Non-spore-forming Gram positive Bacteria
Corynebacterium & Listeria

Corynebacteria (Genus Corynebacterium)

1- Aerobic or facultatively anaerobic
2- Small, pleomorphic (club-shaped), gram-positive bacilli that appear in short chains (“V” or “Y” configurations) or in clumps resembling “Chinese letters”
3- Cells contain metachromatic granules (visualize with methylene blue stain)
4- Lipid-rich cell wall contains meso-diaminopimelic acid, arabino-galactan polymers, and short-chain mycolic acids
5- Lysogenic bacteriophage encodes for potent exotoxin in virulent strains

Pathogenic Corynebacterial Species

- *Corynebacterium diphtheriae*
- *Corynebacterium urealyticum*

*Corynebacterium urealyticum*

- Urinary tract infections (UTI’s); rare but important
- Urease hydrolyzes urea; release of NH$_4^+$, increase in pH, alkaline urine, renal stones
Corynebacterium diphtheriae

Transmission:
1. The habitat is the human throat (human is the only host) of both toxigenic or nontoxigenic.
2. Transmission is via respiratory droplets

Pathogenesis:
1. Toxigenisity and invasion are important.
2. Organism secreats an exotoxin that inhibits protein synthesis by adding ADP-ribose to elongation factor-2 (EF-2).
3. Toxin has two components: Subunit A, which has the ADP-ribosylating activity, and subunit B, which binds the toxin to the cell surface receptors.
4. Pseudomembrane in throat caused by death of mucosal epithelial cells

Mechanism of Action of Diphtheria Toxin: Inhibition of Protein Synthesis
The host response to C. diphtheria consist of:

1- Local inflammation in the throat, that forms the tough, adherent, gray pseudomembrane.
2- Antibody to neutralize exotoxin activity by blocking the interaction of fragment B with the receptor.

Virulence Factors in Corynebacterium Species

- **C. diphtheriae**
  - Diphtheria exotoxin

- **C. jeikeium**
  - Antibiotic resistance

- **C. urealyticum**
  - Antibiotic resistance; urease production

- **C. pseudotuberculosis**
  - Diphtheria exotoxin; phospholipase D

- **C. ulcerans**
  - Diphtheria exotoxin; phospholipase D

**Listeria monocytogenes**

- Gram-positive beta-hemolytic bacillus
- Multiply at refrigerator temperatures (4°C)
- Tumbling motility at room temperature
  - CAMP Test positive (like Group B streptococci)

**Distribution of Listeria**

- Intestinal tract of mammals & birds (especially chickens)
- Persists in soil
- Soft cheeses & unwashed raw vegetables
- Raw or undercooked food of animal origin
  - Luncheon meats
  - Hot dogs
- Large scale food recalls have become common

**Epidemiology of Listeria Infections**

**Natural Reservoirs**
- Mammals
- Fish
- Birds
- Insects

**Common Routes for Human Exposure**
- Food products from fish, fowl, beef, pork, etc.
- Products from the environment; soil, water, vegetation

**Population at Greatest Risk**
- Healthy children and adults
  - Asymptomatic carriage
- Pregnant women
  - Asymptomatic carriage
  - Septicemia
  - Neonatal disease
- Immunocompromised (e.g., cancer or transplant patients)
  - Asymptomatic carriage
  - Meningitis
  - Septicemia
  - Other infections

**Listeriosis**
- Neonates, elderly & immunocompromised
- Granulomatosis infantiseptica
  - Transmitted to fetus transplacentally
- **Early septicemic form:** 1-5 days post-partum
- **Delayed meningitic form:** 10-20 days following birth

**Intracellular** pathogen
- Cell-mediated and humoral immunity develop
- Only **cell-mediated immunity** is protective

*Intracellular Survival & Replication of Listeria*