

## UNDER THE MICROSCOPE: *Staphylococcus aureus*

### “*Staph infections*”

- Gram-positive clusters (“staphyl”) of cocci, opportunistic flora in humans—colonizes the nasal passages and the skin
- Facultative anaerobes, catalase positive, coagulase positive, mannitol fermenter, salt-tolerant, Beta-hemolytic
- ~20% of humans carry it as normal flora; others may be colonized short-term

#### Common Diseases caused by *Staph aureus*:

- Boils
- Pimples
- Impetigo
- Diarrhea and/or vomiting (food-poisoning)
- Pneumonia
- Osteomyelitis
- Endocarditis
- Scalded Skin Syndrome

**Mechanism of Disease.** Strains may have some or all of these abilities—the more of these they possess, the more virulent they are.

- Coagulase – helps prevent phagocytosis
- Large capsule
- Hyaluronidase – AKA “spreading factor”
- Exfoliatin (can cause desquamation; epidermis “falls” off) – can lead to Scalded Skin Syndrome
- Beta-lactamase – deactivates penicillin
- Superantigens
  - Enterotoxin – associated with food poisoning (and in the past, it was associated with Toxic Shock Syndrome from tampons)
- PVL : a leukocidin associated with necrotizing pneumoniae
- Protein A: Part of the cell wall; binds to the tail end of IgG antibodies to inhibit phagocytosis and “hide” from the immune system.

#### MRSA (Methicillin-resistant *Staph aureus*)

- Includes any *Staph* that is resistant to penicillin and similar beta-lactamase antibiotics.
- Not necessarily any more virulent, but it can be life-threatening because it is difficult to halt the bacteria with antibiotics.
- Drug of choice is currently vancomycin (mode of action is a cell-wall inhibitor)—it is usually effective against Gram + bacteria
  - Side effects may include Red Man Syndrome (rapidly infused vancomycin can irritate mast cells; massive degranulation of histamine causes the skin inflammation)