

## Dr Natasa Golic, The use of integrative multi-omics approach in cultivation and characterization of gut bacteria related to microbiota-gut-brain axis as a source for Next Generation Probiotics (NextGenBiotics)

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The main idea of the NextGenBiotics is to cultivate novel Next Generation Probiotics (NGPs) related to microbiota-gut-brain axis (MGBA), in order to decipher their possible role in prevention and treatment of neurodegenerative and psychiatric diseases. Nearly one billion people suffer from neurodegenerative and 450 million people from a mental or behavioural disorders globally, with Alzheimer's disease, Parkinson's disease, multiple sclerosis, autism spectrum disorder, and major depressive disorder as the most prevalent, representing a huge burden on society. Recently, all these diseases have been associated with the gut microbiota dysbiosis and alterations in MGBA functioning. The NextGenBiotics proposes a highly ambitious innovative multidisciplinary research strategy, with combination of traditional and cutting edge molecular microbiology methods including culturomics and integrative multi-omics approaches such as next generation sequencing, dual RNA seq transcriptomic analysis and metabolomics analysis as well as large-scale data sets analysis, coupled with in vitro and in vivo host-microbe interactions experiments. The pioneering work in NextGenBiotics will result in cultivation of novel anaerobic hitherto uncultivated and/or uncharacterized so far NGP strains and characterization of their effect on MGBA. The effects of selected NGPs on behaviour and neuronal activity will be revealed using *C. elegans* as well as the animal models for studying the MS and depression. Eventually, the results obtained during NextGenBiotics will beyond state-of-the-art help to determine the mechanisms involved in health-promoting effects of NGPs in MGBA, broadening the scientific knowledge and opening up the possible novel therapeutic approaches in prevention and therapy of neurodegenerative and psychiatric diseases in order to alleviate the disease symptoms and improve the quality of life.