

## FREQUENCY- AND TIME-DOMAIN EVALUATION FOR PREDICTING MOTOR PATTERNS IN NEONATE RAT SPINAL CORD

K.K. Williams<sup>1,2\*</sup>; K. Sundar<sup>2</sup>; S. Hochman<sup>1</sup>; S.P. DeWeerth<sup>1,2</sup>

1. Physiology, Emory Univ, Atlanta, GA, USA 2. Biomedical Engineering, Georgia Tech, Atlanta, GA, USA

Removed from descending & sensory inputs, the isolated spinal cord produces motoneuron output representing the population-encoded actions of spinal neurons. Bath application of pharmacological agents gives rise to various rhythmic motor patterns that differ in burst shape & frequency. These patterns include 5HT-induced locomotor-like activity, bicuculline & strychnine (bic/strych)-induced synchronous bursting, & other unique bursting patterns (Dougherty et al 2001 SFN Abst). We are using MATLAB technical computing software to conduct frequency- and time-domain analyses on ventral root recordings of the aforementioned induced motor patterns. Our goals are to quantitatively characterize & distinguish between various motor outputs, as well as to develop methods to automatically determine the presence & quality of bursting activity.

We have evaluated burst variability & power spectra to extract pertinent features from the various waveforms. Interestingly, we have found that medium-frequency (12-200Hz) spectra show transient shifts during development of both 5-HT/NMDA & bic/strych-induced bursting. These temporal changes in medium frequencies may represent the role of subthreshold events in coordinating final motor activity. High-frequency (100Hz+) components, while not distinct for locomotor and non-locomotor states of increased activity, showed increasingly uniform high-frequency spectral distribution for bursting patterns of higher regularity. In order to evaluate this possible metric for bursting quality, we have conducted initial comparisons of various bursting pattern high-frequency distributions with time-domain analysis of the waveforms burst shape & period variability. Future work to identify these & other fundamental differences in motor outputs will be used to create realtime feedback loops for automated detection & control of locomotion.  
Support Contributed By: NINDS-NS40440; NSF IBN-0131612