

PLACENTA

Formation and Role

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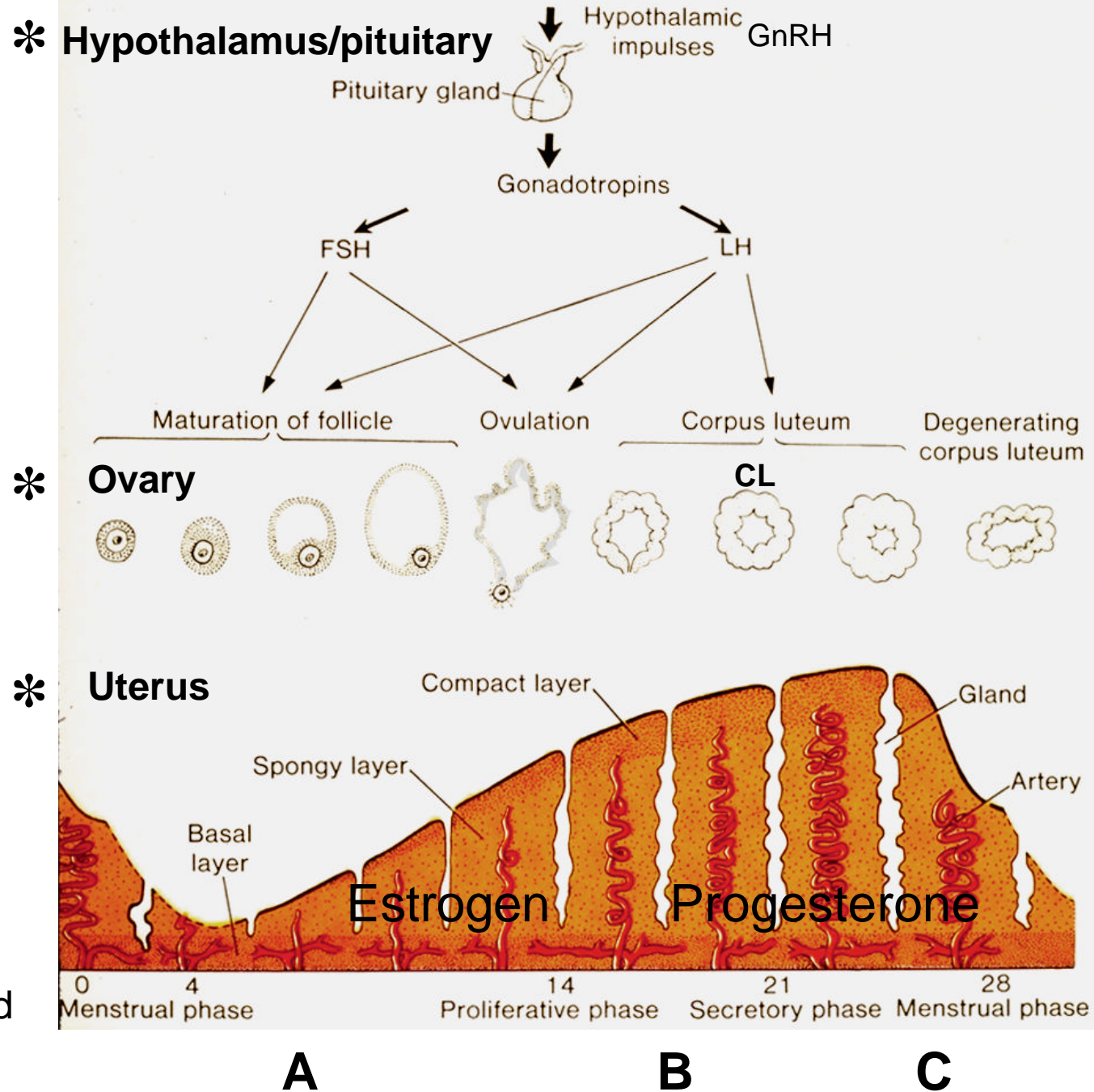
Preparation of the Uterus

