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The role of S-layer proteins as one of the most abundant biopolymers on Earth in probiotic properties of bacterial strain *Lactobacillus brevis* SF9B

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Surface (S)-layer proteins (Slps) form crystalline arrays of protein subunits as the outermost component of the cell wall in only few strains of *Lactobacillus* genera. In the genome of *Lactobacillus brevis* SF9B strain, three regions showed high homology with following slp sequences of the reference strain *L. brevis* ATCC 14869: with SlpB and SlpC in contig 2 (percentage of identities 65% and 89%, respectively) and with SlpD in contig 32 (percentage of identities 99%). Using SDS-PAGE of GHCl-extracted surface proteins of SF9B, a 50 kDa protein band, indicating the expression of the presumed Slp, was detected. 2D-PAGE of the same protein sample revealed a spot with isoelectric point and molecular weight of approximately 10, and 50 kDa, respectively. Structure and function prediction of the isolated Slp was generated using I-TASSER server, based on the data available for *L. brevis* ATCC 14869. Since Slps are exposed at the cell surface of certain *Lactobacillus* strains, they represent an interface between the bacterium and its biotic and abiotic microenvironments. Considering the fact that these environments include stress conditions which can affect bacterial viability and activity in the intestinal tract, Slps must have great importance in probiotic properties of the bacterial cells which express them. Although Slps of *Lactobacillus* strains are of great research interest for number of years, their physiological function remained poorly understood. However, Slps of strain SF9B mediate bacterial adherence to mucin, Caco-2 cells and extracellular matrix proteins, increase survival of *L. brevis* SF9B cells in simulated gastrointestinal conditions and during freeze-drying, and enhance their aggregation and coaggregation ability, which are important probiotic properties. The above mentioned results indicate that Slps contribute to technological and probiotic properties of strain *L. brevis* SF9B and that they have great role in potential application of that strain as novel probiotic culture.

Recent Publications:

1. K. Uroić, J. Novak, U. Hynönen, T, Pietilä, A. Leboš Pavunc, R. Kant, B. Kos, A. Pavla, J. Šušković (2016) The role of S-layer in adhesive and imunomodulating properties of probiotic starter culture *Lactobacillus brevis* D6 isolated from artisanal smoked fresh cheese. LWT – Food *Sci. Technol.* 69 623-632.
2. A. Terzić-Vidojević, A. Leboš Pavunc, K. Tonković, J. Beganović, I. Strahinić, M. Kojić, K. Veljović, N. Golić, B. Kos, N. Čadež, Lj. Gregurek, J. Šušković, P. Raspor, Lj. Topisirović (2015) Evaluation of autochthonous lactic acid bacteria as starter cultures for production of white pickled and fresh soft cheeses. LWT Food *Sci. Technol.* 63(1) 298-306.
3. J. Beganović, B. Kos, A. Leboš Pavunc, K. Uroić, M. Jokić, J. Šušković (2014) Traditionally produced sauerkraut as source of autochthonous functional starter cultures. Microbiol. Res. 169(7-8) 623-632.
4. K. Uroić, M. Nikolić, B. Kos, A. Leboš Pavunc, J. Beganović, J. Lukić, B. Jovčić, B. Filipić, M. Miljković, N. Golić, Lj. Topisirović, N. Čadež, P. Raspor, J. Šušković (2014) Probiotic properties of lactic acid bacteria isolated from Croatian Fresh Soft Cheeses and Serbian White-Pickled Cheeses. Food Technol. Biotechnol. 52(2) 232-241.
5. A. Leboš Pavunc, B. Kos, J. Beganović, K. Uroić, D. Bučan, J. Šušković (2013) Antibiotic susceptibility and antimicrobial activity of autochthonous starter cultures as safety parameters for fresh cheese production, Mljekarstvo 63 (4) 185-194.

Biography

Katarina Zorić is a PhD student employed as assistant on the scientific project "Probiotics and starter cultures - surface proteins and bacteriocins" founded by Croatian Science Foundation (IP-2014-09-7009, Project manager: Prof. Blaženka Kos, PhD) in Laboratory of Antibiotic, Enzyme, Probiotic and Starter Cultures Technology, Department of Biochemical Engineering, Faculty of Food Technology and Biotechnology, University of Zagreb since 2016. So far her work was focused on three main topics: S-layer proteins, bacteriocins and exopolysaccharides of different lactic acid bacteria strains.

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