




STREPTOCOCCAL INFECTIONS

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- *Streptococci*
 - a Gram-positive, nonmotile, nonsporeforming coccus that occurs in chains or in pairs of cells.
 - Individual cells are round-to-ovoid cocci, 0.6-1.0 micrometer in diameter

Streptococcus - taxonomy and properties

- according to serological groups sc. Lancefield A-H, K-V, not all streptococci have this group specific antigen of cell wall
- A *S. pyogenes* *bacitracin* beta hemolysis
- B *S. agalactiae* *CAMP* beta hemolysis
- C *S. anginosus* beta, alfa
- D *S. bovis* alfa, gama
- *S. pneumoniae* *optochin +* alfa
- *S. salivarius* *optochin -* alfa

Streptococcus - taxonomy and properties

- according to haemolysis on blood agar : alfa - incomplete, beta - complete, gama - without haemolysis

α -hemolytic

green,
partial hemolysis

β -hemolytic

clear,
complete hemolysis


γ -hemolytic

no hemolysis

Practical no.2 - winter term-

Streptococcal infections

- Diagnostical model - tonsillitis, febris rheumatica, streptococcal pneumonia
- Microscopy of bouillon culture of *Str. pneumoniae* and haemolytic streptococcus
- Cultivation on blood agar - *Str. pyogenes*, *Str. pneumoniae*, *Str. salivarius*
- Groupe determination - bacitracin, CAMP and optochine test
- Late sequelae of streptococcal infections - ASLO, CRP
- ATB susceptibility testing *Str. pyogenes*, *Str. salivarius*, *Str. pneumoniae*

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- Streptococcal sore throat and a strep rash are bacterial infections often indicated by
 - Fever
 - Inflamed Pharynx Throat
 - Large Tonsils With Pus
 - Sore Throat
 - Tender Nodes In Neck

