

## 2. GENUS STREPTOCOCCUS - MEDICAL RELEVANT BACTERIA

Genus	Streptococcus				
Hemolysis Classification	<b>Alpha-Hemolysis</b>			<b>Beta-Hemolysis (Further divided)</b>	
Species	<i>Streptococcus pneumoniae</i> (pneumococcus)	<b>Viridian Streptococcus</b> (catch all term for oral strep. Flora) <b><u>Some non-hemolysis</u></b>	<i>Enterococcus</i> - renamed genus from Group D <i>Streptococcus-enterococcal</i> <b><u>(little alpha to non hemolysis)</u></b>	GROUP A	GROUP B
				<i>Streptococcus pyogenes</i>	<i>Streptococcus agalactiae</i>
Distinguishing Features	<b>1. <u>Optochin Test:</u></b> - Yes inhibition <b>2. <u>Bile solubility</u></b> - Bile soluble	<b>1. <u>Optochin Test:</u></b> - No inhibition	<b>1. <u>Bile Esculin (+)</u></b> <b>2. <u>6.5% NaCl (+)</u></b> <b>3. <u>Pyrase Positive</u></b>	<b>1. <u>Bacitracin Sensitive:</u></b> - Sensitive-Inhibition <b>2. <u>Pyrase Positive</u></b>	<b>1. <u>Bacitracin Resistant:</u></b> - Resistant-No-Inhibition <b>2. <u>Hippurate Positive:</u></b> - Purple (+)
Transmission and Inhabitant	<b>1. <u>Throat and oral flora + Upp. Resp. Tract flora. Pneumococcus (30% healthy adult carry as throat flora)</u></b>		<b>1. <u>Intestine flora</u></b>	<b>1. <u>Oral flora + Upp. Resp. Tract flora</u></b>	
Diseases caused	<b>1. <u>Bacterial Pneumonia</u></b> (leading cause in adults) Underlying <b>complications</b> such as <b>Chronic diseases</b> or <b>viral respiratory infection</b> play a development of pneumonia since 10-30% healthy people carry <i>S.pneumoniae</i> as part of throat flora		<b>1. <u>Urinary Tract Infection</u></b>	<b>1. <u>Pharyngitis (strep throat)</u></b> <b>2. <u>Wound infection</u></b> <b>3. <u>pneumonia</u></b> <b>4. <u>bacteremia/septicemia</u></b> <b>5. <u>meningitis</u></b> <b>For Toxin producing strains:</b> - <b><u>scarlet fever</u></b> - <b><u>streptococcal toxic-shock</u></b>	<b>(Particular in Newborns)</b> <b>1. Pneumonia</b> <b>2. Sepsis</b> <b>3. Meningitis</b>

<p>Clinical Specimen and Laboratory Identification</p>	<p>1. Fresh clinical specimen may be encapsulated</p>			<p><b><u>Anaerobic incubation</u></b>  (Hemolysis more clearly demonstrated with anaerobic incubation);  - to reliable observe B-hemolysis  <b><u>Hemolysis caused by 2 enzymes:</u></b>  - Streptolysin O (O2 labile) – All  - Streptolysin S (<b><u>O2 Stable</u></b>) - 0.85</p>	<p>1.</p>
<p>Morphology</p>	<p><b><u>Common in Genus:</u></b></p> <ol style="list-style-type: none"> <li><b><u>Gram Positive Cocci</u></b></li> <li><b><u>Cells tend to form chains of variable length including(diplococci)</u></b></li> <li><b><u>No flagella</u></b></li> <li><b><u>None-spore forming</u></b></li> <li><b><u>Generally form small colonies compared to Staph.</u></b></li> </ol>				
<p>Metabolic Properties and Growth Condition</p>	<p><b><u>BA Morphology:</u></b></p> <ol style="list-style-type: none"> <li>GAS → White</li> <li>GBS → Creamy slight Orange (ana or aero same orange pigment)</li> <li>Enterococcus → Greyish colony sometimes can be non-greyish too!</li> <li>Viridian Strep → usually very tiny</li> <li>Pneumococcus → Mucoid may have capsule in fresh clinical specimen, have autolytic enzymes.</li> </ol> <p><b><u>Mac:</u></b></p> <ol style="list-style-type: none"> <li>Enterococcus (only he can grow) → pink indicate it ferment lactose.</li> <li></li> </ol>				
	<p>1. Enterococcus: Can grow in bile- containing media (MacConkey) ara w/o crystal violet. (Except some strain of GBS , Streptococcus that are not intestinal flora can't grow on Mac due to bile, but Staph can grow on Mac) Once Add CV, GP+ bacteria, Enterococcus, strep, staph will be inhibited coz that are G+. Even Enterococcus, intestinal origin also inhibited coz its G+.</p> <p>2. <b><u>Streptococcus are obligate fermenters (aerotolerant fermenter)</u></b></p>				

OTHERS			<p><b>Group D Strep:</b>  -Enterococcal – 2 spp go to genus <b>Enterococcus</b>  <b>6.5%(+) , NaCl +</b>  - <b>Non-enterococcal</b>  <b>6.5%(-), NaCl +</b></p> <p><b>Important coz susceptible to diff. Antibiotics.</b></p>		
	<p><b><u>Others:</u></b></p> <p>→ <b><u>Growth Condition:</u></b></p> <ul style="list-style-type: none"> <li>- BA Plate (35C Increase CO2)</li> <li>- MacConkey (35C)</li> </ul> <p>→ <b><u>Streptococcus comprise dominant oral flora and upp resp tract flora</u></b></p> <p>→ <b><u>They grow as GPC (in chains) can be spherical to rod shaped.</u></b></p> <p>→ <b><u>Taxo A – Bacitracin, Taxo P – Optochin test</u></b></p>				