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NEUROSCIENCE 2014

Presentation Abstract

Program#/Poster#:	215.09/C49
Presentation Title:	A synaptic homogeneity principle for parvalbumin-expressing interneuron synapses in the hippocampal dentate gyrus
Location:	WCC Hall A-C
Presentation time:	Sunday, Nov 16, 2014, 1:00 PM - 5:00 PM
Presenter at Poster:	Sun, Nov. 16, 2014, 1:00 PM - 2:00 PM
Topic:	++B.09.d. Oscillations and synchrony: Other
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Abstract:	The hippocampus is a key brain structure for learning and memory. The dentate gyrus (DG) serves as a primary gate of the hippocampus. Local-circuit GABAergic inhibitory interneurons (INs) in the DG comprise a heterogeneous cell population with distinct molecular, morphological, and electrophysiological properties. Among them, parvalbumin

expressing (PV(+)) INs are a striking type of inhibitory IN and play an important role in controlling neuronal activity and therefore mediate neuronal synchronization. PV+ INs are fast-spiking and exhibit extensive axonal arborization within the DG granule cell layer. They innervate granule cells, non-fast-spiking INs, and fast-spiking INs in the granule cell layer with high connection rates. Although anatomical evidence suggests that PV+ INs also innervate hilar neurons, including hilar mossy cells and hilar INs, the functional connections between PV(+) INs and hilar neurons remain unknown. Here, we combined optogenetics with electrophysiology to address this question. Our preliminary results found that granule cells receive strong synaptic input from PV(+) INs compared to hilar mossy cells and hilar INs. However, the temporal dynamics of inhibitory inputs to granule cells, hilar mossy cells, and hilar INs are not significantly different, indicating that synapses between PV+ INs and their target cells display target cell-independent short-term synaptic plasticity.

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