Second Week of Development
Bilaminar Germ Disc

a day-by-day

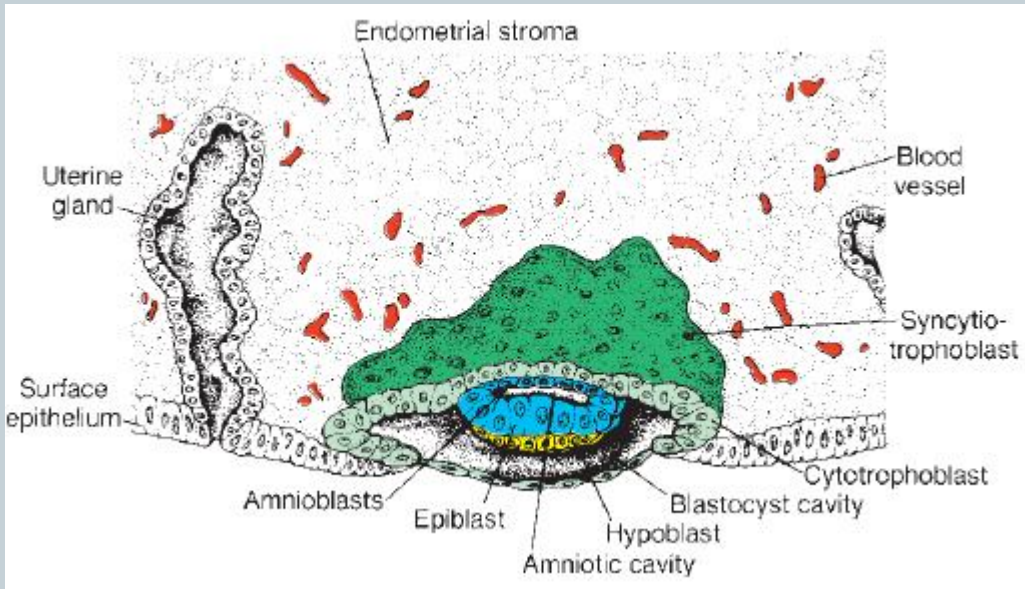
The major events of the second week of Development

8th day

- the blastocyst is partially embedded in the endometrial stroma.

- the area over the embryoblast, the trophoblast has differentiated into two layers:
- (1) **cytotrophoblast (**a mononucleated cells inner layer)
- (2) **syncytiotrophoblast** (an outer multinucleated zone without distinct cell boundaries)

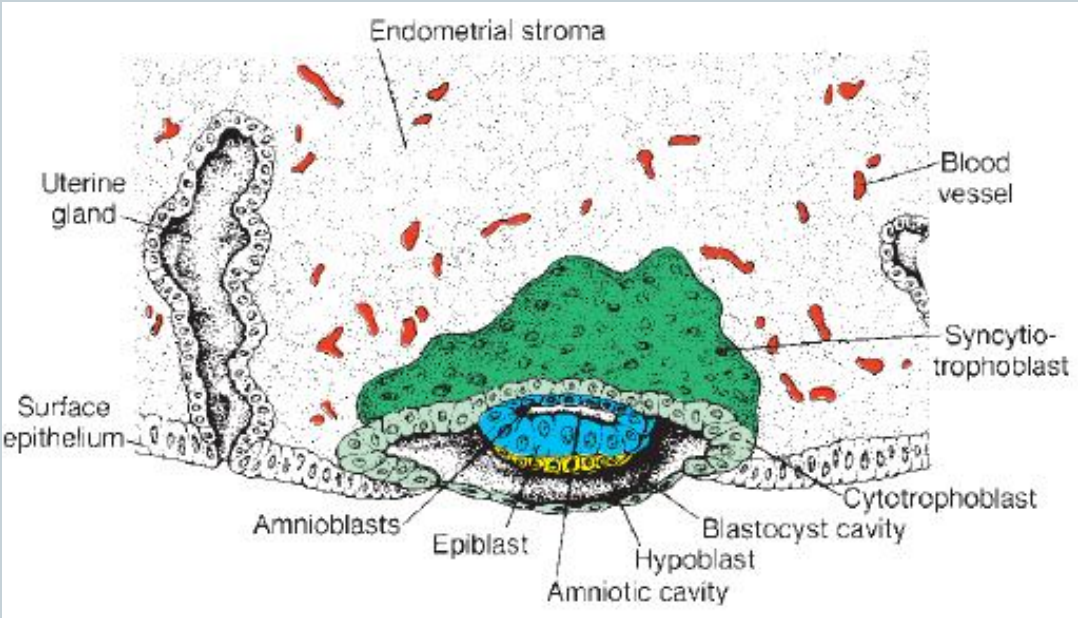
- Mitotic figures are only found in the cytotrophoblast



