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THE HIPPOCAMPAL COMMISSURAL PATHWAY CONTAINS A GABAERGIC INHIBITORY COMPONENT

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RIBAK, Charles E., László SERESS,* Kim B. SEROOGY,* Gary M. PETERSON and Wolfgang H. OERTEL, * Department of Anatomy, University of California, Irvine, California; Department of Physiology, University Medical School, Pécs, Hungary; and Neurology Clinic, Technical University, Munich, West Germany. The hippocampal commissural pathway contains a GABAergic inhibitory component.

Results from both immunocytochemical and retrograde transport studies from our lab have indicated that some GABAergic neurons in the hilus of the dentate gyrus are commissural projection neurons. To test this notion, we have utilized a combined immunocytochemical and retrograde transport method as well as two anterograde methods; degeneration and transport of horseradish peroxidase (HRP). In the combined immunocytochemical or retrograde transport group rats were injected with either fast blue (FB) or WGA-HRP into the contralateral dentate gyrus. One day later the rats were killed by transcardiac perfusion and the brains sectioned for glutamate decarboxylase (GAD) immunocytochemistry. In the two anterograde groups animals were injected with HRP into the hilar region of the dentate gyrus or an electrolytic lesion was placed in this region. Light and electron microscopic preparations were prepared from these rats using routine procedures. Injection and lesion sites were confirmed histologically. The fluorescent studies showed several double-labelled neurons in the hilus contralateral to the injection site. Usually, only 1-2 bipolar or multipolar somata were found to contain FB and GAD per section. Electron microscopic studies revealed axon terminals that either contained HRP or were degenerated in the contralateral hippocampus. Although most of these terminals formed asymmetric synapses, both methods demonstrated that some terminals formed symmetric synapses, the type shown to be formed by GABAergic terminals in the hippocampus. These data indicate that some GABAergic neurons in the hilus of the dentate gyrus send their axons into the hippocampal commissure and are not exclusively local circuit neurons.

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