



Microbiology/Infectious Diseases I

I. SKIN AND SOFT TISSUE INFECTION CASE STUDIES




CASE 1

- A 46 year old man developed pain and swelling in his right thigh. He initially thought he had pulled a muscle while coaching his son's wrestling team, so he took ibuprofen and applied ice to the area. However, the thigh became red, hot, indurated and tender over the next 24 hours. He called his doctor who sent him to the emergency room. Upon arrival his temperature was 104°F and he had difficulty moving the leg.

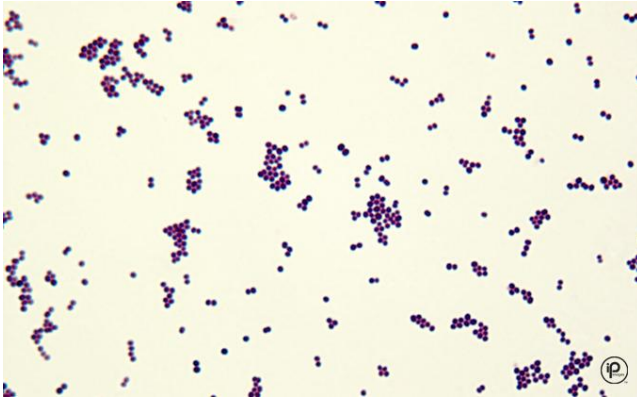


Early

Late

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- 1. What organism is most likely causing this infection?
 - 2. What are the major structural differences between Gram-positive and Gram-negative organisms?
 - 3. How was the infection introduced?
 - 4. Does this present any special antimicrobial resistance issues?

- A surgical consultation is obtained and the patient is taken to the operating room for incision and drainage. 200 ml of pus are removed. It is sent for gram's stain and culture.



gram positive cocci in clusters
eg. *Staphylococcus spp.*

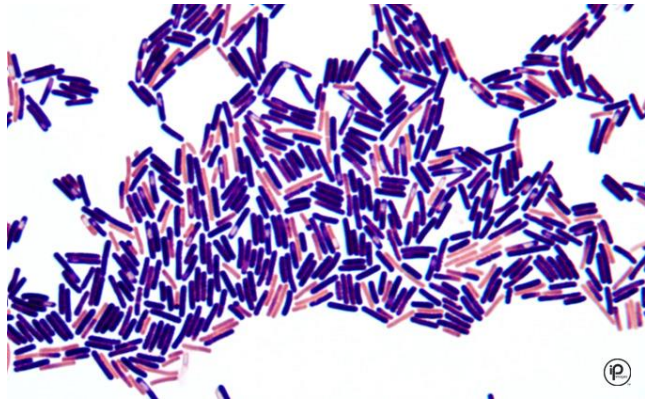


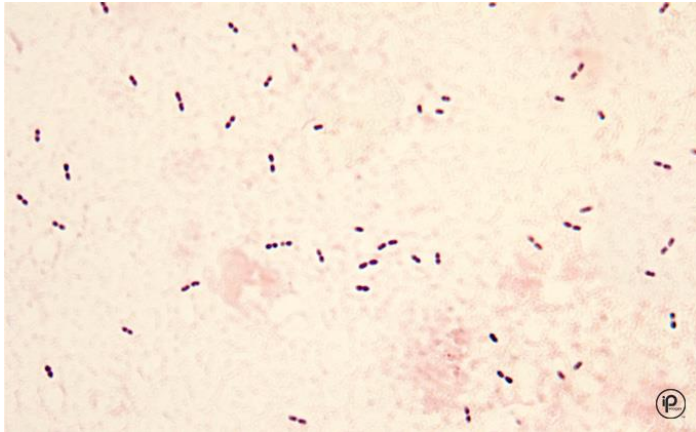
gram positive cocci in chains
eg. *Streptococcus spp.*



