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Comparative electron-microscopic study of the ultrastructure of the hippocampus of rats with status epilepticus provoked by different by action pro-epileptic drugs

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In the present research, using transmission electron microscope, we elucidate the ultrastructure of neurons, synapses, glial cells and porosome complex in hippocampal CA1 and CA3 areas of adult male Wistar rats with pentylenetetrazol- and kainic acid-induced status epilepticus; the mechanism of action of these proepileptic drugs differ. Kainic acid, structural analogue of glutamate, induces temporal lobe epilepsy-like state (the most common form of epilepsy in humans), excitotoxicity and neuronal cell death. The exact mechanism of pentylenetetrazol action is not well-known. Several mechanisms should be involved. One of such mechanisms is its action on GABAA receptors, which are actively involved in epileptogenesis. In comparing with kainic acid administration, pentylenetetrazol-induced status epilepticus does not provoke cell loss or the cell loss is insignificant. The development of status epilepticus and other epilepsy-like activities were recorded via video system. The brains were analyzed 2 weeks and 1 month after status epilepticus. The following main results were obtained: (i) kainic acid-and pentylenetetrazol-induced status epilepticus provoke ultrastructural alterations in both areas of the hippocampus; in both cases alterations were more significant in the CA1 area. Some alterations are irreversible; (ii) there is direct association between the degree of seizure activities and the level of modifications; (iii) kainic acid provokes more large modifications than pentylenetetrazol-associated status epilepticus; (iv) at both experimental time-points the alterations were almost the same; (v) in both models the alterations in mitochondria and dendrites are among the most common, suggesting cell stress and changes to cellular metabolism.

Biography

Mzia G Zhvania has completed her PhD from Institute of Brain, Russian Academy of Medical Science and ScD from Javakhiashvili Tbilisi State University. She is Professor of Neurobiology at Ilia State University and Head of Department of Brain Ultrastructure and Nanoarchitecture at Ivane Beritashvili Center of Experimental Biomedicine, Tbilisi, Georgia. She has published more than 50 papers in reputed journals and international editions and has been serving as an Editorial Board Member of several scientific journals.

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