

3rd International Conference and Exhibition on Probiotics, Functional & Baby Foods

September 23-25, 2014 Hotel Royal Continental, Naples, Italy

Safety aspects of application of lactic acid bacteria

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In last decades, lactic acid bacteria (LAB) have been subject of intensive research in isolation and identification with aim of their application as producer of antimicrobial peptides and beneficial properties. It is well known that many LAB are capable of producing a variety of antimicrobial compounds, which may contribute to their colonization of habitats and their competitive advantage over other bacteria. Besides production of lactic acid, which causes a drop in pH enough to inhibit certain strains, as its non-dissociated form triggers a lowering of the internal pH in sensitive bacteria that causes a collapse in the electrochemical proton gradient resulting in a bacteriostatic or bactericidal effect, LAB can produce other organic acids, diacetyl, hydrogen peroxide, and bacteriocins. LAB constitute a phylogenetically heterogeneous group of ubiquitous microorganisms that are naturally present in high nutrient containing organic products such as foods and occupy a wide range of ecological niches ranging from the surface of plants to the gastro-urogenital tract of animals. Currently, the LAB group includes a large number of cocci and bacilli, such as species of the genera Carnobacterium, Enterococcus, Lactobacillus, Lactococcus, Leuconostoc, Oenococcus, Pediococcus, Streptococcus, Tetragenococcus, Vagococcus, Weissella etc. From a historical point of view, LAB has been used since ancient times in food fermentation processes and preservation. Due to their lack of pathogenicity, most LAB species have received the GRAS (Generally Recognized as Safe) status by the U.S. Food and Drug Administration. In addition to their important technological properties in food production (production of lactic acid, decrease of lactose, improvement of organoleptic and physical characteristics), various species of LAB have been shown to possess therapeutic properties since they are able to prevent the development of some diseases as shown mostly using animal models and have the capacity to promote beneficial effects in human and animal health. In recent years, the number of functional food products enriched with live probiotic microorganisms, has increased exponentially since it is known that these can confer health benefits on the host. Besides all beneficial properties studied for various LAB, a special attention need to be pay on the possible presence of virulence factors, production of biogenic amines and antibiotic resistance. This virulence determinants have been well detected and studied in Enterococci and Streptococci, however, in last few years report on presence of virulence factors in otherwise GRAS Lactobacilli have been showing the potential upcoming problems. Horizontal gene transfer of virulence factors between pathogenic and LAB, including probiotics is a highly possible scenario in case of uncontrolled application of probiotics. In addition, some of the antimicrobial peptides expressed by LAB may be a high cytotoxic. Besides all beneficial properties studied for various LAB, a special attention need to be pay on the possible cytotoxicity levels of the expressed bacteriocins in order to draw conclusion for the safe application of the producer or antimicrobial peptides in the bio-preservation.

Biography

Svetoslav Dimirov Todorov has completed his PhD at ENITIAA, Nantes, France and Sofia University, Sofia, Bulgaria (financed by French Government) and postdoctoral studies from Stellenbosch University, Matieland, South Africa. In last 12 years, he was researcher and invited lecture at University of Stellenbosch, Matieland, Republic of South Africa and University of Sao Paulo, Sao Paulo, Brazil. In the period between 2008-2013, he was visiting professor at Sao Paulo University, Faculty of Pharmaceutical Sciences, Sao Paulo, Brazil. He has published more than 100 papers in reputed journals and serving as a member of the editorial board. He is reviewer for more than 50 international journals.

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