

"Third Week of Development"

» Recap:

Fertilization → 2 cell stage → 4 cell stage
→ 8 cell stage (loose clump of cells) → 3rd
cleavage → Inner cells + Outer cells (in
between inner cells: tight junctions and in
between inner and outer cells: gap junctions)
→ 16 cell stage (Morula) → Contains inner
cell mass that forms embryoblast and
outer cell mass that forms trophoblast →
Travels from ampulla to oviduct to uterus
wall → Blastocoele cavity forms → Just
before implantation, zona pellucida
disappears → L-selectins on trophoblast and
receptors on uterine epithelium + laminin and
fibronectin cause initiation of implantation
→ Embryoblast divides into epiblast and
hypoblast and trophoblast divides into
cytotrophoblast and syncytiotrophoblast →

Formation of oropharyngeal membrane +
amniotic cavity + primitive yolk sac
(exocoelomic cavity) + extraembryonic
somatic and splanchnic mesoderm +
secondary yolk sac → chorionic plate +
connecting stalk + sinusoids and
lacunae + uteroplacental circulation +
primary villi

» Week 3:

- Initially, embryo is a germ disc with
epiblast and hypoblast → Gastrulation
occurs → three germ layers are formed
namely Ectoderm, Mesoderm and Endoderm

» Step 1: Initiation of Gastrulation:

- Begins with formation of primitive streak
 - Clearly visible in a 15-16 day embryo
 - Is a narrow groove with slightly bulging
regions on either side
 - The cephalic end of the streak is called
primitive node: consists of slightly elevated
area surrounding small primitive pit

» Step 2: Invagination:

- When epiblastic cells migrate towards the primitive streak, they become flask shaped and slip beneath it by a process called "invagination"
 - This occurs under the influence of fibroblast growth factor 8 (FGF8)
 - FGF8 is synthesized by streak cells
 - FGF8 down-regulates E-cadherin (E-cadherin binds epiblastic cells together)
 - Epiblastic cells get detached
- FGF8 then controls cell specification into mesoderm by regulating BRACHYURY (T)
- Movement of epiblastic cells is downward laterally and cranially
 - Some cells displace hypoblastic layer → New layer called "endoderm" formed
 - Other cells come to lie between epiblast and endoderm → Mesoderm formed
 - Cells remaining in epiblast → Form Endoderm
- All three layers derived are from "epiblast"

- Expand:

- 1) Cranially: Upto prechordal plate (also formed by invaginating epiblastic cells)
- 2) Laterally: Upto extraembryonic splanchnic mesoderm