MOLECULAR EPIDEMIOLOGY AND DISINFECTANT SUSCEPTIBILITY OF *LISTERIA MONOCYTOGENES* FROM MEAT PROCESSING PLANTS AND HUMAN INFECTIONS

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Background

Previous studies have shown that many *Listeria monocytogenes* isolates from heat-treated meat products seem to have other origins than fresh meat (Boerlin and Piffaretti., 1991; Nesbakken et al., 1996).

Objectives

The purpose of this investigation was to obtain knowledge of sources, routes of contamination and genetic types of *L. monocytogenes* present along the production line in the meat processing industry, and to compare meat industry isolates and human isolates.

Materials and methods

We have investigated the molecular epidemiology of *L. monocytogenes* from the meat processing industry producing cold cuts and from cases of human listeriosis by discriminative pulsed-field gel electrophoresis (PFGE). A subset of the isolates was also investigated for susceptibility to a disinfectant based on quaternary ammonium compounds (QAC) frequently used in the meat processing industry. Of the 218 isolates from four meat-processing plants, 197 were from two plants responsible for nearly 50% of the production of cold cuts in the Norwegian market. The strain collection included historical routinely sampled isolates (1989-2002) and isolates systematically sampled through a one year period (November 2001-November 2002) from fresh meat and production environments in three plants in Norway. Human strains included all available reported isolates from Norwegian patients in selected time periods.

Results and discussion

No isolates were obtained in samples from employees (throat (n=70), faeces (n=45)). The *L. monocytogenes* PFGE data showed a large genetic heterogeneity, with isolates separated into two genetic lineages and further subdivided into 56 different PFGE profiles. Certain profiles were observed on both sides of production (before and after heat treatment) indicating contamination of end products by fresh meat or fresh meat environments. While fresh meat isolates almost exclusively grouped within lineage I, isolates from end products showed a more balanced distribution between lineage I and II. Ten profiles were common among isolates from human and meat industry. Typing of human isolates identified a previously unrecognised outbreak. Generally, a higher QAC resistance incidence was observed among isolates from the meat processing industry than among human isolates although large plant to plant differences were indicated. No correlation between resistance and PFGE profile or resistance and persistence was observed.

Conclusions

Additional factors than fresh meat seem to be responsible for contamination at the end product side. No positive samples detected from throat and faeces of employees indicated employee carriage as a minor factor in colonisation and spread of *L. monocytogenes* in the plants. The results indicate an overall higher prevalence of resistant clones in the food industry compared to isolates from human cases.

References

Boerlin, P. and Piffaretti, J.C. 1991. Typing of human, animal, food, environmental isolates of *Listeria monocytogenes* by multilocus enzyme electrophoresis. Appl. Environ. Microbiol. 57: 1624-1629.

Nesbakken, T., Kapperud, G. and Caugant, D.A. 1996. Pathways of *Listeria monocytogenes* contamination in the meat processing industry. Int. J. Food Microbiol. 31: 161-171.