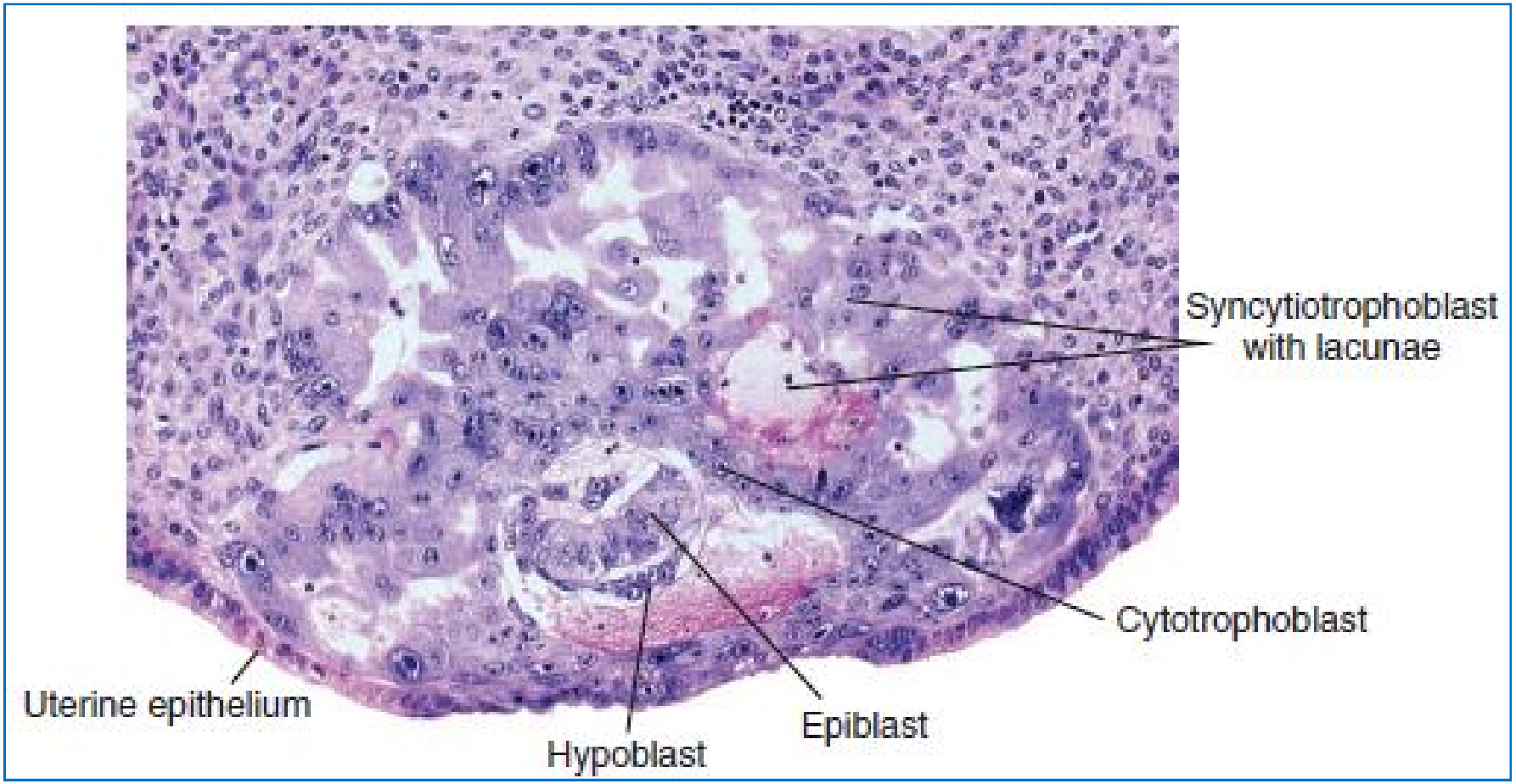
8th day

- Cells in the inner cell mass or embryoblast differentiate into two layers:
- (1) **hypoblast layer** (a layer of small cuboidal cells adjacent to the blastocyst Cavity)
- **(2) epiblast layer** (a layer of high columnar cells adjacent to the amniotic Cavity)

- form a flat disc
- **Amniotic Cavity**
- **Amnioblasts**



- edematous and highly vascular endometrial stroma
- abundant glycogen & mucus secrete by large & tortuous glands


Syncytiotrophoblast
with lacunae
Cytotrophoblast
Uterine epithelium
Hypoblast
Epiblast

