Outline

General overview of prenatal development

Embryonic period phase 1
- Formation of bilaminar disk
- Formation of trilaminar disk (gastrulation)

Embryonic period phase 2
- Formation of neural tube
- Differentiation of mesoderm
- Folding of embryo
  - Formation of pharyngeal arches

Development of head, face and oral cavity
- Face (bones and muscles)
- Pituitary gland
- Palate
- Tongue
- Thyroid
- Jaw bones

Embryology Lecture part 1 Objectives

- In general, what happens in the first and second phases of the embryonic period?
- What happens during weeks 1 and 2?
- Describe the main events in gastrulation.
- How does the neural tube form, and what happens to it?
- How does lateral folding occur (what meets up with what?)
- What is the fate of the endoderm, mesoderm and ectoderm?
This YouTube video is awesome at explaining early embryonic development: http://www.youtube.com/watch?v=rN3lep6roRI

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Week 1: Differentiation of Morula into Blastocyst

Week 2: Formation of Bilaminar Germ Disk

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Gastrulation: formation of primitive streak

Gastrulation: formation of notochord

The notochord is super important because it tells the three layers what to do next.

Gastrulation: movement and differentiation of epiblast cells

Epiblast cells give rise to all three germ cell layers! (the hypoblast does NOT turn into endoderm; it is displaced by endoderm)

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Prenatal Development

Formation of Neural Tube

Fertilization
How does the neural tube turn into the brain?

At about week 3-4, there are three brain vesicles.

By week 5, there are five brain vesicles!

Both the telencephalon and diencephalon must divide into two halves in order to form the two cerebral hemispheres and eyes.
Failure of these parts to divide properly results in a malformation called **holoprosencephaly**.

Holoprosencephaly is often associated with facial defects, which range from mild to severe.

Normal brain Holoprosencephaly

Lobar Semilobar Alobar

What about the rest of the neural tube?
The neural tube closes like a zipper, starting at the middle and moving towards the head and tail.

Neural tube closing Neural tube still open

Embryo, day 23-26

If the neural tube doesn’t “zip up” properly, this can result in a malformation called spina bifida.

Normal Spina bifida

The posterior portions of the vertebrae remain open...
...and sometimes things protrude through the gap.

Spina bifida occulta  Meningocele  Meningomyelocele

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Differentiation of mesoderm

Each somite has three subdivisions

Know this!

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Lateral plate mesoderm splits in two. One part remains near the ectoderm. The other part follows the endoderm.

Endodermal layer (lined by mesoderm) bends, the edges reaching towards each other, meeting in front to form the gut. Ectodermal layer (lined by mesoderm) grows forward, reaches around the gut, and zips up the front to form the anterior body wall.

Amnion (and amniotic cavity) comes along for the ride, eventually surrounding entire embryo. Anterior thoracic wall (mesoderm covered with ectoderm).

Before folding

Day 26

Day 28

Head-Tail Folding of the Embryo