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Population and Public Health Branch (PPHB)

Office of Laboratory Security

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## MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

### SECTION I - INFECTIOUS AGENT

**NAME:** *Hepatitis B virus*

**SYNONYM OR CROSS REFERENCE:** Serum hepatitis, type B hepatitis, homologous serum jaundice, Australia antigen hepatitis, HBV, viral hepatitis B, HB

**CHARACTERISTICS:** Partially double-stranded DNA, 42-47 nm diameter, enveloped, *Hepadnaviridae*; lipoprotein coat contains the HBsAg

### SECTION II - HEALTH HAZARD

**PATHOGENICITY:** Two major forms: asymptomatic infection and symptomatic hepatitis; onset is insidious with anorexia, vague abdominal discomfort, nausea and vomiting, sometimes arthralgias and rash, often progressing to jaundice; fever may be absent or mild; severity ranges from inapparent cases to fatal acute hepatic necrosis, or becomes chronically infected; low short term case fatality rate in hospitalized patients; long term case fatality rate is 2-3% due to cancer or cirrhosis of the liver; 95% of adult infections are self limited

**EPIDEMIOLOGY:** Worldwide; endemic with little seasonal variation; commonly in young adults in North America and in infancy or childhood in Africa and Asia; antigen carrier rate in North America is under 1% for the general population and 10-15% in Asia; common in high risk groups - drug abusers, persons in the health care field exposed to blood or serous fluids, sexually promiscuous individuals

**HOST RANGE:** Humans (chimpanzees are susceptible)

**INFECTIOUS DOSE:** Not known, however, 1 mL of infected blood may contain from  $10^2$ - $10^9$  HBV particles

**MODE OF TRANSMISSION:** Percutaneous or permucosal exposure to infectious body fluids (blood, blood products, cerebral spinal fluid, serum-derived fluids, saliva, semen, vaginal fluids, unfixed tissues and organs), indirect contact with contaminated items in the laboratory; commonly spread by

contaminated needles, syringes and other IV equipment; contamination of wounds or lacerations; exposure of mucous membranes; sexual contact, household contact, perinatal transmission from mother to infant, nosocomial exposure

**INCUBATION PERIOD:** Usually 24-180 days; average 60-90 days; HBsAg can appear in 2 weeks or rarely, 6-9 months, depending on dose, mode of transmission and host factors

**COMMUNICABILITY:** Blood can be infective weeks before onset of symptoms; remains infective through clinical and chronic carrier states; infectivity of chronically infected individuals varies from highly infectious to sparingly infectious; sera of infected individuals may contain as many as  $10^{10}$  infectious virions per mL

### **SECTION III - DISSEMINATION**

**RESERVOIR:** Humans, chimpanzees are susceptible, but an animal reservoir in nature has not been recognized

**ZOONOSIS:** None

**VECTORS:** None

### **SECTION IV - VIABILITY**

**DRUG SUSCEPTIBILITY:** No specific antivirals

**SUSCEPTIBILITY TO DISINFECTANTS:** Susceptible to many disinfectants; 1% sodium hypochlorite, 70% ethanol, 2% alkalinized glutaraldehyde, formaldehyde

**PHYSICAL INACTIVATION:** Stable at 37°C for 60 minutes and 56° C for 30 minutes but not at temperatures above 60°C; stable at pH 2.4 for up to 6 hours (some infectivity is lost); HBsAg not destroyed by UV of blood products; stable for years at -70° C

**SURVIVAL OUTSIDE HOST:** Survives in dried blood for long periods (weeks), stable on environmental surfaces for a least 7 days at 25° C

### **SECTION V - MEDICAL**

**SURVEILLANCE:** Testing of blood samples for the presence of HBsAg, EIA, RIA, PCR

**FIRST AID/TREATMENT:** Alpha interferon licensed for treatment of chronic infection. About 30% effective in elimination of "e" antigenemia; Lamivudine (reverse transcriptase inhibitor) is being investigated for chronic infections

**IMMUNIZATION:** Inactivated vaccine is available and recommended for those of increased risk such as laboratory workers and other health care workers

exposed to blood

**PROPHYLAXIS:** Hepatitis B immunoglobulin (HBIG)

## **SECTION VI - LABORATORY HAZARDS**

**LABORATORY-ACQUIRED INFECTIONS:** The most frequently occurring laboratory-associated infection; incidence in some categories of laboratory workers is 7 times greater than that of the general population; 234 reported cases up to 1974 with one death (3921 total infections surveyed); 26 reported cases in UK laboratories from 1980-1987

**SOURCES/SPECIMENS:** Blood and blood products, urine, semen, CSF, and saliva

**PRIMARY HAZARDS:** Parenteral inoculation; droplet exposure of mucous membranes; contact exposure of broken skin

**SPECIAL HAZARDS:** Needle stick with infected blood

## **SECTION VII - RECOMMENDED PRECAUTIONS**

**CONTAINMENT REQUIREMENTS:** Biosafety level 2 practices and containment for activities utilizing infectious body fluids and tissues; biosafety level 3 primary containment and personnel precautions for activities with high potential for droplet or aerosol production and high production quantities or concentrations; animal biosafety level 2 for work with non-human primates

**PROTECTIVE CLOTHING:** Laboratory coat; gloves when skin contact is unavoidable and when working with animals; wrap-around gown and gloves for work in biosafety cabinet

**OTHER PRECAUTIONS:** General needle safety precautions important - do not bend, break or recap needles; dispose directly into puncture-proof container, universal precaution for blood, blood products or specimens containing or contaminated with blood

## **SECTION VIII - HANDLING INFORMATION**

**SPILLS:** Allow aerosols to settle; wearing protective clothing, gently cover spill with absorbent paper towel 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, chemical disinfection, incineration

**STORAGE:** In sealed containers that are appropriately labelled

## **SECTION IX - MISCELLANEOUS INFORMATION**

**Date prepared:** May, 2001

**Prepared by:** Office of Laboratory Security, PPHB

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