Office of Laboratory Security MSDS

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Clostridium botulinum***

SYNONYM OR CROSS REFERENCE: Botulism

CHARACTERISTICS: Gram positive rods, sporeformer, anaerobic, produces neurotoxin under anaerobic conditions and especially in low-acid foods

SECTION II - HEALTH HAZARD

PATHOGENICITY: Three forms of botulism, all caused by the neurotoxin which binds irreversibly at the neuromuscular junctions of motor neurons: (1) Foodborne: rare, potentially life-threatening; caused by the ingestion of preformed botulinal toxin in contaminated food; characterized by acute flaccid paralysis involving the muscles of the face, head and pharynx, down to the thorax and extremities; death may result from respiratory failure; (2) Wound botulism: occurs subsequent to the growth of the organism in a contaminated wound; toxin is released into the bloodstream; same symptoms as above; (3) infant botulism: results from spore ingestion and subsequent growth and toxin production in the intestinal tract; affects infants under 1 year almost exclusively; wide spectrum of clinical severity

EPIDEMIOLOGY: Sporadic or family-grouped cases occur worldwide; in association with food products prepared or preserved to permit toxin production

HOST RANGE: Humans, animals including fish

INFECTIOUS D0SE: Unknown for infant botulism: cells/spores not normally toxic to adults; toxin is extremely potent

MODE OF TRANSMISSION: Ingestion of contaminated food containing toxin

INCUBATION PERIOD: 12 - 36 hrs after ingestion of toxin

COMMUNICABILITY: No person to person transmission

SECTION III - DISSEMINATION

RESERVOIR: Soil, water, intestinal tract of animals, contaminated food or agricultural products, including honey

ZOONOSIS: None

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Antibiotics generally do not improve the course of the disease; suspectible to penicillin G

DRUG RESISTANCE: Usually resistant to the aminoglycosides; may be resistant to tetracyclines and cephalosporins

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol; solution of 0.1% sodium hypochlorite or 0.1N NaOH inactivates toxin

PHYSICAL INACTIVATION: Toxin destroyed after boiling for 10 min; moist heat at 120°C for at least 15 min destroys spores

SURVIVAL OUTSIDE HOST: Survives well in soil, water and agricultural products

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; demonstration of toxin in serum, stool, gastric aspirate or implicated food

FIRST AID/TREATMENT: Intravenous/intramuscular administration of trivalent (ABE) botulinum antitoxin; assisted ventilation if respiratory failure occurs

IMMUNIZATION: Botulism toxoid

PROPHYLAXIS: Administration of antitoxin

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 2 reported cases: one in association with the large-scale production and handling of botulinum toxin; the other caused by inhalation

SOURCES/SPECIMENS: Food products, clinical materials (serum, feces) and environmental samples (soil, surface water)

PRIMARY HAZARDS: Exposure to the toxin; absorbed after ingestion, or following contact with the skin, eyes, or mucous membranes including the respiratory tract; accidental parenteral inoculation

SPECIAL HAZARDS: Broth cultures grown under conditions of optimal toxin production may contain $2x10^8$ mouse LD_{5O}/ml

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 with materials known or potentially containing the toxin; Biosafety level 3 for activities with a high potential for aerosols, those involving production quantities of toxin, and those involving purified toxins

PROTECTIVE CLOTHING: Laboratory coat; gloves and gown (tight wrist and tie in back) when handling toxin

OTHER PRECAUTIONS: None

SECTION VIII - HANDLING INFORMATION

SPILLS: Use solutions of sodium hypochlorite (0.1%) or sodium hydroxide (0.1N) to decontaminate spills of cultures or toxin

DISPOSAL: Decontaminate before disposal; steam sterilization, incineration, chemical disinfection (sodium hydroxide)

STORAGE: In sealed containers that are appropriately labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: December 1999

Prepared by: Office of Laboratory Security, PHAC

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Last Updated: 2001-01-23  Important Notices