Menstrual cycle

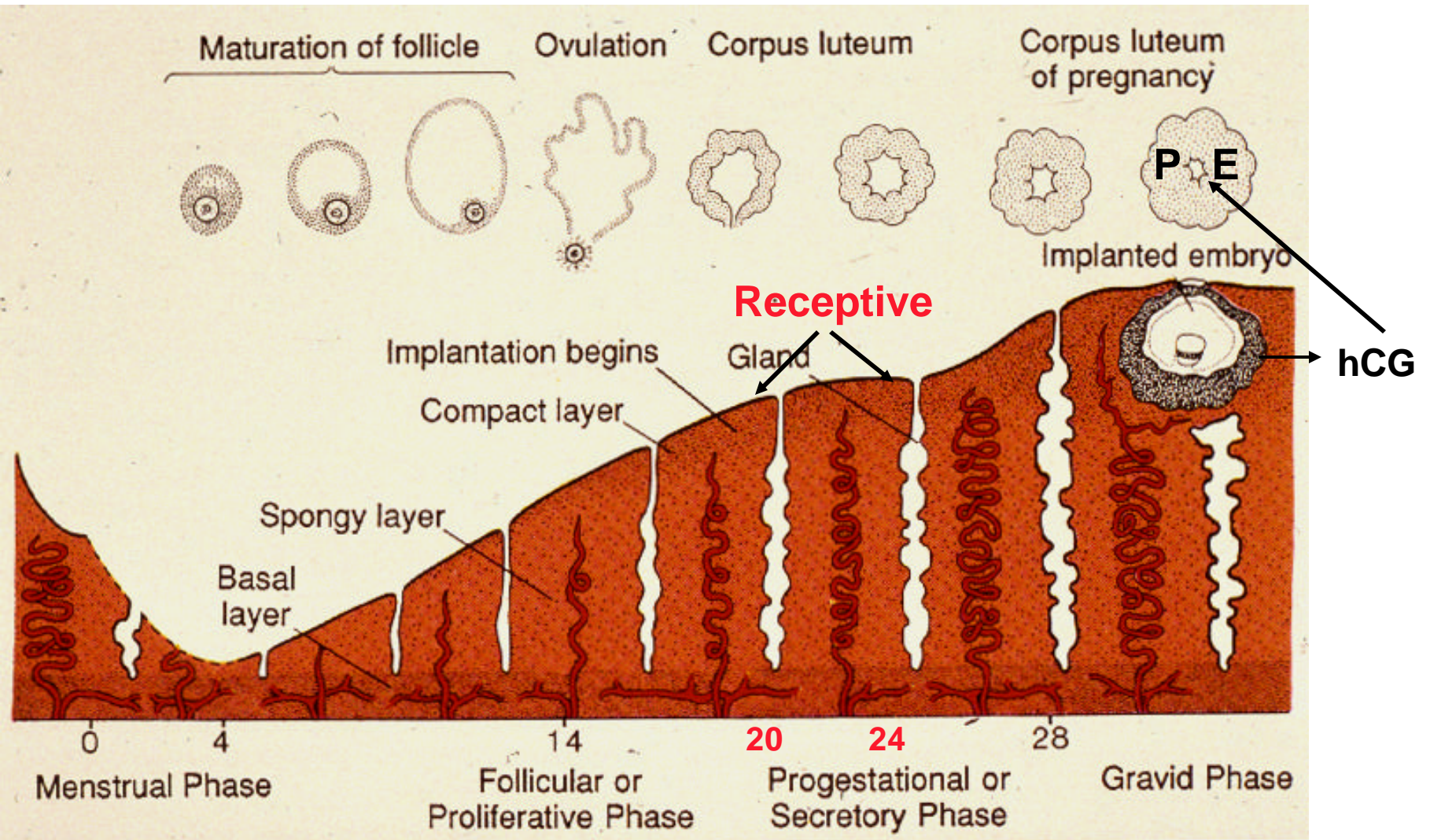
A. Estrogen from growing follicle stimulates regrowth of endometrium.

