Office of Laboratory Security

MSDS

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MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: Hantavirus

SYNONYM OR CROSS REFERENCE: Hemorrhagic fever with renal syndrome (HFRS), hemorrhagic nephrosonephritis, epidemic hemorrhagic fever, Korean hemorrhagic fever, hantavirus pulmonary syndrome (HPS),

CHARACTERISTICS: 3 segmented spherical to oval enveloped virus particles 80 - 115 nm in diameter. *Bunyaviridae*; single stranded, negative sense RNA genome; 25 antigenically distinguishable viral species

SECTION II - HEALTH HAZARD

PATHOGENICITY: HFRS characterized by an abrupt onset of fever lasting 3-8 days, conjunctival injection, prostration, lower back pain, headache, abdominal pains, anorexia and vomiting; hemorrhagic manifestation appears from third to sixth day, followed by proteinuria, hypotension and shock; fatality (5-15%) occurs during the hypotension and oliguric phase, Hantaan virus (HFRS) causes most severe form of HFRS; HPS characterized by fever, myalgia, GI complaints then abrupt onset of respiratory distress and hypotension; mortality approx 40-50%; in survivors, recovery rapid with full restoration of normal lung function, convalescence takes weeks to months; Puumala (nephropathia epidemica) and Seoul virus cause less severe illness

EPIDEMIOLOGY: Endemic in areas with its rodent reservoir including China, Korea, Japan, Scandinavia, Commonwealth of Independent States; other hantaviruses have been identified in urban rats in major Asian and Western cities including USA and Brazil; HPS viruses (Sin Nombre, New York, Black Creek Canal, Bayou, Laguna Negra, Andes) in North and South America ; Hantaan virus found principally in Asia, Puumala virus in Europe and Seoul virus world wide

HOST RANGE: Field rodents (mice and rats), humans

INFECTIOUS DOSE: Not known

MODE OF TRANSMISSION: Aerosol transmission from infected rodent

excreta is presumed and has been demonstrated experimentally; virus present in urine, feces, saliva of persistently infected animals; virus concentration highest in the lungs of the rat; potential routes of transmission: ingestion, contact of infectious materials with mucous membranes, broken skin and via animal bites (rodent to human via bites has been documented); rodent to rodent transmission via bites; person-to-person transmission of hantavirus has not occurred in the USA, however person to transmission has occurred in Argentina, person-to-person transmission is extremely rare

INCUBATION PERIOD: From 3-60 days; average 14-30 days

COMMUNICABILITY: Not generally believed to be directly transmitted from person-to-person with the possible exception of Andesvirus

SECTION III - DISSEMINATION

RESERVOIR: Field rodents: *Apodemus* spp - *Hantaan virus and Dobrova - Belgrade virus.* in Korea, China and Balkan nations; *Clethrionomys voles - Puumala virus* in Scandinavia, Commonwealth of Independent States, China; *Peromyscus* (Deer mouse) and *Microtus* rodents - Sin Nombre virus in USA; *Rattus* spp.- Seoul virus worldwide; humans are accidental hosts

ZOONOSIS: Yes - infection acquired by contact with infected rodents

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: Ribavirin given IV has shown to be effective during the early phase of the HFRS illness; has not shown any effectiveness for HPS to date

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to 1% sodium hypochlorite (10% sodium hypochlorite for heavily soiled material), 70% ethanol, 2% glutaraldehyde

PHYSICAL INACTIVATION: Sensitive to heat: Vero E6 cells infected with *Hantavirus* were completely inactivated after heating for 1 hr at 60° C, nearly 90% of infectious particles were lost by heating at 56° C for 30 minutes; Hantaan virus have shown sensitivity to a pH of 5

SURVIVAL OUTSIDE HOST: Sensitive to drying; virus isolated from immunocytomas stored for 2-8 years; infectivity of *Hantavirus* has been reported to persist in neutral solutions for several hours at 37° C and for several days at lower temperatures as well as in dried cell cultures for up to 2 days; virus suspensions have been stored at -60° C in balanced salt solution + 1% bovine albumin for over 5 years and remain infectious

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; confirm by serology and viral

isolation

FIRST AID/TREATMENT: Administer ribavirin IV for HFRS; supportive therapy for HPS

IMMUNIZATION: None available

PROPHYLAXIS: None available

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: Infections were documented in laboratories over 6 countries; by the end of 1985, 126 laboratory-acquired infections of HFRS reported in Japan; in 1986 4 laboratory-acquired infections reported in the U.K.; most cases were caused by aerosols generated by infected rodents

SOURCES/SPECIMENS: Urine, respiratory secretions, saliva of rats

PRIMARY HAZARDS: Aerosol and droplet exposure of the mucous membranes, accidental parenteral inoculation, ingestion

SPECIAL HAZARDS: Generation of aerosols when working with infected rodents

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 containment equipment and facilities with level 3 operational practices involving clinical specimens for serology and PCR, biosafety level 3 practices and facilities for all other activities involving the virus, clinical specimens and rodents; additional primary containment and personnel precautions may be indicated for activities with a high risk of aerosol or droplet production

PROTECTIVE CLOTHING: Gloves and gowns and goggles / face shield should be worn when handling potentially infectious specimens, cultures or tissues; field studies: protective clothing, gowns, shoe coverings, gloves (2 pair) goggles, half face respirator or powered air purifying respirator (HEPA)

OTHER PRECAUTIONS: Gloved hands should be washed with soap and water or a suitable disinfectant. Hands should be thoroughly washed with soap and water immediately after removing gloves

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wearing protective clothing, gently cover spill with paper towel and apply 1% sodium hypochlorite (10% sodium hypochlorite for heavily soiled material), starting at the perimeter and working towards the centre; allow sufficient contact time (30 min) before clean up

DISPOSAL: Decontaminate before disposal - steam sterilization, incineration, chemical disinfection

STORAGE: In sealed containers that are appropriately labelled

SECTION IX - MISCELLANEOUS INFORMATION

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Prepared by: Office of Laboratory Security, PPHB

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