Listeria monocytogenes and listeriosis

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Listeria are non-sporing Gram positive bacteria. They are facultatively anaerobic and grow at temperatures between about zero and 45˚C. *Listeria* are commonly present in waters, soil and silage, and are often carried by asymptomatic animals. Six species are recognized. Three of four of these may cause occasional infections of humans and/or animals, but the main pathogenic species is *Listeria monocyotgenes*.

Listeriosis in humans is relatively rare in comparison with other foodborne infections as the incidence of reported cases in North America is about 10 per million inhabitants, and less than that in European countries. However, the organism is an intracellular parasite that can cause severe disease, particularly in fetuses, the newborn, and the elderly. Case fatality rates vary considerably with the form of the disease, and range from none in mild, feverish gastroenteritis cases which are rarely reported (2 to 3 day onset, resolve <week), to 30% case fatalities for serious septicemic infection among immune-compromised patients. The organism is mostly acquired from food with most cases occurring sporadically, but identification of the food involved is often difficult because of long incubation times after infection before symptoms become apparent.

L. monocytogenes presents a particular problem for ready-to-eat food. The organism is commonly present in the food processing as well as the food production environment. Specific strains often persisting at individual plants for extended periods, though all such strains are not necessarily pathogenic. Cooking or other processing can eliminate the organism from a product, but the final product may be recontaminated, directly or indirectly, from raw product, the plant environment, or processing equipment. The infectious dose of the organism is relatively high, so numbers in ready-to-eat foods less than 100 cfu/g are regarded as posing no health risk for the general population. However, even if the initial numbers of L. monocytogenes on a chilled food are low, the organism may grow to hazardous numbers during extended storage at refrigeration temperatures, or in much shorter times if the product is subject to temperature abuse.

Obviously, scrupulous cleaning of plant and equipment used for the production of ready-to-eat foods is necessary if health risks from *L. monocytogenes* are to be avoided. It is highly unlikely that the necessary cleaning of food contacting surfaces would ever be neglected by any reputable food processor. Unfortunately, not all food processing equipment is designed to hygienic specifications, and some parts of some equipment may be inaccessible for routine cleaning. Areas that cannot be cleaned may also develop because of damage to properly designed equipment. Detritus or contaminated water that accumulates and persists in such dead areas can harbour large populations of bacteria that may include *L. monocytogenes*; and these organisms can often be spread to the food during operation of the equipment. Careful attention to equipment design and maintenance as well as to plant and equipment cleaning is evidently necessary if risks from *L. monocytogenes* on ready-to-eat foods are to be avoided.

As a precaution in RTE food plants, there should be frequent examination of equipment to see whether a drive bearing seal or a hydraulic seal has failed and allowed food seepage into an assembly. Verification should be done after equipment cleaning has been completed but before equipment is used in production. Just turning on the equipment and looking for spatter of food debris on the cleaned surfaces should be a check that is performed daily, if at all possible.