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### Title

IMMUNOCYTOCHEMICAL LOCALIZATION OF GAD WITHIN STELLATE NEURONS OF RAT VISUAL-CORTEX

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RIBAK\*, C.E., Division of Neurosciences, City of Hope, Duarte, CA. (Introduced by J.E. Vaughn)  
The immunocytochemical localization of GAD

within stellate neurons of rat visual cortex.

Glutamate decarboxylase (GAD), the enzyme that synthesizes the neurotransmitter GABA, has been localized in coronal sections of rat visual cortex. Sections processed by previously published immunocytochemical procedures were obtained from non-injected rats and from rats which had colchicine injected into their occipital cortex 24 hr preceding sacrifice. Sections from non-injected rats displayed GAD-positive reaction product throughout all cortical layers and it was localized within axon terminals as well as a few somata. Since previous studies from non-injected specimens have suggested that somal GAD is detected only within neurons whose dendrites form dendrodendritic synapses, it appears that some neurons in the visual cortex may have presynaptic dendrites. The GAD-positive terminals formed symmetric synaptic junctions most commonly with dendritic shafts and somata of pyramidal and stellate neurons and less frequently with initial axon segments of pyramidal neurons and dendritic spines. The latter synaptic relationship commonly occurred in layer I and GAD-positive terminals usually shared the spines with GAD-negative terminals which formed asymmetric synaptic junctions.

A recent study has shown that colchicine injections into the CNS produce detectable concentrations of GAD within somata and dendrites of neurons that normally have detectable GAD levels restricted to their axon terminals. Sections of colchicine injected visual cortex exhibited a similar distribution of GAD-positive axon terminals as those from non-injected rats, and showed a large increase in the number of GAD-positive somata. The nuclei of these neurons were irregularly shaped and often contained intranuclear rods. Both asymmetric and symmetric synapses occurred upon their somata. The GAD-positive neurons lacked apical dendrites and instead had radially-oriented dendrites of small diameter. From this preliminary analysis, the neurons containing GAD appear to belong to the class of stellate neurons characterized by spine-free or sparsely-spinous dendrites. The results of this study suggest that GABA-ergic inhibition in the visual cortex is exerted by spinous stellate neurons whose axon terminals form symmetric synaptic junctions.

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