Effect of HIGSLYRamide on *Homarus americanus* Heartbeats Frequency and Amplitude

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As the advancement of research continues, more and more knowledge on neuromodulation is emerging, leading to deeper insights into how neural circuits generate rhythmic behaviors and adapt to changing environmental conditions. We are interested in researching the effects of peptides on cardiac and neural tissue, particularly focusing on their excitatory properties. What's intriguing is that the preprohormone containing these peptides have multiple copies, which is particularly unusual. The peptide modulators are observed to be a few copies within the preprohormone. They are known to influence both cardiac and neural tissue separately. It remains unclear where there is this abundance of peptides available and we are interested in how they directly affect the cardiac neuromuscular systems of decapod crustaceans. Specifically, the peptides of interest in Jonah crab (*Cancer borealis)* is HIGSLYRamide, in which we will study the effect of this peptide on the American lobster (*Homarus americanus)* modulating cardiac function and how it drives unique physiological responses. Based on previous data, we hypothesize that the application of HIGSLYRamide will increase the burst frequency and contractile force of *Homarus americanus* heartbeat.

In order to conduct our experiment, the lobster's whole heart was dissected and removed from the organism and pinned in a dish filled with cold physiological lobster saline. The hearts were cannulated through the posterior artery which will allow us to perfuse both saline and the neuromodulator across the whole heart. Next, a force transducer was tied around the anterior artery and used to measure the heartbeat. The peptide solution was prepared by dissolving the neuromodulator in lobster saline at varying concentrations and applied across the whole heart in a dose response curve (10-9M, 10-8M, 10-7M, 10-6M), starting with the lowest concentration of neuropeptide and working up to the highest concentration of neuropeptide with washes of saline in between. The heartbeat is a measure of when the heart contracts and relaxes. The period is defined by the rate of the nervous system firing and the amplitude is defined by the strength of the heartbeat. We are interested in observing potential changes within the firing rate of the nervous system and spike rate or receptors in the muscles.

As a result we saw that the SLY peptide of all concentrations decreased heartbeat period (seconds). For the effect on amplitude, at the lowest concentration of SLY (10-9M), there was no significant difference in the peptide application. However as concentration increased, there was a significant increase among heartbeat amplitudes.

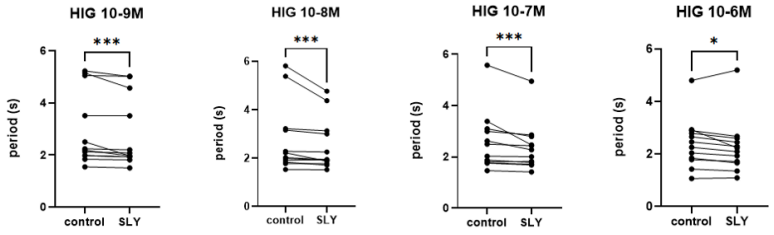

Figure 1. HIGSLYRamide decrease the heartbeat period of *Homarus americanus* whole heart.

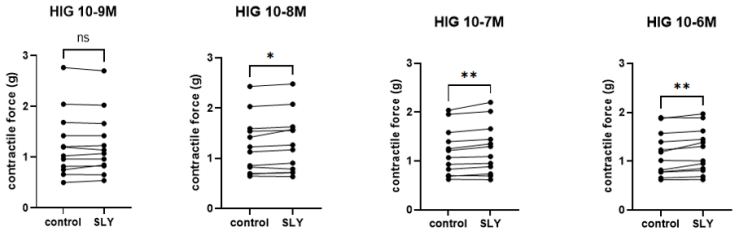

Figure 2. HIGSLYRamide increases heartbeat amplitude of *Homarus americanus* whole heart.

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