gram positive rods with spores

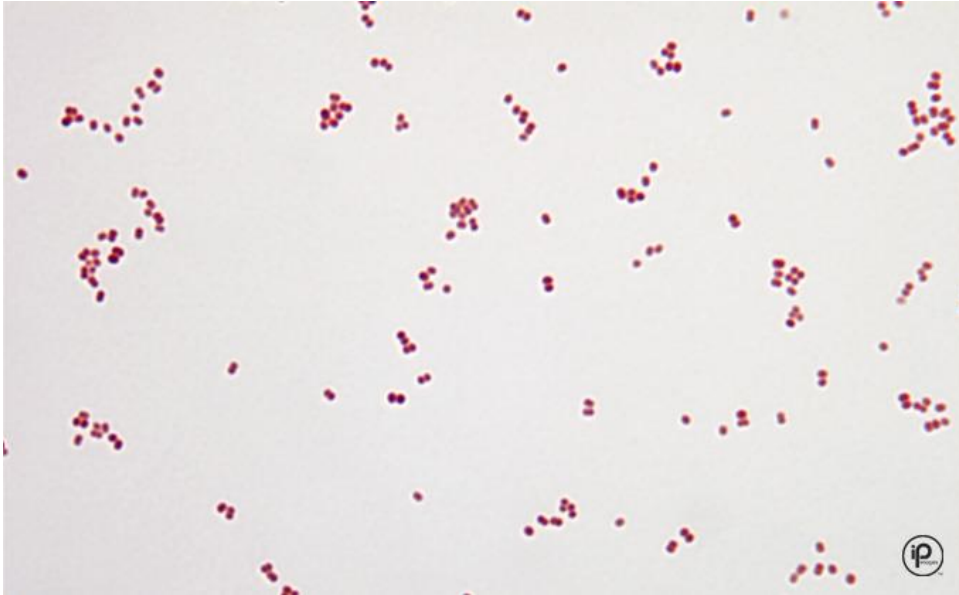
gram positive rods
without spores



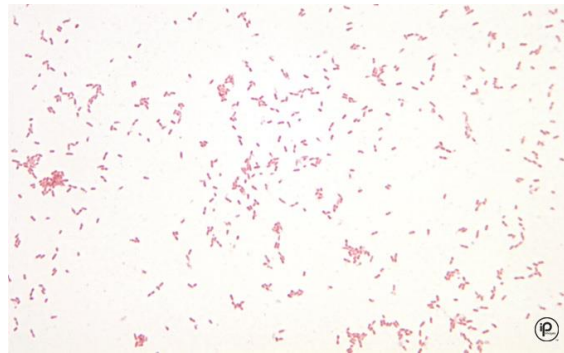
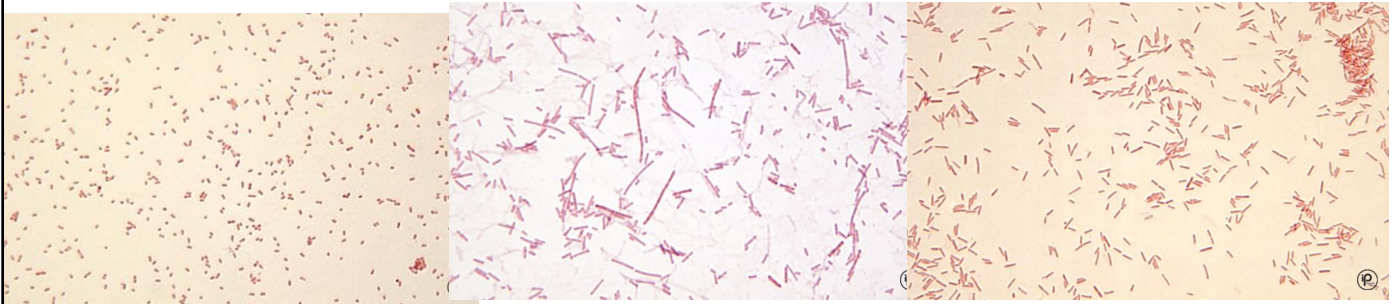


gram positive cocci in pairs
(diplococci)
eg. *Streptococcus pneumoniae*

gram-negative diplococci
Neisseria spp.



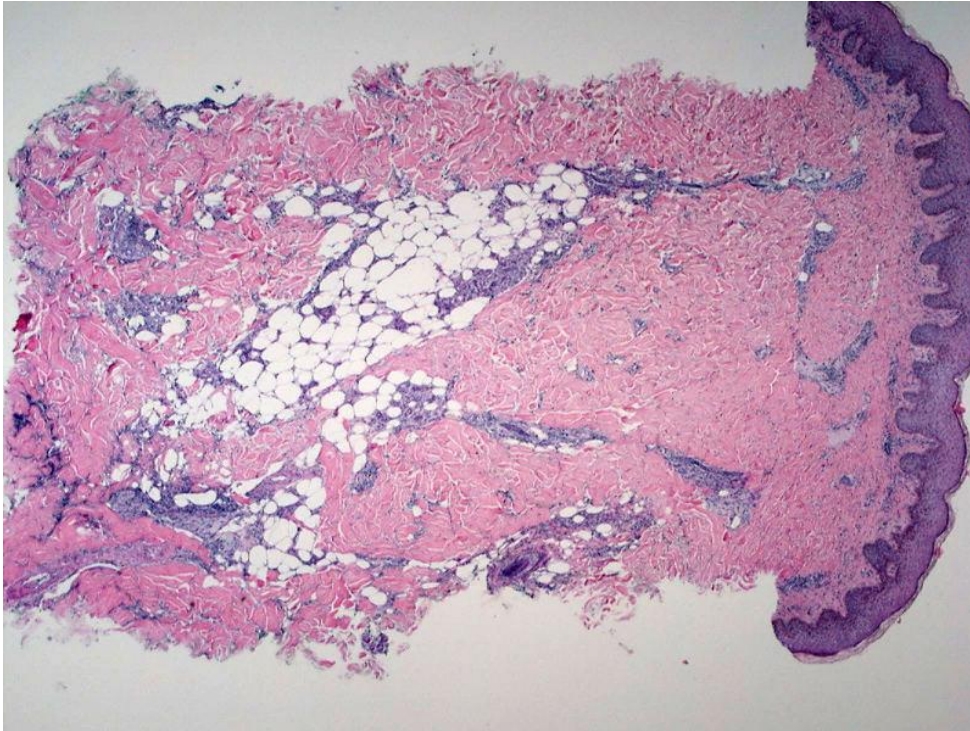
Gram-stain appearance of bacterial species
within the Family *Enterobacteraceae*- Note the variation from small cocco-bacilli to larger rods.
Bottom panel shows very small gram-negative rods suggestive of Haemophilus



