CDB SEMINAR

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Thursday, January 21, 2010

16:00~17:00 C1F CDB Auditorium

Mechanisms of Musculoskeletal Patterning and Integration During Craniofacial Development

Summary

In order for individual musculoskeletal components to achieve their proper size, shape, orientation, and functional integration, embryonic progenitor populations require appropriate spatial and temporal cues. Our research focuses on the extent to which the neural crest serves as a source of spatiotemporal patterning information during craniofacial morphogenesis. Cranial neural crest cells originate along the dorsal margins of the developing neural tube, and they migrate extensively throughout the head. Their derivatives include cartilage, bone, and muscular connective tissues. In my lab, we have been developing an experimental chimeric system using two distinct avian species, quail and duck. This approach exploits the fact that as embryos, quail and duck are morphologically distinct and have considerably different rates of maturation. By exchanging premigratory cranial neural crest cells between quail and duck embryos we can identify neural crest-dependent molecular and histogenic programs of craniofacial development. We find that within quail-duck chimeras, donor neural crest-derived cells execute autonomous molecular programs and regulate gene expression in adjacent host tissues. This in turn, establishes when derivatives of the donor and those of the host undergo differentiation, and determines the size, shape, and location of anatomical structures from both the donor and the host. Thus, neural crest mesenchyme functions as a primary source of spatiotemporal patterning information during craniofacial development, and in this capacity has likely played an essential role in facilitating morphological change during the course of evolution.

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