Bacterial

Come to the Health Center

Swollen uvula

Whitish spots

Red swollen tonsils

Throat redness

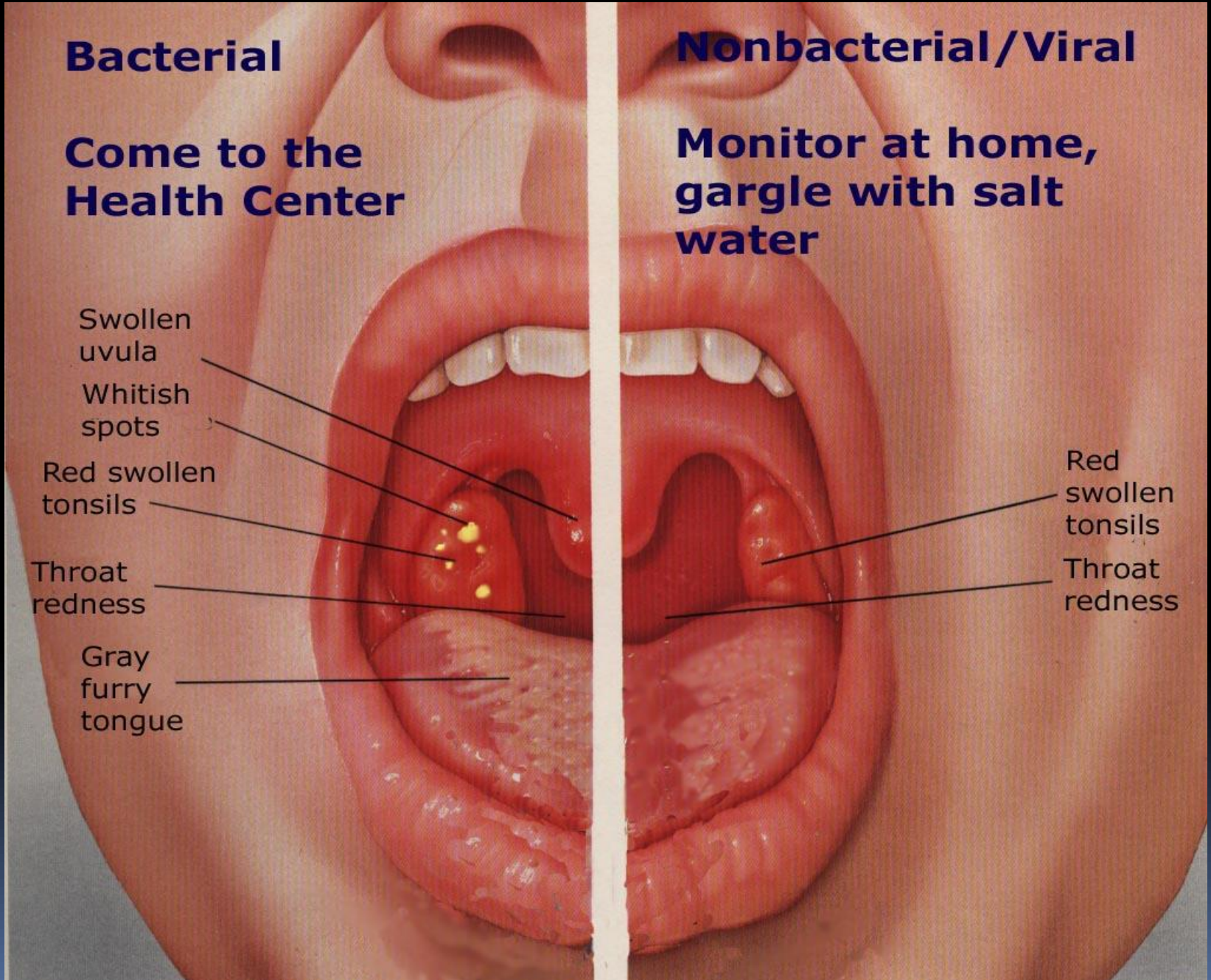
Gray furry tongue


Nonbacterial/Viral

Monitor at home, gargle with salt water

Red swollen tonsils

Throat redness





Streptococcus agalactiae

(β -hemolytic, Group B)


- **Early-onset neonatal disease:** within 7 days of birth, infected newborns develop signs and symptoms of pneumonia, meningitis, and sepsis
- **Late-onset neonatal disease:** more than 1 week after birth, neonates develop signs and symptoms of bacteremia with meningitis
- **Infections in pregnant women:** most often present as postpartum endometritis, wound infections, and urinary tract infections; bacteremia and disseminated complications may occur
- **Infections in other adult patients:** most common diseases include bacteremia, pneumonia, bone and joint infections, and skin and soft-tissue infections

Viridans Streptococci

- **Abscess formation in deep tissues:** associated with *S. anginosus* group
- **Septicemia in neutropenic patients:** associated with *S. mitis* group
- **Subacute endocarditis:** associated with *S. mitis* and *S. salivarius* groups
- **Dental caries:** associated with *S. mutans* group
- **Malignancies of gastrointestinal tract:** associated with *S. bovis* group (*S. gallolyticus* subsp. *gallolyticus*)
- **Meningitis:** associated with *S. gallolyticus* subsp. *pasteurianus*, *S. suis*, and *S. mitis* group



Streptococcus pneumoniae

- **Pneumonia:** acute onset with severe chills and sustained fever; productive cough with blood-tinged sputum; lobar consolidation
 - **Meningitis:** severe infection involving the meninges, with headache, fever, and sepsis; high mortality and severe neurologic deficits in survivors
 - **Bacteremia:** more common in patients with meningitis than with pneumonia, otitis, media, or sinusitis; overwhelming sepsis in asplenic patients
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Diagnostical model

