P2.11.

Are the passive morfofunctional architectures of CNS neurons really different?

Somogyi, A.[1]; Stelescu, A.[1, 2]; Wolf, E.[1*]

1: Department of Anatomy, Histology and Embryology, University of Debrecen, Debrecen, Hungary
2: Department of Head and Neck and Oral Surgery, University of Debrecen, Debrecen, Hungary

The firing activity of neurons is determined by the size and summation of PSPs arriving to the axon hillock (soma). Therefore the study of attenuations and propagation delays of PSPs during their dendritic propagation to the soma may give important information on synaptic integration. Further development of the morphoelectrotonic transformation was made and morphofunctional matrices were created to identify the percents of dendritic surfaces (an estimate of the ratio of dendritic synapses) found in different geometrical and electrotonic or geometrical and temporal distances from the soma. Hippocampal pyramidal neurons and cerebellar Purkinje cells from adult mice and spinal motoneurons of adult frogs were modelled by using high-fidelity 3D reconstructions of the neurons. Attenuations and propagation delays of PSPs were measured between dendritic points and the soma as percentages of their maximum values within the neuron. Passive membranes were deliberately assumed with characteristics typical to these neuron types to compare the passive structures of different CNS neurons across species. We found that distributions and means of attenuations and propagation delays of PSPs over the dendrites are the same or different depending on the homogeneous or inhomogeneous nature of the soma-dendritic membrane of the CNS neurons studied. This suggests surprisingly similar passive structure of CNS neurons across species under certain conditions.

Supported by the OTKA K67747 and ETT 025/2006.