Prenatal Brain Development and Organization

3 weeks 4 weeks 5 weeks
7 weeks 11 weeks 4 months
6 months 8 months Newborn
Formation of Neural Tube

• Three primordial tissues
  – endoderm
  – mesoderm
  – ectoderm

• Which tissue does nervous system develop from?
  – ectoderm
Neural Tube Related Birth Defects

- **Anterior neural pore**
  - Failure to close = anencephaly

- **Posterior neural pore**
  - Failure to close = spina bifida
• Neural crest becomes peripheral nervous system (PNS)
• Neural tube becomes central nervous system (CNS)
• Somites become spinal vertebrae.
Three-vesicle stage (Week 4)

- Prosencephalon or forebrain
- Mesencephalon or midbrain
- Rhombencephalon or hindbrain
Five-vesicle stage

Telencephalon
(2 cerebral hemispheres)

Diencephalon
Midbrain
Hindbrain

mesencephalon
metencephalon
myelencephalon

4 weeks — 6 weeks
Differentiation of Forebrain

(a) Diencephalon

(b) Lateral ventricles
Third ventricle

(c) Telencephalon
Cerebral cortex
Thalamus
Hypothalamus
Basal telencephalon

(d) Corpus callosum
Cortical white matter
Internal capsule
Human Brain at Birth

6 Years Old

14 Years Old
A lot can go wrong.

- Rate of neurogenesis incredibly rapid.
- Failure to form appropriate connections may be basis of many neurological and psychiatric disorders.