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Exogenous and endogenous neurochemicals in *Lactococcus lactis* subsp. *Lactis*

Lactococci synthesize various kinds of bioactive molecules, such as organic acids, bacteriocins and other antimicrobial agents; they can be safely used in a wide spectrum of food items, biopreservatives, probiotics, and prebiotics.

This work demonstrates that *Lactococcus lactis* subsp. *lactis* strains that display antimicrobial activity with respect to test cultures (potential pathogens) synthesize biogenic amines. Strains K-205 and F-116 produce submicromolar amounts of dopamine and its 2,3-Dihydroxyphenylalanine precursor (DOPA) in a medium that is devoid of dopamine and DOPA.

It was also revealed that exogenous neuromediators such as adrenaline (epinephrine), dopamine, and serotonin stimulated the growth and antimicrobial activity of some strains at micromolar concentrations. The growth of *L. lactis* subsp. *lactis* strain 194 was threefold accelerated by all the neurotransmitters. The stimulatory effect was observed after 6 and 12 h of cultivation. Epinephrine and serotonin failed to produce a statistically significant effect on the growth of the other tested strains (K-205, 729, and F-116). Among the tested neurochemicals, dopamine exerted the maximum (40%) stimulatory effect on the antimicrobial activity of the *L. lactis* subsp. *lactis* strains with both gram-positive and negative bacteria. However, these strains did not exhibit much antifungal activity: they only insignificantly inhibited the growth of the tested fungal species, presumably because their inhibitory effect was overridden by the stimulatory influence that the neurochemicals are known to exert on fungi.

The data obtained demonstrates that biogenic amines and their metabolites are synthesized by the tested cultures of probiotic gut bacteria. Since these substances are of indisputable physiological and neurological importance, probiotics producing them can potentially be used as target-oriented functional food items for preventive and therapeutic purposes

Biography

Alexander V Oleskin completed two dissertations (for the Ph. D. and the Doctor of Science Degree) at Moscow State University and was awarded the Full Professor (in Biology) title in 2013. His research focus has been on the role of biogenic amines in the interaction between the microbiota, including probiotics, and the host organism. He is currently lecturing on Intercellular Interactions, Microbial Neurochemicals and Decentralized Network Structures. He has published several monographs and more than one hundred papers in reputed journals and has been serving as an editorial board member of several local and international scientific journals.

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