

UNDER THE MICROSCOPE: *STREPTOCOCCUS*

- Gram positive cocci, opportunistic flora in humans
- Facultative anaerobes that grows in chains (strepto)
- Sensitive to penicillin and catalase negative

Classification of species is very dependent on hemolytic (blood cell lysing) enzymes:

Alpha hemolytic Strep	Reservoir	Potential Diseases	Comments
<i>Streptococcus mutans</i> (and other "viridan" species)	Oral cavity	*Metabolize glucose in the mouth to form plaque that leads to caries *If it gets in the bloodstream, metabolizes glucose to form plaque that sticks to heart valves and blood vessel walls	Associated with sugary diet and high blood sugar (diabetics have higher cardiovascular disease)
<i>Streptococcus pneumoniae</i>	Nasopharynx	Pneumonia, sinusitis, otitis media	PCV13 and similar vaccinations are made against the cell wall of this bacteria—but there are many, many strains

Beta hemolytic Strep	Lancefield Group	Reservoir	Potential Diseases	Comments
<i>Streptococcus pyogenes</i>	Group A Strep (GAS)	Human pathogen	Strep throat; necrotizing fasciitis	Rapid strep test is a way to confirm
<i>Streptococcus agalactiae</i>	Group B Strep (GBS)	GI tract; reproductive tract for some women	Pneumonia or meningitis leading septicemia in newborns	Women Group B+ may be given antibiotics during delivery

Streptococcus pyogenes: Mechanism of Disease

- **Capsule:** hyaluronic acid capsule resembles our connective tissue and helps avoid phagocytosis
- **Cell Wall:** lipoteichoic acids may trigger cytokine storm; M protein helps adhere and avoid phagocytosis and block complement.
- **Exotoxins:**
 - **Pyrogenic (AKA erythrogenic) exotoxins** damage RBCs; these toxins are superantigens that trigger a cytokine storm by stimulating T cells directly (no antigen-presentation needed) via MHC class II receptors. These erythrogenic toxins cause **scarlet fever** and toxic shock syndrome.
 - **Invasins** include streptolysins, streptokinases, and hyaluronidase, all of which allow the bacteria to rapidly invade connective tissue
- **Type II hypersensitivity:** Antibodies produced by the host to M protein may cross-react with joints, heart valves, and/or kidneys. This results in Rheumatic Fever, Rheumatic Heart Disease, or glomerulonephritis.