

Feature	Clostridium tetani (Tetanus)	Clostridium botulinum (Botulism)
General Description	Serious infectious disease of the nervous system. Toxin causes severe prolonged contraction of skeletal muscle fibers. Also called lockjaw.	Rod-shaped, Gram-positive, obligate anaerobic, spore-forming. Causes flaccid paralysis.
Etymology	"Tetanus" from Greek "tautos" (taut = stretch).	Botulus = Latin for sausage.
History	1884: Discovered by Carle and Rattone. 1889: Kitasato isolated organism, showed disease production in animals, and toxin neutralization by antibodies. World War I: Passive immunization. World War II: Tetanus toxoid widely used.	N/A
Characteristics	Slender, gram-positive, anaerobic rod. Terminal spore (drumstick appearance). Sensitive to heat, cannot survive oxygen. Spores resistant to heat, antiseptics, phenol, chemical agents. Found in soil, animal intestines/feces. Manure-treated soil contains many spores.	Rod-shaped, Gram-positive, obligate anaerobic, spore-forming. Ubiquitous. Found in soil and marine sediments. Contaminates vegetables. Requires anaerobic atmosphere, mild alkalinity, low salt/sugar for germination.
Communicability	Not contagious person-to-person. Only vaccine-preventable disease that is infectious but not contagious.	N/A
Transmission	Primarily contaminated wounds (major or minor). Follows surgery, burns, puncture wounds, crush wounds, otitis media, dental infection, animal bites, abortion.	Ingestion of toxin in contaminated food, colonization of infant intestine, wound colonization, adult intestinal toxemia.
Epidemiology	Widely distributed.	Ubiquitous.
Toxins	Tetanolysin (function uncertain). Tetano-spasmin: Neurotoxin, causes clinical manifestations, potent toxin (lethal dose ~2.5 ng/kg).	Seven types (A-G) of neurotoxins. A, B, E, (rarely F) cause human botulism. C, D, E cause illness in other animals. Causes flaccid paralysis. Potent toxin, destroyed by boiling.
Pathogenesis	Enters through wound. Spores germinate in anaerobic conditions. Toxins produced, disseminated via blood/lymphatics. Transported to motor nuclei/spinal cord. Reaches inhibitory interneurons, inhibits neurotransmitter release. Unopposed muscle contraction and spasm. Inhibits GABA release. Cleaves synaptobrevin, blocks neurotransmitter exocytosis.	Neurotoxin production, stomach absorption, circulation, NMJ, inhibition of acetylcholine release, flaccid descending motor paralysis. Affects peripheral cholinergic nerve terminals. CNS probably not involved.

	which contain GAD2 enzyme (GABA synthesizing). GABA acts at inhibitory synapses, opens ion channels, causes hyperpolarization.	
Clinical Features	Incubation: 3-21 days (8 days avg.). Neonatal: 4-14 days (7 days avg.). Local (including cephalic) and generalized (including neonatal) forms.	Food-borne: Onset 18-36 hours. Early: nausea, vomiting, weakness, dizziness. Late: double vision, swallowing/speaking difficulty. Infant: constipation, poor feeding, weak cry, decreased movement, lethargy, swallowing trouble, drooling, muscle weakness, breathing problems, ptosis, poor head control, decreased anal sphincter tone, decreased deep tendon reflexes. Wound: symptoms similar to food-borne, up to 2 weeks onset. Adult intestinal toxemia: prolonged symptoms, relapse.
Local Tetanus	Uncommon. Persistent muscle contraction in injury area. May precede generalized tetanus. 1% fatality.	N/A
Cephalic Tetanus	Rare. Otitis media/head injuries. Cranial nerve involvement (facial). Pharyngeal/laryngeal spasm, aspiration, airway obstruction. Poor prognosis.	N/A
Generalized Tetanus	Common (80%). Trismus (lockjaw), neck stiffness, swallowing difficulty, abdominal rigidity. Elevated temperature, sweating, elevated BP, rapid heart rate. Spasms, months for recovery.	N/A
Neonatal Tetanus	Generalized tetanus in newborns. Lack of maternal immunity. Umbilical stump infection (unsterile instruments). Developing countries. Rare in US.	Infant botulism: Colonization of infant intestine by toxigenic clostridia. Infants <1 year. Spores from honey, food, dust, corn syrup. Germination, toxin release.
Complications	Laryngospasm, respiratory muscle spasm, breathing interference. Spine/long bone fractures. Autonomic hyperactivity, hypertension, abnormal heart rhythm. Fatal in elderly (60+) and unvaccinated.	Respiratory muscle paralysis (food-borne).
Diagnosis	Clinical presentation, history, incomplete immunizations, muscle spasms, fever, BP changes, irregular heartbeat. Neonates: irritability, muscle spasms, poor sucking. Lab tests rarely used.	History and physical findings. Food-borne: food history. Wound: abscess material, serum samples. Adult intestinal toxemia: excreted organisms, toxin in stool.

Differential Diagnosis	N/A	Guillain-Barré syndrome, myasthenia gravis, stroke syndromes, Eaton-Lambert syndrome, tick paralysis, shellfish poisoning, antimicrobial drug-associated paralysis.
Medical Treatment	Limit growth/kill C. tetani, neutralize toxin. Supportive measures. Antibiotics (metronidazole, penicillin G, doxycycline). Antitoxin (TIG). Wound cleansing. Pain medicine. Sedative (diazepam). Ventilator support. IV rehydration.	Intensive care, botulinum antitoxin. Wound botulism: wound cleaning, debridement. C. botulinum susceptible to penicillins. Gastric wash. Antitoxin (A, B, E). Supportive: ICU, respiratory support, wound cleaning, debridement.
Tetanus Immune Globulin (TIG)	Adults: Prophylactic 250 units IM (500 severe/delayed, up to 2000). Therapy: 3000-6000 units deep IM. Children: 4 units/kg (250 units minimum).	N/A
Tetanus Toxoid	Combined with diphtheria toxoid (DT/Td), pertussis vaccine (DTaP). Pediatric (DT/DTaP) vs. adult (Td) formulations. Children <7 years: DTaP/DT. Adults/children ≥7 years: Td.	Vaccine available.
When to Seek Medical Care	Large/crushed/contaminated wounds. Muscle cramps/spasms near injury. Swallowing trouble.	Inspect canned food (bulging, loose lids, mold, odor). Proper home canning.
Prognosis	25-50% fatality (generalized). Elderly/young children severe. Over 65 higher mortality. Intensive care improves prognosis. Death: respiratory failure/heart rhythm disturbance.	With early detection, proper treatment, no long term effects observed (infant).