

Abstract Submitted
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Altering the Balance between Excitation and Inhibition in Cultured Neural Networks¹ RHONDA DZAKPASU, Department of Physics, Georgetown University — How is the network temporal structure altered when the balance between excitation and inhibition is changed? Proper balance is essential for normal brain function, including cognitive processing, the representation of sensory information and motor control. When the balance is compromised, neurological disorders may result. We use a simple reduced experimental system to investigate how manipulating the number of inhibitory neurons in a network of cultured hippocampal neurons affects synchronized bursting activity, the most prominent temporal signature of cultured hippocampal networks. Inhibitory neurons are thought to control spike timing and modulate network excitability and their absence may lead to widespread synchronization. We culture dissociated hippocampal neurons with varying quantities of inhibitory neurons on an 8x8 grid of extracellular electrodes and study how inhibitory neurons modulate network temporal dynamics. We show that as the proportion of inhibitory neurons increase, there is a dramatic transition in the temporal pattern.

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