LOW G+C GRAM POSITIVE COCCI: Staphylococcus, Streptococcus, Enterococcus

STAPHYLOCOCCUS: (p. 540) Ubiquitous. Aerobic or facultatively anaerobic:
V. strong cell wall, resists 10% salt: in cured meats, drying.
Staphylococcus epidermidis common on skin (90% of flora) and nares, in rectum. Opportunistic pathogen.
Staphylococcus aureus (yellow colonies on agar): the most virulent of Staph species

ENZYMES:
catalase “Catalase positive” indicates pathogenicity. (Strep is catalase neg.)
coagulase “Coagulase positive” indicates pathogenic: fibrinogen to fibrin, walls off site of infection, protects from phagocytosis, (S. epidermidis: coagulase neg.)
hyaluronidase spreading factor, hydrolyzes hyaluronic acid, a C.T. polysaccharide
β lactamase inactivates penicillin (95% S. aureus carries it now...) See above.

TOXINS: (p 540)
enterotoxin food poisoning intoxication: heat resistant, a superantigen, triggers T cell inflammatory response: nausea, vomiting, sweating, diarrhea. Rapid onset: 1-6 hrs after eating meats, lasts only 24 hrs, custard pastries, potato salad.
exfoliative toxin “scalded skin syndrome,” dissolves desmosomes, epidermis sloughed off
TSS Toxic shock syndrome fever, vomiting, sunburn-like rash, shock (grph: 542)
leukocidin disrupts lysosomes: neutrophils & macrophages. Causes lysis, tissue damage

Diseases:
Skin: folliculitis pimple, no scar (stv = folliculitis of eyelash),
boil invades dermis, leaves scar
carbuncle underlying tissue cavity, necrosis, suppuration [from under, pus]

Prevent wound infection:
1) scrub wound thoroughly
2) flood with 70% EtOH
3) cover with sterile bandage
4) replace bandage when soiled

Treatment of infection: drain abscess, break up niche, remove dormant bacteria.

Staph develops resistance to drugs faster than any other bacterium (a problem with antibiotic abuse)

MRSA: Methicillin Resistant Staph Aureus: formerly nosocomial, now common in community

STREPTOCOCCUS: cause more disease than any other group of bacteria. (P 543)(But most members are not pathogens)

Distinguish pathogenic species of Strep by two traits: (note Rebecca Lancefield’s Serology Groups A - O)

Traits of pathogenic strep (notably Streptococcus pyogenes): Group A, beta hemolytic strep
1) Group A M protein, in the cell wall, makes it “group A”: it retards phagocytosis
2) Hemolysis: alpha: partial clearing, green cast (Strep. pneumoniae)
beta: complete clearing, yellow cast (the hemolysin is inhibited by O2)
gamma: no clearing

Can be spread by aerosol: Strep carriers: summer: 5% of pop., winter: 10%. Esp in elementary schools.

MECHANISM OF PATHOGENICITY: Act extracellularly, esp. necrotizing exoenzymes:
M protein cell wall attachment protein, inhibits opsonization, (makes it “group A”)
streptolysin lyse RBC, WBC, platelets, etc (accounts for beta hemolysis)
hyaluronic acid contained in its capsule, body ignores (it is part of connective tissue)
streptokinase fibrolisin, digests fibrin in inflamed barrier (therapeutic for MI, stroke)
erthyrogenic toxin pyrogenic toxin (fr lysogenic virus): fever and rash = scarlet fever.

DISEASES:
Spread mostly by respiratory droplets, normal flora missing, compromised barriers

Strep throat (p 544) [10% of sore throats are Strep...] beefy red purulent pharynx, fever, malaise, SORE throat. 15% of children are asymptomatic carriers. (50-90% “pharyngitis” = viral...) children <15 avg 1 inf’ns/yr.
Scarlet fever “scarletina.” Erythrogenic factor, causes vasodilation
necrotizing fasciitis “Flesh eating” bacteria: effective at invading (causing cellulitis, myositis) (p 545)

SEQUELAE:
Rheumatic fever in 3% of untreated children 1-5 wks later, rheumatoid arthritis
glomerulonephritis: filtering basement membrane scarred
Puerperal fever S. agalactiae infection of uterus following childbirth
tooth decay S. mutans (cariogenic) make dextran fr sugar, biofilm = plaque, lactic H+
pneumonia S. pneumoniae (p 541) formerly “Diplococcus pneumoniae” also causes oitis media, sinusitis

leading cause of community acquired pneumonia (85% of pneumonia), due to compromise: flu, alcoholism, diabetes, CHF etc.

ENTEROCOCCUS p 541 E. faecalis, non-pathogenic in GI, but nosocomial: UTI, lungs, bl’d, intestinal laceration. lack capsule, can grow at 45 C, pH 9.6, 6.5% NaCl, 40% bile salt broth.