Cuneothalamic relay neurons are postsynaptic to glycine-immunoreactive terminals in the rat cuneate nucleus

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摘要

Abstract

This study was aimed to clarify whether the cuneothalamic relay neurons (CTNs) in the rat cuneate nucleus contained glycine or whether the neurons were modulated directly by presynaptic glycine-IR terminals. For this purpose, retrograde transport of wheat germ agglutinin conjugated with horseradish peroxidase (WGA-HRP) and immunoperoxidase labelling for glycine have been used to ascertain if the CTNs in the rat are glycine-immunoreactive (glycine-IR). Our results have shown that the WGA-HRP-labelled CTNs (mean area = 318 +/- 6.5 microm(2)) were not reactive for glycine. Glycine immunoreactivity, however, was localized in some small-sized neurons (mean area = 210 +/- 6.2 microm(2)) and axon terminals associated with the CTNs. The synaptic organization between the glycine-IR terminals and CTNs was further analyzed using anti-glycine postembedding immunogold labelling. By electron microscopy, the immunogold-labelled glycine-IR terminals containing pleomorphic synaptic vesicles formed symmetrical synaptic contacts with the dendrites, dendritic spines, and somata of CTNs. Quantitative estimation showed that the mean ratios of glycine-IR terminals to total terminals associated with the soma, proximal dendrites and distal dendrites of the CTN were 49.5, 45.2, and 45.8%, respectively. The higher incidence of glycine-IR terminals on the soma, however, was not significantly different from that of the proximal and distal dendrites. Notwithstanding the above, this study has shown a large number of glycine-IR terminals making direct synaptic contacts with CTNs, suggesting that glycine is one of the important neurotransmitters involved in postsynaptic inhibition on the cuneothalamic relay neurons to modulate incoming somatosensory information from forelimb areas in the rat.