

Letter to the Editor

On the safety of lactic acid bacteria from food

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for LABIP Workshop ¹ on the Safety of Lactic Acid Bacteria, *Hopital Saint-Lazare, Service d'Ilépto Gastro-Entérologie, 107 bis, rue du Faubourg Saint Denis, 7547 Paris Cedex 10, France; and School of Biological Sciences, University of Surrey, Guildford, Surrey GU2 5X11, UK*

Recent reports have shown some lactic acid bacteria (LAB) to be involved in clinical infections, particularly endocarditis (Klein et al., 1992; Aguirre and Collins, 1993; Gasser, 1994). As a result of these reports, a European Union-sponsored workshop was organized by the Lactic Acid Bacteria Industrial Platform (LABIP) in November 1994 to discuss and comment on the significance of these observations and whether ingested LAB could be a risk factor for clinical infection.

For its purposes, the workshop defined LAB to include the genera *Carnobacterium*, *Enterococcus*, *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Pediococcus*, *Tetragenococcus*, *Weissella* and some *Streptococcus* species. *Bifidobacterium*, although phylogenetically unrelated, was also included on the grounds of similarities in its biochemistry, physiology and ecology.

In terms of their incidence, the published data indicate that most *Lactobacillus* strains isolated from clinical cases belong to the species *Lb. rhamnosus*, *Lb. casei* (or *paracasei*) and *Lb. plantarum*. Lactococci, pediococci and leuconostocs are occasionally found in clinical samples but mostly as co-isolates without any evidence of a primary role in infections. *Enterococcus faecium* and *Ent. faecalis* are frequently involved in clinical infections and there is concern over the emergence of vancomycin resistant strains (Gasser, 1994).

The workshop concluded that, with the exception of enterococci, the overall risk of LAB infection is very low (Klein et al., 1992; Aguirre and Collins, 1993; Gasser, 1994), particularly in view of their ubiquity in the environment. They are natural components of the human oral and intestinal microflora, occur in substantial numbers on fresh foods such as meat and vegetables, and have been used since antiquity in the production of a wide range of fermented products such as cheese, yoghurt, salami, sauerkraut and olives where they are present at high levels.

No clinical infections caused by LAB have been reported in otherwise healthy people. In all cases described to-date, patients had underlying conditions which predisposed them to infection, particularly abnormal heart valves in the case of endocarditis. For some *Lactobacillus* strains involved in these cases, potential virulence factors have been described, but they are present in the majority of oral strains (Oakey et al., 1995). Known risk factors for other opportunists such as extremes of age or pregnancy have not been identified as risk factors for LAB infections.

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In most cases of infection the organism appears to have come from the patient's own microflora. No cases have been reported in people working with LAB and routinely exposed to very high numbers, such as those in the starter culture industry. No cases have been linked to the consumption of fermented foods or probiotics.

The workshop felt that continued monitoring of the situation was indicated but that lactococci and leuconostocs pose no significant risk. Under a recent German classification scheme (Berufsgenossenschaft der Chemischen Industrie, 1994), *Lactobacillus rhamnosus* was excluded from the no-risk category, Group 1. On the information available, the workshop concluded that all lactobacilli should be in Group 1, but with *Lb. rhamnosus* warranting particular further surveillance. Enterococci, like other LAB, are normal human commensals and can be readily isolated from the food environment yet they cause more cases of human infection. Several virulence factors have recently been described (Jett et al., 1994) but comparative data on their distribution are not available to allow the potential risk from exogenous enterococci to be evaluated. Foods containing enterococci have a long history of use without established risk, but the workshop felt that any new products containing them should be demonstrated to pose no health risks using available model systems.

A copy of the full report is available from the authors.

References

- Aguirre, M. and Collins, M.D. (1993) Lactic acid bacteria and human clinical infection. *J. Appl. Bacteriol.* 75, 95–107.
- Berufsgenossenschaft der Chemischen Industrie (1994) Sichere Biotechnologie. Eingruppierung biologischer Agenzien: Bakterien, Merkblatt B006.
- Gasser, F. (1994) Safety of lactic acid bacteria and their occurrence in human clinical infections, *Bull Inst. Pasteur* 92, 45–67.
- Jett, B.D., Huycke, M.M. and Gilmore, M.S. (1994) Virulence of enterococci. *Clin. Microbiol. Rev.* 7, 462–478.
- Klein, G., Bonaparte, C. and Reuter, G. (1992) Laktobazillen als Starterkulturen für die Milchwirtschaft unter dem Gesichtspunkt der Sicheren Biotechnologie. *Milchwissenschaft* 47, 632–636.
- Oakey, H.J., Harty, D.W.S. and Knox, K.W. (1995) Enzyme production by lactobacilli and the potential link with endocarditis. *J. Appl. Bacteriol.* 78, 142–148.