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Where the problem is with *Listeria monocytogenes*?

Editorial

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Food borne diseases are considerate an important public health concern in many countries and each year, ingestion of foods contaminated with pathogens causes millions of episodes of diarrhea and other debilitating effects. As results, large number of hospitalizations and thousands of deaths occur, and billions of Euros and Dollars are spent every year with recalls and patients medical treatment. The emergence of some of these diseases is the result of complex interactions, such as the advances in the medical field, the expansion of the food industry, cold storage systems, as well as the change in eating habits. Since the consumption of contaminated food has been associated with the development of diseases, various studies were developed, especially in industrialized countries, in order to clarify the relationship between these pathogens and their persistence in the food processing environment, their main routes of contamination, how they can survive and multiply in foods, and their potential to cause disease. Among these microorganisms, *Listeria monocytogenes* is a concern for Public Health agencies. Several countries adopt a zero tolerance policy regarding the presence of *L. monocytogenes* in foods. However, the environment conditions of food processing industries were always partially located in secondary importance in the tracking presence of reservoirs for *L. monocytogenes* and other foodborne pathogens. In recent years, phenotypic and genotypic studies led to new insights into ecology, epidemiology, virulence potential and genetic evolution of various genuses of bacteria. *L. monocytogenes* is the causative agent of listeriosis, a severe foodborne disease that affects mainly the elderly, immunocompromised individuals, pregnant women and neonates. Listeriosis is characterised by gastroenteritis and septicaemia, leading to abortion and infections in the nervous system. Its mortality rate varies from 20 to 30%, this being common mainly when the pathogen is able to cause encephalitis and meningitis.

The first reported case of *Listeria* can be addressed to 1924 and was proposed the genus Listerella in honour of surgeon and early antiseptic advocate Joseph Lister. *Listeria monocytogenes* was first described by E.G.D. Murray in 1926 based on six cases of sudden death in young rabbits. Murray referred to the organism as *Bacterium monocytogenes*, however Harvey Pirie changed the genus name to *Listeria* in 1940. Eventually, the genus *Listeria* was proposed and accepted. All species within the *Listeria* genus are Gram-positive, non-spore forming, catalase positive rods. The genus *Listeria* was classified in the family Corynebacteriaceae through the seventh edition of Bergey's Manual of Systematic Bacteriology. In 2004, the genus was placed in the newly created Family *Listeria* ceae. The only other genus in the family is Brochothrix.[1]

Currently, the *Listeria* genus comprises twelve species: *L. monocytogenes* , *L. ivanovii*, *Listeria innocua, L. welshimeri, L. seeligeri, L. grayi, L. marthii, L. rocourtiae, L. weihenstephanensis, L. fleischmannii, L. denitrificans* and *L. murrayi* (http://www.bacterio.net/*Listeria* .html). In addition, two species group other subspecies have been recognized: *L. ivanovii* (subsp. *ivanovii* and subsp. *londoniensis*), and *L. fleischmannii* (subsp. *fleischmannii* and subsp. *coloradonensis*). And five other new species have been described recently (*L. floridensis* sp. nov, *L. aquatica* sp. nov., *L. cornellensis* sp. nov., *L. riparia* sp. nov., and *L. grandensis* sp. nov.).[2] Many of these species are widely distributed in the environment and have been isolated in natural, urban, and farm environments, including human and animal faeces. However, only two species are known to be pathogenic: *L. ivanovii*, which has epidemiological importance restricted to ruminants, and *L. monocytogenes* , that can infect a variety of animal species, including humans. *L. monocytogenes* and *L. ivanovii* consist of Gram-positive, facultative intracellular food borne pathogen, that can survive a wide pH range, high salt concentrations, and most important: can survive and multiply at refrigeration temperatures, and they are able to form biofilms.[3,4] The biofilm formation has been associated with the persistence in industrial environments, and it is the main responsible for cross-contamination to end products. Many studies have demonstrated a low occurrence of *L. monocytogenes* in animals upon arrival at slaughterhouses. However, due to its ubiquitous nature and adhesion ability, the food industry environment is considered an important source of contamination by this foodborne pathogen, and many studies demonstrated the presence of *L. monocytogenes* in floors, tables, drains, boxes, hands handlers, transport carts, boxes, and other equipment and utensils. In recent years, the use of molecular methods has helped to demonstrate the genetic diversity of these isolates isolated from various sites, due to the characterization of their genetic profiles. This characterization is mandatory to demonstrate the association between isolates obtained from food and clinical samples. Based on these characteristics, food industries require special attention with respect to cleaning and sanitization procedures to eliminate *L. monocytogenes*, aiming the safety of food products distributed for retail sale, and also to avoid trade barriers and recalls, as various countries have already adopted zero tolerance for *L. monocytogenes*. Several foods are associated with sporadic cases and outbreaks of listeriosis. The Food and Drug Administration (FDA, USA), from an epidemiological risk assessment, developed a scale of risk with the main ready to eat foods, distributed

in risk groups. The ready to eat food, sausages, pates, unpasteurized dairy products, seafood, fish and smoked food products showed higher risks for listeriosis. The processing chain of these foods requires special attention of individuals from risk groups. Meanwhile, further scientific investigations are important to understand the dynamic of contamination, and to development and application of new strategies to control *L. monocytogenes* in the industrial environment.

The nature of the international market changed in last few decades and several of the developing countries have strong growing economies, becoming important suppliers of raw food products, especially animal protein. In this sense, the creation of stronger public policies for surveillance and tracking *L. monocytogenes*, and other food borne pathogens, in all stages from farm to fork is very important. Based on the molecular approaches in the study of the ecology of pathogenic bacteria we are able to track the spread of these bacteria and to focus on more efficient way for control and preventions.

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Conflict of interest

The author declares no conflict of interest.

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