McMaster University
Medical Monitoring Program Information Sheet

The purpose of this document is to provide information on an agent/virus in order for all McMaster University staff and students to make an informed decision about entering our medical monitoring program.

Please review this document, print your name, sign and date the Memorandum of Understanding and Agreement and then provide it to your supervisor.

Shigella

The following summary is provided by the McMaster Biosafety Office.

For a complete copy of the excerpted text below please refer to: http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/shigella-eng.php

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde, iodines, phenolics, and formaldehyde. Organisms can be heat-killed by steaming using an autoclave for 1 hour at 100°C under normal atmospheric pressure. Can survive up to months on dry surfaces, over 3 hours on fingers. Growth is possible at 25°C – 37°C and bacteria can survive at 5°C on MacConkey agar. Flies can carry Shigella for up to 20 – 24 days.

LABORATORY-ACQUIRED INFECTIONS: Shigella species have been recently identified to be the most frequently identified agent of laboratory-acquired infections because of their high virulence and low infectious dose. Organisms can be found in stool and rarely in blood samples. Infection may be acquired through ingestion or accidental parenteral inoculation. Experimentally infected guinea pigs and other rodents have been previously reported to transmit infection to laboratory personnel, although rare.

RISK GROUP CLASSIFICATION: Risk Group 2. This risk group applies to the genus as a whole, and may not apply to every species within the genus. Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potentially infectious materials, animals, or cultures. These containment requirements apply to the genus as a whole, and may not apply to each species within the genus. Lab coat. Gloves when direct skin contact with infected materials or animals is unavoidable. Eye protection must be used where there is a known or potential risk of exposure to splashes. All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The
use of needles, syringes and other sharp objects should be strictly limited. Additional precautions should be considered with work involving animals or large scale activities.

The following summary is provided by Employee Health Services.

For a complete copy of the excerpted text below please refer to:

**Facts**

Worldwide distribution. 5 – 15% of all diarrhea cases can be linked to *Shigella* spp. infection, where two-thirds of all cases and deaths occur in children younger than 5 years (1). Rate of infection is high during the weaning period due to risk of ingesting contaminated foods; increasing age is associated with decreasing prevalence and severity (13). *S. flexneri* is most common in developing countries where there is poor hygiene and limited clean drinking water; however, outbreaks are usually caused by *S. dysenteriae*. *S. sonnei* is most common in developed countries (14). Infections are most prevalent during summer and early fall in temperate regions and during rainy seasons in tropical regions. High risk groups include children in day-care centers, homosexual men, individuals in custodial institutions, migrant workers, travelers to developing countries, and certain First Nation reserves (6). Organisms are spread through the fecal-oral route, and transmission is typically through one of three mechanisms: ingestion of contaminated foods (washed with fecally contaminated water, or handled with poor hygiene, commonly in tossed salads, chicken, and shellfish) (2); drinking contaminated water (or in swimming pools); or by person-to-person contact by anal sexual contact (6). Spread of infection linked to flies has also been recorded.

**Symptoms**

Ingested pathogens can survive gastric acidity and cause illness by infecting the colonic mucosa and multiplying in the colonic epithelial cells, and spreading laterally to adjacent cells (5-7). Infection may be mild and asymptomatic, but it is most commonly characterized by acute intestinal infections upon ingestion, resulting in mild watery diarrhea to severe inflammatory bacillary dysentery or shigellosis, manifested by severe abdominal cramps, nausea and vomiting, fever, tenesmus, anorexia, and stool containing blood and mucus (1, 2, 8). Further complications include Reiter’s syndrome which has been associated with *S. flexneri* (9, 10), severe dehydration, intestinal perforation, toxic mega colon, bacteremia, toxaemia (11), septicemia, seizures, toxic encephalopathy with headache and alterations of consciousness, septic shock and convulsions (very rare) (4), and haemolytic uremic syndrome, which have been linked to Shiga toxin (a potent cytotoxin produced by *S. dysenteriae* that can also cause other neurotoxic effects). Virulence of *Shigella* is temperature-regulated, as organisms are able to invade HeLa cells at 37°C, and cannot do so in vitro at 30°C (12). Infections are usually self-limiting, but can become life-threatening in immunocompromised patients or if not properly treated. Severity of infection depends on the host, dose, and serotype (6). *S. dysenteriae* is the most pathogenic species, with a fatality rate up to 20%, whereas *S. sonnei* usually cause mild forms of shigellosis.
**Diagnosis**
Serological testing of stool isolates can distinguish and confirm serogroups \(^6\).

**Treatment**
Administer appropriate drug therapy. Oral rehydration or electrolyte replacement in dehydrated patients can lead to recovery within days \(^1\). Antibiotics usually are not needed in mild cases, but should be administered for infections involving *S. dysenteriae*. Antimicrobials may reduce duration of infection, carriage state of the patient, and mortality \(^2\). Other treatments aids for severe cases include mechanical ventilation, anticonvulsants, and inotropics \(^4\). No vaccines are currently available; however, live and subunit parental vaccine candidates are under review \(^24\). Live attenuated, conjugate, broad spectrum and proteosome-based vaccines are also currently being studied \(^3\).

**Prevention**
Hand-washing, strict hygiene control during food preparation, providing safe drinking water, improving toilet facilities and excreta disposal can limit dissemination of the bacteria \(^6, 23\).

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**Memorandum of Understanding and Agreement (“MUA”) for BSL2 Medical Monitoring Program**

**Note:** This MUA is to be signed by the employee/student and supervisor, filed and kept by the supervisor. It will be reviewed during the annual biosafety audit by the McMaster Biosafety office.

The employee/student named below acknowledges and agrees as follows:

- I have read and understand all of the information in this Medical Monitoring Information Sheet provided jointly by the McMaster Biosafety Office and Employee Health Services and reviewed the biologically hazardous agent to which I have potential exposure.  
  Initial here____

- I will report a pregnancy or a compromised immune system (due to medication {steroid or other immunosuppressive therapy}, organ transplant, chemotherapy or radiation therapy, HIV infection etc.) to my supervisor and **X (graduate students)** or Employee Health Services Occupational Health Nurse at ext. 20310 (faculty and staff) Initial here____

- I will report an exposure to a biological agent to my supervisor immediately and complete a McMaster incident/accident report. Initial here____

- I will report any illness that resembles the symptoms listed in this Medical Monitoring Information Sheet to my supervisor. Initial here_____
- I recognize my responsibility to observe all safety practices and precautions while present in the BSL2 laboratory. Initial here____

- I am aware of, and wish to participate in, the medical monitoring program (RMM #605) for this biological level 2 agent. Please circle: [yes] [no] Initial here _____

Employee/Student print name: ____________________________
Signature: ____________________________
Date: ____________________________

Supervisor print name: ____________________________
Signature: ____________________________
Date: ____________________________