

Is stretch feedback in the heart of

modulated by neuropeptides

Madi Thies, Class of 2021

Central pattern generators (CPGs) are neuronal networks that produce a consistent rhythmic motor output to generate behaviors such as eating, walking, and breathing. One central pattern generator is the cardiac ganglion (CG), which controls the heart of the American lobster and is responsible for generating patterned bursts of action potentials, each of which results in a contraction of the heart. The cardiac ganglion includes four premotor and five motor neurons, as well as stretch-sensitive dendrites, which extend from the CG neurons (Cooke, 2002).

Two intrinsic feedback pathways modulate the bursting pattern of the CG. A negative feedback pathway using nitric oxide decreases contraction frequency, while feedback from the stretch-sensitive dendrites generally increases contraction frequency. The stretch of CG dendrites carries information about the filling of the heart to the rest of the CG. In addition, extrinsic modulation via neuromodulators plays a key role in achieving flexibility. However, the extent to which the heart's feedback system is modulated is still unknown. Here, we asked whether neuromodulators alter the positive stretch feedback system itself.

One family of modulatory peptides that modulate the CG is the FMRFamide-like peptides. In , two FMRF-amide-like peptides, SGRNFLRFamide (SGRN) and GYSDRNYLRFamide (GYS), have been found to alter contraction amplitude and frequency by actions at multiple sites. Data suggest that the

Faculty Mentor: Patsy Dickinson

Funded by Henry L. and Grace Doherty Charitable Foundation Coastal Studies Research Fellowship

References:

Cooke, I. M. (2002). Reliable, responsive pacemaking and pattern generation with minimal cell

number2 (a) 9 589.9143 cm BT 46 0 0 46 473 446 Tm/TT4 1 Tf [(H) 4.6 46 250 9 (oo9.2 (d69 (A9c) 9.2 -10.9 (C