Order: Pseudomonadales

. F: *Pseudomonadaceae*

G: Pseudomonas

Pseudomonaceae

It’s a family widely distributed in nature
- contains several genera like *Pseudomonace* and the important medical species is *P.aeruginosa* which present in soil, water and sometime colonizes human and is considered as a major human pathogen.

Pseudomonas aeruginosa

- It is motile bacterium rod shape, Gram-negative, measuring about 0.6 × 2 µm and occurs as single bacteria, in pairs and occasionally in short chain.
- **Growth and culturing characteristics:**
- 1- P. aeruginosa is an obligate aerobe that grows easily on many types of culturing media
- 2- producing specific odor like sweet or grap-like odor.
- 3- its form smooth, round colonies with fluorescent greenish color or non fluorescent bluish color (pyocyanine) which diffuse into the agar (characteristic feature). Other species produce dark red color pigment (pyorubin or black pigment which is pyomelanin.
- 4- some strains produce hemolysis on blood agar.
- 5- cultures from patients with cystic fibrosis produce P.aeruginosa with mucoid colonies as a results of overproduction of alginate (an exopolysaccharide)
- 6- its grows well at 37-40 C°, oxidase test positive, it does not ferment CHO, but many strains oxidize glucose

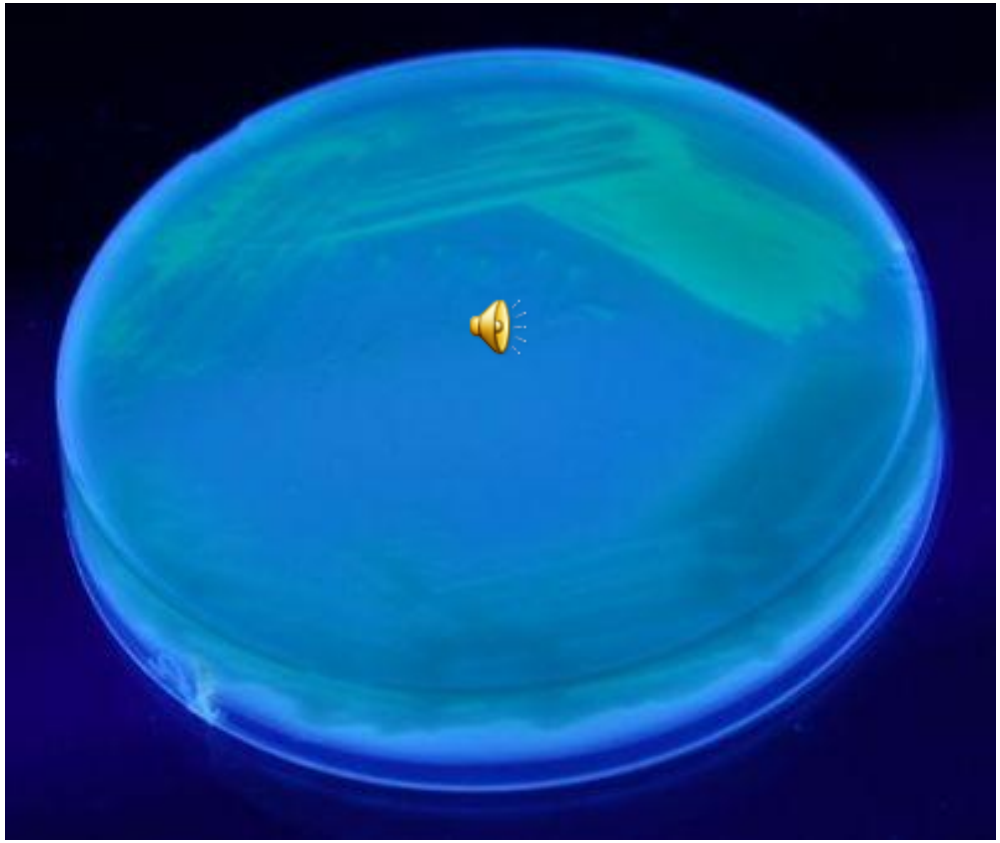
Gram-negative *P.aeruginosa*

Greenish pigment of *P.aeruginosa*

PIGMENT PRODUCTION

- Some strains produce diffusible pigments:
  - Pyocyanin (blue); fluorescein (yellow); pyorubin (red)
- *P. aeruginosa* produces characteristic grape-like odor and blue-green pus & colonies
- Broad antibiotic resistance

