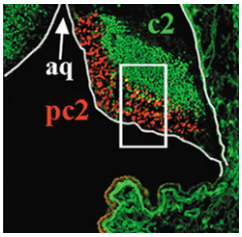
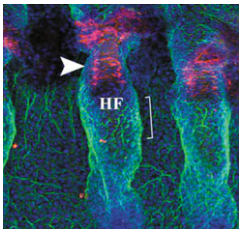


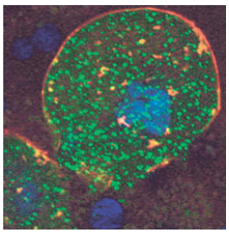
Roof plate signals cerebellar development

In the developing central nervous system, neural specification is often controlled by signals secreted from local signalling centres. The cerebellar territory, for example, is initially established by the isthmus (a signalling centre at the mid-hindbrain junction), but what specifies the neural cell types within this territory is unclear. Chizhikov and co-workers now report that the roof plate of dorsal rhombomere 1 (r1; the neural tube region that becomes cerebellum) is a signalling centre for multiple aspects of cerebellar patterning (see p. 2793). The researchers define several cell populations in the cerebellar anlage using gene expression and fate mapping studies. They then show that secreted signals from the r1 roof plate are necessary and sufficient for the specification of the adjacent cerebellar rhombic lip. These signals are not, however, absolutely needed to specify more distal cerebellar regions but instead regulate progenitor proliferation and cell position throughout the anlage. Thus, the researchers conclude, the r1 roof plate is a second, important signalling centre during cerebellar development.



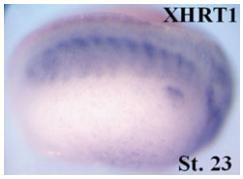
New hair progenitors for the follicly challenged?

If we are lucky, our hair, like the rest of our skin, constantly renews itself throughout our life. The epidermal stem cells that are central to hair renewal reside in a region of the hair follicle called the bulge. Now, though, Nijhof and co-workers identify a potential new reservoir of mouse epidermal progenitor cells just above the bulge. These cells are characterised by the expression of MTS24, a cell-surface marker for thymic epithelial progenitor cells (see p. 3027). The researchers show that although MTS24+ cells do not express the bulge-specific stem-cell markers CD34 or keratin 15, they can form colonies in vitro. Furthermore, their overall gene expression profile resembles that of bulge stem cells. Given these results, the researchers propose that MTS24+ keratinocytes are committed progenitor cells that are derived from the bulge stem cells. Further characterisation of these cells, they suggest, might reveal ways to modify keratinocyte progenitor cell behaviour during hair loss, wound healing and cancer.



Wnt pathways MAKe the switch

Two distinct Wnt signalling pathways regulate many important developmental processes during embryogenesis. The canonical pathway acts through β-catenin to control cell fate determination, whereas the non-canonical pathway modulates morphogenetic movements by regulating the actin cytoskeleton. But how do developing tissues switch between these pathways? On p. 2845, Kibardin and colleagues propose that metastasis-associated kinase (MAK) may do the switching during *Xenopus* development. In loss-of-function and gain-of-function experiments, the researchers show that MAK is required for convergent extension movements, eye development and specification of the midbrain/hindbrain boundary, all of which are controlled by Wnt signalling. MAK, they report, stimulates non-canonical Wnt signalling but negatively regulates the canonical pathway. These effects require its kinase activity, one possible substrate of which is Dishevelled, which functions in both Wnt signalling branches. The researchers propose, therefore, that MAK may switch Wnt signalling from the canonical to the non-canonical pathway during development through phosphorylation of Dishevelled. Future research should uncover what regulates MAK activity.

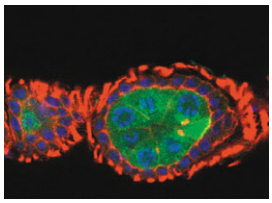


Notch signals in context

Notch signalling controls numerous developmental cell fate decisions through different combinations of ligands, receptors, signal transducers and effectors. On p. 2961, Taelman and colleagues provide new insights into Notch signalling by describing the role played by the Notch effector Hairy-related transcription factor (XHRT1) in the development of the pronephros (embryonic kidney) in *Xenopus*. The researchers show that Notch activation is essential first for glomus (the site of blood filtration) and later for proximal tubule fates. They report that several basic helix-loop-helix Orange (bHLH-O) transcriptional repressors, such as XHRT1, which act as downstream mediators of Notch signalling, have distinct and restricted dynamic expression patterns in the developing pronephros and that their expression is regulated by Notch. XHRT1 in particular plays a role that is distinct from that of the other pronephric bHLH-O repressors in the early proximodistal patterning and glomus formation of the developing pronephros. Overall, these results highlight how Notch signalling uses different downstream effectors to send context-dependent messages during development.

Cooperative SALLies form organs

The human developmental Okihiro and Townes-Brocks syndromes are caused by mutations in *SALL4* and *SALL1*, respectively, human homologs of the *Drosophila* homeotic gene *spalt* (*sal*). Both syndromes feature limb, kidney, heart and anal deformities. Now, on p. 3005, Sakaki-Yumoto et al. report that the mouse homologs of *sal* cooperate during anorectal, heart, brain and kidney development. To investigate the roles of mammalian Sal-related genes in organogenesis, the researchers studied mice carrying mutations in these genes. Unexpectedly, they discovered that *Sall4* is essential for embryonic stem cell proliferation and early embryogenesis. *Sall4* haploinsufficiency, however, causes anorectal and heart defects; *Sall4*/*Sall1* compound heterozygotes have an increased incidence of these abnormalities, plus brain and kidney defects. Consistent with this genetic interaction, the researchers found that Sall4 and Sall1 form heterodimers. Furthermore, truncated Sall1 prevents the normal localisation of Sall4 to heterochromatin. Because SALL1 is truncated in Townes-Brocks patients, the authors suggest that certain abnormalities associated with this disease might be caused by SALL1 inhibiting SALL4.



New function for *oskar* mRNA

Maternal proteins help to establish body axes in many developing organisms. In *Drosophila*, the maternally encoded protein Oskar is responsible for the formation of the posterior pole plasm in the egg and thus the development of the adult's abdomen and germline. Jenny, Hachet and colleagues now report that *oskar* mRNA has an additional, translation-independent role in early *Drosophila* oogenesis (see p. 2827). Classical *oskar* mutants, which produce embryos that lack an abdomen and germ cells, make *oskar* mRNA but no Oskar protein. The researchers describe two new mutants in which little or no *oskar* mRNA is made. These mutants are sterile because of an early arrest in oogenesis, but their egg-less defect can be rescued by expression of the *oskar* 3′ untranslated region alone, indicating that *oskar* mRNA mediates this early *oskar* function. The researchers suggest that *oskar* mRNA might either sequester a negative regulator of oogenesis or provide a scaffold on which the cytoplasmic complexes needed for oocyte development are assembled.

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