B. Progesterone from corpus luteum stimulates secretion of endometrial glands.

C. Corpus luteum depends on LH - Negative feedback by E and P inhibits LH and CL degenerates.

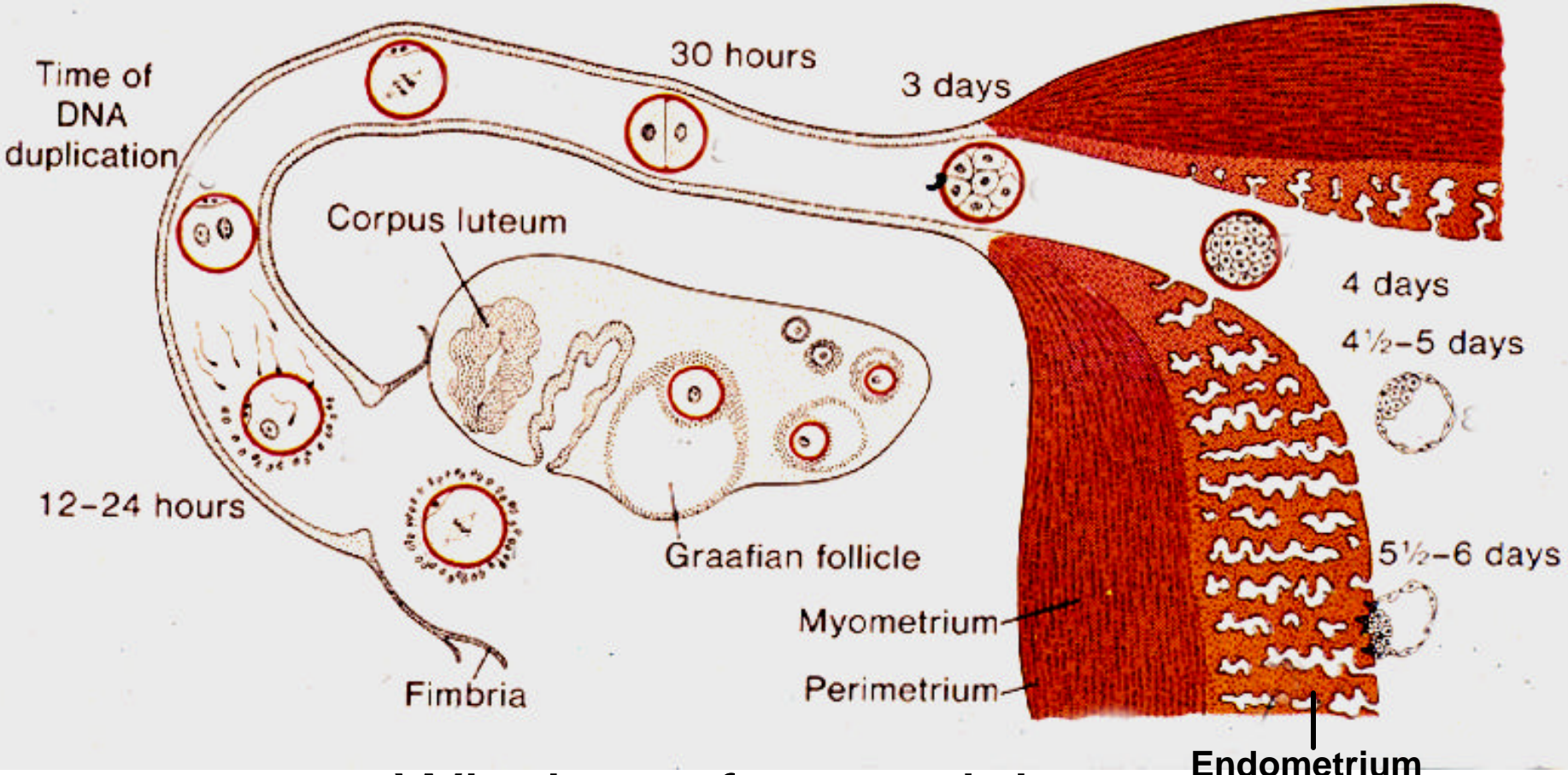


Pregnancy



Human chorionic gonadotropin (**hCG**) from embryo maintains corpus luteum.
P and **E** from CL sustain the endometrium.

