

9.14

Classes #35-38: Neocortex

Questions on development of neocortex, based on the following readings and on presentations:

Purves and Lichtman, chapter 4 pp 91-95 (*Movement and migration of neurons*).

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

1. What are cortical layers, cortical areas, and cortical columns?
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? (The problem is alleviated by use of retrovirus-mediated gene transfer.)
6. What are the key issues in the debate over how cortex gets specified into different areas?

Questions on the role of activity in the shaping of cortical structure:

1. Why is the visual system a good model for examining the role of activity in cortical development?
2. How does sensory experience alter electrical activity in the brain?
3. What is the ocular dominance of a cell in primary visual cortex? What is an ocular dominance column?
4. What are the following terms: "critical period", "binocular competition"?
5. What is Hebb's postulate of learning? What does this have to do with activity-dependent development of cortical connections?
6. What is the NMDA receptor? What makes it special?
7. What is "long-term potentiation"?

8. What are neurotrophins?

9. How might neurotrophins be involved in competition regulated by neuronal activity?