

Mastery Series: Clostridium

1. The 4 clinically-important *Clostridium* species are:
2. Describe *Clostridium* with regard to:
 - a. Gram reaction
 - b. Shape and arrangement
 - c. Ability to survive harsh conditions (and why)
 - d. Oxygen tolerance
3. *Clostridium botulinum*:
 - a. Type of disease caused
 - b. Type of exotoxin; how does it function?
 - c. What might be cause of death and why.
 - d. How oxygen tolerance relates to ways you can get the disease.
 - e. Treatments that we use the toxin for.
4. *Clostridium tetani*:
 - a. Disease caused
 - b. Compare the way the neurotoxin works in tetanus to how it works in botulism.
 - c. Why newborn babies exposed to soil may contract the disease.
5. *Clostridium perfringens*
 - a. Types of diseases
6. *Clostridium difficile*
 - a. Type of disease
 - b. Typical causes of the disease
 - c. Current treatment research

Mastery Series ANSWERS: Clostridium

1. The 4 clinically-important *Clostridium* species are: *C. difficile*, *C. botulinum*, *C. tetani*, and *C. perfringens*.
2. Describe *Clostridium* with regard to:
 - a. Gram reaction--**positive**
 - b. Shape and arrangement --**single rods**
 - c. Ability to survive harsh conditions (and why) – **very good ability to survive harsh conditions because it makes endospores.**
 - d. Oxygen tolerance –**intolerant; it's an obligate anaerobe**
3. *Clostridium botulinum*:
 - a. Type of disease caused—**food poisoning (botulism)**
 - b. Type of exotoxin; how does it function? **Neurotoxin; it blocks synaptic transmission at the neuromuscular junction and causes paralysis**
 - c. What might be cause of death and why. **Respiratory arrest because the diaphragm is a muscle affected by the toxin.**
 - d. How oxygen tolerance relates to ways you can get the disease. **Generally, botulism is a concern in improperly canned food. If there is some viable *C. botulinum* (or its endospores) in the can when it is sealed up, the bacteria can thrive in the anaerobic environment.**
 - e. Treatments that we use the toxin for. **Beauty treatments to paralyze some laugh/frown lines; also used medically to relieve some painful cramping conditions.**
4. *Clostridium tetani*:
 - a. Disease caused: **tetanus**
 - b. Compare the way the neurotoxin works in tetanus to how it works in botulism. **This neurotoxin affects the CNS and inhibits neurons that help muscles relax.**
 - c. Why newborn babies exposed to soil may contract the disease. **The bacteria naturally live in the soil and may cause infection in the umbilical stump.**
5. *Clostridium perfringens*
 - a. Types of diseases: **gas gangrene**
 - b. Toxins: **Exotoxin can dissolve connective tissue to allow a speedy spread**
6. *Clostridium difficile*
 - a. Type of disease: **diarrheal**
 - b. Typical causes of the disease: **occurs after antibiotic use has wiped out normal colonic flora**
 - c. Toxin: **enterotoxin causes water loss from intestinal cells; cytotoxins can directly damage intestinal cells— may lead to pseudomembranous colitis**
 - d. Current treatment research: **fecal transplants of normal flora to recolonize the colon with healthy bacteria and crowd out *C. diff.***