Progress of embryo in hours or days post ovulation



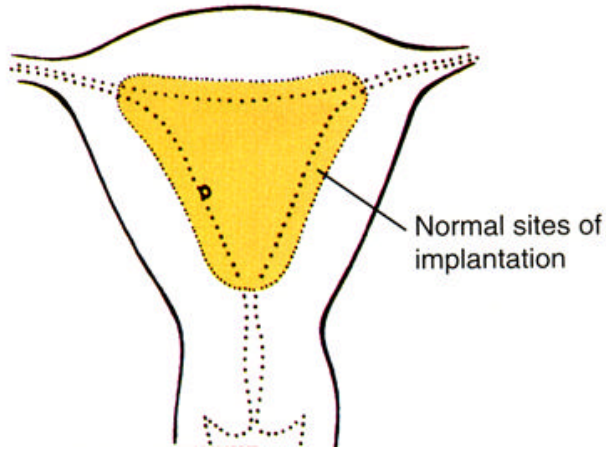
Window of receptivity

Endometrium - edematous, secretory

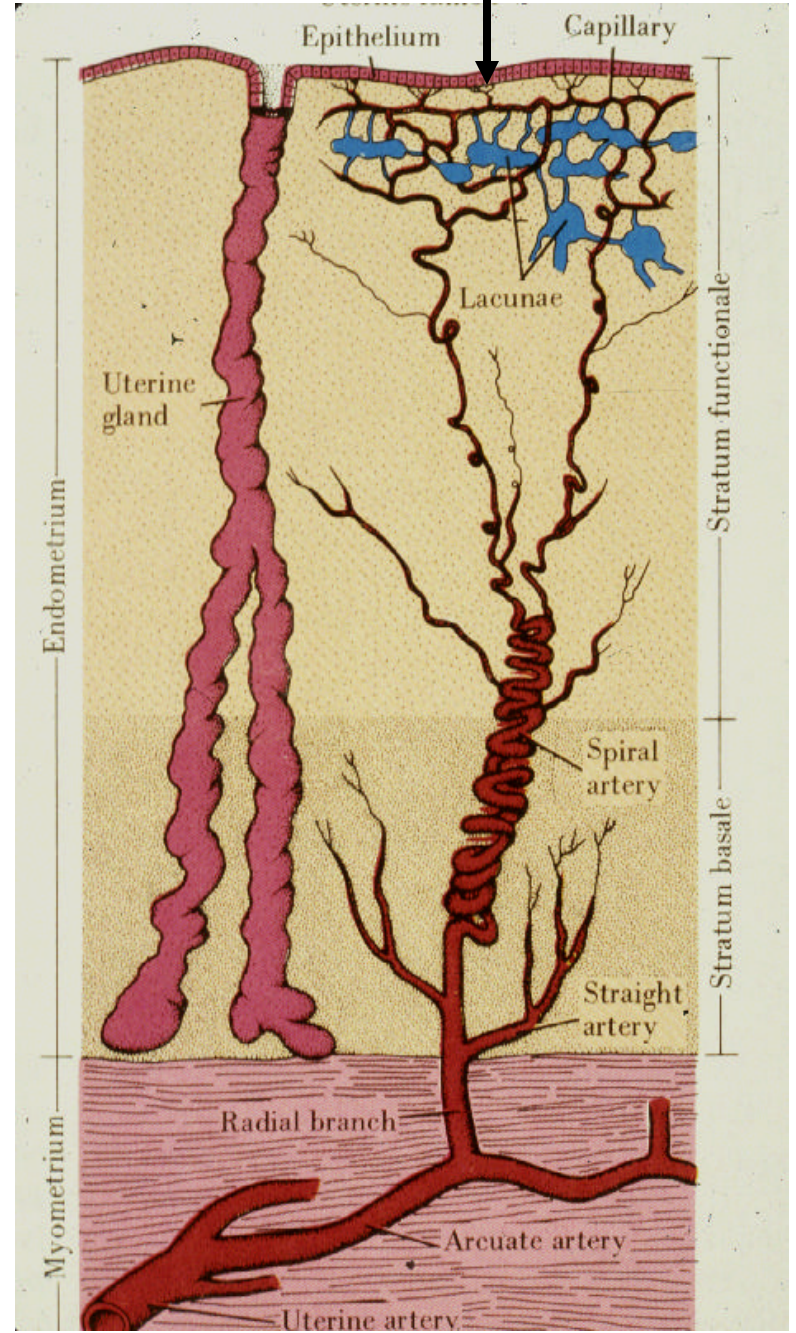
Decidual reaction

