Ten years of subproteome investigations in lactic acid bacteria: A key for food starter and probiotic typing

The definition of safety and efficacy of food-employed bacteria as well as probiotic strains is a continuous, often unattended, challenge. Proteomic techniques such as 2DE, DIGE and LC/LC-MS/MS are suitable and powerful tools to reveal new aspects (positive and negative) of "known" and "unknown" strains that can be employed in food making and as nutraceutical supplements for human health. Unfortunately, these techniques are not used as extensively as it should be wise. The present report describes the most significant results obtained by our research group in 10 years of study on subproteomes in bacteria, chiefly lactic acid bacteria. Production of desired and undesired metabolites, differences between strains belonging to same species but isolated from different ecological niches, the effect of cryoprotectants on survival to lyophilization as well as the adhesive capability of strains, were elucidated by analysis of cytosolic, membrane-enriched, surface and extracellular proteomes. The present review opens a window on a yet largely underexplored field and highlights the huge potential of subproteome investigations for more rational choice of microbial strains as food starters, probiotics and for production of nutraceuticals. These analyses will hopefully contribute to manufacturing safer and healthier food and food supplements in the near future. This article is part of a Special Issue entitled: HUPO 2014.