Characterization of food and clinical *Listeria monocytogenes* isolates collected in Portugal

Barbosa, J., Ferreira, V., Magalhães, R., Santos, I., Almeida, G., Gibbs, P. and Teixeira, P.*

CBQF/Universidade Católica Portuguesa, Escola Superior de Biotecnologia
Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal
***Corresponding author:** pcteixeira@esb.ucp.pt

Introduction

Listeria monocytogenes has been implicated in food-borne outbreaks and subsequently isolated from various products such as vegetables, meat, fish, milk and milk products. The high incidence of *L. monocytogenes* in foods and the high fatality rate associated with listeriosis, makes this pathogen of high concern to the Food Industry (Arslan and Ozdemir, 2008, Pesavento et al., 2010).

The collection and characterization of *L. monocytogenes* isolates from food are essential to a better understanding of the distribution of the pathogen through the food chain and the potential contribution of specific strains to human infection.

In this study, we thus characterized both food and human clinical isolates of *L. monocytogenes* collected through 2003 to 2008 in Portugal.

Material and Methods

In this study 3698 *L. monocytogenes* isolates from different food products, namely vegetables (30), dairy (782), fish (19), pre-cooked meals (240), ready-to-eat (RTE, 217), and meat products (2410) and 75 *L. monocytogenes* isolates from human cases were investigated.

Isolates were tested for:

(i) the major serotype-specific genes: serotypes 1/2a and 3a (subtype A), serotypes 1/2b, 3b and 7 (subtype B), serotypes 1/2c and 3c (subtype C), serotypes 4b, 4d and 4e (subtype D) and serotypes 4a and 4c (subtype E) (Doumith *et al.*, 2004);

(ii) resistance to arsenic (Ar), cadmium (Cd) and tetracycline (Tet) (McLauchlin *et al.*, 1997 and Vaz-Velho *et al.*, 2001).

Results and Discussion

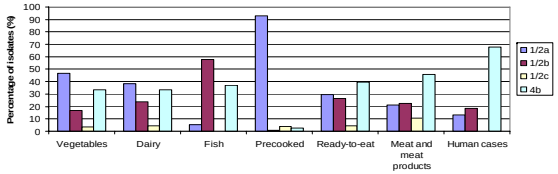

Figure 1. Major serotype-specific genes found for each group of food product.

As showed in figure 1, subtype A isolates were most frequently detected on vegetables (46.7%), dairy (38.4%) and pre-cooked meals (92.9%) products; subtype B was most frequently detected on fish (57.9%) product isolates, and subtype D was most frequently detected on RTE (39.6%) and meat products (45.9%) isolates as well as on clinical isolates (68.0%).

The most frequent profiles for Ar, Cd and Tet among isolates from different food products were as follows: ArSCdSTetS on vegetables (73.3%), dairy (54.9%) and clinical isolates; ArSCdRTetS on fish (47.4%), pre-cooked meals (80.0%), RTE (43.3%) and meat products (55.2%). Interestingly, profiles ArRCdSTetR and ArSCdRTetR were only detected on dairy and meat products isolates, respectively.

Overall, our data suggested that specific characteristics of isolates might be associated with their source. However, it is important to analyze a larger number of products in order to guarantee that these characteristics are, in fact, specific of these products. Further genotypic characterization of the isolates by DNA macrorestriction analysis by pulsed-field gel electrophoresis (PFGE) is being performed in order to confirm the observed tendencies.

These results would be very useful in the identification of sources of cases and outbreaks of listeriosis.

References

- Arslan, S., Ozdemir, F., 2008. Prevalence and antimicrobial resistance of *Listeria* spp. in homemade white cheese. *Food Control* **19:** 360–363.
- Doumith M., Buchrieser C., Glaser P., Jacquet C., Martin P. (2004) Differentiation of the major *Listeria monocytogenes* serovars by multiplex PCR. Journal of Clinical Microbiology 42, 3819-3822.
- McLauchlin J., Hampton M., Shah S., Threlfall E,, Wieneke A. (1997) Subtyping of *Listeria monocytogenes* on the basis of plasmid profiles and arsenic and cadmium susceptibility. Journal of Applied Microbiology 83, 381-388.
- Pesavento, G., Ducci, B., Nieri, D., Comodo, N., Lo Nostro A., 2010. Prevalence and antibiotic susceptibility of *Listeria* spp. isolated from raw meat and retail foods. Food Control 21: 708–713.
- Vaz-Velho M., Duarte G. McLauchlin, J., Gibbs P. (2001) Characterization of *Listeria monocytogenes* isolated from production lines of fresh and cold-smoked fish. Journal of Applied Microbiology 91, 556-562.

Acknowledgements

This work was financially supported by "Fundação para a Ciência e a Tecnologia" / FEDER, project PTDC/AGR-ALI/64662/2006 and PhD grant to Vânia Ferreira (SFRH/BD/24240/2005).