Glycogen, cytokine (LIF), integrin ($\alpha v \beta 3$), pinopodes

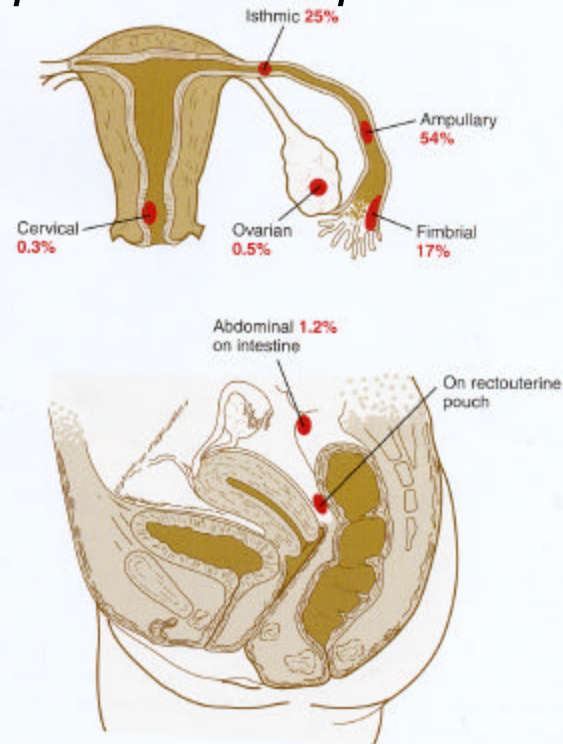
Normal implantation site



Implantation

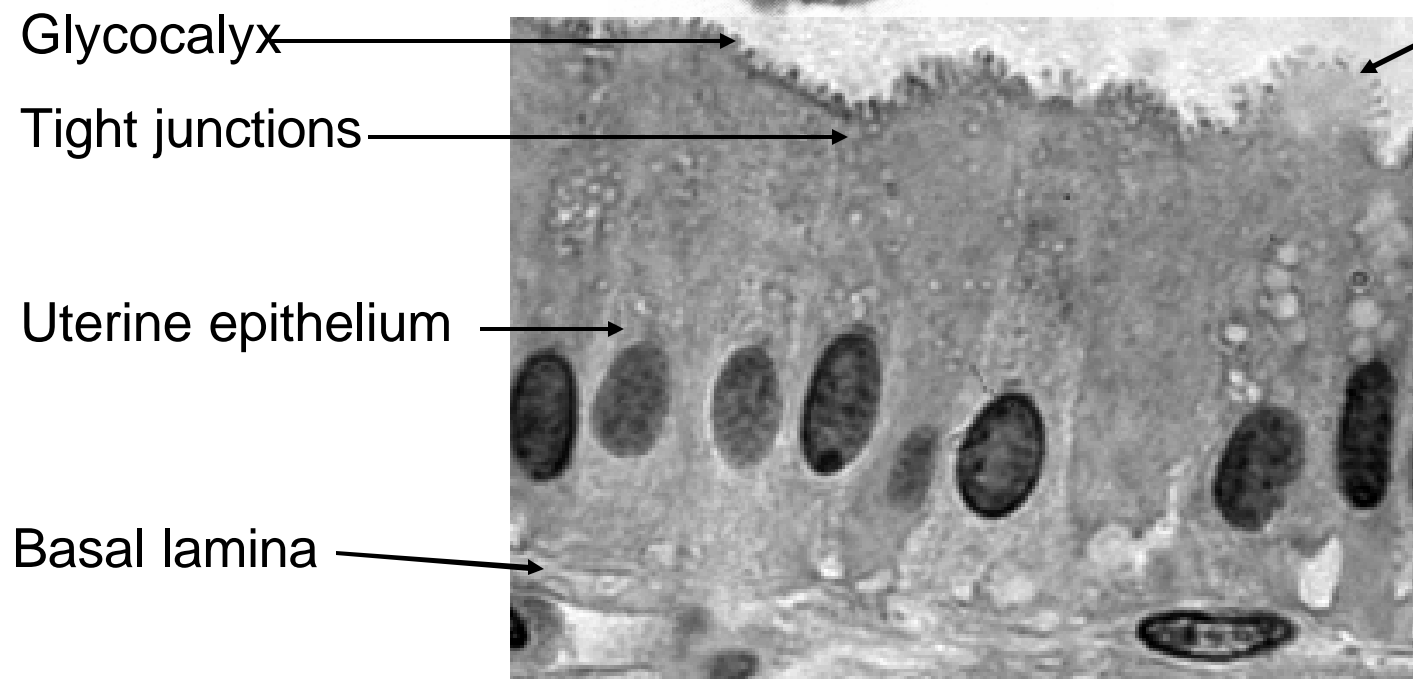
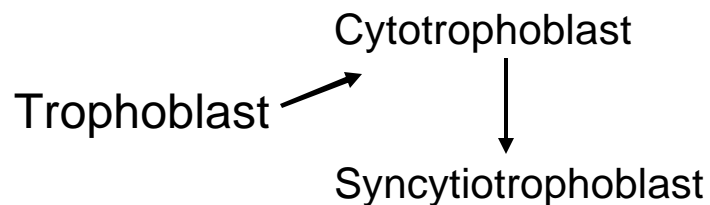
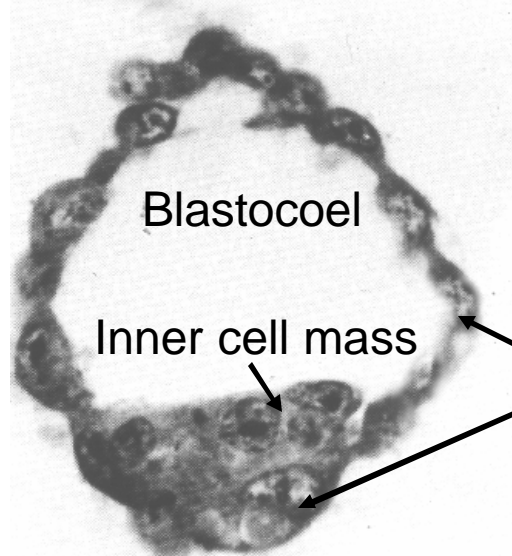


