

migration. Inca, a novel gene, was shown to bind to p21 activated-kinase4 (PAK4) and inhibits catalytic activity, and also regulates actin and microtubule cytoskeletal dynamics. Loss of function of all three genes leads to defects in the craniofacial skeleton. PCNS and MyoX function in the migration of NC cells to the pharyngeal arches, while Inca is required for the terminal differentiation of cranial cartilage. These results illustrate the diverse functions of TFAP2-regulated genes, by affecting cell–cell adhesion, cell migration and cytoarchitecture in different stages of NC development.

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Program/Abstract # 21
Anterior and posterior neural plates from epiblast are derived by distinct molecular mechanisms

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The transcription factor gene Sox2, a major player in the genesis of neural primordia, is regulated by many spatially and temporally specific enhancers. Among these, enhancers N-2 and N-1, which are activated the earliest and involved in the genesis of the anterior and posterior neural plates, respectively, are of particular interest. Sox2 expression in the epiblast and the anterior neural plate are both regulated by N-2. However, in the epiblast, N-2 is activated by Class V POU (OCT3/4), while in the anterior neural plate it is activated by the combined action of OTX2 and Class III POU (OCT6/BRN2). The transition in transcriptional regulation from Class V POU dependence to a dependence on the combination of OTX2 and Class III POU appears to underlie the derivation of the anterior neural plate from the epiblast. In the genesis of the posterior neural plate, enhancer N-1 is activated in the anterior primitive streak and its surrounding region where the cell population “stem zone” resides and serves as the common precursor for the posterior neural plate and paraxial mesoderm. N-1 is activated by the combined action of Wnt and FGF signaling, and is repressed by a T-box factor-dependent mechanism. In Brachyury (T) and Tbx6 null mutant embryos, ectopic neural tubes are produced at the expense of mesodermal tissues. We demonstrate that the ectopic neural tubes are the consequence of enhancer N-1 dysregulation causing ectopic Sox2 expression. This study characterizes the distinct molecular regulations that derive neural plates from the epiblast in the anterior and posterior domains.

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Program/Abstract # 22
Crosstalk between NF-kappaB and Wnt/beta-catenin pathways involved in skin appendages development

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Program/Abstract # 23
Pathways controlling cell fate decisions in the early mouse embryo

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TGF β pathways are instrumental in patterning the somatic lineages of the early mouse embryo, as well as for formation of the germ line. Previous experiments argue that graded Nodal activities control the very earliest cell fate decisions during axis patterning, and are essential for correct mesodermal patterning and specification of axial mesendoderm and definitive endoderm. During gastrulation high levels of nodal induce endoderm progenitors, whereas lower levels specify mesoderm. In addition Nodal directly acts to maintain undifferentiated trophoblast stem cells within the extraembryonic ectoderm and thereby maintain the expression of Bmp4 required for germ cell specification. Our recent studies show that the Tbox transcription factor Eomesodermin (Eomes), acting downstream of nodal signalling, plays multiple roles in the developing embryo. Eomes activities in the trophoblast are required for maintaining trophoblast stem cells, while in the epiblast Eomes has two roles namely to promote nascent mesoderm to undergo EMT during gastrulation, and for specification of the definitive endoderm lineage. Interestingly Eomes is also transiently expressed in the subventricular zone of the developing cortex. Sox1.Cre mediated deletion causes microcephaly and severe behavioural defects. This can be attributed to a reduction in the expansion of the SVZ progenitor cells leading to a disturbance in the formation of upper cortical neurons. Thus Eomes has emerged as a key regulator of multiple processes in the mouse embryo.

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Program/Abstract # 24
Localized Xenopus Trim36 regulates cortical rotation and dorsal axis formation

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The activation of Wnt/beta-catenin signaling on the future dorsal side of the blastula is necessary and sufficient for axis formation in *Xenopus* and other vertebrates. Wnt signaling is initiated by dorsal enrichment of vegetally localized molecules following rotation of the egg cortex after fertilization. Both localized wnt11 mRNA and protein inhibitors of beta-catenin degradation, Dishevelled and GBP, have been implicated, but the mechanisms activating Wnt signaling in axis formation still remain elusive. Because vegetally localized RNAs are important for this process, we have conducted a microarray screen to identify novel mRNAs localized to the vegetal cortex. We present evidence that a localized mRNA encoding a Tripartite Motif Protein (Trim), Trim36, plays a critical role in *Xenopus* axis formation. Maternal antisense inhibition of Trim36 resulted in ventralized embryos, with reductions in dorsal beta-catenin accumulation and Wnt target gene expression. We further present experiments to identify the extent that Trim36 interacts with Wnt/beta-catenin signaling and cortical rotation mechanisms.

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