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NMDA-RECEPTOR DEPENDENT SYNAPTIC PLASTICITY IN RAT HIPPOCAMPAL STRATUM RADIATUM INTERNEURONS AND GIANT CELLS.

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We examined the ability of hippocampal stratum radiatum interneurons and giant cells, located in the CA1 subfield, to exhibit long-lasting synaptic plasticity using whole-cell recording techniques and differential interference contrast optics in Sprague-Dawley rats (14-35 days old). All cells were biocytin filled and later histologically verified. Giant cells and interneurons both showed significantly more LTP at 34 °C than at 23 °C when administered tetanic stimulation at 200 Hz (50 pulses x 4). No LTP was observed in either cell type in the presence of the NMDA-receptor antagonist APV (50 μM). The potentiation appeared to be dependent upon postsynaptic Ca2+ entry, as addition of the Ca2+ chelator EGTA (10 mM) to the patch pipette prevented the induction of LTP. The activity of voltage dependent channels in the postsynaptic neuron also seemed essential, as the addition of QX314 (5 mM) to the internal solution also prevented the induction of LTP in both cell types. These results indicate that both SR interneurons and giant cells differ from hippocampal CA1 pyramidal cells in that they exhibit a temperature sensitive form of LTP that is dependent upon NMDA-receptor activation in response to 200 Hz stimulation.

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