

Alterations in neuronal morphology and synaptophysin expression in the rat brain as a result of changes in dietary n-6: n-3 fatty acid ratios

ABSTRACT

Background: Polyunsaturated fatty acids (PUFA) play important roles in brain fatty acid composition and behavior through their effects on neuronal properties and gene expression. The hippocampus plays an important role in the formation of memory, especially spatial memory and navigation. This study was conducted to examine the effects of PUFA and specifically different dietary n-6: n-3 fatty acid ratios (FAR) on the number and size of hippocampal neurons and the expression of synaptophysin protein in the hippocampus of rats. **Methods:** Forty 3-week old male Sprague–Dawley rats were allotted into 4 groups. The animals received experimental diets with different n-6: n-3 FAR of either 65:1, 26.5:1, 22:1 or 4.5:1 for 14 weeks. **Results:** The results showed that a lowering dietary n-6: n-3 FAR supplementation can increase the number and size of neurons. Moreover, lowering the dietary n-6: n-3 FAR led to an increase in the expression of the pre-synaptic protein synaptophysin in the CA1 hippocampal subregion of the rat brain. **Conclusions:** These findings support the notion that decreasing the dietary n-6: n-3 FAR will lead to an intensified hippocampal synaptophysin expression and increased neuron size and proliferation in the rat brain.

Keyword: n-3 polyunsaturated fatty acid; Neuronal morphology; Synaptophysin; Hippocampus; Rats