

DIAGNOSTIC LABORATORY 1

Patient: Alison

DOB: 01/02/1995

SEX: F

****FINAL REPORT****

GRAM STAIN: gram-positive cocci

MSA PLATES: yellow colonies

CATALASE TEST: positive

COAGULASE TEST: positive

DESCRIPTION OF TESTS

GRAM STAIN: Gram staining is a technique of staining bacteria that allows visualization of morphology (cocci, rods, etc.) and characterization of the cell wall. Gram-positive bacteria have a thick layer of peptidoglycan that absorbs ample crystal violet dye and therefore appear purple (Figure 2). Gram-negative bacteria have a very thin peptidoglycan layer that is dissolved in the ethanol wash step and therefore do not absorb crystal violet. They do, however, absorb the counter stain (safranin), which makes them appear pink.

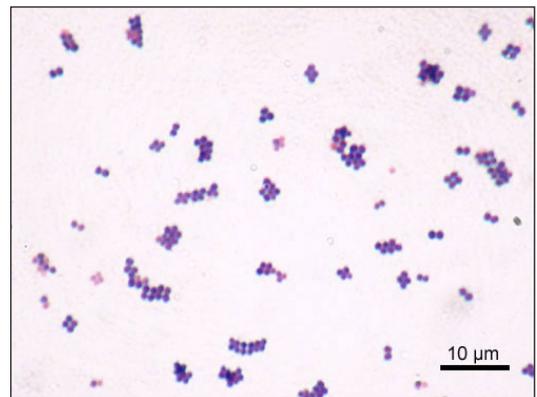


Figure 2. Gram stain showing gram-positive cocci under the microscope. Credit: Y Tambe, CC BY-SA 3.0, <<https://commons.wikimedia.org/w/index.php?curid=49534>>.

MANNITOL SALT AGAR (MSA) PLATES: MSA plates are growth plates that select for gram-positive bacteria and differentiate between mannitol fermenters and non-mannitol fermenters. If the bacteria ferment mannitol, the media to becomes acidic and the phenol red indicator turns yellow. (Figure 3)

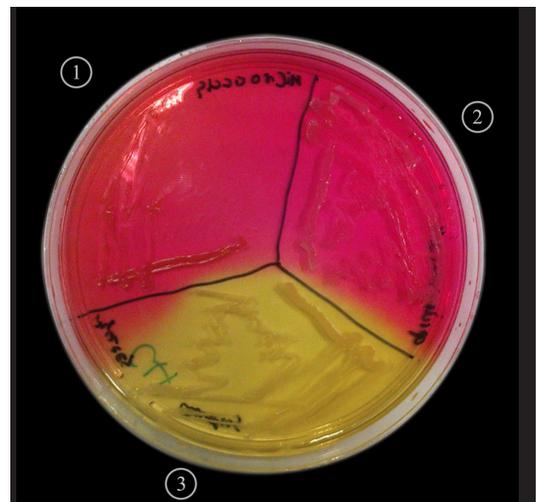


Figure 3. MSA plate with positive result (bottom section). Credit: Navaho, CC BY-SA 4.0, <<https://commons.wikimedia.org/wiki/File:Chapmanes.jpg>>.

DIAGNOSTIC LABORATORY 1 (cont.)

COAGULASE: Coagulase is an enzyme produced by certain bacteria that allows them to convert fibrinogen to fibrin (causing blood coagulation). To test for the presence of coagulase activity, a bacterial colony is added to a tube containing plasma, inoculated, and assessed for a fibrin clot. Presence of a clot indicates the bacterium is positive for coagulase. (Figure 4)



Figure 4. Positive coagulase test. Credit: Philippinjl, CC BY-SA 3.0, <<https://commons.wikimedia.org/w/index.php?curid=1968795>>.

CATALASE: Catalase is an enzyme used by bacteria to protect from oxidative damage caused by reactive oxygen species. If a bacterium produces catalase, when that bacterium is added to hydrogen peroxide on a microscope slide, bubbles form. (Figure 5)



Figure 5. Positive catalase test. Credit: CC BY-SA 3.0, <<https://commons.wikimedia.org/w/index.php?curid=1686190>>.

<i>Bacterium</i>	<i>Morphology</i>	<i>Mannitol</i>	<i>Coagulase</i>	<i>Catalase</i>
<i>Staphylococcus epidermidis</i>	Gram + cocci	Negative	Negative	Positive
<i>Staphylococcus aureus</i>	Gram + cocci	Positive	Positive	Positive
<i>Escherichia coli</i>	Gram – rod	Positive or Negative	Negative	Positive
<i>Bacillus cereus</i>	Gram + rod	Negative	Negative	Positive