

Microbial update

listeria

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An infection by listeria causes listeriosis, an illness that has many forms. One of the main forms of the illness affects mothers and their unborn or newly born children. In such cases the symptoms suffered by the mother can be mild, with a slight fever and mild gastroenteritis. For the child, however, the outcome can be very serious and often fatal. In non-pregnancy associated cases, those affected can suffer bacteraemia (viable organisms in the blood) or meningitis (swelling of the membranes surrounding the brain).

More recently however, there have been an increasing number of cases in the over 60 year old age group.

It was during 2006 that it became apparent that there was a change in epidemiology for listeria infections within England and Wales.

The change involved an increase in the number of cases involving people that were 60 years old or greater who had an illness characterised by bacteraemia (the presence of live bacteria within the blood) and an absence of infection of the central nervous system (previously a common symptom of Listeria infection).

In reality, the number of cases of this type doubled between 2001 and 2006.

Interestingly, very similar patterns were



noted in Scotland, Northern Ireland and many other European countries.

Previously to this, as noted before, infection tended to be associated with pregnant women or immunocompromised individuals, often with a symptom of infection of the central nervous system. In the pregnant this often results in a stillbirth or neonatal death.

Infection in infants older than a month was quite rare, as it was in healthy adults. The increase in cases in those greater than 60 years old was, therefore, of great significance.

Listeria

Listeria are common organisms, they have been isolated from a range of different animal species and can be commonly found in the environment. Listeria comprises six species (*L. monocytogenes*, *L. innocua*, *L. ivanovii*, *L. seeligeri*, *L. welshimeri* and *L. grayi*).

A previous species called *L. murrayi* is now considered to be the same as *L. grayi*. Out of all of these species, only *L. monocytogenes* is considered to be a human pathogen. Unusually for pathogenic bacteria, Listeria can grow at refrigeration temperatures, so whilst chilling will reduce their growth rate, it will not, on its own, stop them from growing.

Listeria originates from the environment and can be commonly found in soils and untreated water.

This will of course mean that animals and

plants destined for human consumption may well be contaminated with listeria, leaving the food producer to develop ways in which this contamination can be removed – this being particularly important in any food considered 'ready to eat'.

With animal derived foods, normal cooking is enough to destroy the organism, the main control that has to be employed is the correct cooking time and temperature, followed by hygienic methods that prevent recontamination of the cooked material.

Some animal derived foods are not cooked, for example cold smoked fish; here good hygienic procedures are the only way forward.



It is well known that listeria can be a problem in some dairy foods. Raw milk can be contaminated with the organism and there can be a risk that products made from raw milk can contain viable listeria.

Plant based material such as vegetables, can be contaminated in the field. In vegetables items that are going to be cooked before eating this is not an issue; however salad vegetables are eaten raw and could be a source of a problem.

Commercial ready to eat salad products are washed before packing, often using a sanitizer in the washing water. This will remove soils and can kill contaminating micro-organisms and may be a control for low levels of contaminating listeria.

Foods

One of the main types of foods of concern with respect to listeria are those considered ready to eat. Listeria is not resistant to heat, so a normal cook will inactivate the organism.

However, foods that are not given a heat process immediately before eating could become contaminated and be a possible source of infection. Food producers have gone a long way to reducing or eliminating listeria on such ready to eat products, but on occasions some foods can become contaminated.

In the past 10 years, large listeria outbreaks have occurred in Canada (ready to eat, cooked sliced meats), Austria (soft cheeses), butter (UK), and prepared sandwiches (UK). In the incidents involving sandwiches, a number have been sandwiches supplied to hospitals.

This brings into question issues of the correct storage of sandwiches within hospital environments (availability of good chilled storage), and patient practices (potential for



not eating supplied sandwiches immediately but storing at ambient temperature for some time).

Change in epidemiology

In the UK, the Advisory Committee for the Microbiological Safety of Foods (ACMSF) has considered the rise in cases in the over 60s and developed four hypotheses as to why this may be occurring:

- The rise in cases is an artefact associated with improved case recognition.
- The population predominantly affected by the recent increase has become more susceptible to infection with *L. monocytogenes*.
- The pathogen, *L. monocytogenes* has become more virulent and 'new' strains are more capable of causing infection which manifests as bacteraemia in this group of patients.
- Levels of exposure have increased, as a result of increased contamination of foods, changes in processing and composition of foods, or changing patterns of consumption,

or food storage in the over 60s. As yet there is no clear evidence as to which of the hypotheses may be correct, it is not believed that increased case recognition plays a great part in the situation and there is also no evidence that the organism is becoming more virulent. But there is an aging population, with a great proportion suffering from underlying conditions that could increase their susceptibility to infection. Additionally, it is possible that levels of exposure of this particular group have increased, as they may now eat more foods that could occasionally contain listeria.

Conclusions

Some 10 years ago, food microbiologists and epidemiologist believed that they understood listeria and listeriosis. Within the past five years that has changed and we are in a situation where we are looking for reasons why certain group are at increased risk of infection.

It is another clear indicator that food producers and microbiologists must remain ever vigilant and continue their observations and studies to assure a safe food supply. ■

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Recent listeria outbreaks

■ Raw poultry

April 2010: US Agricultural Research Service (ARS) scientists pinpointed incoming raw poultry as the primary source of *Listeria monocytogenes* contamination in commercial chicken cooking plants. For the 21 month study, scientists from ARS and the University of Georgia tested a new commercial cooking facility before and after processing began. The plant was free of *L. monocytogenes* when first constructed.

■ Acid-curd cheese

February 2010: Quargel acid-curd cheese was identified as the probable source of an outbreak of *Listeria monocytogenes* that made 12 people ill in Austria and two in Germany. Both of the Germans and two of the Austrian victims died as a result of their infections.

■ Cooked meat

Autumn 2008: An outbreak of *Listeria monocytogenes* caused 57 confirmed cases and killed 22 people due to listeria contamination

in RTE meat products from the Maple Leaf Foods plant in Canada. Even though testing and safety procedures were in place, the listeria was not controlled. This reportedly cost the company \$20 million.

■ Sandwiches

Autumn 2003: An outbreak of listeriosis occurred in the Swindon area of the UK. Five cases were detected in pregnant women. Four of these women were thought to have eaten pre-packed sandwiches from a retail outlet in one particular hospital. Sampling at the supplier detected *Listeria monocytogenes*, which was indistinguishable on molecular testing from the patients' isolates.

■ Butter

January and July 2003: Seventeen confirmed cases of Listeriosis occurred in the North East of England; 14 in the Yorkshire and Humberside region. Tests associated the outbreak with butter produced at a dairy in the region. Eleven cases were pregnancy-associated and two miscarriages and one stillbirth were reported. Four of the non-pregnancy associated cases were immuno-compromised; all were over 50 years of age and two deaths were reported.