Ectopic sites of implantation

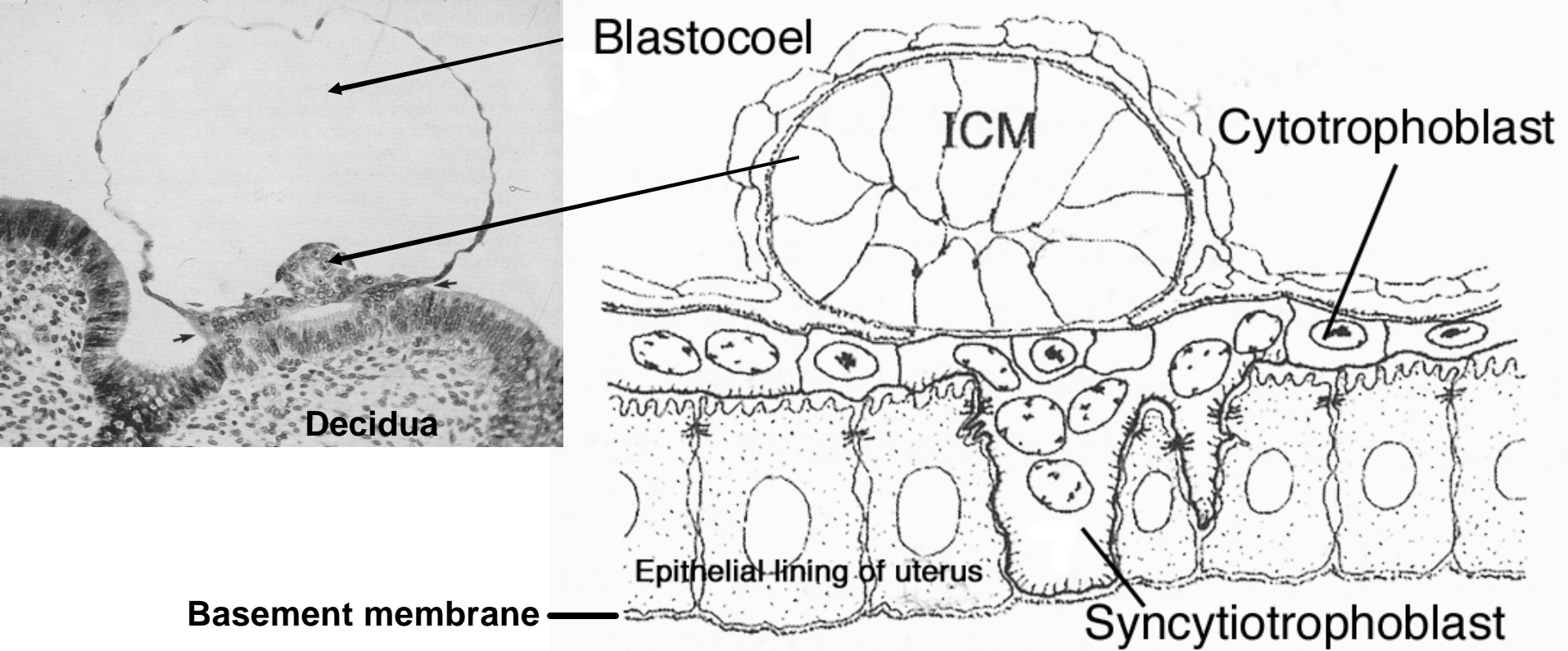


Implantation

Adhesion & Penetration



