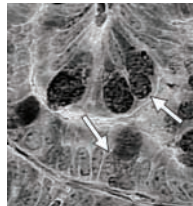


Prostate stem cell located?

Both of the main epithelial cell types of the prostate – luminal and basal cells – develop from the urogenital sinus (UGS), but the cell lineage relationship between the two cell types is unclear. On p. 4955, Kurita et al. show that p63, a p53 tumour suppressor homologue, is essential for the differentiation of prostatic basal cells in mice, but that luminal cells develop independently of basal cells. The researchers transplanted UGSs from *p63*^{-/-} mice, which die perinatally, into adult male nude mice, and show that the prostatic tissue formed by these grafts contains neuroendocrine and luminal cells but no basal cells. Some luminal cells transform into mucinous cells, indicating that basal cells are needed to maintain luminal cell differentiation. Finally, *p63*^{-/-} grafts can regenerate after the host mice are castrated, suggesting that the mouse prostatic luminal epithelium contains self-renewing stem cells that could be the target of carcinogenesis.



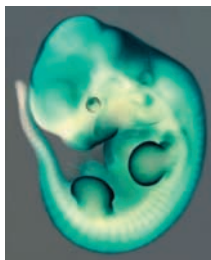
Parallel routes to ear development

The vertebrate inner ear develops from the otic placode, an ectodermal thickening that forms next to the developing hindbrain. Now, Hans and colleagues report that the paired box transcription factors Pax2a and Pax8 function synergistically in zebrafish otic specification (see p. 5091). They show that zebrafish embryos in which Pax8 is depleted using morpholinos have mild ear defects similar to those seen in *pax2a*⁻ mutants but that ear development is blocked in Pax8-depleted *pax2a*⁻ mutants. Other experiments reveal that expression of *pax8* and *pax2a* is regulated by the transcription factors Foxi1 and Dlx3b, respectively, and indicate that Pax2a and Pax8 are the main downstream effectors of the Fgf signals that induce otic specification. The researchers propose that the Foxi1-Pax8 pathway jump starts otic specification, which is then maintained by the Dlx3b-Pax2a pathway. Similar parallel pathways may act in otic specification in other vertebrates.



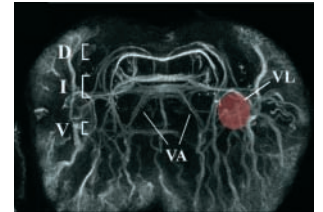
Of mice and flies

Morphogens act through only a few signalling pathways but elicit many different cellular responses during development. In their investigation of how morphogens accomplish this, Brugger and colleagues identify a bone morphogenetic protein (BMP)-responsive element in the mouse *Msx2* gene, a target of BMP signalling (see p. 5153). Consensus Smad-binding sites and a consensus homeodomain sequence within the 52-bp core of this element are both needed for general BMP responsiveness in mouse cells and embryos; ancillary elements mediate signalling in diverse developmental settings. The sequence of the minimal BMP-responsive element, although conserved in mammals, is absent from other vertebrates and non-vertebrates. Even so, provided both Smad and homeodomain sites are present, the core *Msx2* BMP-responsive element responds to Dpp signals when introduced into *Drosophila* embryos. Thus, synergistic interactions between homeodomain and Smad-related proteins may be an ancient mechanism for mediating the transcriptional activation of BMP/Dpp-regulated genes.



Building an adult insect nervous system

Insects that undergo complete metamorphosis, such as *Drosophila*, have two waves of neurogenesis. The embryonic wave, which generates the neurons that regulate larval behaviour, has been extensively studied. However, little is known about the postembryonic patterning of the adult-specific structures of the central nervous system (CNS). On p. 5167, Truman and colleagues use mosaic analysis with a repressible cell marker (MARCM) to follow adult-specific lineages of cells produced from individual neuroblasts in the ventral CNS of larval *Drosophila*. They identify the 24 lineages that make up the scaffold of a thoracic hemineuromere, and show that the adult-specific cells in a given lineage are all very similar and project to only one or two initial targets. The description of these initial contacts provides a developmental framework for future studies into how the complex connectivity of the adult CNS is achieved.



NGF and the immune system

Nerve growth factor (NGF) and its receptors are best known for regulating development in the mammalian nervous system. Now, on p. 5185, Coppola and colleagues use a reverse conditional gene targeting strategy in mice to show that the NGF/TrkA receptor system also modulates immunological functions. Previous work has hinted that NGF/TrkA is required for a healthy immune system. Immunodepletion of NGF in mice, for example, causes major immunological abnormalities. However, this phenotype could be indirectly caused by neural system abnormalities rather than by intrinsic effects of NGF/TrkA on the immune system. To distinguish between these possibilities, the researchers genetically activated TrkA in the neuronal structures only of TrkA-null mice. The result: grossly normal mice containing all the major immune system cell populations, but with defects in immunoglobulin production and B cell number with aging. Thus, although the NGF/TrkA system is dispensable for lymphoid system development, it directly modulates immunological functions in adult animals.

In Journal of Cell Science

Hearing through tight junctions

The internal environment of multicellular organisms is split into specialized compartments containing different fluids, such as the endolymph compartment of the mammalian cochlear. These compartments are surrounded by epithelial cell barriers, which are sealed by tight junctions (TJs). The endolymph compartment has a high K⁺ concentration and a positive endocochlear potential (EP), which are essential for transducing acoustic signals to electrical signals by the cochlear hair cells, and are probably generated by the stria vascularis (SV), an adjacent compartment delineated by two epithelial cell layers. Kitajiri et al. now show by making mice lacking claudin-11 – a major component of TJs in the basal cell layer of the SV – that, although an intact SV is not needed to maintain endolymphatic K⁺ concentrations, it is indispensable for the generation/maintenance of EP, and thus for hearing.

Kitajiri, S.-i. et al. (2004). Compartmentalization established by claudin-11-based tight junctions in stria vascularis is required for hearing through generation of endocochlear potential. *J. Cell Sci.* 117, 5087-5096.