

PROBIOTIC STRAINS OF *LACTOCOCCUS LACTIS* SUBSP. *LACTIS* PRODUCE NEUROACTIVE SUBSTANCES

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Abstract

The symbiotic microbiota of the human organism constantly communicates with the host. An important communication channel is based on neurochemicals including biogenic amines (BAs). Probiotic lactococci with the Generally Recognized as Safe (GRAS) status are involved in producing a variety of fermented dairy products including functional food items for medical purposes. However, their capacity to produce neurochemicals still remains to be explored. In this work, important neuroactive BAs were detected in several strains of *Lactococcus lactis* subsp. *lactis*.

We tested 4 strains of lactococci, 3 of which were isolated from milk and fermented dairy products; strain F-116 was obtained by the cell fusion method. The probiotic activity of these strains was estimated from their antimicrobial effects on pathogenic and opportunistic microorganisms. BAs such as dopamine (DA), noradrenaline (NA), and serotonin (5-HT) were quantitatively determined in the culture liquid and the ultrasonically disintegrated biomass sediment. They were separated using HPLC and detected amperometrically.

NA at nanomolar concentrations was present in the culture liquid and not in the biomass fraction of all tested strains. The two fusion strains with high bacteriocine-producing activity (equivalent to 4200 - 4600 IU/mL nisin) and fungicidal effects (against *Aspergillus* sp., *Candida* sp., and others) contained 50 μ M DA in the biomass fraction and low amounts of DA in the culture liquid. The biomass of the fusion strains contained more 5-HT than that of the other tested strains. Almost no 5-HT was detected in the culture liquid.

Thus, the tested probiotic strains produce neuroactive substances that should impact the nervous and the immune system of the host. They can potentially be used as target-oriented functional food items for preventive and therapeutic purposes.

Key words: Probiotics, *Lactococcus lactis* subsp. *lactis*, bacteriocine, Fungicidal effects, Functional food, neurochemicals, Psychobiotics, Biogenic amines.