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Food Safety: Secretome of *Lactococcus lactis* and *Listeria monocytogenes* in competition.

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ABSTRACT

Listeria monocytogenes (LM) is a foodborne pathogen responsible of listeriosis. In the spreading of this pathology, milk and dairy products are key reservoir for this pathogen¹. Food processing represents one of the major steps that could be linked to LM growth. Inhibition of LM growth through competition of *Lactococcus lactis* (LAC) could represent a solution to this problem. Exoproteome of LM and two different strains of Lactic Acid Bacteria in co-culture have been studied in order to highlight mechanisms of bacterial competition useful to improve food safety. Two different strains of LAC and one strain of LM were cultivated in appropriate medium cultures (BHI), also in competition. Filtrated cultures (SECRETOME) were lyophilized and resuspended for proteomics analysis. Shotgun analysis on each secretome was performed on nano UPLC-MS system. Obtained data reveal, during competition, the higher production by LM of moonlighting protein Enolase and Glucose 6 Phosphate isomerase, of Septation ring formation regulator EzrA, involved into cell replication and the lower secretion of Endopeptidase P60. In parallel, *L. lactis* produced higher amounts of Secreted 45 kDa protein and switched from antibiotic Nisin A production to Nisin Z production. In competition with LM, LAC strain investigated produce higher amounts of Secreted 45 kDa protein with peptidoglycan lytic activity and the selective secretion of Nisin Z probably to improve antibiotic solubility in less acidic environment. Next step will be validation of obtained results in dairy products. These results are of interesting to design new strategies of fighting LM as contaminant in food from animal origin.

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REFERENCES

Greenwood, M. H.; Roberts, D.; Burden, P., The occurrence of *Listeria* species in milk and dairy products: a national survey in England and Wales. *International journal of food microbiology* 1991, 12, (2), 197-206.