

MEETING ABSTRACTS

ACETYLCHOLINESTERASE IN NEUROMUSCULAR SYNAPTIC CLEFTS OF VERTEBRATES

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Precise positioning and density of acetylcholinesterase (AChE) in the synaptic cleft is required to correctly control the duration of transmitter action in cholinergic synapses according to the particular functional demands of the synapse. We had previously evaluated the densities of AChE at neuromuscular junctions (NMJs) by EM-autoradiography, using radiolabeled probes. The current study addressed fundamental issues concerning the precise location and distribution of the enzyme in the cleft, i.e., whether it is associated with pre- or postsynaptic membranes, or with synaptic basal lamina (BL), and whether it is present only in the primary cleft (PC) or also in postjunctional folds. Quantitative EM-analysis using nanogold labeled anti-AChE probes demonstrated that AChE sites are almost exclusively located on the BL rather than on pre- or postsynaptic membranes and are distributed in the PC and down the postjunctional folds, with a defined pattern. This localization pattern of AChE is suggested to ensure full hydrolysis of acetylcholine bouncing off receptors, thus eliminating its harmful re-binding. The methodology developed for normal NMJs provides a benchmark for studying other peripheral and central nervous system synapses under physiological or pathological conditions.

Keywords: nanogold; acetylcholinesterase; basal lamina; synaptic cleft; postjunctional folds