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Title

Hilar mossy cells regulate the activity of hippocampal dentate gyrus circuitry in a frequency-dependent manner

Sections**1. Abstract Body**

Mossy cells (MCs) are glutamatergic neurons within the hippocampal dentate gyrus (hDG). They are implicated in key roles of the hDG, such as context discrimination and spatial memory. Our aim was to stimulate the hDG at physiological frequencies associated with spatial memory and determine how MCs regulate this circuitry. We recorded excitatory postsynaptic potentials (EPSPs) induced in dentate granule cells (GCs) by medial perforant pathway (MPP) stimulation in acute hippocampal slices from wildtype (WT) mice and genetically-modified mice that lack MCs. We found the absence of MCs increased the excitability of GCs to MPP stimulation at 20Hz and 50Hz but not at 5Hz. These results were recapitulated in WT slices by the application of type 1 cannabinoid receptor agonist WIN 55,212-2 that selectively blocks glutamate release at MC-GC synapses. These results suggest that MCs regulate GC responses to MPP stimulation at frequencies relevant to spatial memory processing in the hDG.

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