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## Presentation Abstract

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Presentation Title: Afferent-specific recruitment of interneurons in the dorsal hippocampal dentate gyrus

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Presentation time: Sunday, Nov 16, 2014, 1:00 PM - 5:00 PM

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Topic: ++B.09.d. Oscillations and synchrony: Other

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Abstract: Dentate gyrus (DG) is the primary gate of the hippocampus and receives several excitatory afferents projections from different brain areas. How the principal cells, that is, granule cells (GCs) and various local-circuit GABAergic interneurons respond to different excitatory inputs remains unclear. Here, we used optogenetics to investigate the

target-cell-specific neurotransmission at the hilar commissural pathway-DG and medial perforated pathway (MPP)-DG circuits. We found that monosynaptic excitatory transmission at both hilar commissural pathway-GC and MPP-GC synapses exhibited similar short-term synaptic depression. In striking contrast, hilar commissural pathway- and MPP-recruited GABAergic transmission onto GCs were markedly different. The ratio of inhibitory GABAergic conductance versus excitatory conductance (I/E ratio) in single GCs was monotonically increased during 10 Hz successive stimulation of the hilar commissural pathway, whereas the I/E ratio was decreased during the same stimulation of the MPP pathway. Differential recruitment of interneurons by these two pathways may account for the difference in GABAergic transmission. In agreement with this notion, ML-like and TML-like interneurons received stronger input from the hilar commissural pathway compared to the MPP pathway, and were more reliably recruited by the hilar commissural pathway during 10 Hz successive stimulation. By contrast, the MPP pathway preferentially recruited ML-like interneurons at the onset of stimulation train and did not recruit TML-like interneurons. Our results suggested that the use-dependent shift of the excitation-to-inhibition in the DG GCs is specific to the type of glutamatergic afferent.

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