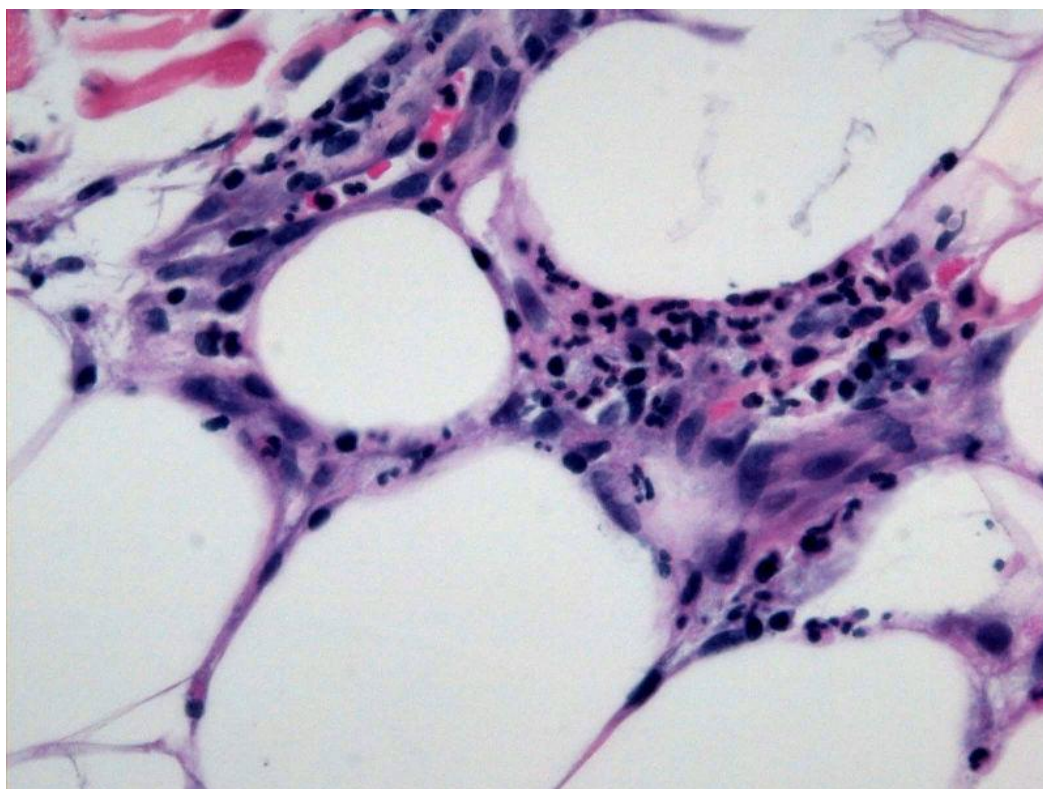
5. What type of inflammation is this? (Demonstrate contrasting histology)

