Office of Laboratory Security MSDS

[Material Safety Data Sheets - Index]

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Yersinia pestis***

SYNONYM OR CROSS REFERENCE: Plague, Peste, Bubonic plague

CHARACTERISTICS: Gram negative rod-ovoid 0.5-0.8 µm in width and 1-3 µm in length, bipolar staining (safety pin appearance), facultative intracellular, non-motile

SECTION II - HEALTH HAZARD

PATHOGENICITY: Zoonotic disease; bubonic plague with lymphadenitis in nodes receiving drainage from site of flea bite, occuring in lymph nodes and inguinal areas, fever, 50% case fatality if untreated; may progress to septicemic plague with dissemination by blood to meninges; secondary pneumonic plague with pneumonia, mediastinitis, and pleural effusion; untreated pneumonic and septicemic are fatal

EPIDEMIOLOGY: Wild rodent plague in North America, South America, Africa, Near and Middle East, Central and Southeast Asia, Indonesia; plague foci in USSR; urban plague controlled in most areas; human plague occurred recently in Africa; endemic in Burma and Vietnam; sporadic cases in North and South America following exposure to wild rodents or their fleas (no human-to-human transmission in USA since 1925)

HOST RANGE: Humans, > 200 mammalian species

INFECTIOUS DOSE: Unknown

MODE OF TRANSMISSION: Result of human intrusion into zoonotic (sylvatic) cycle or by entry of rodents or infected fleas into human's habitat and bite of infected fleas; domestic pets can carry plague-infected fleas; contact of commensal rodents and their fleas with sylvatic rodents may result in epizootic and epidemic plague; handling of infected tissues; airborne droplets from humans or pets with plague pneumonia; careless manipulation of laboratory cultures; person-to-person transmission by human fleas

INCUBATION PERIOD: From 2 to 6 days; may be a few days longer in

vaccinated individuals; for primary plague pneumonia, 1 to 6 days, usually short

COMMUNICABILITY: Fleas may remain infective for months; bubonic plague not usually transmitted directly from person-to-person; pneumonic plague may be highly communicable under appropriate climatic conditions (overcrowding facilitates transmission)

SECTION III - DISSEMINATION

RESERVOIR: Wild rodents (rats) are the natural reservoir; lagomorphs (rabbits, hares) and carnivores may be a source of infection to humans

ZOONOSIS: Yes - bites of fleas from an infected animal; contact or being bitten by an infected animal

VECTORS: Wild rodent fleas, especially the oriental rat flea (*Xenopsylla cheopis*); occasionlly by human fleas (*Pulex irritans*)

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Sensitive to streptomycin, tetracycline, chloramphenicol (for cases of plague meningitis), kanamycin (for neonates)

DRUG RESISTANCE: Generally not a concern; a multi-drug resistant strain (MDR) mediated by transferrable plasmid has been isolated

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde, iodines, phenolics, formaldehyde

PHYSICAL INACTIVATION: Sensitive to moist heat (121° C for at least 15 min) and dry heat (160-170° C for at least 1 hour)

SURVIVAL OUTSIDE HOST: Blood - 100 days; human bodies - up to 270 days

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; presumptive diagnosis by visualizing bipolar staining, ovoid, gram-negative organisms in sputum or material aspirated from bubo; FA and ELISA test; PHA using Fraction-1 antigen

FIRST AID/TREATMENT: Antibiotic therapy in early stages (8 to 24 hours after onset of pneumonic plague); secondary infection or suppurative bubo may require incision and drainage

IMMUNIZATION: Although field trials have not been conducted to determine the efficacy of licensed vaccines, experience has been favourable; immunization is recommended for personnel working regularly with culture of *Y. pestis* or infected rodents, boosters are required every 6 months if high risk

continues; protection against pneumonic form is limited

PROPHYLAXIS: Chemoprophylaxis using tetracyclines or sulfonamides; for close contacts of pneumonic cases

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 10 reported laboratory-acquired infections with 4 deaths

SOURCES/SPECIMENS: Bubo fluid, blood, sputum, CSF, feces, urine

PRIMARY HAZARDS: Direct contact with cultures and infectious materials from humans or rodents; infectious aerosols or droplets generated during manipulation of cultures and infected tissues and in the necropsy of rodents; accidental auto-inoculation; ingestion

SPECIAL HAZARDS: Bites by infected fleas collected from rodents

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 3 practices, containment equipment and facilites for all activities involving the handling of potentially infectious clinical materials and cultures

PROTECTIVE CLOTHING: Gloves should be worn when handling field-collected or infected laboratory rodents and when there is the likelihood of direct skin contact with infectious materials; gown with tight cuffs and ties in back should be worn when manipulating cultures and specimens; a mask should be worn when there is a risk of contact with aerosols

OTHER PRECAUTIONS: Special care should be taken to avoid the generation of aerosols during the necropsy of animals; necropsy should be conducted in a biological safety cabinet; insecticide treatment when collecting animals (living or dead) for testing

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wearing protective clothing, gently cover spill with paper towels and apply 1% sodium hypochlorite, starting at perimeter and working towards the centre; allow sufficient contact time (30 min) before clean up

DISPOSAL: Decontaminate before disposal; steam sterilization, incineration (animal carcasses)

STORAGE: In sealed containers that are appropriately labeled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: January, 2001

Prepared by: Office of Laboratory Security, PPHB

Although the information, opinions and recommendations contained in this Material Safety Data Sheet are compiled from sources believed to be reliable, we accept no responsibility for the accuracy, sufficiency, or reliability or for any loss or injury resulting from the use of the information. Newly discovered hazards are frequent and this information may not be completely up to date.

[Material Safety Data Sheets - Index]

top

Last Updated: 2001-03-05 Important Notices