DISTRIBUTION OF T-TYPE CALCIUM CHANNELS IN CA1 STRATUM ORIENS INTERNEURONS. L.M. Schultz*[1], B.R. Christie[1], and T.J. Sejnowski[1,2]. [1]Computational Neurobiology Lab and [2]Howard Hughes Medical Institute, The Salk Institute for Biological Studies, La Jolla, CA 92037.

Low-threshold (T-type) calcium currents have been implicated in the bursting behavior of thalamic neurons. Given that hippocampal interneurons in the stratum oriens region (SO) also display burst firing, we used confocal imaging techniques to determine the relative density of functional T-type channels in the soma and dendrites of SO interneurons. Transverse hippocampal slices were prepared from 14-28 day-old Sprague-Dawley rats, and somatic whole-cell current clamp recordings were obtained at room temperature using 3-5 MΩ patch electrodes containing (in mM): 140 $KMeSO_4$, 10 HEPES, 4 NaCl, 4 ATP, 0.3 Tris-GTP, 14 phosphocreatine, and 0.1 Oregon Green 488 BAPTA-1. A train of 5-10 action potentials was evoked by somatic current injection, and calcium influx was simultaneously monitored using a confocal microscope in linescan mode. Calcium influx was quantified as the percentage change in fluorescence of the high-affinity calcium indicator dye Oregon Green. Measurements were made before, during, and after bath application of the T-type antagonist nickel chloride (25 μM), an agent that also blocks burst activity. As evidence for the presence of T-type channels in SO interneurons, we found that nickel reversibly reduced voltage-activated calcium influx in both the soma and dendrites. Preliminary results also suggest that T-type channels are differentially distributed in SO interneurons. Unlike thalamic relay cells, where distal dendrites have the highest density of T-type channels (Destexhe et al., 1998), T-type calcium channels appear to be more concentrated in the soma of SO interneurons. These results suggest that low-threshold calcium currents may contribute to the bursting behavior of SO interneurons and thalamic relay neurons via different mechanisms.

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