Biopsy

Low Power

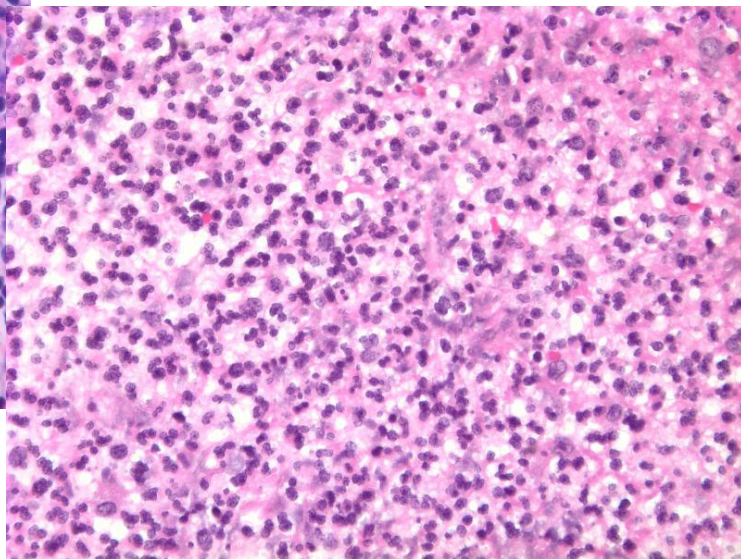
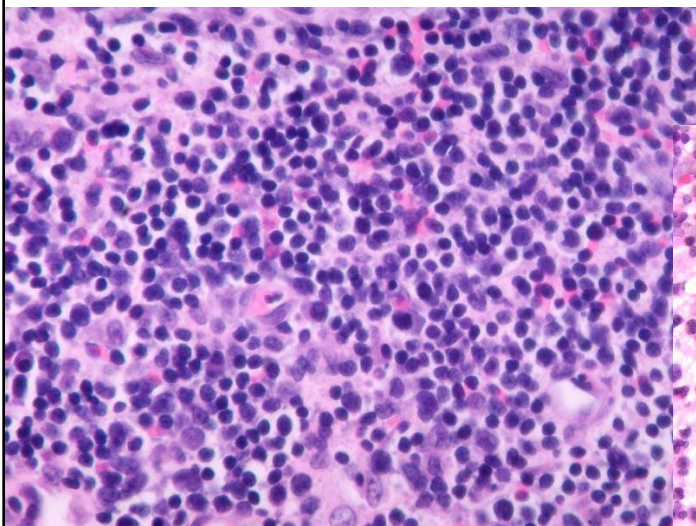


High Power

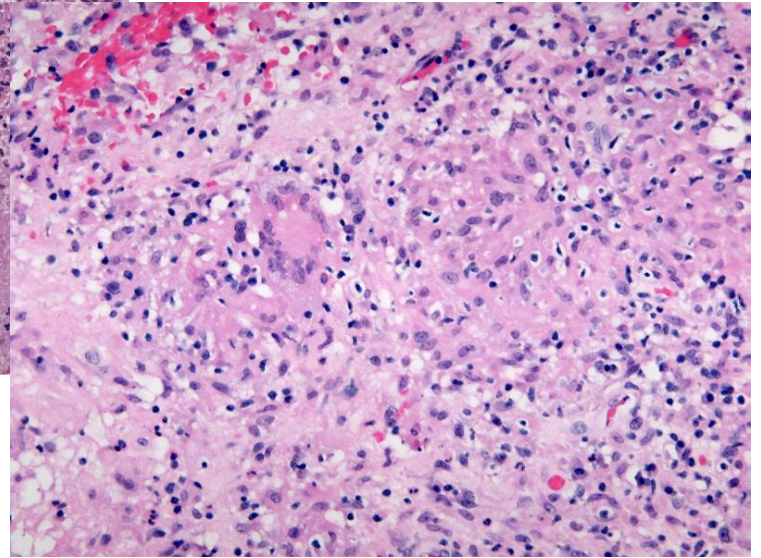
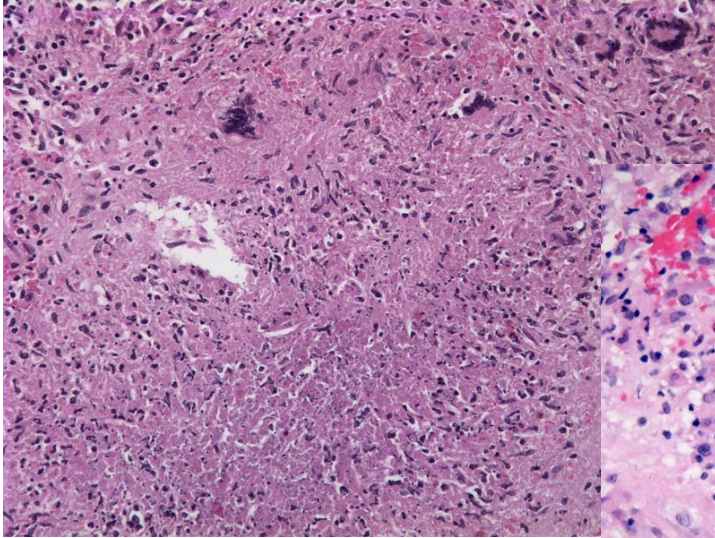


