RIBAK, Charles E. and László SERESS*, Department of Anatomy and Neurobiology, University of California, Irvine, California. A Golgi-electron microscopic study of fusiform cells in the hilus of the hippocampal dentate gyrus.

The fusiform cells of the hippocampal dentate gyrus were analyzed in Golgi-electron microscopic preparations. These cells are located in a portion of the hilus within 100 microns of the granule cell layer. They have ovoid somata and bipolar dendrites that generally run parallel to the granule cell layer. Spiny and sparsely-spiny types were identified and distinguished in both light and electron microscopic preparations. The spiny fusiform cell has numerous spines along its dendrites, and they are contacted by terminals with the features of granule cell axon collaterals. This cell type also displays somal spines that are contacted by similar terminals. In contrast, the sparsely-spiny fusiform cell displays only a few spines, and they are contacted by multiple small axon terminals that synapse with both the stalk and end bulb of the spine. Most synaptic input is made with the smooth surfaces of the soma and dendrites. A variety of terminals form synapses with the sparsely-spiny fusiform cell, including terminals that resemble the fine axon collaterals of mossy fibers. The somata of these two cell types also display differences in the amount of Nissl bodies and the degree of nuclear infolding.

The results indicate that spiny fusiform cells are similar to mossy cells, another hilar cell type that receives its major synaptic input from axon collaterals of mossy fibers from granule cells. The distribution of the dendrites of spiny fusiform cells and the pattern of granule cell axon collaterals (Claiborne et al.,1986) suggest a high degree of convergence from granule cells. The heterogeneity of the synaptic input to sparsely-spiny fusiform cells suggests that more diverse inputs affect this cell's activity. Therefore, the structure and circuitry of these two hilar cell types are very different. This study adds further evidence to indicate that the hilus contains a large variety of cell types with different neuronal connections.

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