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*Spinal Cord Stimulation - Neuraxial Modulation of Ventricular Arrhythmias*

**Abstract**

Sudden cardiac death (SCD) due to ventricular tachyarrhythmias is a major cause of perioperative mortality. Imbalances in the autonomic nervous system play a large role in the pathophysiology of cardiac arrhythmias leading to SCD. Neuraxial interventions at the spinal level, such as spinal cord stimulation (SCS) and thoracic epidural anesthesia, provide an important avenue for therapeutic intervention for cardiac arrhythmias. While regulation of myocardial excitability at the level of the cardiac tissues is well understood, there are major gaps in our understanding of neuraxial regulation of cardiac sympathetic excitability from the level of the heart to the spinal cord. We propose that cardio-spinal reflexes are necessary to control myocardial sympatho-excitation. Adverse remodeling in cardiac disease results in altered afferent signaling and is fundamental to the increased potential for SCD in heart disease. Our hypothesis is that SCS decreases ventricular excitability in chronic MI through reduction in afferent neural signaling and attenuation of spinal cord sympathetic efferent outflow. The goal of this proposal is to determine how spinal cord processing of cardiac afferent and efferent neural impulses control ventricular excitability and to help explain how spinal neuromodulation therapies work, thereby providing a basis for expanding their use. Experiments in normal subjects will provide the foundation of understanding the effect of SCS on afferent and efferent neural modulation of ventricular arrhythmias. Then therapeutic experiments in Chronic MI subjects will lead to understanding the role of alterations in afferent neural input and the mechanisms for the anti-arrhythmic effects of SCS therapy.