Mycoplasma as a trigger for the neurodegenerative process development

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Parkinson's and Alzheimer's are the most common forms of neurodegenerative disorders. One of the main events leading to neurodegenerative processes is a violation of the assembly of the tertiary structure, aggregation, and deposition of proteins, which lead to the loss of synaptic connections and the death of neurons. The involvement of brain infection (bacterial, viral and fungal) in the pathogenesis of abnormal protein accumulation is gaining more and more evidence. Various neurodegenerative disorders are associated with frequent bacterial infections, and the genus Mycoplasma is the most common. In this work we investigated proteomic changes occurring in neurons upon mycoplasma infection. Using the easily cultivated bacterium Mycoplsams gallisepticum as a model object, as well as unique cell lines of neuronal progenitors obtained from iPSCs from patients with Parkinson's disease and healthy donors, the infected cells were analyzed using a mass spectrometric approach using a quantitative shotgun analysis for Q Exactive HF-X with NanoSpray Flex II. Using the KEGG database, we found that the observed protein changes are well clustered along metabolic pathways associated with neurodegenerative diseases (Alzheimer's, Parkinson's, Hentigton's), which clearly indicates that mycoplasma infection leads to the development of processes in neurons associated with neurodegeneration. In addition, we carried out experiments to analyze the direct effect of mycoplasma on the aggregation of amyloid peptides APP40 and APP42, and also evaluated the effect of mycoplasma on the phosphorylation status of tau protein. The obtained results will shed light on the mechanisms of neurodegenerative changes, and, consequently, to advance in their treatment and preventive measures.
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