Chronic

Acute

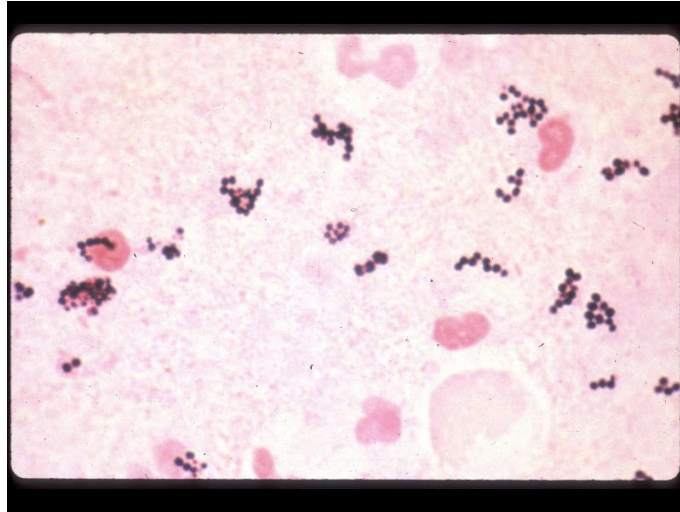


Granulomatous



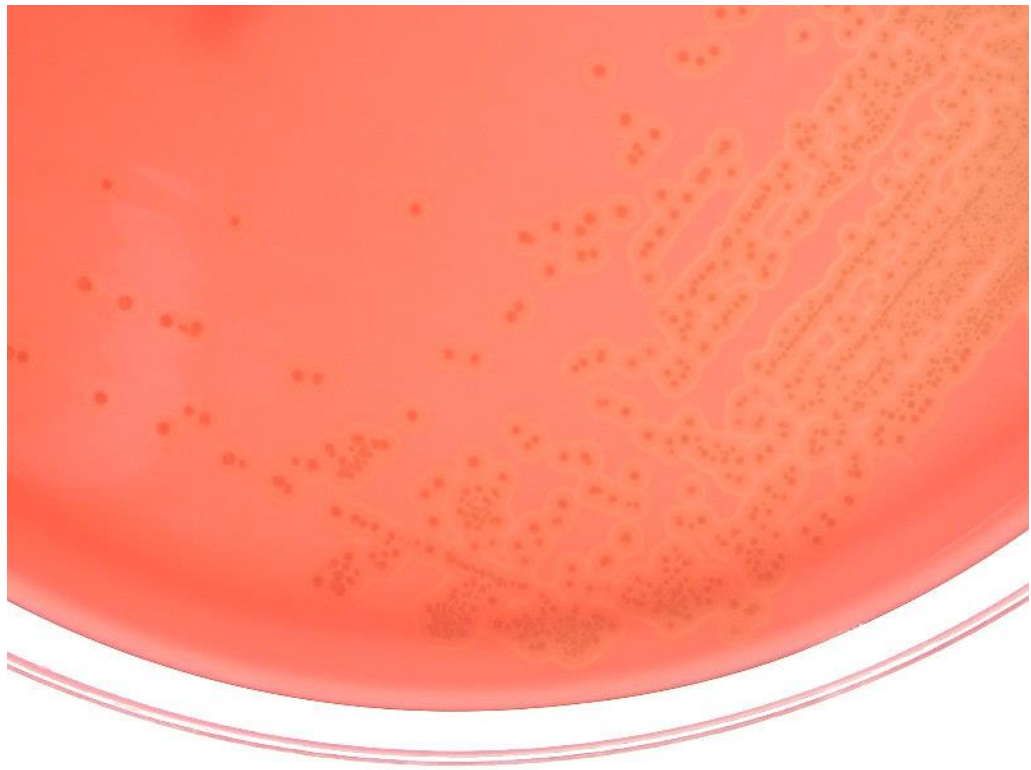
- 6. What is the most likely organism?