9th day

- The blastocyst is more deeply embedded in endometrium (a fibrin coagulum)

The trophoblast development, (particularly at the embryonic pole)

- vacuoles appear in the syncytium
- vacuoles fusion & large lacunae formation

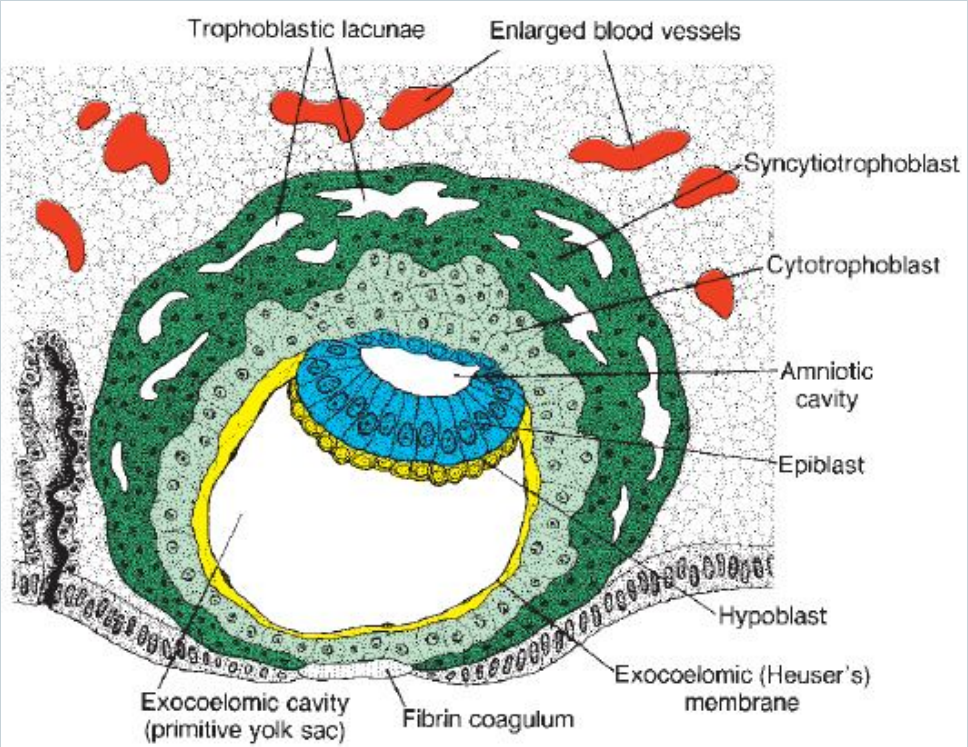
lacunar stage

At the abembryonic pole

- the exocoelomic (Heuser's) membrane

(hypoblast flattened cells)

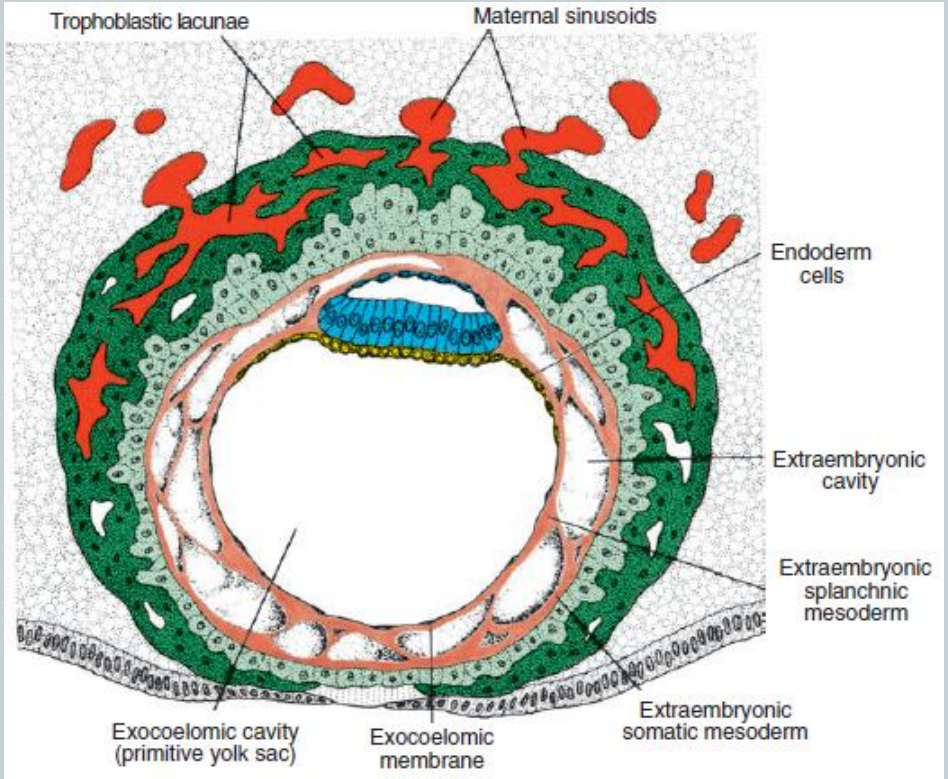
- **exocoelomic cavity (primitive yolk sac)**



