

## RESEARCH INTERESTS – SLOBODAN TODOROVIC

Our research interests involve studies of pharmacology and function of T-type (low-voltage-activated, LVA) calcium channels in sensory transmission. These channels have been identified in a variety of excitable and non-excitable cells. Proposed roles for neuronal T-channels include promotion of calcium-dependent burst firing, generation of low-amplitude intrinsic neuronal oscillations, elevation of calcium entry and boosting of dendritic signals, possibly contributing to pacemaker activity, wakefulness, and seizure susceptibility. Unlike the family of HVA (high-voltage-activated) Ca<sup>2+</sup> channels, no natural toxins or venom components have been identified that alter T-channels selectively. Thus, despite the fact that these channels were first described in peripheral sensory and thalamic neurons, their function in sensory processing remains unclear.

Our lab utilizes biophysical techniques to measure membrane currents (voltage clamp and patch clamp recordings) from acutely dissociated rat sensory neurons and intact thalamic neurons in brain slices. We use immunohistological techniques to characterize T channels expressed in peripheral and central sensory pathways. We also have cell lines available that express recombinant ion channel proteins which allow studies of the relationship between structure and function. At the system level, we directly examine the effects of Ca<sup>2+</sup> channel modulators on thermal and mechanical nociception following injection into peripheral receptive fields of sensory neurons.

Our future studies will investigate how modulation of T-type Ca<sup>2+</sup> channels in peripheral and central sensory neurons affects their function and how different anesthetic, analgesic and anticonvulsant agents selectively target particular classes of voltage-gated Ca<sup>2+</sup> channels. This research is funded by the grants from NIH..

## GRANT SUPPORT

NIH R0-1 GM 070726-01, 03/1/2005-2/28/2010. “Anesthetics block neuronal voltage-gated calcium currents”. Principal Investigator: Slobodan M. Todorovic 35% effort. This grant aims to study anesthetic modulation of synaptic transmission and dendritic signaling in the thalamus.

NIH R0-1 GM075229-01, 6/1/2006-5/31/2010

“Redox pharmacology of T channels in DRG neurons”

Principal Investigator: Slobodan M. Todorovic 35% effort

This project aims to elucidate roles of redox modulation of T-type calcium channels as boosters of peripheral nociceptive pathways.