Gram Stain

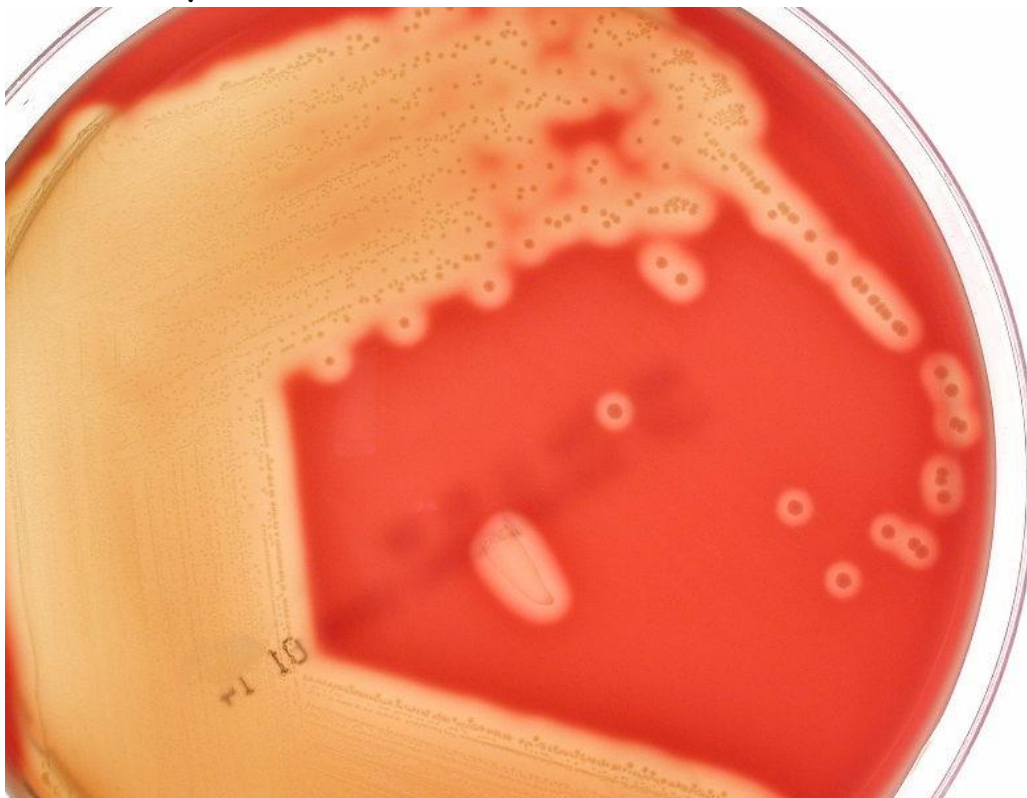


- 7. How will the clinical laboratory characterize and differentiate the organism?

