The Influence of Neurotransmitters on IGF-2 and IGF2R Expression in Cell Models

Svoboda, Metodej (School: Gymnazium Zikmunda Wintra Rakovnik)

Insulin-like growth factor 2 (IGF-2) is a regulatory peptide involved in neuroplasticity, memory consolidation, and neuroprotection in the CNS. Despite the well-documented association between neurodegenerative disorders and alterations in the dopaminergic and serotonergic systems, along with the observation of structural changes in correlation with elevated neurotransmitter levels, such as in the case of schizophrenia, the underlying mechanisms remain to be fully elucidated. The aim of this study was to analyze the effects of dopamine and serotonin on IGF-2 and IGF2R expression in neural cell models. Basal expression of IGF-2 and IGF2R was quantified by RT-qPCR in four cell lines (SH-SY5Y, U87 MG, MIN6, IM-9). Based on detectable expression levels, SH-SY5Y and U87 MG were selected for further analysis and stimulated with dopamine (2 uM, 50 uM) and serotonin (50 uM, 200 uM), alongside vehicle controls. Gene expression was quantified by RT-qPCR. No significant changes in IGF-2 or IGF2R expression were observed in the U87 MG cell line following stimulation. In the SH-SY5Y cell line, dopamine exposure induced a trend toward decreased IGF-2 expression, reaching approximately 0.10-fold of control at higher concentration; however, this effect did not reach statistical significance ($p \sim 0.069$). These findings suggest the presence of a potential regulatory link between neurotransmiters, and the IGF-2/IGF2R axis, which may contribute to elucidating the molecular mechanisms of neurodegenerative diseases. These findings point toward molecular mechanisms that could help explain e. g. the association between long-term SSRI use and delayed Alzheimer's onset, while establishing a methodological framework for future research.

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