URI-205

URINARY TRACT INFECTIONS (UTI) PART 2

Microbiology & Immunology Department

Objectives:

By the end of this lecture, you should be able to:

- ❑Know the characteristic features of the most common bacterial pathogens causing the UTI.
- ❑Identify the classification and diagnosis of glomerulonephritis.
- ❑Identify the cause, mode of infection and method of diagnosis of Leptospirosis (Weil's disease)

.

Characteristics of bacteria causing UTI

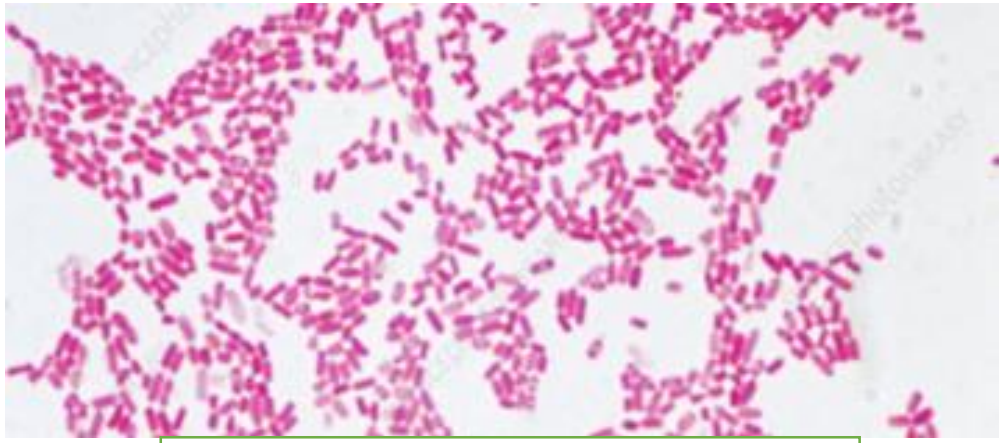
A. Gram negative bacilli

Escherichia coli:

- Gram-negative bacilli.
- Member of *Enterobacteriaceae:* Facultative anaerobic & Oxidase negative.
- Lactose fermenter: pink colonies on MacConkey's agar plate
- Colonies with metallic green sheen on EMB.

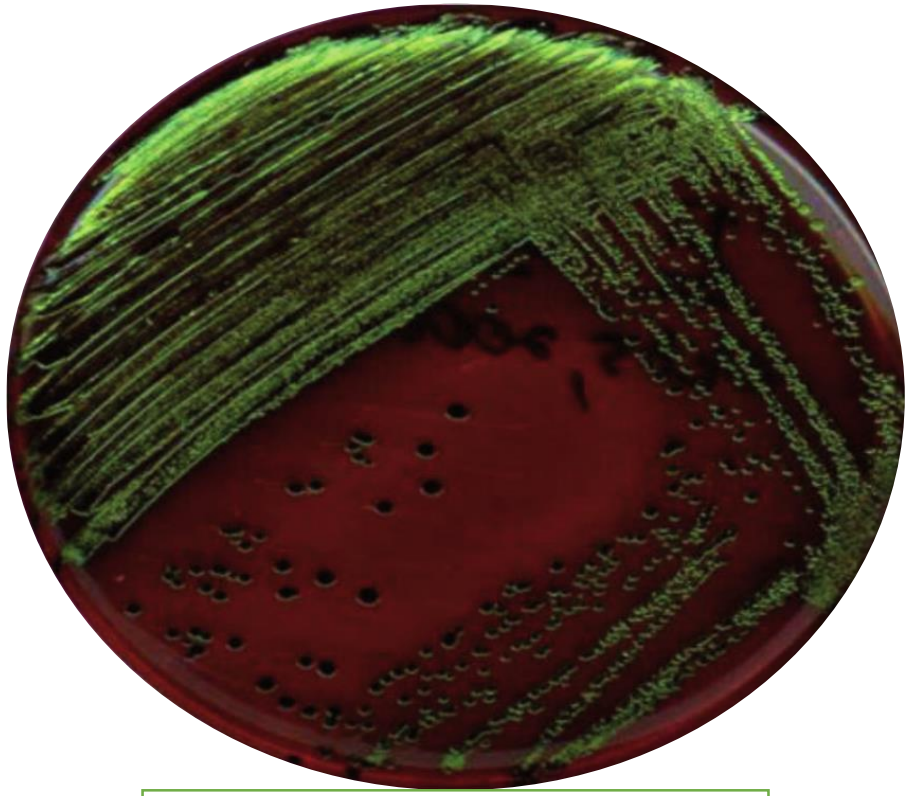
Virulence:

- Specific adhesion by fimbria, which is specific for cystitis.
- Capsular antigens and hemolysin.