11^{th} & 12^{th} days

- blastocyst is completely embedded in the endometrial stroma
- slight protrusion into the lumen of the uterus

Sinusoids
uteroplacental circulation

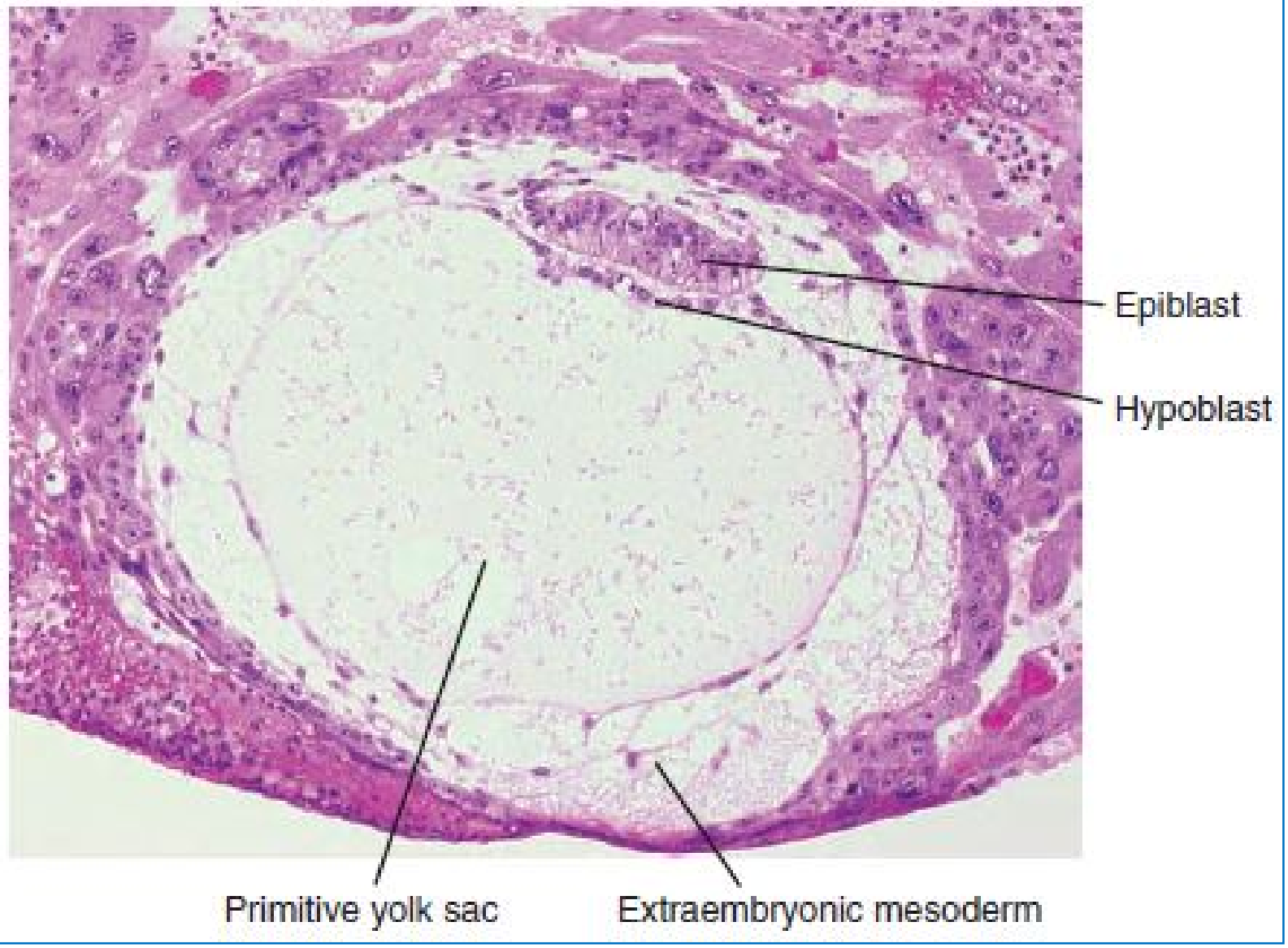


- exocoelomic cavity

Extraembryonic mesoderm

- **extraembryonic cavity (chorionic cavity)**

- connecting stalk
- **extraembryonic somatic mesoderm**
- **extraembryonic splanchnic mesoderm**
- **decidua reaction**


