

Listeriosis

Listeriosis is a food-borne infectious disease caused by a bacterium, *Listeria monocytogenes*. It's most commonly caused by eating improperly processed meats and raw milk or food products prepared with raw milk or unpasteurized milk like ice cream & yogurt. It is a sporadic bacterial infection that can affect a wide range of animals, birds, and humans. Healthy people rarely become ill from listeria infection, but the disease can be fatal to unborn babies, newborns, and people with weakened immune systems. Hence can be very serious for pregnant women, people older than 65, and people with weakened immune systems. The most frequently recognized form of clinical presentation is Encephalitis or meningoenephalitis. Early diagnosis and prompt antibiotic treatment can help to control the effects of listeria infection.

Etiology

Listeria monocytogenes is a gram-positive, motile, non-spore-forming, extremely resistant, diphtheroid coccobacillus. The exact range for the growth of *Listeria* is 39.2°F (4 °C) to 98.6°F (37°C). It is a ubiquitous saprophyte, that lives in the plants or soil environment. It has been isolated from 42 species of domestic and wild mammals and other feed-stuffs, including milk, cheese, meconium, and feces.

Epidemiology

Worldwide, more frequently seen in temperate and colder climates. It is a relatively rare disease with 0.1 to 10 cases per 1 million people per year depending on the countries and regions of the world. Although the number of cases of listeriosis is small, the high rate of death (20%–30%) associated with this infection makes it a significant public health concern.

A recent meta-analysis conducted from the studies done in South East Asian countries found that: the overall prevalence for *L. monocytogenes* was 16% (in food, animal, and environmental

sources) (95% [CI]: 10–23). The subgroup analysis revealed ready-to-eat food of vegetable origin had the highest prevalence of 21% (CI: 6–41).

A Sri Lankan study conducted in 1995 to identify *L. monocytogenes* contamination in food samples taken from the market found that 38% of the samples contained bacteria. The percentage of positive samples was highest among vegetables (49%), second in chicken (34%), and lowest in dairy products (26%). Inactivation of *L. monocytogenes* during the cooking of green leaves indicated that *L. monocytogenes* was recovered from samples up to 8 min of cooking by which time the temperature was 72°C.

The natural reservoir of *L. monocytogenes* is found to be soil and mammalian GI tracts, which can contaminate plants. Animals ingest the organism and further contaminate vegetation and soil. Among animals, the transmission occurs via the feco-oral route. From animals to humans, transmission occurs either through direct contact with infected animals or via ingestion of contaminated food products such as milk, cheese, meat, eggs, or vegetables. Outbreaks of this disease have generally involved the ingestion of foods containing high doses of *L. monocytogenes*. Epidemiologic investigation of several outbreaks of listeriosis globally recognized that listeriosis is a foodborne disease.

The disease

Listeriosis affects all ages and sexes. There are two main types of listeriosis: a non-invasive form and an invasive form. Noninvasive listeriosis (febrile listerial gastroenteritis) is a mild form of the disease affecting mainly otherwise healthy people. Symptoms include diarrhea, fever, headache, and myalgia (muscle pain). Invasive listeriosis is a more severe form of the disease and affects certain high-risk groups of the population. It causes severe infections in humans. Human illness due to *L. monocytogenes* usually occurs in the setting of immunosuppression, pregnancy, or extremes of age. Although human exposure to *L. monocytogenes* is not uncommon, transmission of *L. monocytogenes* by food occurs following the penetration of the organism through the intestine. Intracellular multiplication can occur in various types of cells. Factors that may influence whether the invasive disease will occur include the infecting organism's virulence, the host's susceptibility, and the size of the inoculum.

Symptoms might begin a few days after eating contaminated food. The incubation period is usually one to two weeks but can vary between a few days and up to 90 days. It can be presented with fever, chills, muscle aches, nausea, and diarrhea. If the listeria infection spreads to your nervous system, signs and symptoms can include headache, seizures, stiff neck, confusion or changes in alertness, loss of balance, and convulsions. Nonpregnant adults with listeriosis are most often diagnosed with meningitis, meningoenzephalitis, or sepsis. Additional syndromes include abscesses of the brain and spinal cord, endocarditis, endophthalmitis, osteomyelitis, and septic arthritis.

Listeriosis during pregnancy

Pregnant women are about 20 times more likely to contract listeriosis than other healthy adults. Listeriosis may develop at any time during pregnancy, although most infections are detected in the third trimester. Although listeria is a mild illness in pregnant women, the consequences for their babies can be serious. Miscarriage, Stillbirth, Premature birth, or a potentially fatal infection can occur after birth.

Various detection methods, including polymerase chain reaction (PCR), are available for diagnosing listeriosis in humans. The initial diagnosis of listeriosis is made based on clinical symptoms and detection of the bacteria in a smear from blood, cerebrospinal fluid (CSF), meconium of newborns (or the fetus in abortion cases), as well as from feces, vomitus, foods or animal feed.

The spinal fluid examination may show pleocytosis with predominantly polymorphonuclear leukocytes; Gram stain may show gram-positive bacilli but is more often unrevealing; the protein level is elevated; and the glucose level usually is within normal limits. However, many other patterns have been observed. Diagnosis is made by culture of *L. monocytogenes* from spinal fluid, blood, or some other usually sterile site.

Prevention

Listeriosis is a serious, but preventable and treatable disease. Due to the long incubation period, it is challenging to identify the food which was the actual source of the infection. The

controlling *L. monocytogenes* are challenged due to its ubiquitous nature, high resistance to common preservative methods, such as the use of salt, smoke, or acidic condition in the food, and its ability to survive and grow at refrigeration temperatures (around 5 °C). The increased number of immunosuppressed populations at present has led them to an increased risk of listeriosis. More concern was gained as a clinical entity due to high morbidity and mortality and also an increase in safety measures of the food industry. Vulnerable people with a weakened immune system should avoid unsafe food. *L. monocytogenes* is not especially heat resistant and is killed at normal pasteurization temperature. Pasteurization heats milk to a high enough temperature for a long enough time to kill germs. Heat the milk to 63°C (150°F) for at least 30 minutes or 72°C (162°F) for at least 15 seconds and thoroughly cooking the meat product to 165°F/74°C will kill the bacteria. Therefore listeriosis due to cooked poultry is linked either to inadequate cooking or recontamination after cooking. However, the Sri Lankan practice of thoroughly cooking meat in the form of curry probably reduces the risk of listeriosis through poultry meat. In the current context, fast food outlets serving various preparations of poultry meat may pose a threat if inadequately cooked.

L. monocytogenes can easily propagate in nature and can maintain a non-zoonotic life cycle in soil, water, and vegetation. Therefore raw vegetables are considered an important vehicle of bacteria. Since green leaves are grown in low-lying areas with plenty of water the possible contamination with *L. monocytogenes* is high. The practice of eating green leaves either raw or partially cooked as “mallun” is common in Sri Lanka. Therefore proper cleaning before preparation and as evidenced by studies shows that cooking time and temperature should exceed 8 min and 72°C respectively in order to inactivate a heavy inoculum of *L. monocytogenes*. Lettuce and cabbage too were found to be contaminated and adequate precautions should be taken when preparing salads. It has been shown that when vegetables are held at 4°C for 4 d the population of *L. monocytogenes* can increase. The use of refrigeration in supermarkets and homes does not reduce the risk due to the ability of the organism to multiply during refrigerated storage.

In conclusion, it can be said that those engaged in the food industry as well as at household levels should practice good food hygienic practices in order to eliminate the organism during processing, avoid post-processing contamination and check sample products for contamination.

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