

Exposure Response Plan for Laboratory Handling of *Listeria monocytogenes*

Background Information:

L. monocytogenes is a motile gram-positive rod. It produces disease and asymptomatic carriers in both humans and animals. The organism has been isolated from soil, animal feed as well as contaminated human food and surfaces of food processing equipment. The disease is termed listeriosis. Most human infections follow consumption of contaminated raw foods. Refrigeration does not slow growth of bacteria significantly. Skin and eye contact have led to occupationally acquired infections. Transplacental infections can result in miscarriage, premature delivery, stillbirth or neonatal death.

Listeriosis in pregnancy: Occurs mostly during the third trimester, and is characterized by a “flu like” illness with symptoms such as fever, chills, malaise, arthralgia, back pain, and diarrhea. In many cases the infection is subclinical or unapparent; however, intrauterine infection of the fetus can lead to fetal death, spontaneous abortion, premature delivery, or the birth of a fetus that dies shortly after birth. Surviving newborns with listeriosis are often classified as “early onset” or “late onset”. Early onset neonatal listeriosis due to transplacental infection often presents as pneumonia and/or sepsis. Severe disease can result in widespread granulomas (granulomatosis infantisepticum). Late onset neonatal listeriosis occurs from infection during birth, with neonates showing symptoms of meningitis one to several weeks after birth. In both early and late onset neonatal listeriosis, the mortality rate ranges from 20 to 30%.

Listeriosis of the CNS: Meningitis is the most frequently recognized listerial infection. Common symptoms of listeriosis of the CNS include high fever, nuchal rigidity, tremor and/or ataxia, and seizures. The most common form of non-meningitic form of CNS listeriosis is encephalitis involving the brainstem (rhombencephalitis).

Febrile gastroenteritis: A non-invasive form of listeriosis that manifests as symptoms typical of gastroenteritis, for example, fever, diarrhea, and vomiting.

Glandular listeriosis: Resembles infectious mononucleosis with swelling of the salivary glands and nuchal lymph nodes.

Local listeriosis: Can manifest as papules and pustules on the hands and arms following direct contact with infectious material, and can be accompanied by constitutional symptoms (fever, myalgia, and/or headache).

Typhoid listeriosis: Characterized by high fever and is particularly frequent in immunocompromised individuals.

Atypical listeriosis: Rare cases of have been described with symptoms such as endocarditis, purulent (mononuclear) pleural exudates, pneumonia, urethritis, and abscesses.

Exposure Incident: Any exposure of the agent to the eyes, nose or mouth, nonintact skin or inhalation of aerosols. Diagnosis is often delayed because symptoms are similar to other agents. If you work with or are around this agent, bring this to your healthcare provider's attention. The infectious dose is unknown and is believed to vary with both strain and host susceptibility. Lab acquired infections have rarely been reported.

Reporting Exposure Incidents: All exposure incidents must be reported immediately to the Principal Investigator/ lab supervisor and seek immediate medical evaluation. Whenever there is an accident involving *Listeria*, the Biosafety Officer must be notified.

Pre-exposure Health Screening:

Prior to beginning work with or around *Listeria*, the PI or an Employee Health Professional will inform the worker of the risks and symptoms of exposure. Listeriosis primarily affects older adults, pregnant women, newborns, and adults with weakened immune systems. Based on the seriousness of the effects, pregnant women may consider avoiding occupational exposure. Workers with additional concerns about pre-existing medical conditions should schedule an individual appointment with the Occupational Medicine physician by calling 541-737-7566. Note: Immunization for *Listeria* is not available.

The following diseases and medications are risk factors for *Listeria* infection, most of which are associated with at least some degree of immunosuppression:

- Glucocorticoid therapy
- Hematologic malignancies
- Solid tumors
- Organ transplantation (especially renal)
- AIDS
- Treatment with tumor necrosis factor-alpha antagonists
- Diabetes mellitus
- End-stage renal disease (including hemodialysis and peritoneal dialysis)
- Iron overload
- Collagen-vascular diseases
- Other serious chronic nonmalignant diseases
- Liver disease and alcoholism

Pregnant women are 20 times more likely to become infected than non-pregnant healthy adults. Infection can occur at any time during pregnancy, but it is most common during the third trimester when the immune system is somewhat suppressed. Discussion with a healthcare provider is recommended. Use of antacids and medications that block gastric acid production increases the risk of infection. Self-identification and subsequent discussion as noted above should be considered.

Precautions:

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.

After an Exposure Incident Occurs:

Immediate Action by Route of Exposure:

- **Needlestick, Animal Bite or Laceration:** Wash the area with soap and running water.
- **Mucous membranes (eye, nose, mouth):** If contaminated material is splashed or sprayed contaminating the eyes, nose or mouth: Flush the eyes for 10-15 minutes. Rinse mouth out with clean water and do not swallow.
- **Inhalation:** If contaminated materials are aerosolized outside of primary containment and potentially inhaled, rinse mouth twice expelling the rinsate. Do not swallow.

Medical Evaluation and Follow-up:

- Following the exposure and immediate actions stated above, faculty and staff should contact the Corvallis Clinic during business hours at 541-753-1785 or 1-866-209-7711 after business hours. Student workers should be evaluated at Student Health Services as soon as possible by the Occupational Health Physician and contact OSU Occupational Medicine at 541-737-7566. Such cases will be handled as a possible laboratory-acquired listeriosis.

Signs and Symptoms of Disease:

- Influenza like symptoms including fever and chills
- Nausea/vomiting
- Pregnant women may experience mild flu-like symptoms, headaches, muscle aches, fever, nausea, and vomiting. If the infection spreads to the nervous system it can cause stiff neck, disorientation, or convulsions.

The incubation period is variable with a median of 3 weeks and a range of 3-70 days.

PLEASE NOTE: Workers must be aware of the remarkably long incubation period of listeriosis, as symptoms may occur months after an exposure. If an exposed individual experiences signs or symptoms of listeriosis, immediately notify the PI and the campus Biosafety Officer and be evaluated by a physician. The more serious cases of listeriosis may take one to six weeks to develop. These cases may result in meningitis (brain infections) and septicemia (bacteria in the bloodstream). Both have a high mortality rate.

Post-exposure Prophylaxis:

There is currently no post exposure pre-symptom prophylaxis for listeriosis.

Oregon Department of Public Health classifies listeriosis as a reportable disease. It must be reported to the Local Board of Health immediately by the attending physician. This disease is also reportable on the national level. If an employee develops signs and symptoms associated with *Listeria* exposure in the absence of an exposure incident, the PI and Biosafety Officer shall be notified immediately. Isolated infection will be considered laboratory-acquired until proven otherwise.