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## S-layer proteins and bacteriocins in probiotics as living drugs – impact on microbiota

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A rich collection of autochthonous lactic acid bacteria (LAB) was screened for the presence of S-layer proteins and production of bacteriocins. Analyses of bacterial surface proteins using SDS-PAGE, 2D-PAGE and PCR with specific primers for slp genes, discovered that only four *Lactobacillus brevis* strains express S-layer proteins, while using antibacterial activity assays and PCR with specific primers for genes encoding various bacteriocins, only three *Lactobacillus plantarum* strains were confirmed as bacteriocin producers. Biological functions of *Lactobacillus* S-layer proteins are still poorly understood, however, our investigations confirmed that they mediate bacterial adherence to intestinal epithelial cells and extracellular matrix proteins and also influence the immune response, which are important probiotic properties. When applied as mixed culture, S-layer protein carrying strain and bacteriocin producing strain made strong influence on microbiota composition of rats used as animal models in investigation of Alzheimer's disease. Purified S-layer proteins of *L. brevis* SF9B strain, with MW of 50.9 kDa and pI of 9.54, were identified using LC/MS method, while the prediction of their secondary structure was generated using I-TASSER modelling. The fact that purified S-layers are stable toward non-physiological pH and that they protect the cell against various stress conditions, opens an interesting perspective in the development of vehicles for oral administration of drugs or vaccines, specially taking into account GRAS (Generally Regarded as Safe) status of LAB.

### Recent Publications

1. Šeme H., Bogovič Matijašić B., Švigelj, K., Langerholc, T., Fujs S., Horvat, J., Zlatić, E., Gjuračić K., Petković H., Štampelj M., Kos B., Šušković J., Kosec G. (2017) Generation of *Lactobacillus plantarum* strains with improved potential to target gastrointestinal disorders related to sugar malabsorption, *Food Research International* 94: 45-53.
2. Hana Šuranská, Peter Raspor, Ksenija Uroić, Nataša Golić, Blaženka Kos, Sanja Mihajlović, Jelena Begović, Jagoda Šušković, Ljubiša Topisirović, Neža Čadež (2016) Characterisation of the yeast and mould biota in traditional white pickled cheeses by culture-dependent and independent molecular techniques, *Folia Microbiol.* 61:455–463.
3. Uroić, K., Beganović, J., Hynönen, U., Pietilä, T. E., Leboš Pavunc, A., Kant, R., Kos, B., Palva, A., Šušković, J. (2016) The role of S-layer in adhesive and immunological properties of probiotic starter culture *Lactobacillus brevis* D6 isolated from artisanal smoked fresh cheese. *LWT - Food Sci. Technol.* 69: 623-632.
4. M. Gačić, N. Bilandžić, Đ. Ivanec Šipušić, M. Petrović, B. Kos, N. Vahčić, J. Šušković (2015) Degradation of Oxytetracycline, Streptomycin, Sulphathiazole and Chloramphenicol Residues in Different Types of Honey, *Food Technol. Biotechnol.* 53 (2) 154–162.
5. M. Zivkovic, N. Cadez, K. Uroic, M. Miljkovic, M. Tolinacki, P. Dousova, B. Kos, J. Suskovic, P. Raspor, Lj. Topisirovic, N. Golic (2015) Evaluation of probiotic potential of yeasts isolated from traditional cheeses manufactured in Serbia and Croatia,

### Biography

Blaženka Kos has years of experience in research, evaluation and teaching in the field of biotechnological production of enzymes, antibiotics, probiotics and starter cultures at the Faculty of Food Technology and Biotechnology, University of Zagreb, Croatia. Her scientific work covers different fields of biotechnology, especially industrial microbiology. The main area of her research is production and application of probiotics as living drugs and selection of strains within the probiotic concept. Microencapsulation technologies, as a useful tool to improve the delivery of probiotics and functional starter cultures, are of her special scientific interest.

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