HIGHLIGHTS

URLs

C X C R 4 :
<http://www.ncbi.nlm.nih.gov/LocusLink/LocRpt.cgi?l=12767>

S D F - 1 :
<http://www.ncbi.nlm.nih.gov/LocusLink/LocRpt.cgi?l=20315>

DEVELOPMENT

Finding the right address

The inhibitory interneurons of the neocortex originate in subcortical proliferative zones called the ganglionic eminences, from where they migrate in a tangential stream. Little is known about how these cells navigate the cortical environment to reach the correct layer, but two studies reported in the *Journal of Neuroscience* provide some intriguing new insights.

Valcanis and Tan showed that in the mouse neocortex, interneurons populate the layers in an inside-out sequence, mirroring the order of placement of projection neurons. To some extent, their final destination is determined at the start of their journey, but it is not necessarily set in stone. For example, when the authors transplanted early-born interneuron progenitors into an older brain, these cells tended to adopt an abnormally

superficial position. Progenitors that divided within the cortex were more prone to re-specification than post-mitotic progenitors, indicating that the cells acquire some positional information from their immediate surroundings during their final round of division.

In the second study, Stumm *et al.* identified a signal that might be responsible for guiding some interneurons to their final destination. They found that the late-born interneurons that colonize the superficial cortical layers express CXCR4 chemokine receptor 4 (CXCR4), a receptor for stromal cell-derived factor-1 (SDF-1). SDF-1 is expressed in the outermost layer of the developing cortex, and it seems to attract CXCR4-expressing interneurons.

These findings indicate that the fate of cortical interneurons is partially specified before they reach the cortex, although a subset of cells might also pick up local information within the cortical layers. A previous study by Nadarajah *et al.* indicated that the cortical ventricular zone is an additional source of patterning signals for interneurons. So, cortical interneurons seem to acquire their layer-specific address at various points along their migration pathway. The next challenge will be to characterize these signals in more detail.

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References and links

ORIGINAL RESEARCH PAPERS Valcanis, H. & Tan, S.-S. Layer specification of transplanted interneurons in developing mouse neocortex. *J. Neurosci.* **23**, 5113–5122 (2003) | Stumm, R. K. *et al.* CXCR4 regulates interneuron migration in the developing neocortex. *J. Neurosci.* **23**, 5123–5130 (2003)

FURTHER READING Marin, O. & Rubenstein, J. L. A long, remarkable journey: tangential migration in the telencephalon. *Nature Rev. Neurosci.* **2**, 780–790 (2001) | Nadarajah, B. & Parnavelas, J. G. Modes of neuronal migration in the developing cerebral cortex. *Nature Rev. Neurosci.* **3**, 423–432 (2002) | Nadarajah, B. *et al.* Ventricle-directed migration in the developing cerebral cortex. *Nature Neurosci.* **5**, 218–224 (2002)