- Pharyngitis
- Febris reumatica
- Streptococcal pneumonia

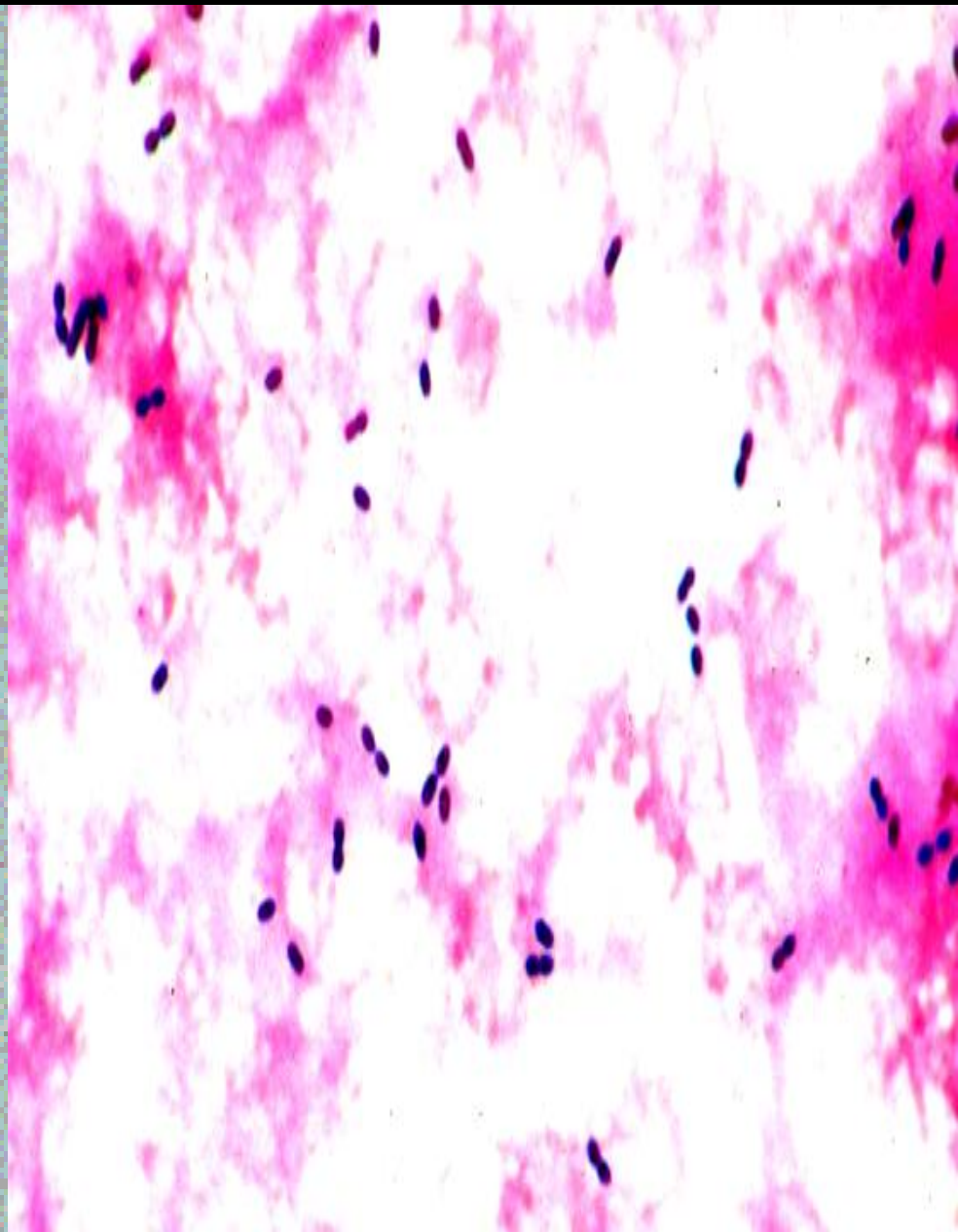
- Sample collection - swab of tonsils, blood, sputum

Streptococcal infections

- Streptococcus pyogenes HSA- pharyngitis, scarlat fever, toxic shock syndrom, erysipelas, pyodermia, -
rheumatic fever, glomerulonephritis
- Streptococcus agalactiae HSB - newborne infections (meningitis, pneumonia), postpartum sepsis
- Streptococcus salivarius, viridans - bacteriaemia, endokarditis, dental caries
- Streptococcus pneumoniae
 - pneumonia, meningitis, bakteraemia - encapsulated strains,
 - sinusiis, otitis media - nonencapsulated strains

