

12th International Conference on

Alzheimer's Disease & Dementia

October 29-31, 2018 | Valencia, Spain

Yolkin polypeptide complex isolated from hen egg yolk regulates BDNF production in PC12 cells via cAMP/CREB –dependent mechanism

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Background & Aim: Brain-derived neurotrophic factor (BDNF) supports neurons of the central nervous system (CNS) and is a key molecule in the maintenance of synaptic plasticity and memory storage in the hippocampus. However, changes in the level of BDNF mRNA or protein have been reported both in the CNS and in the blood of Alzheimer's disease (AD) patients, which indicates its potential role in the pathogenesis of AD. Yolkin, the polypeptide complex isolated from hen egg yolk was discovered as a fraction accompanying immunoglobulin IgY, which possesses neuroprotective activity and improves cognitive function of aged rats. We also demonstrated that yolkin stimulates both PC12 neuron-like cells and human whole blood cells to release BDNF in a dose- and time-dependent manner. However, the mechanism of yolkin action is not clear. The aim of the present study was to investigate the mechanism of yolkin action which leads to increased BDNF production by PC12 cells.

Methods & Results: We have found that yolkin stimulates PC12 cells to release significant amounts of mature BDNF protein, when added at concentrations higher than 10 µg/ml in a time-dependent manner. This effect was connected with the impact of yolkin on activation of adenylate cyclase, resulting in the increase of cAMP concentration and upstream phosphorylation of cAMP response element-binding protein (CREB).

Conclusion: Our study showed that the regulatory substance of natural origin, yolkin, is able to amplify neuroprotective mechanisms in the CNS and can be considered as a potential therapeutic agent in the treatment of neurodegenerative diseases.

Biography

W Kazana is a second-year PhD student at the Hirsfeld Institute of Immunology and Experimental Therapy in Wrocław. She graduated in Biotechnology from Wrocław University of Science and Technology (MSc thesis awarded). Her research focuses on neuroprotective and immunoregulatory properties of yolkin, polypeptide complex isolated from hen egg yolk. She has already presented her preliminary results at Neuronus conference (poster) and symposium opening Biotechnology: Research and Industrial Applications conference (oral presentation) during this year. She is also one of the Co-Authors of an article presented in Neuropsychiatry, London.

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