Epiblast
Hypoblast
Primitive yolk sac
Extraembryonic mesoderm

13th day

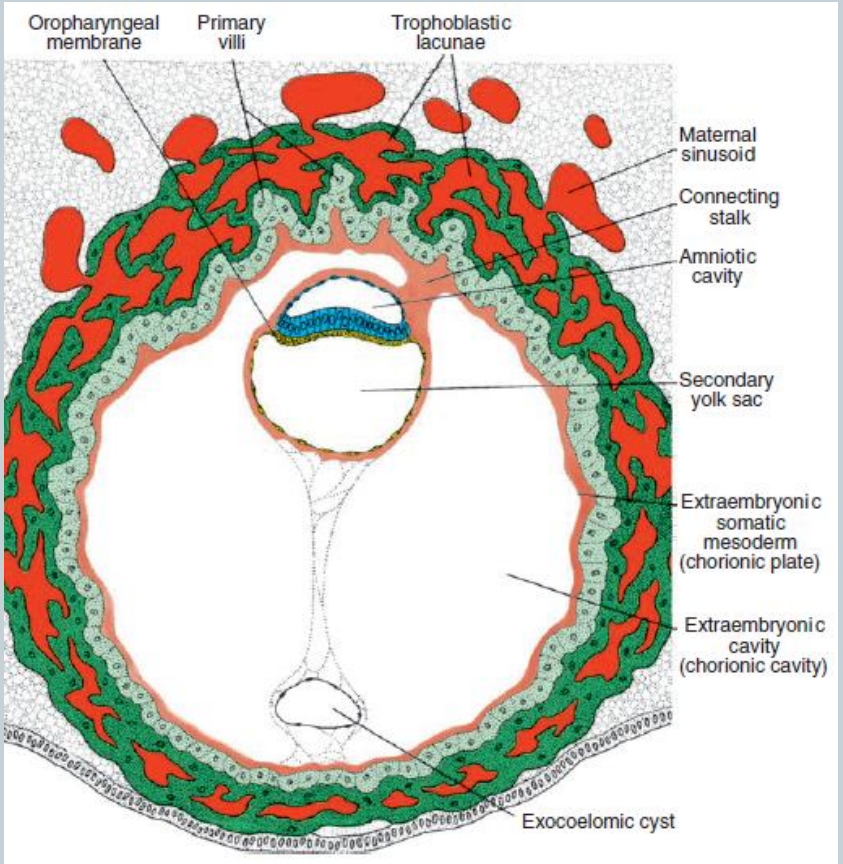
- the surface endometrium has healed.
- Occasionally, bleeding occurs at the implantation blood flow in lacunar spaces

