)