**Botulinum Toxin**

**Source**
- *Clostridium botulinum*, a large gram-positive, spore-forming, anaerobic bacillus

**Characteristics**
- Grows anaerobically on Blood Agar and egg yolk plates

**Pathogenesis**
- Toxin enters nerve terminals and blocks release of acetylcholine, blocking neuro-transmission and resulting in muscle paralysis

**Toxicity**
- Most lethal of all toxic natural substances
- Groups A, B, E (rarely F) cause illness in humans

**Symptoms**
- 24-36 h (up to 3 d for wound botulism)
- Progressive skeletal muscle weakness
- Symmetrical descending flaccid paralysis
- Can be confused with stroke, Guillain-Barre syndrome or myasthenia gravis

**Ricin Toxin**

**Source**
- *Ricinus communis* seeds commonly called castor beans

**Characteristics**
- Toxin can be disseminated in the form of a liquid, powder or mist

**Pathogenesis**
- A-chain inactivates ribosomes, interrupting protein synthesis
- B-chain binds to carbohydrate receptors on the cell surface and allows toxin complex to enter cell

**Toxicity**
- Highly toxic by inhalation, ingestion and injection
- Less toxic by ingestion due to digestive activity and poor absorption
- Low dermal toxicity

**Symptoms**
- 18-24 h post exposure
- Fever, cough, chest tightness, dyspnea, cyanosis, gastroenteritis and necrosis; death in ~72 h

**Staph Enterotoxin B**

**Source**
- *Staphylococcus aureus*, a gram-positive cocci

**Characteristics**
- Appears as grape-like clusters on Gram stain or as small off-white colonies on Blood Agar
- Toxin-producing and non-toxigenic strains of *S. aureus* will appear morphologically identical

**Pathogenesis**
- *Staphylococcus* Enterotoxin B (SEB) is a superantigen. Toxin binds to human class II MHC molecules causing cytokine release and system-wide inflammation

**Toxicity**
- Toxic by inhalation or ingestion

**Symptoms**
- 4-10 h post-ingestion, 3-12 h post-inhalation
- Flu-like symptoms, fever, chills, headache, myalgia
- Nausea, vomiting, and diarrhea
- Nonproductive cough, chest pain, and dyspnea
- SEB can cause toxic shock syndrome

Gram stain
Lipase on egg yolk plates
Ricin plant
Castor beans
S. aureus Gram stain
Growth on Blood Agar
### Botulinum Toxin

**Transmission**
- Aerosol release
- Food contamination
- Wound contamination
- Toxin not transmitted person to person

**Clinical Specimens**
- Serum: > 5 ml (10 ml preferred)
- Feces and gastric contents: >10 g
- Clinical swab specimens: Place swabs in an anaerobic transport media
- Autopsy: contents from small and large intestines
- Storage: Refrigerate, preferably in plastic containers

**Environmental Samples**
- All environmental samples: 100 ml or 2 g
- Food, drinks: Send entire item
- Storage: Refrigerate, preferably in plastic containers

**Detection**
- Mouse neutralization assay
- Enzyme-linked immunosorbent assays (ELISA)
- PCR

### Ricin Toxin

**Transmission**
- Aerosol release
- Food contamination
- Injection
- Toxin not transmitted person to person

**Clinical Specimens**
- Serum to test for circulating antibody (>5ml) (Tested at CDC)
- Urine: >5 ml (10 ml preferred)
- Storage: Room temperature, in plastic containers (do not use glass)
- Note: Ricin toxin can be denatured by freezing or excess heat

**Environmental Samples**
- All environmental samples: 100 ml or 2 g
- Food, drinks: Send entire item
- Storage: Refrigerate

**Detection**
- Time-resolved fluorescence (TRF)
- PCR
- Ricinine detection by chemical analysis

### Staph Enterotoxin B

**Transmission**
- Aerosol release
- Food contamination
- Toxin not transmitted person to person

**Clinical Specimens**
- 5-10 ml blood in EDTA
- Urine: > 5 ml (10 ml preferred)
- Respiratory secretions, or nasal swabs
- Bacterial isolates
- Storage: Refrigerate

**Environmental Samples**
- All environmental samples: 100 ml or 2 g
- Food, drinks: Send entire item
- Storage: Refrigerate

**Detection**
- Time-resolved fluorescence (TRF)
- Gel diffusion assay
- Latex agglutination test
- PCR

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If any of these toxins are suspected **immediately contact** the Wadsworth Center, NYSDOH to refer the specimen/sample **518 - 474 - 4177**

If within the 5 boroughs of NYC, please call (212) 447-1091