LISTERIA MONOCYTOGENES EXPOSURE/INJURY RESPONSE PROTOCOL

Organism or Agent: Listeria Monocytogenes  
Exposure Risk: Listeriosis  
UCSF Occupational Health Services: 415/885-7580 (Available during work hours)  
Exposure Hotline: 415/353-7842 (Available 24 hours)  
Office of Environment, Health & Safety: 415/476-1300 (Main number; available during work hours) 415/476-1414 or 9-911 (In case of emergency, via the UCSF Police Department; available 24 hours)  
EH&S Biosafety Officer 415/514/2824  
EH&S Public Health Officer: 415/514-3531

PROTOCOL SUMMARY

In the event of an accidental exposure or injury, the protocol is as follows:

1. Modes of Transmission:  
   a. Skin puncture or injection  
   b. Ingestion  
   c. Contact with mucous membranes (eyes, nose, mouth)  
   d. Contact with non-intact skin  
   e. Exposure to aerosols  
   f. Bites of infected animals

2. First Aid:  
   a. **Skin Exposure**, immediately go to the sink and thoroughly wash the skin with soap and water. Decontaminate any exposed skin surfaces with an antiseptic scrub solution.  
   b. **Skin Wound**, immediately go to the sink and thoroughly wash the wound with soap and water and pat dry.  
   c. **Splash to Eye(s), Nose or Mouth**, immediately flush the area with running water for at least 5-10 minutes.  
   d. **Splash Affecting Garments**, remove garments that may have become soiled or contaminated and place them in a double red plastic bag.

3. Treatment:  
   a. In the event of an acute injury resulting from a laboratory incident which requires immediate medical care, the injured employee/student should report to the emergency department for medical treatment. The injured individual must take a copy of this entire protocol document to the Emergency Department, including information regarding the specific strain/serotype associated with exposure.
b. In the event of exposure, with or without an injury, call the Exposure Hotline in order to get access to medical care for the exposure. The hotline responder will provide guidance to the injured individual on necessary medical treatment and post exposure follow-up.

4. **Follow up is needed in the event of any Laboratory Exposure:**
   a. **After first aid has been administered, immediately inform your supervisor of the exposure.**
   b. In the event of a large spill, contact the emergency response team (9-911) for clean-up.
   c. Contact Occupational Health Services, after first aid is complete, for follow-up care.
1. **WORKER’S RESPONSIBILITIES (Employee/Student Initial Self-Care)**

   a. **First Aid:** Perform the recommended first aid and decontamination according to the posted instructions.

   b. **Treatment:** i) In the event of an acute injury resulting from a laboratory incident which requires immediate medical care, the injured individual should report to the Emergency Department for acute medical treatment. ii) In the event of an exposure, with or without an injury, call the Exposure Hotline in order to get access to medical care for the exposure.

   c. **Access to the Exposure Hotline:** Call the Exposure Hotline page in order to get access to medical care for the exposure. Dial 415/353-7842 and provide your name and contact information to the operator. If there is no call back in 15 minutes, call again. If there is no call back the second time, proceed to the nearest Emergency Department with this protocol.

   d. **Reporting:** Inform your laboratory supervisor / principal investigator of the exposure.

   e. **Secure the laboratory:** Identify the equipment involved in the exposure and the mechanism of exposure. Make sure that the laboratory area has been secured and that notification of contamination has been posted to prevent other individuals from entering the area.

   f. **Follow up:** Contact Occupational Health Services (OHS) at 415/885-7580 for any needed follow up care.

2. **SUPERVISOR’S/PI’S RESPONSIBILITIES**

   a. **First Aid and Decontamination:** Verify that the worker has washed and decontaminated himself/herself. Ensure that appropriate medical treatment has been received.

   b. **Secure the laboratory:** Confirm that the laboratory area has been secured and that notification of contamination has been posted to prevent other individuals from entering the area.

   c. **Laboratory clean-up (as needed):** Contact the Office of Environment, Health & Safety (OEH&S) through the UC Police Department Emergency Dispatch (from a campus telephone 9-911, from a non-campus phone 415/476-1414).

   d. **Report the exposure:** Call the Biosafety officer during regular hours to discuss the exposure. Prepare a written report for the Biosafety Officer and the Biosafety Committee.

   e. **Follow Up:** Confirm that the worker has called for an appointment at the UCSF Occupational Health Clinic.

SECTION I – Infectious Agent
Organism or Agent: Listeria monocytogenes
Synonym or Cross Reference: Listeriosis, Listerella
Characteristics: Gram-positive, non-spore forming, facultatively anaerobic bacilli

SECTION II – Recommended Precautions
Containment Requirements: Biosafety level 2 practices, safety equipment and facilities for specimens or cultures known or suspected to contain the agent. ABSL-2 practices, containment equipment and facilities for activities involving experimentally or naturally infected animals. Due to potential risks to the fetus, pregnant women should be aware of risks of exposure, and be given alternate job duties that minimize the risk of potential exposure to Listeria.

UCSF Required Personal Protective Equipment: gloves, eye protection, lab coat.