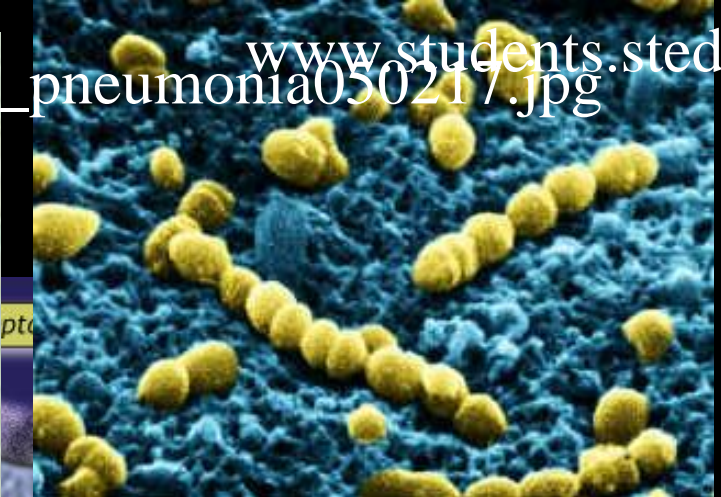
Microscopy and Gram staining

- Buillon culture of *Streptococcus pneumoniae* and *Streptococcus pyogenes*
- Gram staining: Violet, Lugol, Aceton, Karbolfuchsin
- Micro picture G+ cocci
- *Str. pneumoniae* - diplococcus, lancet shape, capsule
- *Streptococcus pyogenes* - coccus, chains



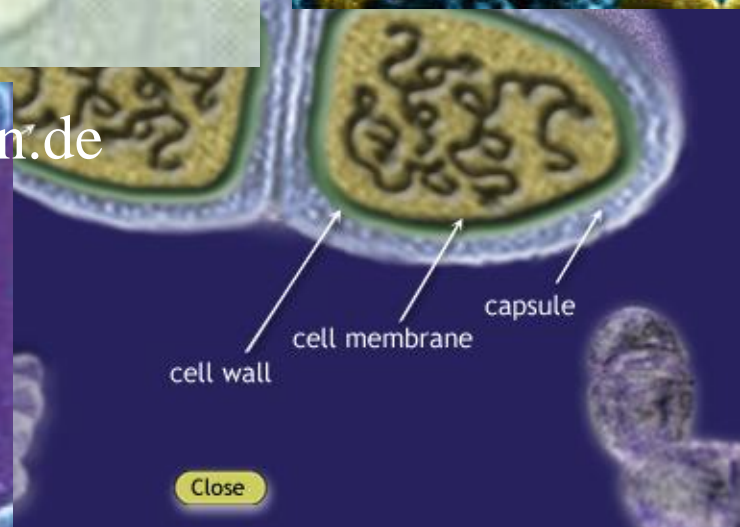
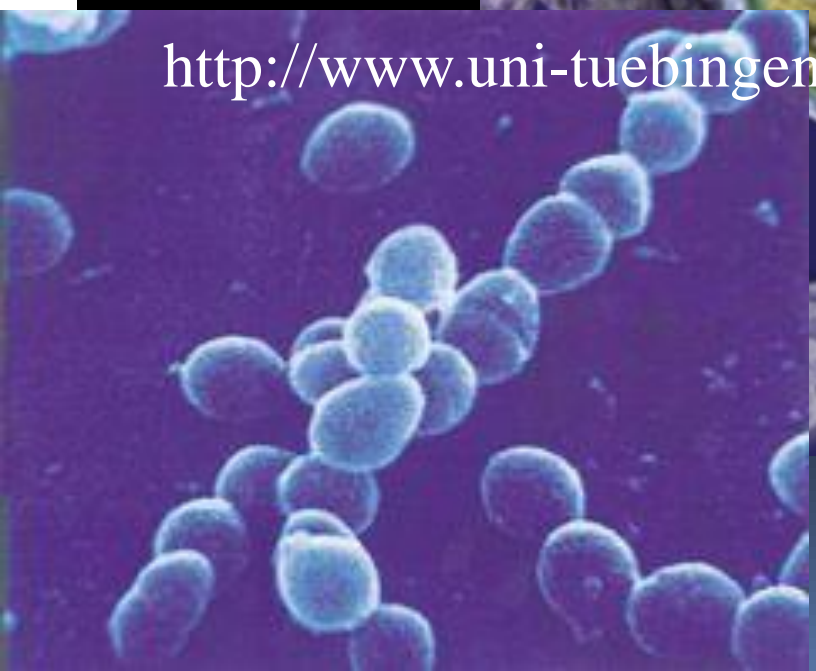
Streptococcus pneumoniae

http://www.cbc.ca/gfx/pix/streptococcus_pneumonia050217.jpg



www.students.stedwards.edu

<http://www.uni-tuebingen.de>



<http://www.uni-tuebingen.de>

Cultivation on blood agar

- Alfa hemolysis – viridation /green
- Beta hemolysis - clear, transparent
- *Streptococcus pyogenes* - beta hemolysis
- *Streptococcus agalactiae* – beta hemolysis
- *Streptococcus pneumoniae* - viridation, mucouse - capsule, concave
- *Streptococcus salivarius, viridans* - viridation

