

# Listeria monocytogenes: Reducing your risk

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## Background

The Centers for Disease Control and Prevention (CDC) reports that nearly 50 million individuals are sickened each year with a foodborne disease in the United States alone. Up to 20% of these cases implicate a known foodborne pathogen<sup>1</sup>. While less than 2,000 cases are associated with *Listeria* as the causative agent, *Listeria monocytogenes* (*L. monocytogenes*) has a high mortality rate in susceptible populations, and is ranked as the third leading agent implicated in death associated with foodborne illness<sup>2</sup>. In recent years, there has been eight outbreak events in the U.S. linked to *L. monocytogenes*<sup>3</sup>.

## What is *L. monocytogenes*?

*L. monocytogenes* has been identified as foodborne pathogenic bacterial agent since the 1980s. *L. monocytogenes* is included in the genus *Listeria* and is identified as the only one of six species to be characterized as a public health concern to public health<sup>4</sup>. There are several unique attributes that make *L. monocytogenes* such a critical organism in food safety.

## Who is at risk for infection from *L. monocytogenes*?

Healthy individuals are less likely to be at risk for infection, and if there is an infection, their symptoms will be flu-like and not life threatening. The organism presents a much higher incidence of illness in populations that already would be considered compromised in some capacity. These high-risk groups include the immunocompromised, young children, pregnant women, and the elderly. The disease incidence of *L. monocytogenes* is relatively low in comparison to other known pathogenic bacteria. However, as consequences of an infection by the pathogen can be severe, causing miscarriage and even death, U.S. food regulatory agencies have escalated this organism to a level of zero tolerance.

## What foods are commonly associated with *L. monocytogenes*?

Foods that are commonly associated vectors for *L. monocytogenes* transmission are those not cooked before consumption, often classified as ready to eat (RTE). These products include deli meats, prepared salads, fresh cut produce and non-fermented dairy products. Characteristics of this organism contribute to its persistence in foods if contaminated. *L. monocytogenes* is not only able to survive, but even will grow under refrigerated and freezer conditions<sup>6</sup>. Also, consideration must be given that these food types may have very low levels of natural bacteria which can inhibit growth of *Listeria* spp.

## Where does *L. monocytogenes* come from?

*Listeria* spp., including *L. monocytogenes*, are frequently termed to be ubiquitous in the environment. This genus of organism is found in soil, raw ingredients, raw produce, floor drains and food processing equipment<sup>5</sup>. *L. monocytogenes* is known to be transferred through a variety of methods, including soiled clothing, cross contamination with food processing equipment, raw materials, employee traffic and handling of materials.

## How does the food industry assure that product is safe?

*L. monocytogenes*, as well as other known foodborne pathogens, are closely scrutinized in food production environments. The approach largely adopted in the U.S. to ensure the safety of food in production facilities are known as Hazard Analysis Critical Control Point (HACCP) programs. HACCP programs are scientifically based systems that are developed to identify and mitigate/eliminate biological or chemical agents from entering the food supply.

In consideration of a HACCP program, risks (in this example, the presence of *L. monocytogenes*) are determined to reasonably likely to occur. In that context, the product may be presumed to be positive for the agent of concern. With that information,

the product is handled through the manufacturing process up to and including packaging and supply chain logistics until it is verified that *L. monocytogenes* is not present.

The charge of a HACCP practitioner is to eliminate potential contamination from racing through the processing line, but to also understand the persistent nature of *L. monocytogenes* in the environment, thereby securing and protecting the product from recontamination following processing.

Any individual tasked with creating, implementing and executing a HACCP program is required to go through training. This training reinforces the fundamental principles and provides framework of knowledge from which quality managers can build their food safety programs. As the concept of critical control points is implemented, those responsible for overseeing the HACCP program must be constantly aware of changes in the risks incurred in their processing environment, and verify that careful monitoring will be sufficient to detect any breakdown in the HACCP program.

Once a HACCP plan is crafted and implemented, how is it verified to be effective? How does a quality management team know that food produced is microbiologically safe and there has not been a breakdown in the system? Clearly it is not always realistic to sustain a statistically valid sample regime for finished product testing. The goal is to incorporate tools that would allow sentinel markers of system and process efficacy. This largely includes environmental monitoring for indicator organisms such as *Listeria* spp. and *L. monocytogenes*, and sanitation monitoring to verify cleaning practices and efficacy to complement testing of finished product. This surveillance testing approach will be effective only if executed daily or following any activity affecting the process, such as cleaning and sanitation. Equally important, if not more so, is interpreting the data and understanding it helps the organization's goal for production of safe food. Data is often used to understand where issues manifest and even persist in the plant. This approach to plant mapping reinforces the integrity of the safety processes and allows quality personnel to understand where potential risks or gaps in control may physically reside in their facility. The capability to trend this data seasonally or annually empowers the producer to shift food safety processes to address to risk dynamics.

## What resources are available for me as a food manufacturer?

To further support food safety awareness, Neogen's website [www.neogen.com](http://www.neogen.com) is continually updated and provides links to relevant industry groups and regulatory agencies.

## Conclusion

*Listeria monocytogenes* is a virulent foodborne pathogen that can lead to illness and death. A well-developed HACCP plan can identify and mitigate risks from foodborne pathogens such as *L. mono*. Neogen offers diagnostic tools and tests that can provide early warning for potential breakdowns in food safety programs designed for pathogen control. The ANSR, Reveal 2.0, and GeneQuence *Listeria* systems have all been validated by the AOAC Performance Tested Methods Program on a variety of foods including ice cream. Please contact us for further information.

## References

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