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Listeria monocytogenes (page 1)

(This chapter has 3 pages)

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Introduction

Listeria monocytogenes is a Gram-positive rod-shaped bacterium. It is the agent of listeriosis, a serious infection caused by eating food contaminated with the bacteria. Listeriosis has been recognized as an important public health problem in the United States. The disease affects primarily pregnant women, newborns, and adults with weakened immune systems.

Listeriosis is a serious disease for humans; the overt form of the disease has a mortality greater than 25 percent. The two main clinical manifestations are sepsis and meningitis. Meningitis is often complicated by encephalitis, a pathology that is unusual for bacterial infections.

Microscopically, Listeria species appear as small, Gram-positive rods, which are sometimes arranged in short chains. In direct smears they may be coccoid, so they can be mistaken for streptococci. Longer cells may resemble corynebacteria. Flagella are produced at room temperature but not at 37°C. Hemolytic activity on blood agar has been used as a marker to distinguish Listeria monocytogenes among other Listeria species, but it is not an absolutely definitive criterion. Further biochemical characterization may be necessary to distinguish between the different Listeria species.

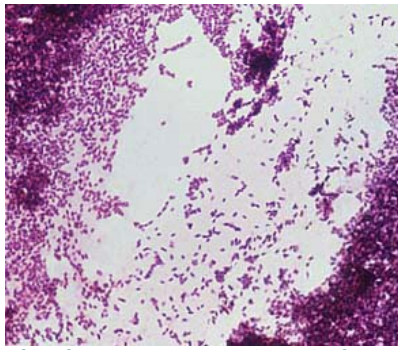
As Gram-positive, nonsporeforming, catalase-positive rods, the genus Listeria was classified in the family Corynebacteriaceae through the seventh edition of Bergey's Manual. 16S rRNA cataloging studies of Stackebrandt et al. (1983) demonstrated that Listeria monocytogenes was a distinct taxon within the Lactobacillus-Bacillus branch of the bacterial phylogeny constructed by Woese (1981). In 2001, the Family Listeriaceae was created within the expanding Order Bacillales, which also includes Staphylococcaceae, Bacillaceae and others. Within this phylogeny there are six species of Listeria. The only other genus in the family is Brochothrix.

Web Review of Todar's Online Textbook of Bacteriology. "The Good, the Bad, and the Deadly".

Tag words: Listeria, Listeria monocytogenes, listeriosis, food poisoning.

Listeria monocytogenes

Kingdom: Bacteria
Phylum: Firmicutes
Class: Bacilli
Order: Bacillales
Family: Listeriaceae
Genus: Listeria
Species: L. monocytogenes



*Listeria monocytogenes* Gram Stain.

### Natural Habitats of *Listeria* and Incidence of Disease

Until about 1960, *Listeria monocytogenes* was thought to be associated almost exclusively with infections in animals, and less frequently in humans. However, in subsequent years, listeriae, including the pathogenic species *L. monocytogenes* and *L. ivanovii*, began to be isolated from a variety of sources, and they are now recognized to be widely distributed in Nature. In addition to humans, at least 42 species of wild and domestic mammals and 17 avian species, including domestic and game fowl, can harbor listeriae. *Listeria monocytogenes* is reportedly carried in the intestinal tract of 5-10% of the human population without any apparent symptoms of disease. Listeriae have also been isolated from crustaceans, fish, oysters, ticks, and flies.

The term **listeriosis** encompasses a wide variety of disease symptoms that are similar in animals and humans. *Listeria monocytogenes* causes listeriosis in animals and humans; *L. ivanovii* causes the disease in animals only, mainly sheep. Encephalitis is the most common form of the disease in ruminant animals. In young animals, visceral or septicemic infections often occur. Intra-uterine infection of the fetus via the placenta frequently results in abortion in sheep and cattle.

The true incidence of listeriosis in humans is not known, because in the average healthy adult, infections are usually asymptomatic, or at most produce a mild influenza-like disease. Clinical features range from mild influenza-like symptoms to meningitis and/or meningoencephalitis. Illness is most likely to occur in pregnant women, neonates, the elderly and immunocompromised individuals, but apparently healthy individuals may also be affected. In the serious (overt) form of the disease, meningitis, frequently accompanied by septicemia, is the most commonly encountered disease manifestation. In pregnant women, however, even though the most usual symptom is a mild influenza-like illness without meningitis, infection of the fetus is extremely common and can lead to abortion, stillbirth, or delivery of an acutely ill infant.

In humans, overt listeriosis following infection with *L. monocytogenes* is usually sporadic, but outbreaks of epidemic proportions have occurred. In 1981, there was an outbreak that involved over 100 people in Canada. Thirty-four of the infections occurred in pregnant women, among whom there were nine stillbirths, 23 infants born infected, and two live healthy births. Among 77 non pregnant adults who developed overt disease, there was nearly 30% mortality. The source of the outbreak was coleslaw produced by a local manufacturer.

One of the most serious and publicized outbreaks of listeriosis occurred in California in 1985 as reported in MMWR, June 21, 1985 / 34(24):357-9.

According to the report, between January 1 and June 14, 1985, 86 cases of *Listeria monocytogenes* infection were identified in Los Angeles and Orange Counties, California. Fifty-eight of the cases were among mother-infant pairs. Twenty-nine deaths occurred: eight neonatal deaths, 13 stillbirths, and eight non-neonatal deaths. The increased occurrence of listeriosis was first noted at the Los Angeles County-University of Southern California Medical Center; all cases were in pregnant Hispanics, and all appeared to be community-acquired. A systematic review of laboratory records at hospitals in Los Angeles and Orange County identified additional cases throughout the area.

An analysis of Los Angeles County cases showed that 45 (63%) of the *Listeria* cases were among mother-newborn pairs. Most (70%) of these women had a prior febrile illness or were febrile on admission to the hospital. Forty-two of the neonatal patients had onset of disease within 24 hours of birth, and all isolates available for testing were serotype 4b. Three of the neonatal patients had late onset disease; only one of the two isolates available for testing was serotype 4b.

Samples of Mexican-style cheeses from three different manufacturers purchased from markets in Los Angeles were cultured at CDC; four packages of one brand of cheese grew *L. monocytogenes* serotype 4b. The four positive cheese samples were of two varieties, queso fresco and cotija.

In 2002, a multistate outbreak of *Listeria monocytogenes* infections with 46 culture-confirmed cases, seven deaths, and three stillbirths or miscarriages in eight states was linked to eating sliced turkey deli meat. One intact food product and 25 environmental samples from a poultry processing plant yielded *L. monocytogenes*. Two environmental isolates from floor drains were indistinguishable from that of outbreak patient isolates, suggesting that the plant might be the source of the outbreak.

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[chapter continued](#)

[Next Page](#)

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