Flourescent isolates of *P.aeruginosa*



Classification of medically important Pseudomonads

rRNA\DNA group	Genus and species
• Fluorescent group	*P.aeruginosa*
•	*P. flurescens*
•	*P. putida*
• Non fluorescent gr.	*P. stutzeri*
•	*P. mendocine*

P. aeruginosa

Pathogenesis

Antigenic structure, enzymes, and toxins

Pili and nonpilus adhesins.

Capsule (alginate, glycocalyx): seen in cultures from patients with cystic fibrosis.

LPS- endotoxin, multiple immunotypes.

Pyocyanin: catalyzes production of toxic forms of oxygen that cause tissue damage. It also induces IL-8 production. Pyoverdin: a siderophore.

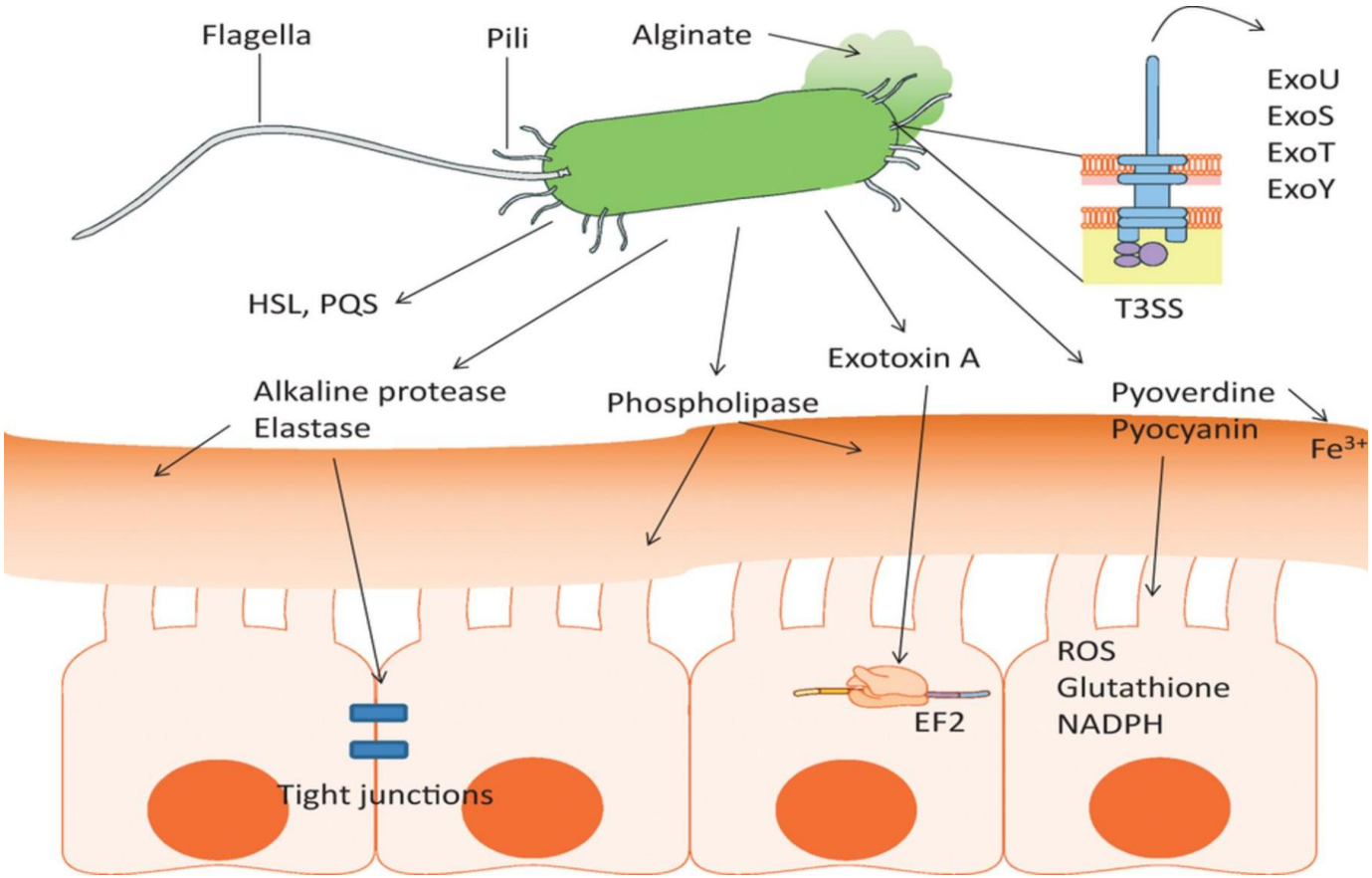
Proteases

- Serine protease, metalloprotease and alkaline protease cause tissue damage and help bacteria spread.