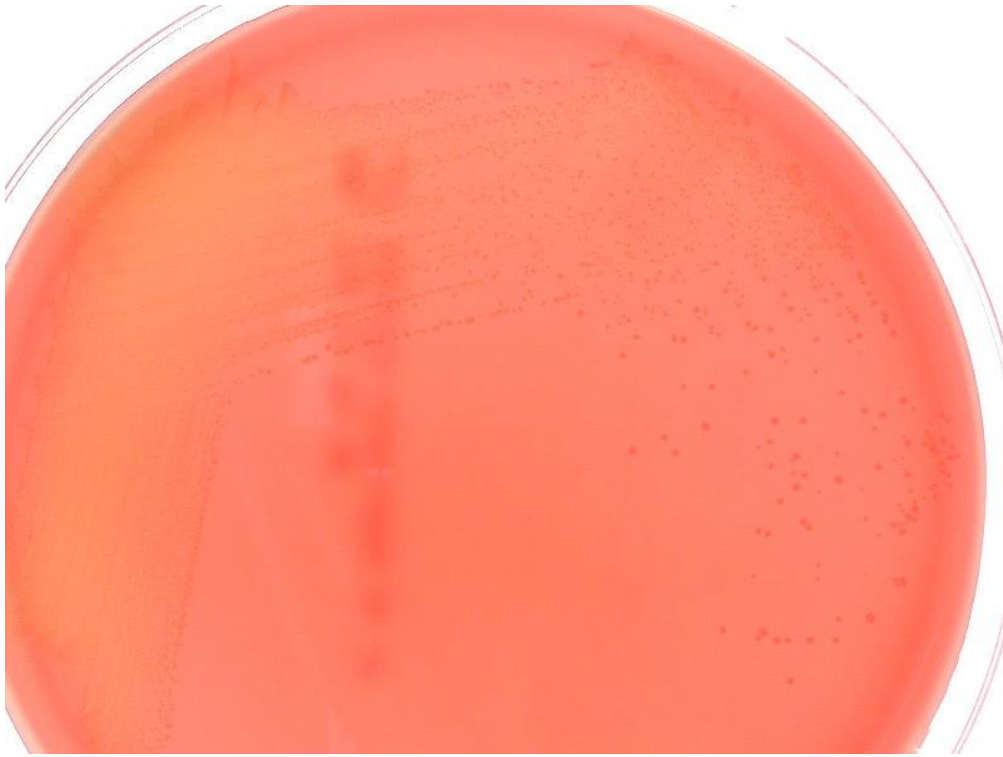
- Alpha Hemolysis



- Beta Hemolysis



- Gamma hemolysis



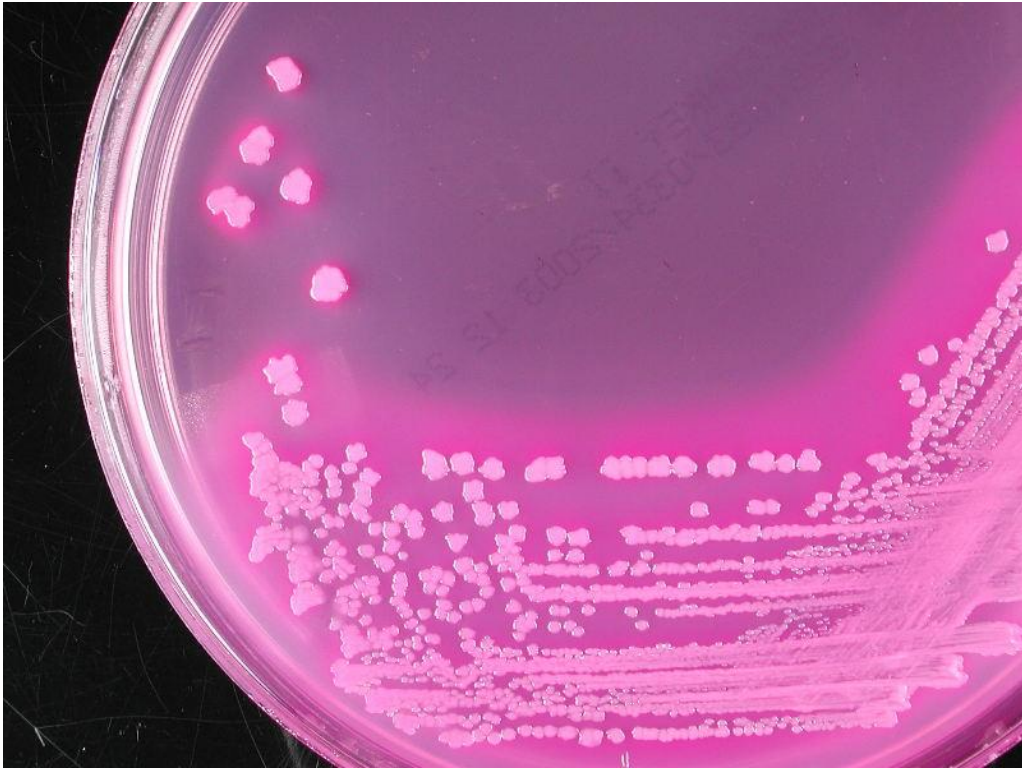
- E. coli on Blood Agar



- Pseudomonas on Blood Agar

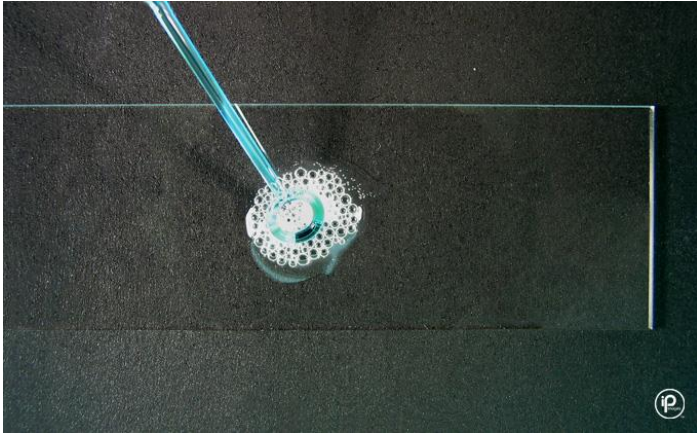


- E.coli on MacConkey Agar

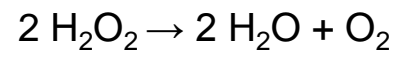


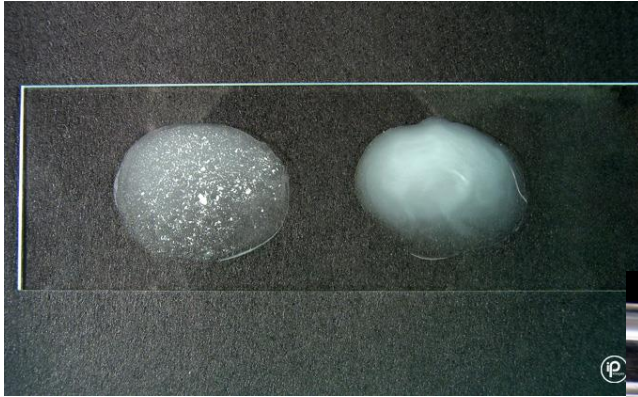
- *Pseudomonas* on MacConkey Agar



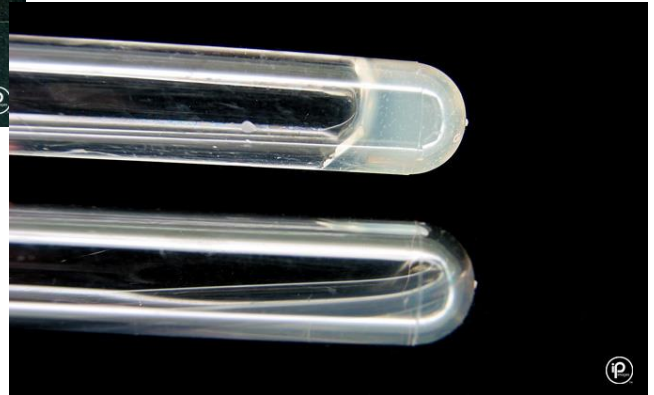


catalase test






coagulase slide test



coagulase tube test

- Coagulase binds plasma fibrinogen, causing the organisms to agglutinate or plasma to clot.
- Two different forms of coagulase can be produced, free and bound.
- Free coagulase is an extracellular enzyme produced when the organism is cultured in broth.
- Bound coagulase, also known as clumping factor, remains attached to the cell wall of the organism.
- The tube test can detect the presence of both bound and free coagulase.
- Isolates that do not produce clumping factor must be tested for the ability to produce extracellular coagulase (free coagulase).


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- The patient was initially treated with vancomycin pending susceptibilities, but his blood pressure dropped, his kidney function deteriorated and he developed a diffuse red rash and his skin began to peel.

