

Roles of Retinoic Acid Signaling in Cardiopharyngeal Development during *Ciona robusta* Embryogenesis

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Abstract

Vitamin A (retinol) and its derivatives play several essential roles during embryogenesis and throughout adult life in Metazoa, acting both at the genetic and epigenetic levels. The earliest requirement of all-trans retinoic acid (atRA) in the development of vertebrate occurs in the patterning of the antero-posterior axis, which affects the patterning of several organs, including the spinal cord, forelimbs, eye, reproductive tracts and heart. In vertebrates, RA signaling is necessary for proper vertebrate heart development as alteration of RA embryonic levels can result in congenital heart malformations. Presently, it has been widely shown the existence of a retinoic acid signaling pathway in ascidian and its conserved function with vertebrates during development. However, specific and detailed studies on the role of RA signaling for proper heart development are still missing in tunicates. The primitive chordate *Ciona robusta* has emerged as a significant model system for the study of chordate development including the heart. **Therefore, given the high level of conservation with vertebrates of the key genes involved in cardiac cell specification and differentiation the goal of this PhD project will be to determine the requirements and the role of RA signaling for proper heart development during *Ciona robusta* embryogenesis.** The use of a non-canonical model system such as *Ciona robusta* has the potential to improve our understanding of inappropriate RA signaling that will ultimately provide new insight to shed light also to human congenital heart defects and disease.