Phospholipase C: a hemolysin

Exotoxin A: causes tissue necrosis and is lethal for animals (disrupts protein synthesis); immunosuppressive.

Exoenzyme S and T: cytotoxic to host cells.


Flagella
Pili
Alginate
ExoU
ExoS
ExoT
ExoY
T3SS
HSL, PQS
Alkaline protease
Elastase
Phospholipase
Exotoxin A
Pyoverdine
Pyocyanin
Fe^{3+}
ROS
Glutathione
NADPH
EF2
Tight junctions

Pathogenesis

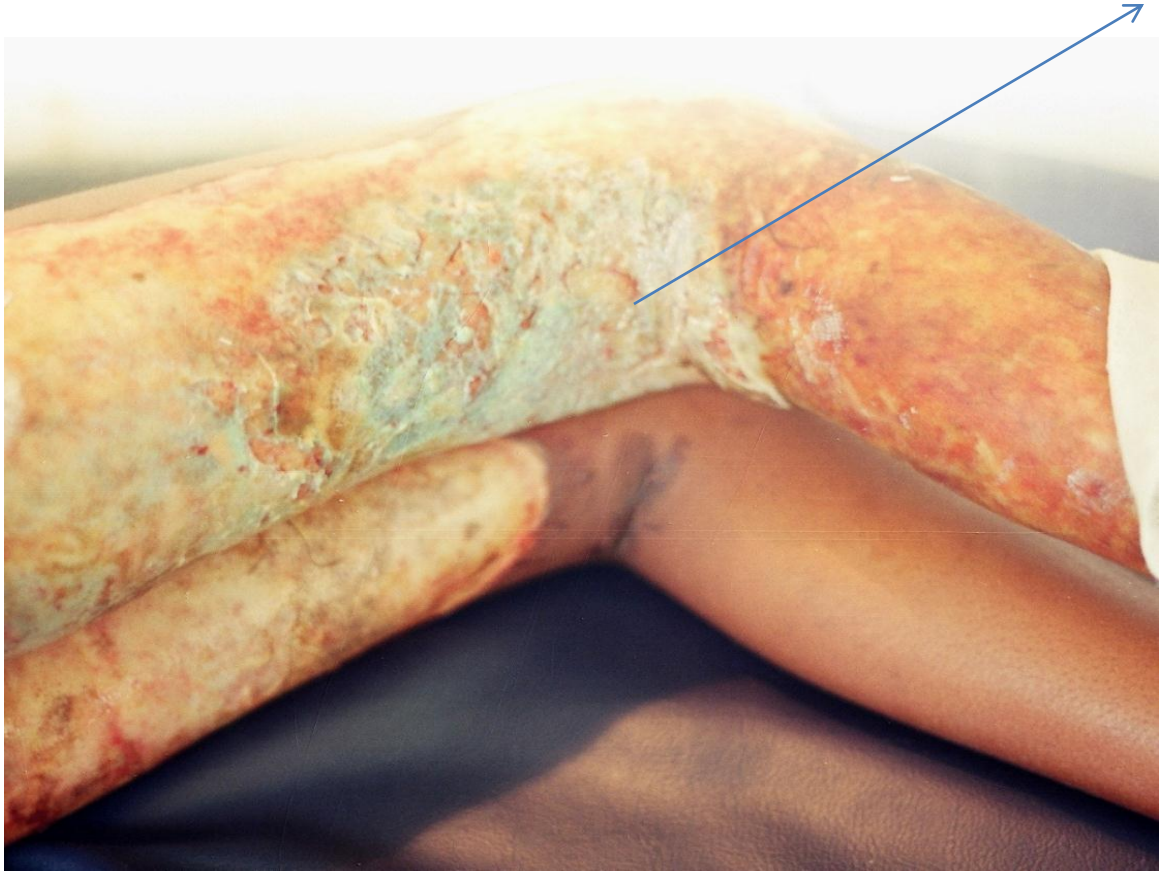
- 1-P.aeruginosa is pathogenic only when introduced areas devoid of normal defenses.
- 2-the bacterium attaches to and colonizes the m.m. or skin, invade locally, and produces systemic diseases like shock, septicemia and multiple organ dysfunction.
- 3- these processes are promoted by pili, enzymes and toxins.
- 4- these bacteria are considered as multi-drugs resistant.

