Microorganisms Causing Foodborne Disease

*Staphylococcus aureus*

*S. aureus*
- Member of the family Micrococcaceae
- Primary reservoir - animal and human body
  - 30-50% of humans are carriers
  - Throat, nose and skin
- Causes staphylococcal food poisoning
  - Caused by a heat-resistant enterotoxin produced as a result of staphylococcal growth

*S. aureus*
- Gram-positive, clustered cocci
- Nonmotile
- Mesophilic
- Aerobic, slow anaerobic growth
- Poor competitor in food
- Most strains produce a gold pigment
- Most strains produce coagulase and heat-stable DNase (thermonuclease or TNase)
  - Key in the ID of this organism
  - Strains that do not produce TNase and coagulase are not likely to produce enterotoxin
**S. aureus**

- Enterotoxins
  - A, B, C₁, C₂, C₃, D, E and H
- Properties:
  - Low molecular weight proteins
  - Single polypeptide chains
  - Resistant to proteolytic enzymes - not inactivated in digestive tract
  - Heat resistant - most heat processing will not inactivate

**S. aureus**

- Short incubation period
  - 1 – 8, sometimes has been as short as 30 min
  - Intoxication
- Syndrome
  - Nausea
  - Projectile vomiting
    - Continues at 5 to 20 min intervals
    - 1 to 8 hours
    - Vomits frequently blood-streaked
  - Abdominal and muscular (legs) cramping
  - Diarrhea
  - No fever
- 3.5 µg of toxin sufficient to cause illness in a 150-lb man
  - Usually associated with growth of the organism to large numbers

**S. aureus**

- One of the three most common cause of FBI
  - *Salmonella, Clostridium perfringens* and *S. aureus*
- Most cases due to human food handling
- Growth to high numbers necessary for sufficient toxin production
**S. aureus**

- Foods associated
  - Processed Meat, dairy, poultry and fish products
  - Cream sauces
  - Salads
  - Custard
  - Cream-filled bakery products
- Foods that support staphylococcal growth
- Stored under conditions that promote its growth

**S. aureus**

- Method of isolation
  - No detection but enumeration is important
  - Dilutions
  - Surface-spread plating onto Baird Parker agar
  - Coagulase and TNase tests
  - Sometimes an MPN method has been proposed

**Baird parker agar**

- Selective components
  - LiCl₂ + glycine
  - Potassium tellurite (K₂TeO₃)
- Differential components
  - K₂TeO₃ → TeO₂⁻ → Te⁰
  - Egg yolk
- Enriching components
  - Egg yolk
  - Sodium pyruvate