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Poster presentation

Storage and recall in the CA1 microcircuit of the hippocampus: a biophysical model

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It has been suggested that the hippocampal theta rhythm can contribute to memory formation by separating encoding and retrieval of memories into different functional cycles [1]. Herein, we investigate via computer simulations the mechanisms by which storage of spatio-temporal input patterns is achieved by the CA1 microcircuitry. A model of the CA1 microcircuitry is presented using biophysical representations of its major cell types including pyramidal cells and three types of inhibitory interneurons: basket cells, chandelier cells and bistratified cells. Inputs to the network come from the medial septum, entorhinal cortex and CA3 Schaffer collaterals. Patterns of CA3 input are stored via an STDP-type learning rule on the pyramidal cell target synapses. The other inputs provide context and timing information. The model simulates accurately the timing of firing of different hippocampal cell types relative to the theta rhythm and proposes functional roles for the different classes of inhibitory interneurons in the storage and recall of input patterns.

Acknowledgements

References

1.   Hasselmo M, Bodelon C, Wyble B: **A proposed function for hippocampal theta rhythm: separate phases of encoding and retrieval of prior learning.** *Neural Comput* 2002, **14**:793-817.