MULTI-NUTRIENT SUPPLEMENTATION INDUCES CHANGES IN SYNAPTIC PROTEIN EXPRESSION

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Objectives: Alzheimer's disease (AD) is a progressive neurodegenerative disease and although its etiology is not yet completely known, it is clear that loss of dendritic spines and synaptic connections are a hallmark of AD. Preclinical work indicates that nutrients such as DHA, EPA, UMP, choline, B-vitamins, folate, phospholipids, vitamin C and E, and selenium (combined in Fortasyn™Connect) can act as precursors or cofactors in the synthesis pathway of new neuronal membranes and act synergistically in synapse formation. To explore the molecular mechanisms in which these nutrient combinations stimulate synaptogenesis, we tested their effects on synaptic protein gene expression in vitro.

Methods: Exposed to nerve growth factor (NGF), PC12 cells undergo neuronal differentiation characterized by neurite outgrowth and neuronal protein expression. In this cell model the effects of multi-nutrient supplementation on gene expression of several proteins involved in synapse formation were tested. Cells were differentiated with NGF and supplemented with or without combinations of DHA and EPA, UMP, choline, B-vitamins, phospholipids and vitamin C and E and selenium.

Results: After nutrient supplementation, mRNA was isolated and differences in gene expression of synaptic proteins were determined using quantitative Real-Time-PCR. Analysis of the data showed an increase in mRNA expression of synaptic proteins related to neurite outgrowth and synapse formation.

Conclusion: These data show that supplementation with specific nutrient combinations increases synaptic protein gene expression, suggesting that a multi-nutrient approach might offer an effective method in the management of AD.

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