- Secondary (definitive) yolk sac formation

- Formation of villus structure
- Primary villi

Extraembryonic coelom expand & form chorionic cavity

Connective stalk form umbilical cord



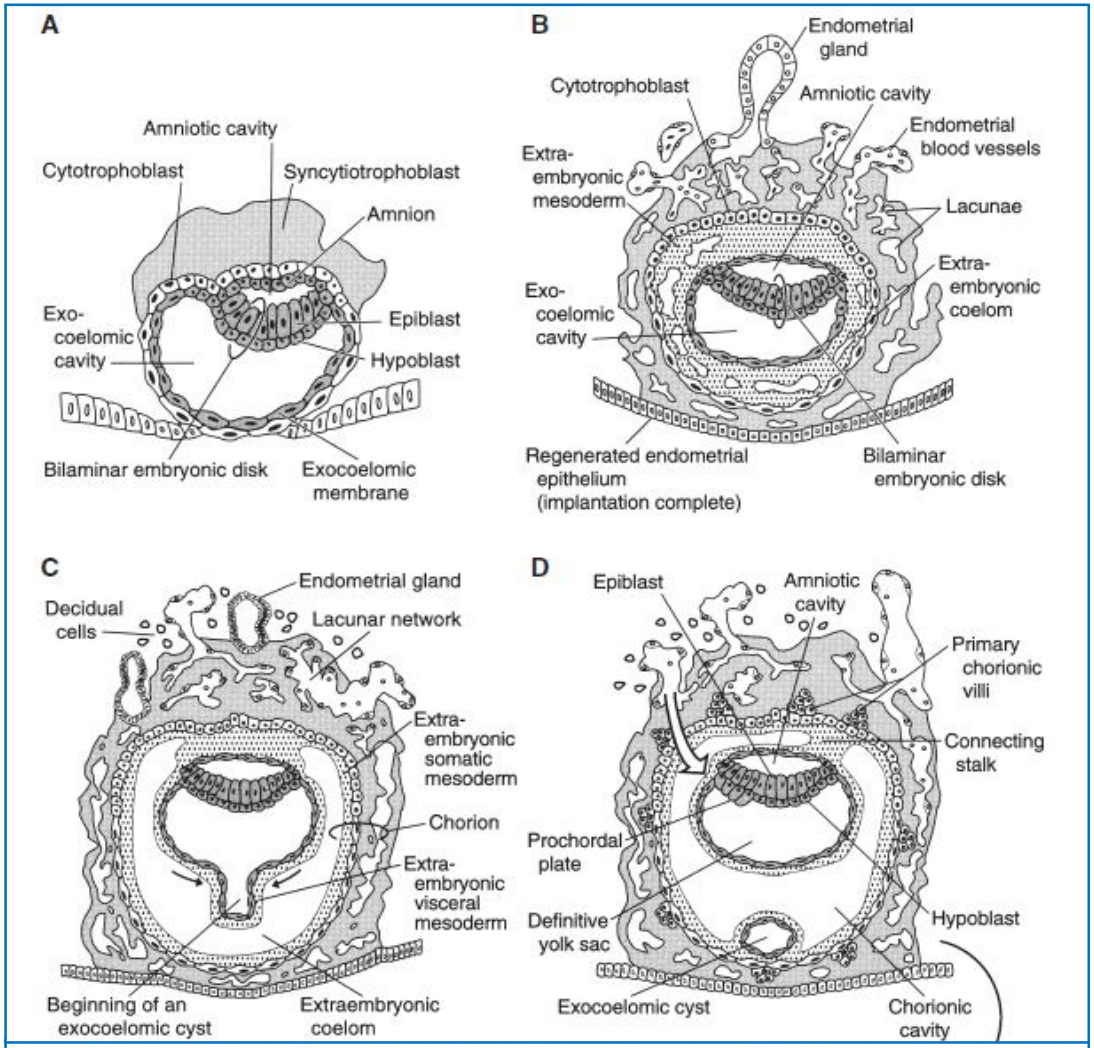
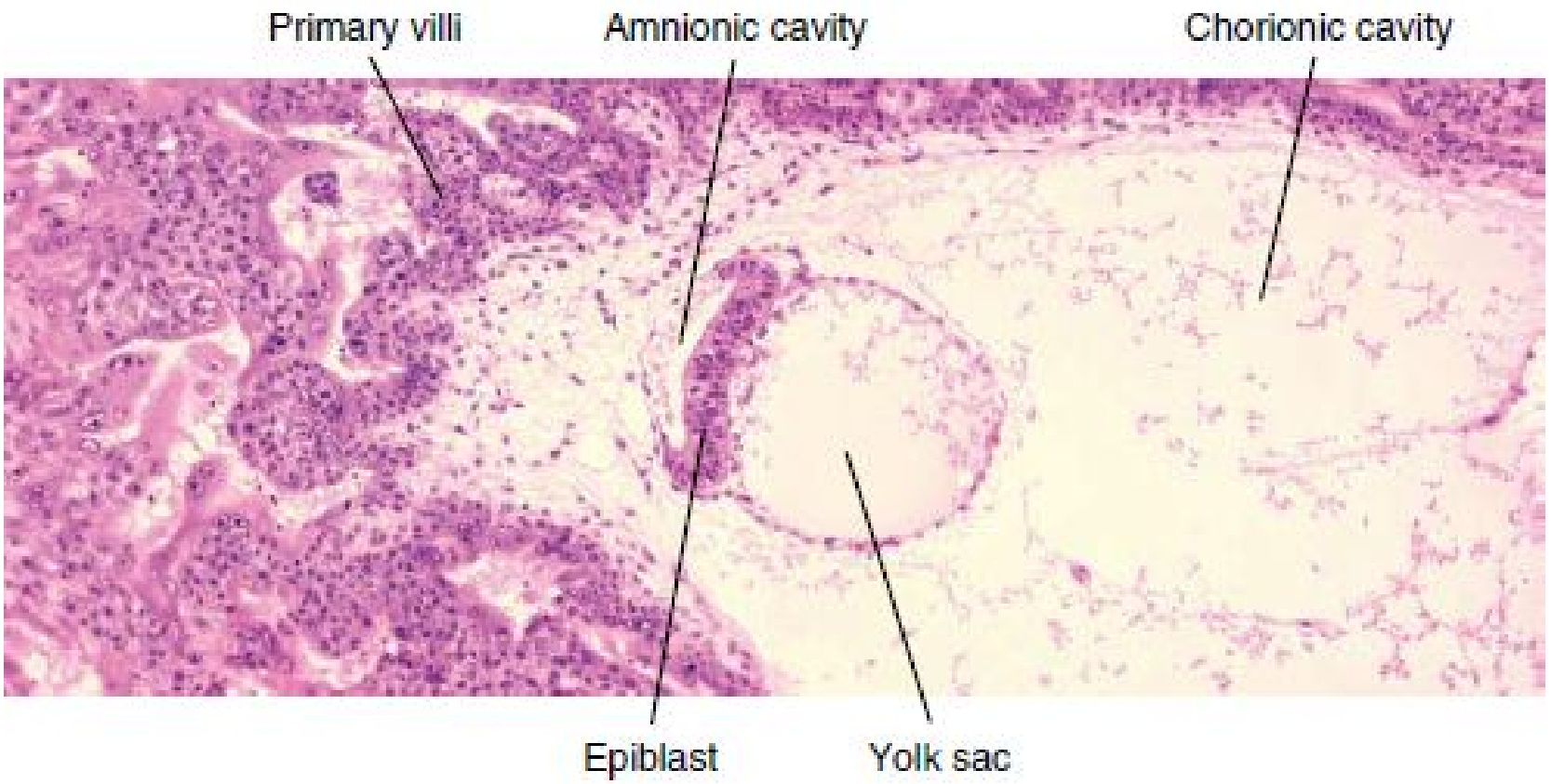


