

Listeria monocytogenes

What is *Listeria monocytogenes*?

Listeria monocytogenes is one of the many *Listeria* species and is a facultative anaerobic bacterium that causes the foodborne illness, Listeriosis. Listeriosis is often characterized by septicemia, meningitis, encephalitis, gastrointestinal infection and abortion. Listeriosis is rare; however, it has a high death rate of up to 30% and therefore remains a high priority for the food safety community. The most susceptible populations are the elderly, pregnant individuals, neonates and immunocompromised individuals.

What foods are implicated with *Listeria*?

L. monocytogenes is found throughout nature and has even been found in healthy animals and humans. *Listeria* can be isolated from sewage, silage, soil, fertilizer, vegetable matter and many foods. Almost any type of food with the below parameters can support the growth of *L. monocytogenes*:

- A pH of 4.4 and above
- Water activity of 0.92 and above
- Storage temperatures between -0.4° and 45°C

Listeriosis outbreaks have been most associated with Ready-to-Eat (RTE) food products. Some examples include but are not limited to coleslaw, raw sprouts, fruit salads, ice cream cakes, prepackaged sandwiches, RTE fish products, deli meats, frankfurters, cheese, milk and more.

RTE food products that meet the parameters above are classified into three categories based on risk and are treated accordingly. These categories are:

- **Category 1** - RTE foods that can support the growth of *L. monocytogenes* and/or the food product is intended for the susceptible population.
- **Category 2A** - RTE foods where limited growth of *L. monocytogenes* to levels not greater than 100 CFU/g can occur throughout the stated shelf-life.
- **Category 2B** - RTE foods in which the growth of *L. monocytogenes* cannot occur throughout the expected shelf-life of that food.

Control Measures for *Listeria* in Food Products

To control the growth of *L. monocytogenes*, there are a variety of methods that can be utilized alone or in combination, including:

- Storing products at freezing temperatures of a minimum of -18°C or below
- Acidifying the product to a pH below 4.3
- Reducing the water activity to below 0.92
- Limiting shelf-life to less than five days
- Including anti-*Listeria* compounds in product formulation

Control Measures for Listeria in the Environment

Contamination that occurs during post-processing poses the greatest threat to RTE food products. *L. monocytogenes* can contaminate the product during post-processing activities through interaction with raw materials, incoming air, workers' uniforms and hands or the food processing environment. Therefore, sanitation programs that include environmental monitoring, physical separation from raw materials and proper process flow are critical in producing RTE food products.

Sanitation Program: Should include a cleaning step followed by a sanitization step that utilizes a sanitizer with appropriate concentrations of quaternary ammonium compounds that is rotated with another appropriate sanitizer to ensure *L. monocytogenes* does not develop resistance to the quaternary ammonium compound.

Environmental Monitoring Program: Following sample procedures set out by *Health Canada* based on the health risk assessment should be followed. Product and environmental swabbing should occur every month for a Category 1 RTE product and twice a year for a Category 2 RTE product if no antimicrobial agent or a post-lethality treatment is not conducted.

Physical Separation: Processing facilities should be designed to ensure that storing, handling and processing of raw materials occurs in separate rooms from the processing room, and there is an additional room for packaging and storing the final RTE product separate from all incoming raw ingredients.

Process Flow: The flow of product should occur in a way that limits any cross-over of product, workers or equipment. Sanitizer foot baths should be utilized at areas where cross-over does occur, and when possible, equipment such as conveyors should be used to further reduce the potential of cross-overs.

Resources and Further Information:

Health Canada. 2011. Policy on *Listeria monocytogenes* in Ready-to-Eat Foods. [policy_listeria_monocytogenes_2011-eng.pdf \(canada.ca\)](#)

Canadian Food Inspection Agency. Control measures for *Listeria monocytogenes* in ready-to-eat foods. [Control measures for Listeria monocytogenes in ready-to-eat foods - Canadian Food Inspection Agency \(canada.ca\)](#)

Lopez-Valladares, G., Danielsson-Tham, M.L., Tham, W. 2018. Implicated Food Products for Listeriosis and Changes in Serovars of *Listeria monocytogenes* Affecting Humans in Recent Decades. *Foodborne Pathogens and Disease*. 15 (7): 387-397.

Schlech III, W.F. 2000. Foodborne Listeriosis. *Clinical Infectious Diseases*. 31: 770-775.

U.S Food and Drug Administration. 2012. Bad Bug Book (Second Edition): *Listeria monocytogenes*. [Bad Bug Book \(Second Edition\) | FDA](#)