United States Department of Agriculture - Agricultural Research Service

Food Safety Research Information Office

FSRIO

FOOD SAFETY RESEARCH: A FOCUS ON

Listeria monocytogenes

Listeria monocytogenes (Lm) is the causative bacteria of listeriosis, a very dangerous and often deadly disease. The CDC reports approximately 2,500 cases a year, 500 of which are fatal. This is more than both Salmonella and Botulism.

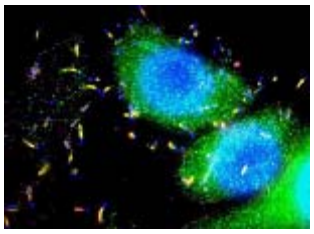
Effectively controlling Lm is challenging and requires intensive management and resources. Although the risk of developing listeriosis is low, the consequences are devastating for both the consumer and the processor.

Due to the ubiquitous nature of the bacteria, it is among the most highly researched foodborne pathogens in the United States, Canada, and many other countries.

In the US, the food industry and government agencies have taken great steps to reduce contamination. The USDA and FDA are establishing performance standards for processing facilities of ready-to-eat (RTE) products. The USDA and FDA monitor plants and food regularly. If a food or plant is contaminated, the agencies intensify inspections and if necessary recall the product.

The CDC's National Center for Infectious Disease works with health departments in outbreak investigations, studying the impact of prevention and education to determine its effects on occurrence.

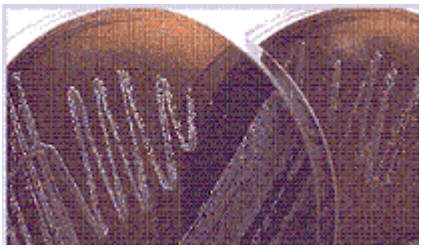
It is the organism's ability to grow and reproduce in a wide variety of conditions that make it such a dangerous foodborne pathogen. Lm can be isolated from soil and ground water, mammals, raw and pasteurized milk, under-cooked seafood, and RTE meat and poultry products such as hotdogs and lunch meats.



L. mono-cytogenes. Image courtesy of David Drubin, University of California

Lm can grow and reproduce at refrigerated temperatures. The infective dose of Lm varies with the strain and susceptibility of the victim, thus the US, Canada, and Europe maintain zero tolerance for Lm.

Listeriosis has been linked to some of the most deadly outbreaks of foodborne illnesses in the US. The disease can affect pregnant women, newborns, and immune compromised adults. In healthy individuals, the disease can take the form of mild to substantial flu-like symptoms. Lm in pregnant women can lead to stillbirths and miscarriages. Penicillin is effective in the treatment of Listeriosis.



Standard agar detection method for Lm takes 48h to complete. Rapid methods are being developed and studied.

RESEARCH AREAS

Studying the prevalence of Listeria monocytogenes in beef processing plants.

Generating a complete genome sequence and plasmids for Lm Scott A strain, serotype 4b.

Determing the effectiveness of irradiation and packaging treatments to control L. monocytogenes.

Distinguishing illness causing strains from non-illness causing strains of L. monocytogenes.

Evaluating production intervention strategies, education and GMPs.

Evaluating the effectiveness of varying sanitation procedures and products in the contolling of L.

Asessing the potential of a biopreservative applied to frankfurter casings for control of Lm.

Evaluating the dose-response of infection following an intragastric inoculation of Lm.

Studying post-cooking intervention to eliminate L. monocytogenes from packaged and refrigerated RTE

Evaluating the appropriateness of an absolute zero tolerance for Listeria levels.

Evaluating more sensitive detection methods for low level healthy or injured cell detection of L.

Developing better agars and quicker rapid detection methods.

FSRIO DATABASE PROJECTS

Projects in the FSRIO database related to this topic are listed below. Visit FSRIO online to access the projects.

Control of Listeria Monocytogenes in Processed Meats: Combinations of Physical, Chemical and Biological Interventions
USDA. Cooperative State Research Educationand Extension Service.

Eliminating Listeria Monocytogenes from Ready-to-eat Products
USDA. Agricultural Research Service.

Genome Sequence for Listeria Monocytogenes
USDA

Identification of Listeria monocytogenes Genetic Clusters Having Increased Pathogenic Potential
USDA. National Research Initiative.

Inhibition of L. monocytogenes Biofilms by Plasma-Deposited Antibacterial Layers
USDA. Cooperative State Research Education and Extension.

Molecular Ecology of Listeria Monocytogenes in the Turkey Processing Industry
USDA. Agricultural Research Service.

Risk Assessment of the Public Health Impact of Foodborne Listeria monocytogenes
FDA. Center for Food Safety and Applied Nutrition.

Transfer Coefficients for Listeria Monocytogenes to and From Food Contact Surfaces Found in meat Fabrication Facilities
USDA. Agricultural Research Service.

RESOURCES

This factsheet was produced using the resources listed below. Visit FSRIO online to access these links.

Listeriosis
CDC. Division of Mycotic Diseases.

Listeria monocytogenes
USDA. Food Safety Inspection Service.

Foodborne Pathogenic Microorganisms and Natural Toxins Handbook: Listeria monocytogenes
FDA. Center for Food Safety and Applied Nutrition.

How to Safely Handle Refrigerated RTE Foods and Avoid Listeriosis
FDA. Center for Food Safety and Applied Nutrition.

This fact sheet is one of several information products developed by the Food Safety Research Information Office (FSRIO) at the USDA's National Agricultural Library (NAL). Fact sheets on specific food safety research topics are available on the FSRIO web site at:
http://fsrio.nal.usda.gov/topics.php

FSRIO is a unique resource for the food safety research community. The program features a web site that serves as a gateway to research information and includes a database of federally-funded research projects. The database is available for researchers, policymakers, consumers and others to learn about research initiatives, and assist the government in assessing food safety research needs and priorities, thereby minimizing duplication of effort. FSRIO also provides a reference service at no charge.

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http://www.nal.usda.gov

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