FIGURE 3.1. **(A)** A **day 8 blastocyst** is shown partially implanted into the endometrium. Extraembryonic mesoderm (EEM) has not formed yet. **(B)** A **day 12 blastocyst** is shown completely implanted within the endometrium, and epithelium has regenerated. This type of implantation is known as interstitial implantation. EEM begins to form. **(C)** A **day 13 blastocyst.** A lacunar network forms, establishing an early uteroplacental circulation. An exocoelomic cyst begins to pinch off (*small arrows*). **(D)** A **day 14 blastocyst.** The embryoblast can be described as two balloons (amniotic cavity and yolk sac) pressed together at the bilaminar embryonic disk. The *curved open arrow* indicates that the embryoblast receives maternal nutrients via diffusion. **(E)** A sonogram at about week 3 shows a hyperechoic rim representing the chorion (*thick arrow*) surrounding the chorionic cavity (or gestational sac). Within the chorionic cavity, two tiny cystic areas (i.e., the amnion and yolk sac) separated by a thin echogenic line (i.e., embryonic disk) can be observed. Note the hyperechoic base of the endometrium (*long arrows*) and two endometrial cysts (*short arrows*).


Primary villi
Amnionic cavity
Chorionic cavity
Epiblast
Yolk sac

Clinical correlations

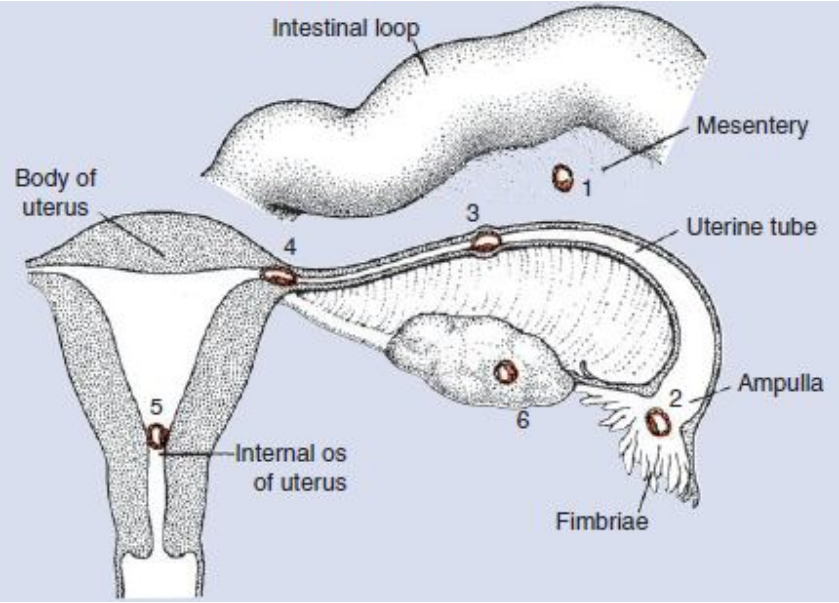
- Human chorionic gonadotropin (hCG)
- Second week
- RIA
- Immune system & pregnancy
- Cellular to humoral immunity

