HIGHLIGHTS

DEVELOPMENT

What lies beneath

The subplate is a transient layer of neurons that underlies the developing cortical plate. Subplate neurons relay information from the thalamus to the cortex before the thalamocortical projection is established, and now Kanold *et al.* report that the subplate is also essential for the maturation of thalamocortical synapses.

The authors ablated the subplate during the early postnatal period in the cat, after thalamic axons had reached layer 4 of the visual cortex but before they had segregated to form eye-specific ocular dominance columns. As was shown in previous studies, the ocular dominance columns did not form in the absence of the subplate. In addition, Kanold *et al.* found that orientation columns (clusters of neurons that respond preferentially to visual stimuli in the same orientation) failed to develop.

However, perhaps the most intriguing finding of this study was that in areas where the subplate was ablated, the synaptic connections between thalamic axons and layer 4 neurons were much weaker than in areas where the subplate was intact. By contrast, the intracortical synapses in layer 4 were fully functional, indicating that the defect was specific to thalamocortical synapses.

The subplate normally provides excitatory input to the cortical plate, and this might provide a clue as to how it influences thalamocortical connectivity. For example, one could envisage a Hebbian-type mechanism, in which excitation of the cortex by the subplate increases the probability of synchronous firing between thalamic and cortical neurons, thereby strengthening the synapses between them. Whatever the actual mechanism turns out to be, the findings of Kanold *et al.* confirm that the subplate is a key intermediary between the thalamus and cortex during the formation of thalamocortical connections.

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References and links

ORIGINAL RESEARCH PAPER Kanold, P. O. *et al.* Role of subplate neurons in functional maturation of visual cortical columns. *Science* **301**, 521–525 (2003)

FURTHER READING Katz, L. C. & Crowley, J. C. Development of cortical circuits: lessons from ocular dominance columns. *Nature Rev. Neurosci.* **3**, 34–42 (2002) | López-Bendito, G. & Molnár, Z. Thalamocortical development: how are we going to get there? *Nature Rev. Neurosci.* **4**, 276–289 (2003)