STAPHYLOCOCCUS
PAMM 550
Spring 2007

Gram stain; 
*Staphylococcus aureus*

Slide Catalase Test

Staphylococcal Cell Wall 
Peptidoglycan 
Protein A 
Teichoic acids (ribitol based)

Beta-Hemolysis

Hemolytic Patterns
Mannitol Salt Agar

Tube Coagulase Test

Bacteriophage Typing

Epidemiology
- Normal flora: Nose, skin
- Community-acquired & Nosocomial
  - Endogenous/Person-to-person

Virulence Factors
- Alpha-toxin: Transmembrane pores
- Coagulase
- Other extracellular products:
  - Collagenase, hyaluronidase, nucleases, lipases, proteases, plasminogen activator, fibrinolysin, hemolysins, siderophores
- Cellular components:
  - Capsule, peptidoglycan, protein A, teichoic acid

Folliculitis
Patient with staphylococcal orbital cellulitis. Note the periorbital swelling and erythema.
Staphylococcal Scalded Skin Syndrome

- Diffuse ill-defined erythema & flaccid bullae
- Positive Nikolsky’s sign
  - superficial layers of skin slipping free from lower layers with slight pressure
- Primarily
  - newborns and infants < 2 yrs
  - patients with renal failure

Systemic Infections

- Bacteremia
- Endocarditis
- Osteomyelitis
- Pneumonia
- Abscesses

Staphylococcal Scalded Skin Syndrome (SSSS)

- General erythema of SSSS
- Peeling epidermis of SSSS
- Flaccid bullae of SSSS
- Cleavage plane in SSSS
Toxic Shock Syndrome

- Superabsorbent tampons/wounds
- TSST-1: sAg (activation of helper T cells, release of IL-1, TNF, others)
- Signs/Symptoms
  - Early: High fever, myalgia, diarrhea, vomiting, sore throat
  - Rash/desquamation: esp. soles/palms
  - Late: Hypotension (shock), multisystem failure, death

Staphylococcal Food Poisoning

- Non-refrigerated foods
  - Picnics, banquets, family reunions, etc.: Meats, gravies, dressing, salads (e.g., chicken salad, turkey dressing, ham, etc.)
- Enterotoxin
  - “Intoxication”
  - Heat resistant
- Signs/symptoms
  - Vomiting esp., may be some diarrhea, cramps, but no fever
  - Rapid onset (~2-6 hours)
  - Short duration (“24 hour flu”)
    - Others: C. perfringens, B. cereus

SUPERANTIGENS

![SUPERANTIGENS Diagram](https://example.com/superantigens_diagram.png)

Staphylococcus aureus

- Gram stain

![Staphylococcus aureus Gram stain](https://example.com/staphylococcus_aureus_giemsa_stain.png)
Beta-Hemolysis

Coagulase Test

Tolerance to Beta-lactams

Therapy: Staph. aureus

- Beta-lactamase resistant penicillin/cephalosporin
  - Cloxacillin, dicloxacillin, nafcillin, oxacillin;
  - Cefepime (4th gen), cefazolin (1st gen)
- Vancomycin for MRSA (+ others)
  - MRSA usually resistant to β-lactamase-resistant penicillins, cephalosporins, and carbapenems
- Drainage
Methicillin Resistant Staphylococcus aureus (MRSA)

- Normal susceptibility to methicillin
- Resistance to methicillin (MRSA)

S. epidermidis

- Epidemiology
  - Skin
  - Catheters; Prosthetic devices
  - Immunocompromised
- Virulence
  - Slime (capsule) production

S. saprophyticus

- Urinary tract infections (UTI's)
- Therapy: Antibiotics

Coagulase Negative Staphylococci

- S. epidermidis
- S. saprophyticus
- Others (~30)