



## A NOVEL TOOL FOR SAFETY ASSESSMENT OF PROBIOTIC STRAINS

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### Abstract:

In the field of functional genomics, the derivatives of gene transcription and translation are referred with the suffix 'ome'. OMICS (comprehensive analysis of biochemical molecular species like the genes, transcripts, proteins and metabolites) have been applied to a great deal in probiotic studies. With the numerous records validating the health benefits of probiotics, sporadic cases of risk posed by such strains are also reported. Data mining of the complete genome sequences reveals the maximum potential risk of a probiotic organism and whole-genome sequencing of bacteria has recently emerged as a cost-effective and convenient approach for identifying virulent strains, testing resistance to antibiotics, and monitoring the spread of bacterial pathogens. Hence a study was undertaken in our lab on the established probiotic strain *L. helveticus* MTCC 5463 strain to re-assure its safety using metagenomic approaches. The genome does not pose the threat of transferability of such antibiotic resistance as it lacks the presence of a CRISPRs, plasmids and complete prophages, implying the mode as intrinsic resistance. Ten structural and regulatory genes associated with prophages and integrases, six uncategorised mobile genetic elements, 154 homologs of transposases and 13 genes related to R/M systems were established. For heavy metal effluxing MTCC 5463 carried total 16 genes involved in copper homeostasis, cobalt, cadmium, nickel and iron uptake system with 8 adverse metabolism genes associated with formation of putatively genotoxic metabolites. Falling into the category of host-interaction factors rather than virulence factors, the presence of 44 fitness related genes have been observed in the genome viz., adhesion, biofilm, surface proteins interacting with immunity, lipopolysaccharides formation and 15 stress related proteins that provide gastrointestinal robustness of the strain. Further, on the lines of EFSA proposed Quality Presumption of Safety guidelines, the above results provide safety assurance for the use of *L. helveticus* MTCC 5463.

### Biography:

Professor Jashbhai B. Prajapati is a Dairy Technology graduate from Gujarat Agricultural University and Ph.D. in Dairy Microbiology from National Dairy Research Institute, Karnal, India. Since last 35 years, he is serving at the Faculty of Dairy Science in various capacities and from 2004, he is the Head of Dairy Microbiology Department and at present he is the Principal & Dean of the Faculty of Dairy Science. He is a renowned academician and scientists in the area of probiotics and fer-



mented foods. He is handling number of research projects sponsored by ICAR, DBT, State Govt., EU, SIDA and has published more than 300 papers, including two text book. He has guided 27 MTech and 6 PhD students. He was awarded Chancellors Gold medal for being the best student in the University in 1984 and has received 6 times best paper awards. He had Fellowship award from Erasmus Mundus (EU) as well as Indian National Science Academy. He is a Fellow of Indian Dairy Association as well as Fellow of National Academy of Dairy Science. Dr. Prajapati is the Coordinator of Swedish South Asian Network on Fermented Foods since its inception in 2003. He is also a Member in Indian National Committee of International Dairy Federation (IDF) in 3 groups viz., Probiotics, Lactic acid bacteria & starters and Microbiological methods for analysis and a member of Task Force on Inventory of Microorganisms with a Documented History of Use in Foods. He has travelled in Europe for building the network on fermented foods.

### Recent Publications:

- Preservation of food through formation of inhibitory metabolites such as organic acid (lactic acid, acetic acid, formic acid, propionic acid), ethanol, bacteriocins, etc., often in combination with decrease of water activity (by drying or use of salt) (Ross et al., 2002, Gaggia et al., 2011).
- Improving food safety through inhibition of pathogens (Adams and Mitchell, 2002, Adams and Nicolaides, 2008) or removal of toxic compounds (Hammes and Tichaczek, 1994).
- Improving the nutritional value (van Boekel et al., 2010, Poutanen et al., 2009).
- Organoleptic quality of the food (Marilley and Casey, 2004, Smit et al., 2005, Lacroix et al., 2010, Sicard and Legras, 2011).

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