

Calcium modulation of the kinetics of evoked quantum secretion in neuromuscular synapses of cold- and warm-blooded animals

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Abstract

© 2015, Pleiades Publishing, Ltd. Calcium entry into the nerve endings through voltage-dependent calcium channels triggers a chain of events leading to exocytosis of neurotransmitter, providing the transmission of excitation through the synapse. In this regard, a significant role of calcium ions and presynaptic calcium channels in the modulation of secretion is evident. However, the question of the contribution of different types of voltage-dependent calcium channels in the calcium regulation parameters of the quantal secretion still remains unclear. The secretion kinetics characterizes a degree of synchrony of the neurotransmitter release. In recent decades it is regarded as one of the important factors maintaining the effectiveness of the synaptic transmission. Since neuromuscular synapses of frogs and mice are classical objects of physiological and pharmacological studies, the results of which are summarized and extrapolated to other synapses, it is interesting to compare changes of the acetylcholine secretion in these synapses under different conditions of calcium entry into the nerve endings. In this review we discuss the data on the neuromuscular synapses of frogs and mice and analyze some aspects of calcium regulation and involvement of different types of voltage-dependent calcium channels in the modulation of the acetylcholine secretion kinetics.

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Keywords

calcium, kinetics of quantal release of neurotransmitter, neuromuscular junction, voltage-dependent calcium channels