Welcome to Pathogen Group 1

- Clostridium botulinum
- Clostridium perfringens
- Clostridium tetani
- Clostridium difficile
- Corynebacterium diphtheriae
- Bordetella pertussis
Food Poisoning vs food-borne infection
Clostridium botulinum: Botulism

- Long, Gram + bacillus
- Large spore
- Obligate anaerobe
- Motile
effect of botulinum toxin
botulism symptoms

- *food poisoning*: blurred vision, double vision (diplopia), weakness, dry mouth, symmetric paralysis may progress rapidly to death

- *infant botulism*: constipation, poor feeding, failure to thrive, progressive weakness, dyspnea, death

- *wound botulism*
  - increase in wound botulism is linked to black tar heroin
Botulism as a biological weapon?

- Botulism (as is Anthrax) is now designated as a category A agent for bioterrorism
  - The potential of being used as a biological weapon
- Traditionally, individual cases have required intervention by public health with coordination with laboratories
- The threat of bioterrorism represents a challenge for planning and protecting the nation’s food supply
- A significant number of cases at one time may result in the difficulty providing an adequate supply of antitoxin!
Clostridium perfringens: perfringens food poisoning and gas gangrene

- nonmotile
- sporeforming
- anaerobic
- food poisoning: see charts in thick packet
- "gangrene" vs "gas gangrene"

Growing in necrotic tissue
gangrene in toes
**Clostridium tetani:** Tetanus

- motile
- anaerobic
- sporeforming

with spore vegetative
effect of tetanus toxin
tetanus symptoms

- painful muscle contraction, especially in jaw and neck
- “lockjaw”
tetanus
Tetanus Shots

• DTaP: childhood diphtheria, tetanus, acellular pertussis vaccine
• Tdap: adolescent and adult tetanus, diphtheria, and pertussis boosters
  – Boostrix for ages 10-18
  – Adacel for ages 11-64
• Td: adult tetanus diphtheria vaccine
  – Booster dose every 10 years
  – Expected to be phased out as it is replaced by Tdap
• TIG (tetanus immune globulin) for passive immunity during wound management
Clostridium difficile

- Most common cause of nosocomial diarrhea in developed countries
- Pseudomembranous colitis: membranous lesions cover intestinal wall (>90% of cases are C. dif)
- Almost always result of antibiotic use
Clostridium difficile

- strictly anaerobic
- Sporeforming
- Motile by peritrichous flagella
- Source: soil, animal feces
Corynebacterium diphtheriae: Diphtheria

- Gram + pleomorphic bacillus
- uneven staining
- nonmotile
- aerobic
Corynebacterium

- powerful exotoxin damages heart and nerves
- sore throat, fever, membrane in throat
- Vaccine
  - DTaP
  - Tdap
Inhibition of protein synthesis

*Corynebacterium diphtheriae*

Toxin

Cell membrane

Prevents protein synthesis

Cell death
diphtheria
Bordetella pertussis: Pertussis or whooping cough

- Gram - bacillus
- aerobic
- nonmotile
- bronchitis
- paroxysms of coughing, inspiratory whoop, may vomit after coughing

Vaccine
- DTaP
- Tdap

on respiratory cilia