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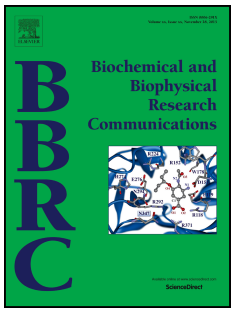

Early-stage reduction of the dendritic complexity in basolateral amygdala of a transgenic mouse model of Alzheimer's disease

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Early-stage reduction of the dendritic complexity in basolateral amygdala of a transgenic mouse model of Alzheimer's disease

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Abstract

Alzheimer's disease is a representative age-related neurodegenerative disease that could result in loss of memory and cognitive deficiency. However, the precise onset time of Alzheimer's disease affecting neuronal circuits and the mechanisms underlying the changes are not clearly known. To address the neuroanatomical changes during the early pathologic developing process, we acquired the neuronal morphological characterization of AD in APP/PS1 double-transgenic mice using the Micro-Optical Sectioning Tomography system. We reconstructed the neurons in 3D datasets with a resolution of 0.32×0.32×1 μm and used the Sholl method to analyze the anatomical characterization of the dendritic branches. The results showed that, similar to the progressive change in amyloid plaques, the number of dendritic branches were significantly decreased in 9-month-old mice. In addition, a distinct reduction of dendritic complexity occurred in third and fourth-order dendritic branches of 9-month-old mice, while no significant changes were identified in these parameters in 6-month-old mice. At the branch-level, the density distribution of dendritic arbors in the radial direction decreased in the range of 40-90 μm from the neuron soma in 6-month-old mice. These changes in the dendritic complexity suggest that these reductions contribute to the progressive cognitive impairment seen in APP/PS1 mice. This work may yield insights into the early changes in dendritic abnormality and its relevance to dysfunctional mechanisms of learning, memory and emotion in Alzheimer's disease.

Key words: Alzheimer, basolateral amygdaloid nucleus, dendritic complexity, Micro-Optical Sectioning Tomography