Groupe determination - dif. dg

- Alfa hemolysis - viridation-

- *S. pneumoniae* *S. salivarius:*
optochine test

- Beta haemolysis:

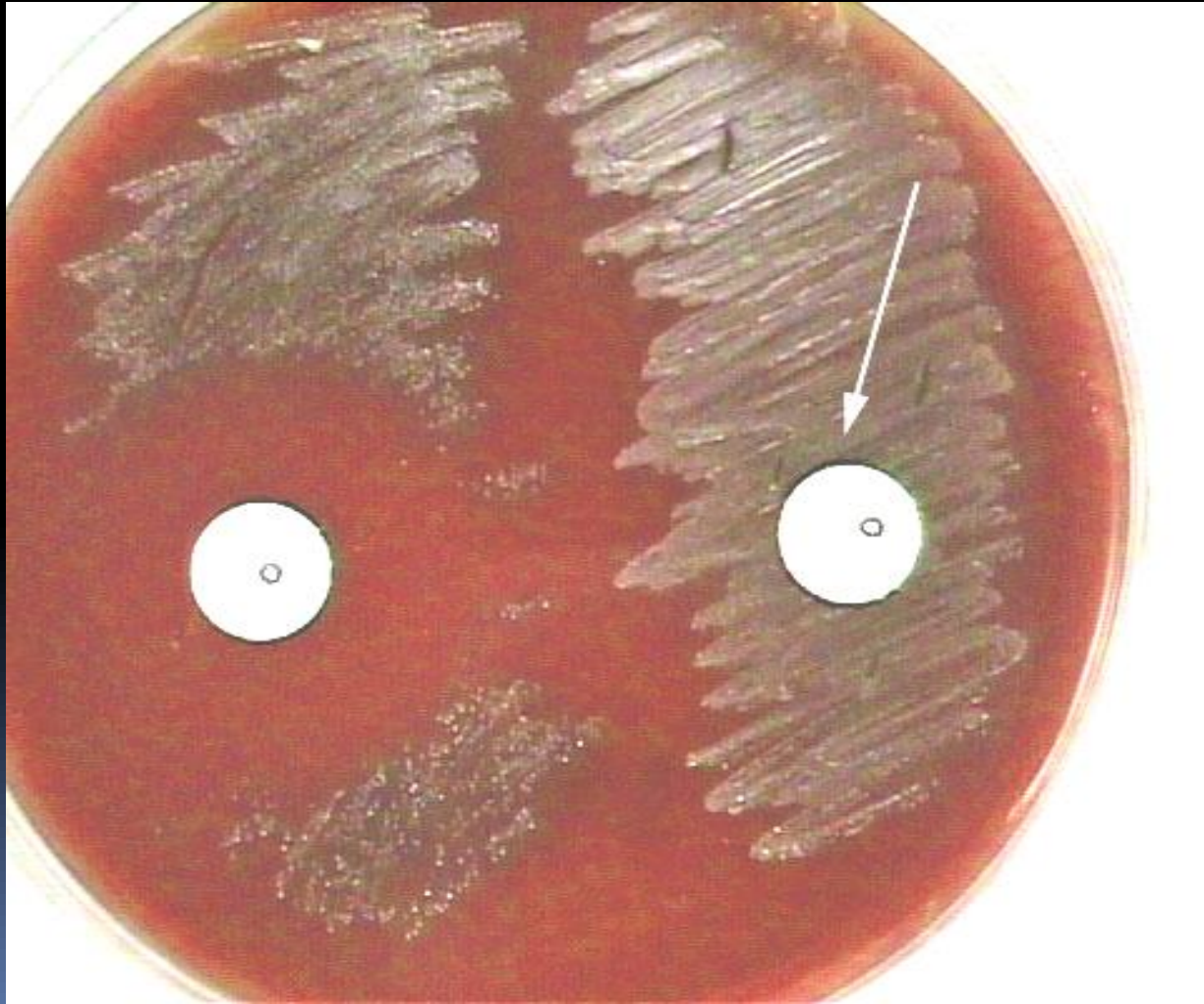
S. pyogenes, HSA

- bacitracin

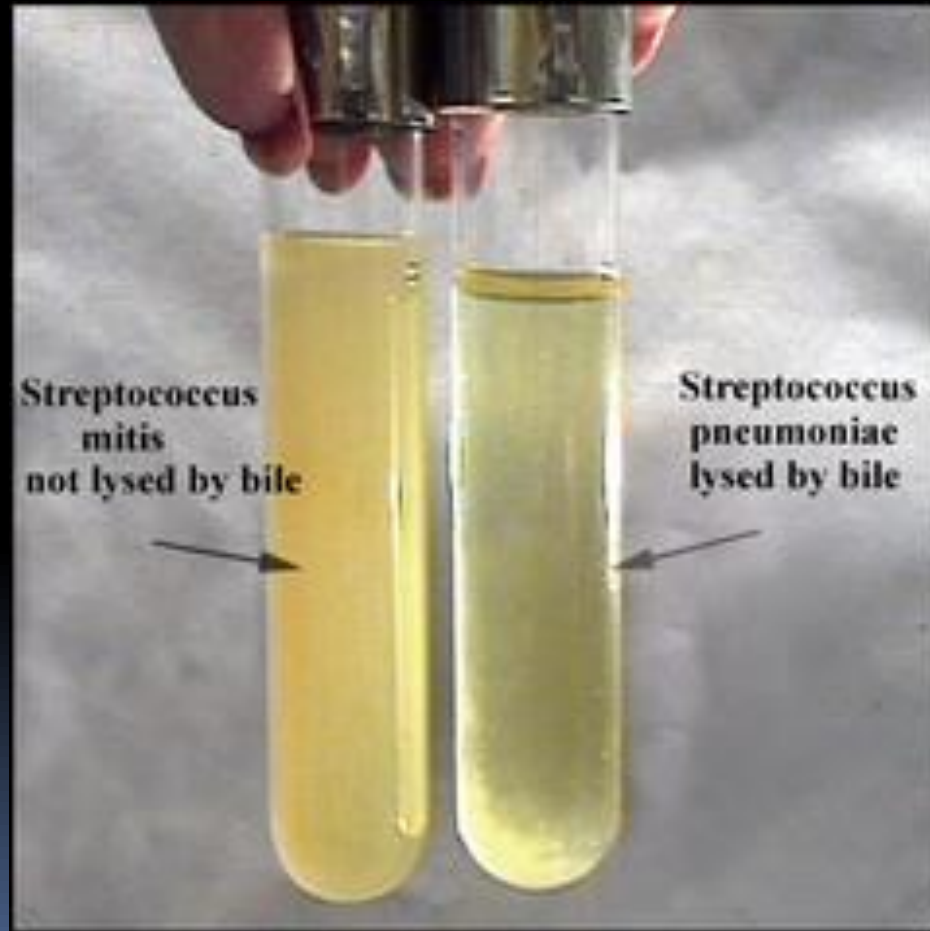
S. agalactiae, HSB

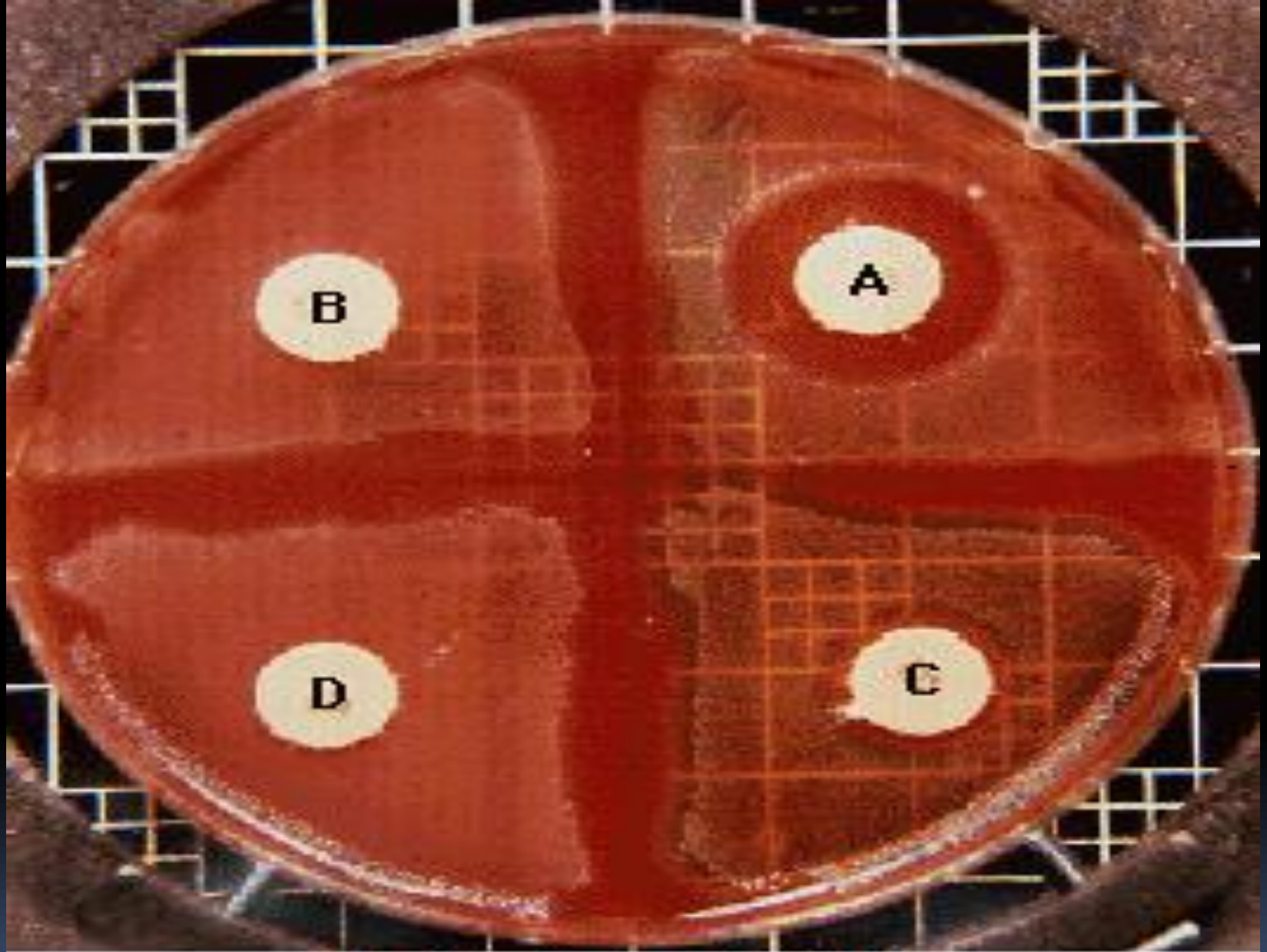
CAMP test

Optochine test



Bile solubility test





**Bacitracin Sensitivity
Streptococcal serological grps. A-D**



Streptococcal infections - late sequelae

- Febris rheumatica - rheumatic fever - nonsuppurative streptococcal disease - inflammatory disease of heart, joint, vessels and submucosa - autoimmune disease, connected to certain serotype of M protein (type specific antigen, factor of virulence, M18, M3...) sequelae only of respiratory tract infection. Not after skin streptococcal disease
