

Lecture 2 Objectives (also read Brain Facts chapter 2): embryological development and neural circuits

- part 1 = how we get from one cell type to the 5,000 or so neuron types in the brain?
- part 2 = how do neurons grow toward, find and innervate their target cells?

Part 1

1. According to Dr. Jessel, how is neuroscience different than psychology?
2. What are the points of communication between neurons called?
3. How many synaptic connections do we have in our brain?
4. How many nerve cells are in the human brain of the average 10 year old?
5. What is a transcription factor?
6. What is a 'tabula rasa'?
7. How do cells convert their 'position' into their 'identity' (e.g. cortex versus spinal cord)?
8. What is 'Sonic Hedgehog' (in relation to the nervous system, not the cartoon) and what does it do?
9. What could the absence or low concentration of Sonic Hedgehog do to the eyes of a developing animal?
10. How long does a cell have to be exposed to the signaling molecule during development?

## Part 2

1. Where is the growth cone and what does it do?
2. How do growth cones know which way to go?
3. Approximately what percentage of synapses that initially form in your developing brain break down or fail to be maintained?
4. What do neurexin and neuroligin do? A mutation in these genes is associated with what disorder?
5. What determines if a synapse is maintained or eliminated?