P2.04.

A unique distribution pattern of the Kv4.2 channels on hippocampal CA1 pyramidal cells is revealed by freeze-fracture replica labeling

Kerti, K. M.[1]; Lőrincz, A.[1]; Nusser, Z.[1*]

1: Laboratory of Cellular Neurophysiology, Institute of Experimental Medicine, Hungarian Academy of Sciences, Budapest, Hungary

A-current flowing through Kv4.2 voltage-gated K+ channels plays a critical role in controlling pyramidal cell (PC) excitability. Electrophysiological recordings have demonstrated a 6-fold increase in A-type K+ current density along the somato-dendritic axis of hippocampal CA1 PCs. However, the underlying channel distribution and densities remained unknown. Here we examined the subcellular distribution and densities of Kv4.2 subunits in CA1 PC somata and 11 distinct dendritic compartments using a highly sensitive immunogold method (SDS-digested freeze-fracture replica labeling). Only a moderate (only 50%) increase in Kv4.2 immunogold density was observed along the proximo-distal axis of apical dendrites in the stratum radiatum with a slight decrease in stratum lacunosum-moleculare. This was characteristic to all dendritic compartments, including main apical dendrites, oblique dendrites and dendritic spines. In addition to the somato-dendritic localization, the Kv4.2 subunit was also found in axon terminals at a 4-fold lower density. Our results demonstrate a novel distribution pattern of the Kv4.2 subunit along the axo-somato-dendritic surface of CA1 PCs and suggest that the strong increase in the A-current density cannot be solely explained by a corresponding increase in channel number.