Gram negative bacilli

MacConkey's agar plate



EMB agar plate

Proteus

- Gram-negative bacilli.
- Member of *Enterobacteriaceae:* Facultative anaerobic & Oxidase negative.
- Non-lactose fermenter: pale colonies on MacConkey's agar plate
- Highly motile: “swarming” motility on agar surface.
- Urease positive.

Pathogenesis:

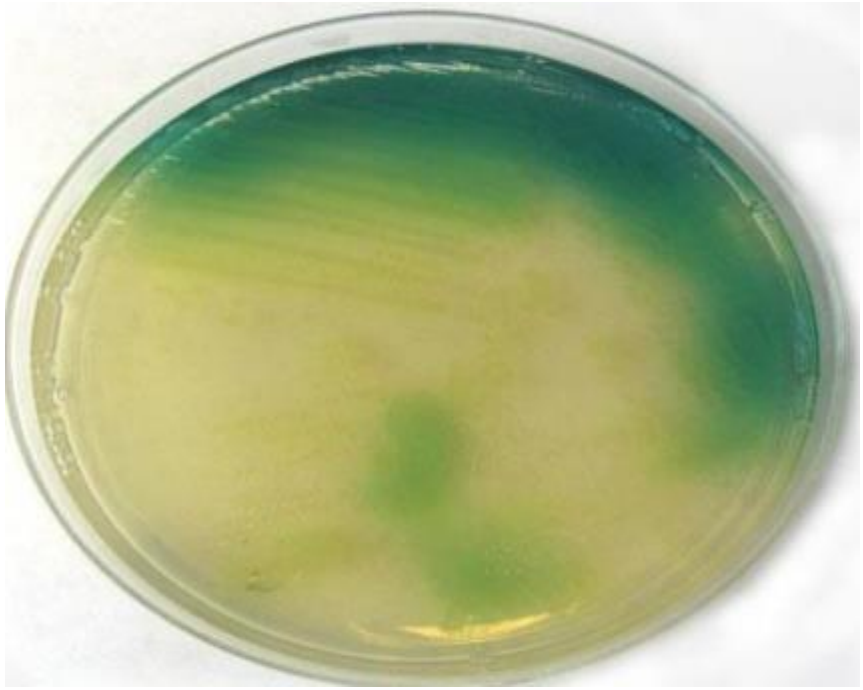
- Urease raises urine pH to cause kidney stones (staghorn renal calculi).
- Motility may aid entry into bladder.
- Endotoxin causes fever and shock when septicemia occurs

Swarming motility of *Proteus* on nutrient agar plate

Urease test

Pseudomonas aeruginosa:

- Oxidase-positive
- Gram-negative bacilli.
- Non lactose fermenter.
- Produces two pigments: pyocyanin (blue-green) and fluorescein
- Causes grape-like odor of urine.
- Able to form biofilm because it has a slime layer.
- Associated with nosocomial infection and urinary catheterization.



B. *Staphylococci*

- Gram-positive cocci in clusters.
- Catalase positive (streptococci are catalase negative).

Species of Medical Importance:

- *S. Aureus*
- *S. Epidermidis*
- *S. Saprophyticus*

Coagulase negative Staphylococci:

S. Epidermidis → Novobiocin sensitive

S. saprophyticus → Novobiocin resistant

Glomerulonephritis (GN)

- Glomerulonephritis (GN) are the most common cause of chronic kidney disease.
- Most GN occur as the result of an autoimmune (immune complex) disorder.
- the most well characterized mechanism of GN is post streptococcal glomerulonephritis (GN): Occur after *Streptococcus pyogenes* (throat and skin infection).

GN can be classified as follows:

- ❑Primary disease without systemic illness (e.g. IgA nephropathy)
- ❑Secondary disease due to systemic illness (e.g. post-infectious GN, diabetic nephropathy, lupus nephritis)

It may be further classified as follows:

1. **Nephritic "acute GN":** hematuria, RBC casts, edema, hypertension, and renal failure (e.g. post-infectious GN).
2. **Nephrotic:** heavy proteinuria, hyperlipidemia, edema, and hypertension (e.g. diabetic nephropathy).
3. **Rapidly progressive GN:** usually nephritic, accompanied by sub-acute renal failure (over 1-2 weeks).

Diagnosis:

I. Using clinical evaluation.

II. Urine analysis for proteinuria, hematuria and casts.

III. Serology e.g. ASOT.

IV. The definitive diagnosis is usually made by renal biopsy, especially when there is heavy proteinuria or renal insufficiency.

Leptospirosis (Weil's disease)

- Leptospirosis is a rare bacterial disease that is acquired by contact with the urine of rodents.
- It is caused by bacteria of the genus Leptospira.

Manifestations:

- Renal and liver failure
- Myositis

Diagnosis:

Serology with ELISA


THANK
YOU