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Ageing, behavior and brain ultrastructure: Experimental study

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Ageing is associated with dynamic modifications in biological, physiological, behavioral and some other processes. Ageing affects all organs, including brain. Despite the fact that ageing affects every brain differently, it represents a major risk factor for many neurodegenerative diseases, such as Alzheimer's disease, dementias, or Parkinson disease. Studies from the basic biology of ageing using laboratory animals are especially important, since they lead to the emergence of theories to explain ageing. They also give the possibility to compare in detail the changes provoked by ageing with the modifications provoked by various neurological states associated with ageing. This presentation is the part of our large multidirectional investigation of the effect of ageing on the brain. Male Wistar rats at the age P30-35 (adolescents), P130-135 (adults) and P380-390 (senescent rats) were used. The following behavioral activities were assessed: (i) short-term memory in multi-branch maze, (ii) locomotor activity in open field, (iii) anxiety-like behavior in elevated cross maze, (iv), spatial memory in Morris water maze, (v) spontaneous alternation behavior in open field. Quantitative data were analyzed using t-test and Post-hoc (Tukey-test). In parallel with behavioral studies, electron microscopic investigation of the hippocampus (CA1 and CA3 areas), prefrontal cortex and amygdala in adolescent and adult rats was performed. Behavioral analysis revealed that aging does not affect significantly the process of learning and short-term memory; some tendency for changing was observed in emotional sphere, but locomotor activity in senescent rats was significantly decreased. The ultrastructure of adolescent and adult brain also do not differ, however, we do not exclude that some difference may be detected in the case of comparative qualitative and quantitative electron microscopic analysis of different types of neurons, glial cells and synapses in all three groups of animals.

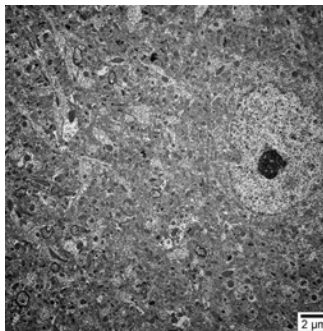


Figure 1. The part of neuropil of central nucleus of amygdala. All components have normal ultrastructure

Biography

Nino Lomidze is a PhD student at Ilia State University and Head of Clinical Subjects at the Department of Medicine School of Health Sciences and Public Health, University of Georgia, Tbilisi, Georgia. As the Head of Department, she has an expertise in assessment and improving of Neuroscience teaching for Georgian and international students. As PhD student, she has an expertise in evaluation of the effect of aging on the brain. Specifically, she investigates behavioral, histological, electron microscopic and other alterations provoked by aging in the rat brain regions involved in cognition and emotions. The originality of her work: performing quantitative electron microscopic analysis, she studies ultrastructural changes produced by ageing in different parameters of synapses. Her current interest is to compare the finest modifications which develop in senescent animals with the modifications obtained from Alzheimer rat model.