 - 8. Is this an antibiotic failure?
 - 9. What is causing the progression of his disease?
 - 10. Final susceptibilities demonstrated that the organism was susceptible to oxacillin. What is the appropriate therapy at this time?

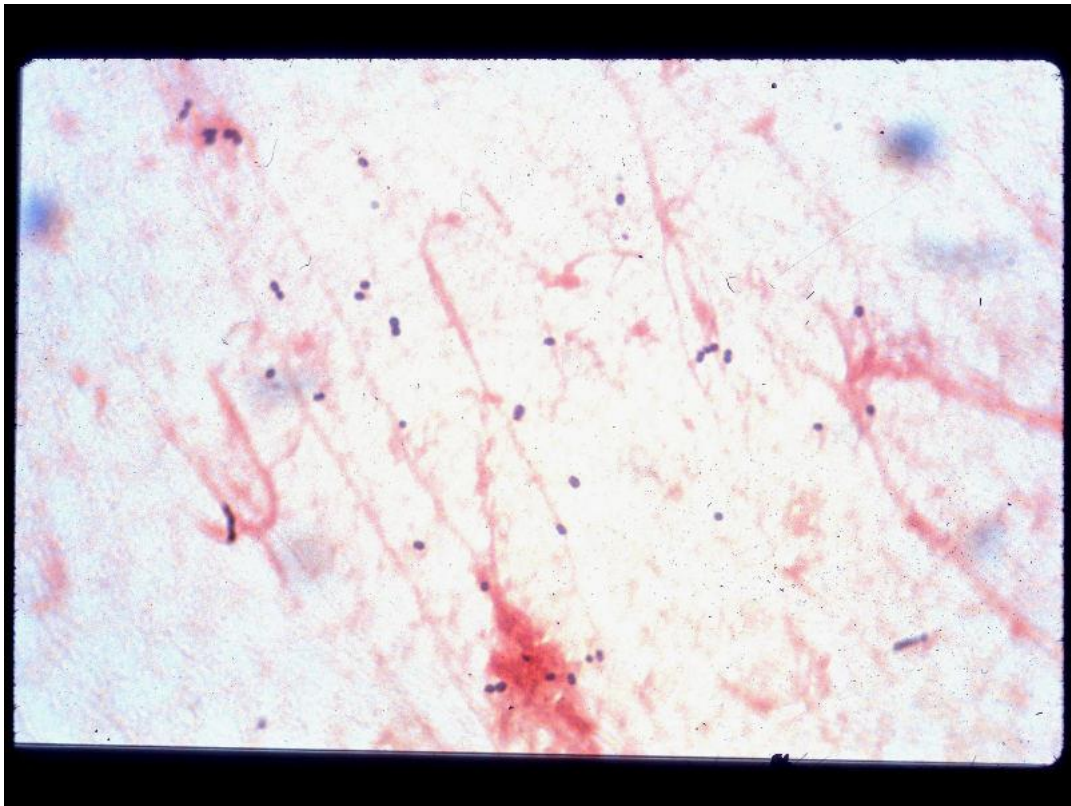
CASE 2


- A 60 year old woman with diabetes mellitus, poor blood flow to her legs and chronic leg ulcers went to her doctor because her leg became red and hot 3 days after she slipped on the ice and fell.



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- 1. Is this an infection?
 - 2. What can explain the character of the rash?
 - 3. How does this case differ from case I? What can explain the differences?

- A leading edge aspirate was performed and sent for Gram's stain and culture.



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- 4. What is the most likely organism to cause this infection? Where did it come from? Why did it cause an infection?
 - 5. How are these organisms classified?
 - 6. Why is it important to determine the species here?
 - 7. What is the most appropriate antibiotic?
 - 8. Could this antibiotic have been used in Case I?