Cardiac Ganglion Responses to Muscle Stretch in Presence of CLDH Modulator in *Homarus americanus*

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Neural circuitry across all organisms is modulated by peptides, muscle stretch, neurotransmitters, and other neuromodulators. The interplay between neuromodulators and the circuitry of the neuronal system is under studied, especially when looking at specific modulators like calcitonin-like diuretic hormone (CLDH) and muscle stretch, which is what was completed in this study. To investigate the effects of modulation by muscle stretch and CLDH, the lobster heart was used, specifically the cardiac ganglion (CG) within the heart. The CG is a circuit known as a central pattern generator, meaning it can produce rhythmic output without input. The lobster preparation was used because lobster neurocircuitry is also entirely known and can be mapped easily, due to its simplicity relative to that of larger organisms. Additionally, the change in the bursting frequency and duration during a stretch to the cardiac muscle surrounding the CG is well established, allowing us to notice any potential influence that the neuropeptide CLDH may have on the stretch response.

Upon stretching the muscle in normal saline, the frequency of bursting in the ganglion would decrease while the hooks were pulling the muscle apart (rising phase), increase while the hooks were holding the muscle at a constant stretch (hold phase), and decrease again while the hooks were releasing the muscle back to its baseline stretch (release phase) (Figure 1). After perfusing CLDH 10^{-6}M across the muscle and ganglion, the frequency of the bursting sped up overall (Figure 2). When stretches were applied with the CG exposed to CLDH, the frequency changes were not as dramatic during the stretch response (Figure 3). After the CLDH was washed out, the frequency of the CG bursting remained elevated, potentially indicating a long-term effect of the neuropeptide in addition to the decrease in stretch response it caused on application (Figure 3).

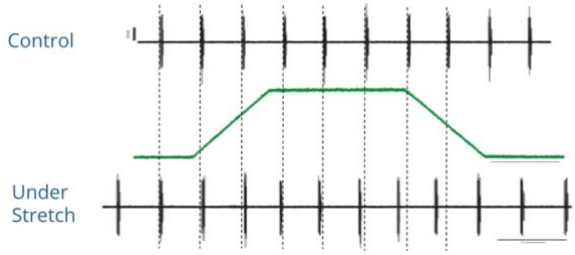

Figure 1: Bursting frequency changes across stretch phases.

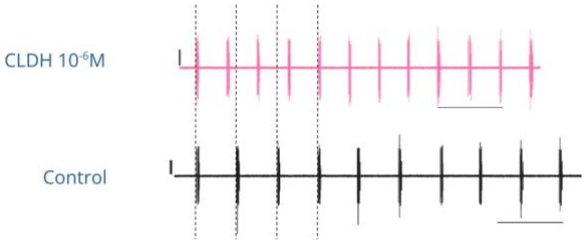

Figure 2: Frequency of bursting in control saline and CLDH 10^{-6}.

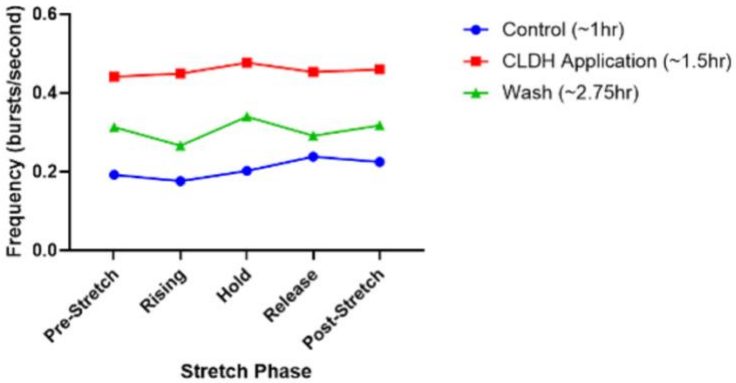

Figure 3: Frequency of CG bursting across control stretch phases, CLDH application stretch phases, and wash stretch phases.

Faculty Mentor: Dan Powell
Funded by the Henry L. and Grace Doherty Charitable Foundation Coastal Studies Research Fellowship