

9.14 class #25: Neocortex 2: Neurogenesis, cell migration and the specification of laminar and areal identity

Readings:

Purves and Lichtman, "chapter 4: Movement and migration of neurons", pp 91-95.

Rakic, P., "A small step for the cell, a giant leap for mankind: a hypothesis of neocortical expansion during evolution", *Trends in Neurosciences*, 1995, 18: 383-388.

For your review of earlier topics:

Brodal text, "chapter 4, Development, aging, and plasticity of the nervous system", pp. 123-159.

Brodal text, "chapter 20, Cerebral cortex", pp. 583-599. (Assigned for previous class. The remainder of the chapter is relevant to our classes on association cortex.)

Additional readings, recommended:

Shatz, C.J., "Dividing up the neocortex", *Science*, 258: 237-238, 1992.

McConnell, S.K., "The control of neuronal identity in the developing cerebral cortex", *Current Opinion in Neurobiology*, 1992, 2: 23-27,

Mione, M.C. and Parnavelas, J.G., "How do developing cortical neurons know where to go?" *Trends in Neurosciences*, 1994, 17: 443-445,

Sur, M. and Cowey, A., "Cerebral Cortex: Function and Development", *Neuron*, 1995, 15: 497-505, (selected parts will suffice).

Questions (to think about during and after class):

1. What are cortical layers and cortical areas?
2. What are the following regions: ventricular zone, marginal zone, cortical plate, subplate?
3. What are the following entities: progenitor cell, radial glia, migratory neuron?
4. What does "symmetric" and "asymmetric" cell division refer to?
5. How does tritiated thymidine help in establishing the birthdate of a cell? What is a problem associated with the technique?
6. How do labeling methods using retrovirus-mediated gene transfer alleviate the problem?
7. How have transplant studies helped in establishing some of the factors that determine the laminar location of a cell?
8. What are the key issues in the debate over how cortex gets specified into different areas?
9. What is the 'protomap' hypothesis? How does it differ from the 'protocortex' hypothesis?
10. What is the evidence that supports one hypothesis or the other?