- Poststreptococcal acute glomerulonephritis - specific nephritogenic strains, after str. infection of skin and respiratory system


ASLO, ASO

- Streptolysin O - factor of virulence, HSA,
- lysis of leukocytes,
- stimulation of lysosomal enzymes release,
- immunogen - antibody formation - antistreptolysin (ASO).
- detection in ASLO (ASO) test.
- Appearing 3-4 weeks after exposition and persisting. Their laboratory detection means prove of recent HSAinfection of respiratory systeme in patients with FR or GNf. Not elevated after skin streptococcal infections
- ASLO (ASO) determination of the level of antistreptolysine O - antibody against streptolysine (200 IU/ml)
- Latex agglutination of sensibilised latex particuls - quickest
- Serum + ASLO + sheep ery + SLO- agglutination of ery
- Serum..... sheep ery + SLO - haemolysis of ery





CRP

- CRP - C substance of str. pneumoniae -
During bacterial infections organism
synthesises CRP - C reactive protein - protein of
acute phase of inflammation, reacting with C
substance of Str. pneumoniae
 - Immunodiffusion on glass - quantitative
 - In capillars - precipitation - qualitative
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ATB susceptibility

- Str. pyogenes - 100% sensitive to PNC, (in allergy macrolids, ERY)
- Str. agalactiae - very good sensitivity to PNC
- Str. salivarius
- Str. pneumoniae - PNC, TTC, CMP, CEF., appearance of resistance to PNC - also multiresistence - low affinity of ATB to penicilin binding protein