

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Tubular Heart Pumping Mechanisms in *Ciona Intestinalis***

NICHOLAS BATTISTA, LAURA MILLER, University of North Carolina at Chapel Hill — In vertebrate embryogenesis, the first organ to form is the heart, beginning as a primitive heart tube. However, many invertebrates have tubular hearts from infancy through adulthood. Heart tubes have been described as peristaltic and impedance pumps. Impedance pumping assumes a single actuation point of contraction, while traditional peristalsis assumes a traveling wave of actuation. In addition to differences in flow, this inherently implies differences in the conduction system. It is possible to transition from pumping mechanism to the other with a change in the diffusivity of the action potential. In this work we consider the coupling between the fluid dynamics and electrophysiology of both mechanisms, within a basal chordate, the tunicate. Using CFD with a neuro-mechanical model of tubular pumping, we discuss implications of the both mechanisms. Furthermore, we discuss the implications of the pumping mechanism on evolution and development.

Nicholas Battista  
University of North Carolina at Chapel Hill

Date submitted: 31 Jul 2015

Electronic form version 1.4