

Abstract Submitted
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Computer Simulations of Loss of Organization of Neurons as a Model for Age-related Cognitive Decline¹ LUIS CRUZ, ELENE FENGOMETIDIS, FRANK JONES, SRINIVAS JAMPANI, Physics Dept., 3141 Chestnut St., Drexel University, Philadelphia PA 19104 — In normal aging, brains suffer from progressive cognitive decline not linked with loss of neurons common in neurodegenerative disorders such as Alzheimer's disease. However, in some brain areas neurons have lost positional organization specifically within microcolumns: arrays of interconnected neurons which may constitute fundamental computational units in the brain. This age-related loss of organization, likely a result of micron-sized random displacements in neuronal positions, is hypothesized to be a by-product of the loss of support from the surrounding medium, including dendrites. Using a dynamical model applied to virtual 3D representation of neuronal arrangements, that previously showed loss of organization in brains of cognitively tested rhesus monkeys, the relationship between these displacements and changes to the surrounding dendrite network are presented. The consequences of these displacements on the structure of the dendritic network, with possible disruptions in signal synchrony important to cognitive function, are discussed.

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Luis Cruz Cruz
Physics Dept., 3141 Chestnut St., Drexel University, Philadelphia PA 19104

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