**Brain-friendly metabolites from microscopic world**

For thousands of years natural products have been used as remedies to improve health and treat diseases. These are compounds with various chemical structures and a wide range of effects from different sources. The common sources are terrestrial plants, marine organisms and microorganisms from different niches. The introduction of metabolites of microbial origin dates back to the discovery of penicillin from *Penicillium notatum* by Alexander Fleming (15). Then many other substances were found with health promoting effects and in recent years were used in bio-therapeutics technology. One major source of metabolites with beneficial effects on brain health and protective effects against neurodegenerative disease are probiotics. Probiotics as a whole are described as live microorganisms which when administered in adequate amounts confer a health benefit on the host (1). Some of the probiotic products include surface components such as proteins from outer membrane, exo-polysaccharides and bacteriocins (5, 14). Among versatile beneficial properties, their neuroprotective role is of great importance. To be able to confer their effect on neurons, these metabolites must interact with blood brain barrier (BBB) whose integrity is affected in turn mainly by the gut microbial products. Probiotics send signals to the CNS through producing compounds such as gamma aminobutyric acid (GABA) and tryptophan products with specific role in regulating their communication pathway, the gut brain axis(2). Based on these interrelationships between probiotic metabolites and body organs including brain, many research works have focused on finding the best single or consortia of probiotics with the most effects on preventing inflammation, improving immunity and neuroprotection (2, 3, 4). Several experiments have confirmed these beneficial roles in cell culture and mouse models as well as in human (6, 7, 8, 9, 13). Probiotic formulas with benefits for mental health and metabolic function, alleviating symptoms of neurodegeneration and cognitive disorders, protecting neurons from oxidative stress and apoptosis are the goal of investigations (11, 12). The results are promising but more research is needed on the effector molecules produced by these beneficial microorganisms and their interactions with the central nervous system.

**Keywords:** neurodegenerative disease; dysbiois; probiotics; neuroprotective; effector molecules; gut- brain axis; gut microbiota.

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