Concurrent Session 5: Cellular Contact in Growth and Differentiation

Program/Abstract # 32
Regulation of adherens junctions components during chick neural crest cell migration
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The neural crest, a population of migratory cells derived from the future central nervous system in the developing vertebrate embryo, gives rise to a diverse range of cell types, including most of the peripheral nervous system, melanocytes, and the craniofacial skeleton. Initially existing as adherent epithelial cells (the premigratory neural crest), these cells undergo an epithelio-to-mesenchymal transition (EMT) characterized by the loss of intercellular contacts to facilitate their emigration from the dorsal neural tube. This EMT is mediated, in part, by the regulatory activity of the Snail2 transcriptional repressor. We have identified components of premigratory neural crest cell adherens junctions (cadherin6B and alpha-N-catenin) to be Snail2 targets that play important roles in proper neural crest cell migration. Knock-down and overexpression of both adherens junctions components enhances and inhibits, respectively, neural crest cell migration in vivo. Furthermore, alpha-N-catenin regulates the appropriate detachment of neural crest cells and their movement away from the neural tube through a mechanism that requires changes in Cadherin protein levels. Snail2 directly represses transcription of both adherens junctions components, and loss of either in a Snail2-depleted background rescues the neural crest cell migration defects normally observed in chick embryos with reduced Snail2. Collectively, our results point to the importance of dismantling adherens junctions to facilitate the proper migration of neural crest cells during the development of the vertebrate embryo.

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Program/Abstract # 33
Stability control of ATF4 protein is involved in the promotion of neural crest EMT
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Neural crest, the 4th germ layer in vertebrate development, provides platforms for studying several biological phenomena, such as embryonic patterning, directed migration, cell differentiation etc. Epithelial–mesenchymal transition (EMT) is one of them, and it allows neural crest cells to delaminate from the epithelial ectoderm, and to migrate extensively in the embryonic environment. In this study, we have identified ATF4, a basic-leucine-zipper transcription factor, as one of the neural crest EMT regulators. Although ATF4 alone was not sufficient to drive formation of migratory neural crest cells, ATF4 cooperated with Sox9 to induce neural crest EMT by controlling the expression of cell–cell and cell–extracellular matrix adhesion molecules. This was likely, at least in part, by inducing the expression of Foxd3, which encodes another neural crest transcription factor. We also found that ATF4 protein level was strictly regulated by proteasomal degradation and p300-mediated stabilization, allowing ATF4 protein to rapidly accumulate in the nuclei of neural crest cells undergoing EMT. Thus, our results emphasize the importance of the spatio-temporal control of protein stability in the neural crest EMT.

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Program/Abstract # 34
Control of skin pattern formation by gap junction in zebrafish
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Skin pattern is one of the most intriguing aspects of animals. Zebrafish has stripe pattern on its body which consists of melanophore, black pigment cell, and xanthophore, yellow pigment cell. Developments and differentiations of these pigment cells have been well studied, however it still remains unclear how spatial pattern of pigment cells is determined on fish skin. We have proposed that the skin pattern is formed cell-autonomously and cell–cell interaction among the chromatophores is a key factor for the pattern formation. Furthermore we also have proposed that connexin41.8 (cx41.8), a responsible gene for leopard fish is a key molecule for the pattern formation. In these transgenic fish cx41.8 works as an activator for melanophore development and inhibitor for xanthophore development which lead to the stripe pattern formation of zebrafish. We also provide evidence that gap junction protein has a potential to contribute pattern variation of animals.

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Program/Abstract # 35
Cytoskeletal polarity mediates localized induction of the heart precursor lineage
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Embryonic cells must make appropriate fate decisions within a complex and dynamic environment. In vitro studies suggest that the cytoskeleton acts as an integrative platform for this environmental