- MS & AR (cellular autoimmunity)
- Lupus (humuralautoimmunity)

Abnormal implantation

Normally:

- Anterior or posterior wall of uterus
- Cervix internal os (placenta previa)

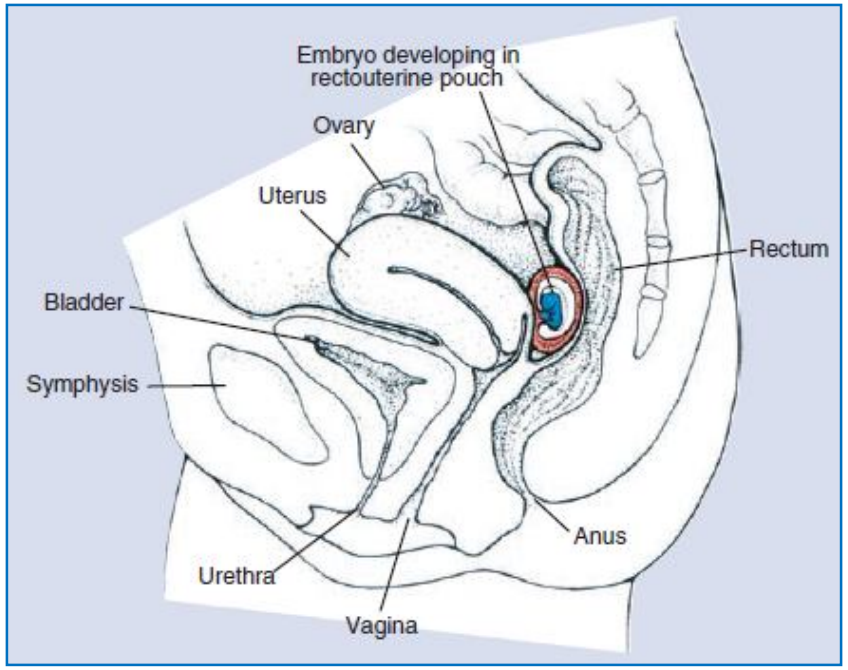


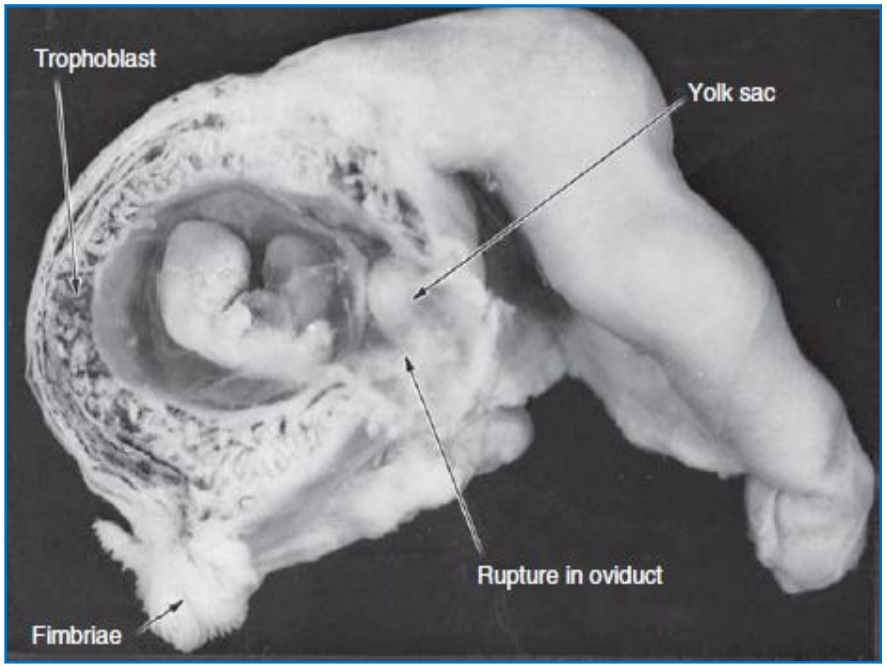
- Ectopic pregnancy (2%) (9% mortality)

Abdominal cavity (rectouterine cavity)

Ovary

Uterine tube (95%)


Embryo developing in rectouterine pouch
Ovary
Uterus
Rectum
Bladder
Symphysis
Anus
Urethra
Vagina


Trophoblast
Yolk sac
Rupture in oviduct
Fimbriae

Abnormal implantation

Hydatidiform mole (choriocarcinoma)
Paternal

Genomic imprinting

15% of oocytes no fertilization
10-15% cleavage but no implantation
70-75% impantation
58% survive to second week (16% abnormal)
Only 42% of fertilized oocytes survived