SECTION III – Handling Information
Spills: Allow aerosols to settle; wearing protective clothing, gently cover spill with paper towel and apply 1% sodium hypochlorite, starting at perimeter and working towards the center; allow sufficient contact time before clean up.
Disposal: Decontaminate before disposal.
Storage: Store in sealed containers that are appropriately labeled.

SECTION IV – Health Hazards
Pathogenicity: Opportunistic pathogen manifested in the elderly, in neonates and or among immunocompromised individuals as meningoencephalitis and/or septicemia; unapparent infection at all ages with consequence only during pregnancy; perinatal infections occur transplacentally and can result in abortion, stillbirth; meningitis, endocarditis, septicemia. Adults may develop meningitis, brain stem encephalitis, brain abscesses, endocarditis, localized infection, gastroenteritis, fever and disseminated granulomatous lesions.
Epidemiology: Uncommonly diagnosed infection; typically sporadic; few recent outbreaks associated with food; nosocomial acquisition; 40% of clinical cases occur in infants; in adults infection occurs mainly after age 40; European studies have disclosed large numbers of human carriers; case fatality rate in newborns is 50%.
Host Range: Mammals, birds, fish, crustaceans and insects.
Infectious Dose: The infective dose of *L. monocytogenes* is unknown but is believed to vary with the strain and susceptibility of the victim. From cases contracted through raw or supposedly pasteurized milk, it is safe to assume that in susceptible persons, fewer than 1,000 total organisms may cause disease. *L. monocytogenes* may invade the gastrointestinal epithelium. Once the bacterium enters the host's monocytes, macrophages, or polymorphonuclear leukocytes, it is bloodborne (septicemic) and can grow. Its presence intracellularly in phagocytic cells also permits access to the brain and probably transplacental migration to the fetus in pregnant women. The pathogenesis of *L. monocytogenes* centers on its ability to survive and multiply in phagocytic host.
cells. (This section is taken directly from USFDA reference cited below, and refers to the oral route of exposure).

**Modes of Transmission:** In neonates, transmission from mother to fetus *in utero* or during passage through infected birth canal; direct contact with infectious material or soil contaminated with infected animal feces can result in papular lesions on hands and arms; ingestion of contaminated food (vegetables and dairy products have been reported); venereal contact and inhalation of the organism is possible; nursery outbreaks via hands of medical staff.

**Incubation Period:** Variable, outbreak cases have occurred 3-70 days following a single exposure to an implicated product, median incubation is estimated at 3 weeks.

**Communicability:** Mothers of infected newborn infants may shed the agent for 7-10 days after delivery; infected individuals can shed organism in the stool for several months.

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**FOR THE USE OF THE EXPOSURE HOTLINE**

**SECTION V – Viability**

**Drug Susceptibility:** Sensitive to penicillin, ampicillin, aminoglycosides, tetracyclines (resistance has been observed), chloramphenicol.

**Susceptibility to Disinfectants:** Moderately susceptible to disinfectants - 1% sodium hypochlorite, 70% ethanol, glutaraldehyde.

**Physical Inactivation:** Sensitive to moist heat (121°C for at least 15 min) and dry heat (160-170°C for at least 1 hour); able to grow at low temperatures (-0.4 to -0.1°C); sensitive to short wave UV and gamma irradiation.

**Survival Outside Host:** Survives well in soil, water, food, feces.

**SECTION VI – Medical**

**Surveillance:** Self-monitor for symptoms for 2 months following exposure. Any pregnant or immune compromised worker should be evaluated by an infectious disease specialist. If available, serodiagnosis by measurement of antibodies to listeriolysin O may be of use. Any exposed UCSF employee or student should be evaluated at the UCSF-OHS. An Infectious Disease Consultation should be considered within 24-48 hours for any pregnant or immune compromised worker.

**First Aid/Treatment:** No specific treatment; anti-biotic drugs used in symptomatic cases.

**Immunization:** None available

**Prophylaxis:** Consider prophylaxis with tirmethoprim-sulfamethoxazole (Septra), or other antibiotics, as advised by an Infectious Disease Consultant.

**Reporting:** Any known cases of listeriosis must be reported to local and federal authorities: [http://www.cdc.gov/nationalsurveillance/PDFs/ListeriaCaseReportFormOMB0920-0004.pdf](http://www.cdc.gov/nationalsurveillance/PDFs/ListeriaCaseReportFormOMB0920-0004.pdf)

**SECTION VII – Laboratory Hazards**

**Laboratory-Acquired Infections:** Not a common laboratory-associated infection.

**Sources/Specimen:** Cerebrospinal fluid, blood, placental or fetal tissue, genital tract secretions, amniotic fluid.

**Primary Hazards:** Experimentally infected animals are a risk factor to laboratory workers; ingestion is the common mode of exposure, however may cause eye and skin infection following direct exposure; parenteral inoculation, ingestion, exposure to highly concentrated aerosols.

**Special Hazards:** None
SECTION VIII – Emergency Medical Treatment

Treatment Indications: Emergency department treatment will be required for injuries that require immediate medical care. The treatment needs to consist of the following: 1) decontamination and debridement, 2) wound repair, 3) infectious disease referral for high risk exposure, and 4) follow up with UCSF-OHS.