Microvilli altered



Peri-implantation dialogue

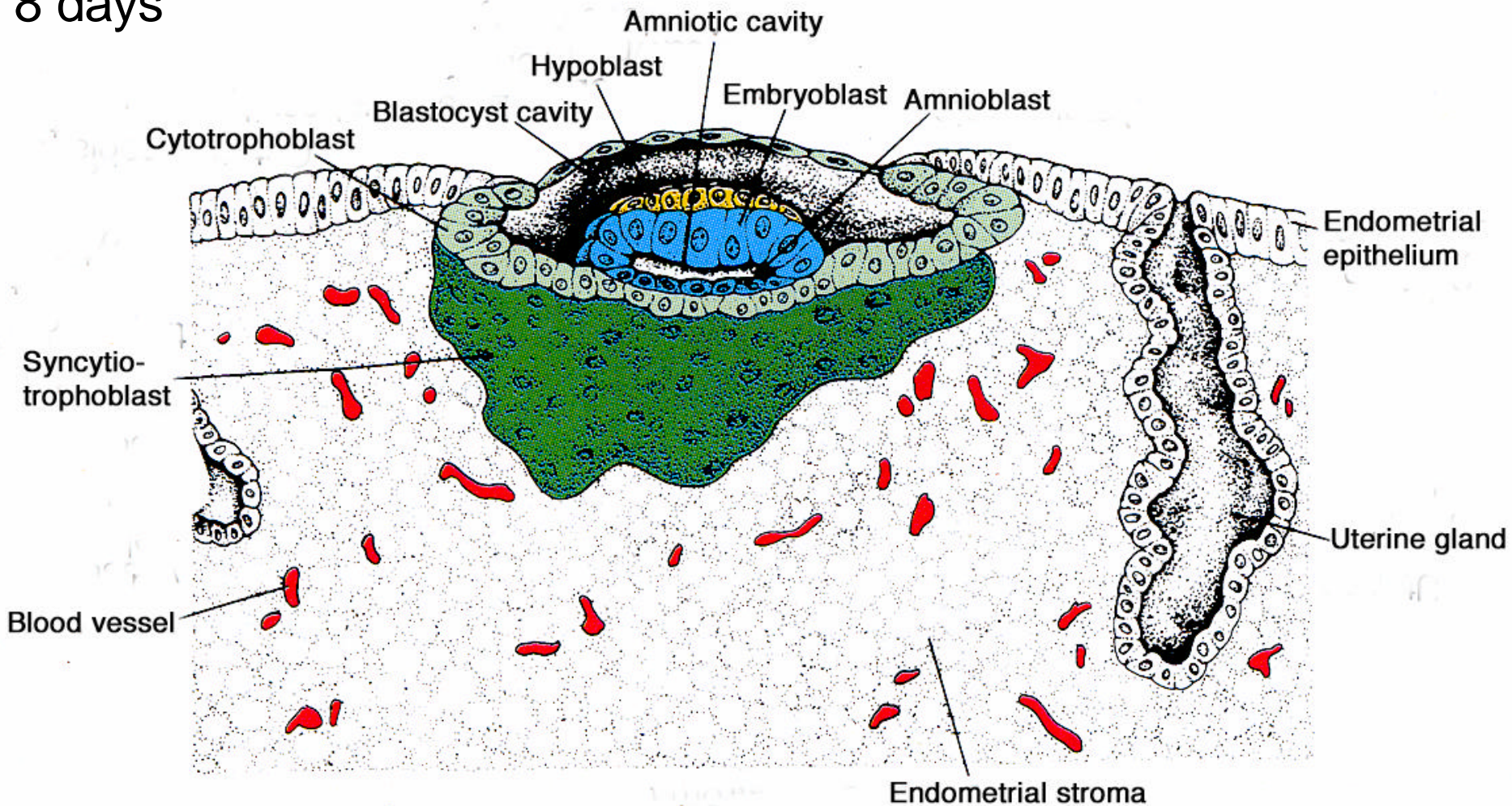
Embryo: hCG and other factors and receptors

