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Neuronal Activity in the Entorhinal-Hippocampal Circuitry in Early Stages

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Nerve cells known as pyramidal cells in a region of the brain called the entorhinal cortex are the first cells to die in the early stages of Alzheimer's disease. This observation has been confirmed in humans as well as in animal models of the disease. Even within the entorhinal cortex, only a select population of pyramidal cells are susceptible to early death. The causes of this susceptibility are not known.

Stefan Leutgeb, Ph.D. and colleagues have proposed to study the electrical properties of pyramidal cells in the entorhinal cortex. They will perform these studies in rats that have been genetically altered to express Alzheimer-like pathology. The researchers plan to record the shape of action potentials from these cells. Action potentials are the electrical waveforms that propagate through nerve cells and give the brain many of its unique capabilities.

Dr. Leutgeb's team also plans to record electrical activity from cells in another brain region known as the hippocampus. This region is of interest because it is immediately "downstream" from the entorhinal cortex, and cells in this region often die soon after those in the entorhinal cortex. By performing these experiments in the early stages of disease, Dr. Leutgeb and colleagues hope to identify changes in cellular electrical activity that presage later cell death.