Clinical signs

- 1- P.aeruginosa produces infection of wounds and giving rise to blue-green pus.
- 2- meningitis when introduced by lumbar puncture. Also causes UTI when introduced by urinary catheters, respiratory infection, mild otitis, infection the eye.
- 3- bacteria may invade the bloodstream and causes fatal sepsis, this condition occurs in patients with abnormal immune state (lymphoma, leukemia and patient with severe burn.

Burn case contaminated by *P.aeruginosa*

Green pus



Diagnosis

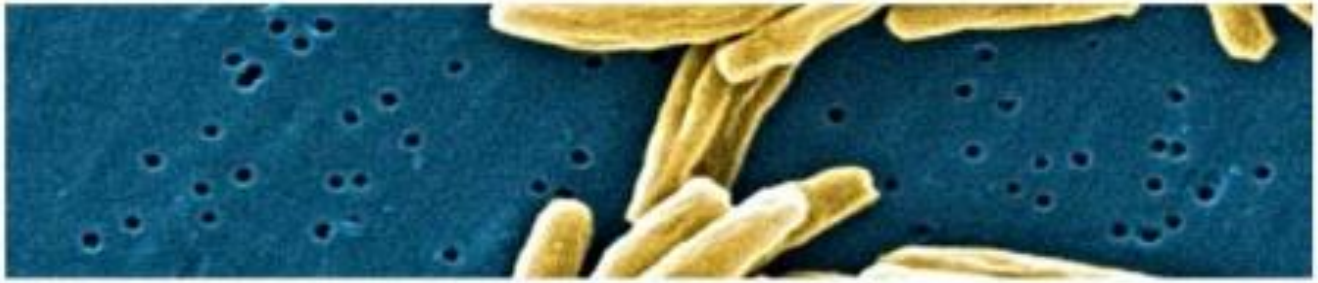
- 1- specimens from skin, pus, blood, spinal fluid, sputum are cultured on blood agar, differential media like macConkey agar.
- 2- production of specific odor and pigment on culturing media.
- 3- gram stain
- 4- biochemical reactions like culturing on TSI (alkaline/alkaline), IMVC (-,-,-,+), Oxidase test +
- 5- identification by API NE System.

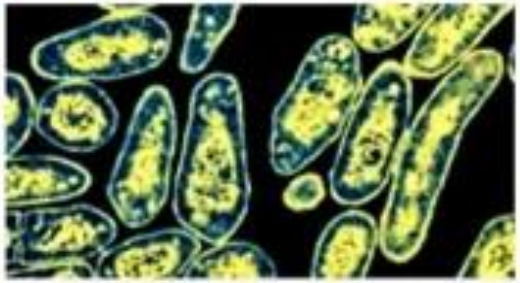
Treatment

- 1- Treatment of P. aeruginosa should be not occure by one antimicrobial agent due to the high rate of resistant pattern, therefor beta lactam drugs plus aminoglycoside usually useful in the treatment.

WHAT ANTIBIOTICS TO USE

- Aminoglycosides
- Gentamycin, Amikacin, Cephalosporins
- Cefotaxime. Ceftazidime. Ofloxacin,
- Piperacillin, ticarcillin
- Local application, colistin, polymyxin





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Thank you

for your attention !