Exposure Indications: In the event of an exposure, with or without an injury, the Exposure Hotline must be called.

Decontamination: Ensure that the wound has been adequately decontaminated.

(Format/Content adapted directly from Canadian SDS and the 5th Edition of Biosafety in Microbiological and Biomedical Laboratories (BMBL) with additional information from subsequent portions of the protocol)

SECTION VIII – References

Public Health Agency of Canada

US FDA BBB
http://www.fda.gov/food/foodborneillnesscontaminants/causesofillnessbadbugbook/ucm070064.htm

BMBL 5th Edition

Principles and Practice of Infectious Diseases, Mandell et al, Churchill Livingstone, 5th edition
I. RISKS IN LABORATORY WORKERS/CLINICAL SUMMARY

- There have been few documented laboratory acquired infections. However, infection in “neonates, pregnant women, elderly persons, immunosuppressed transplant recipients and others with impaired cell-mediated immunity” may cause “life threatening bacteremia and meningoencephalitis.”¹

- “Although most human listeriosis appears to be foodborne, other modes of transmission occur including from mother to child transplacentally or through an infected birth canal, cross-infection in neonatal nurseries, and one common-source outbreak traced to contaminated mineral oil used for bathing infants. Localized cutaneous infections have occurred in veterinarians and farmers after direct contact with aborted calves and infected poultry.”¹

- Laboratory workers should be extremely diligent in the practice of hand hygiene. Whenever gloves are removed, laboratory workers should always wash their hands.

- The main target populations for listeriosis are:
  - pregnant women/fetus - perinatal and neonatal infections;
  - persons immunocompromised by corticosteroids, anticancer drugs, graft suppression therapy, AIDS;
  - cancer patients - leukemic patients particularly;
  - less frequently reported - diabetic, cirrhotic, asthmatic, and ulcerative colitis patients;
  - the elderly;
  - normal people--some reports suggest that normal, healthy people are at risk, although antacids or cimetidine may predispose. A listeriosis outbreak in Switzerland involving cheese suggested that healthy uncompromised individuals could develop the disease, particularly if the food stuff was heavily contaminated with the organism.²

- Pregnant women are about 20 times more likely than other healthy adults to get listeriosis. About one-third of listeriosis cases happen during pregnancy. Newborns rather than the pregnant women themselves suffer the serious effects of infection in pregnancy.³

All UCSF employees who work with Listeria monocytogenes should be aware of the OEH&S policy on workers with immune compromise/pregnancy. Please refer to Campus Research Exposure Protocols, Immune Compromised Worker: http://www.occupationalhealthprogram.ucsf.edu/ohpEE.asp#EP

1. Principles and Practice of Infectious Diseases, Mandell et al., 5th edition, Churchill Livingstone.
2. From U.S. Food and Drug Administration: http://www.fda.gov/food/foodborneillnesscontaminants/causesofillnessbadbugbook/ucm070064.htm
3. From CDC Surveillance: http://www.cdc.gov/listeria/surveillance.html
II. CDC/NIH RECOMMENDATIONS FOR LABORATORY EXPOSURE TO LISTERIA

OCCUPATIONAL INFECTIONS
Cutaneous listeriosis, characterized by pustular or papular lesions on the arms and hands, has been described in veterinarians and farmers. Asymptomatic carriage has been reported in laboratories.

NATURAL MODES OF INFECTION
Most human cases of listeriosis result from eating contaminated foods, notably soft cheeses, ready-to-eat meat products (hot dogs, luncheon meats), paté and smoked fish/seafood. Listeriosis can present in healthy adults with symptoms of fever and gastroenteritis, pregnant women and their fetuses, newborns, and persons with impaired immune function are at greatest risk of developing severe infections including sepsis, meningitis, and fetal demise. In pregnant women, *Listeria monocytogenes* infections occur most often in the third trimester and may precipitate labor. Transplacental transmission of *L. monocytogenes* poses a grave risk to the fetus.

LABORATORY SAFETY
*Listeria monocytogenes* may be found in feces, CSF, and blood, as well as numerous food and environmental samples. Naturally or experimentally infected animals are a source of exposure to laboratory workers, animal care personnel and other animals.

Agent Summary Statements – Bacterial Agents
While ingestion is the most common route of exposure, *Listeria* can also cause eye and skin infections following direct contact with the organism.

Containment Recommendations
BSL-2 practices, containment equipment, and facilities are recommended when working with clinical specimens and cultures known or suspected to contain the agent. Gloves and eye protection should be worn while handling infected or potentially infected materials. ABSL-2 practices, containment equipment and facilities are recommended for activities involving experimentally or naturally infected animals. Due to potential risks to the fetus, pregnant women should be advised of the risk of exposure to *L. monocytogenes*.

Taken Directly from: http://www.cdc.gov/biosafety/publications/bmbl5/index.htm

III. REFERENCES:

Please see individual sections above and:

http://www.fda.gov/food/foodborneillnesscontaminants/causesofillnessbadbugbook/ucm070064.htm
http://www.cdc.gov/listeria/surveillance.html