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Possible specialization of motoneuron axonal compartments in synthesis of particular proteins

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Abstract

Spontaneous quantal neurotransmitter release and its modulation was studied on neuromuscular preparations of rat soleus from intact animals and from animals in which colchicine had been applied to the sciatic nerve to block the axonal transport. After six days of colchicine application, neither the spontaneous quantal secretion nor its reaction to potassium-induced membrane depolarization or to activation of the presynaptic acetylcholine receptors with carbachol were disturbed in any way. Keeping in mind the relatively short half-life of proteins that take part in exocytosis and its regulation, it may be concluded that the functioning of the terminal neurosecretory apparatus does not depend on the state of axonal transport. These data are consistent with the earlier hypothesis that some proteins performing their functions in nerve terminals are synthesized directly at the site of their operation, rather than in the perikaryon as traditionally assumed. © 2010 Pleiades Publishing, Ltd.

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Keywords

axonal transport, colchicine, electron microscopy, intra-axonal protein synthesis, motor response, spontaneous quantal secretion