Uterus: LIF and other cytokines, growth factors, integrins, receptors

Adhesion & Penetration

Changes: microvilli (terminal web), MUC-1, junctions, basement membrane

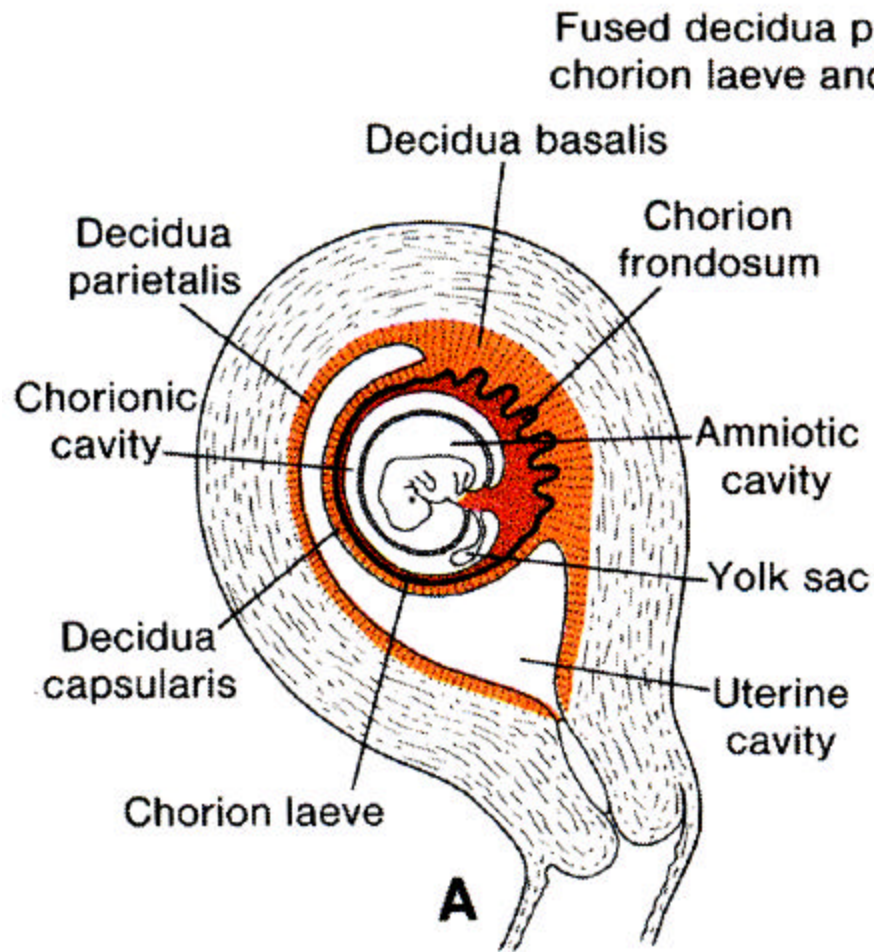
8 days



Embryo - Endometrium - Allograft - Why no immune rejection?

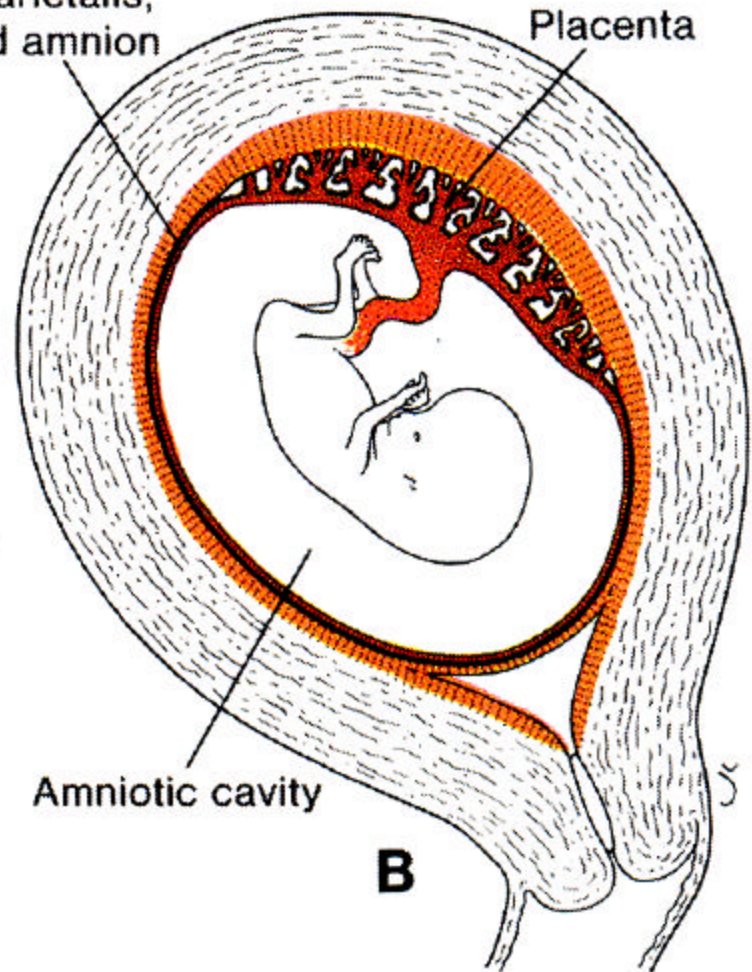
Maternal - Decidual reaction altered immune system

Embryonic - HLA-G



Embryo 8 weeks

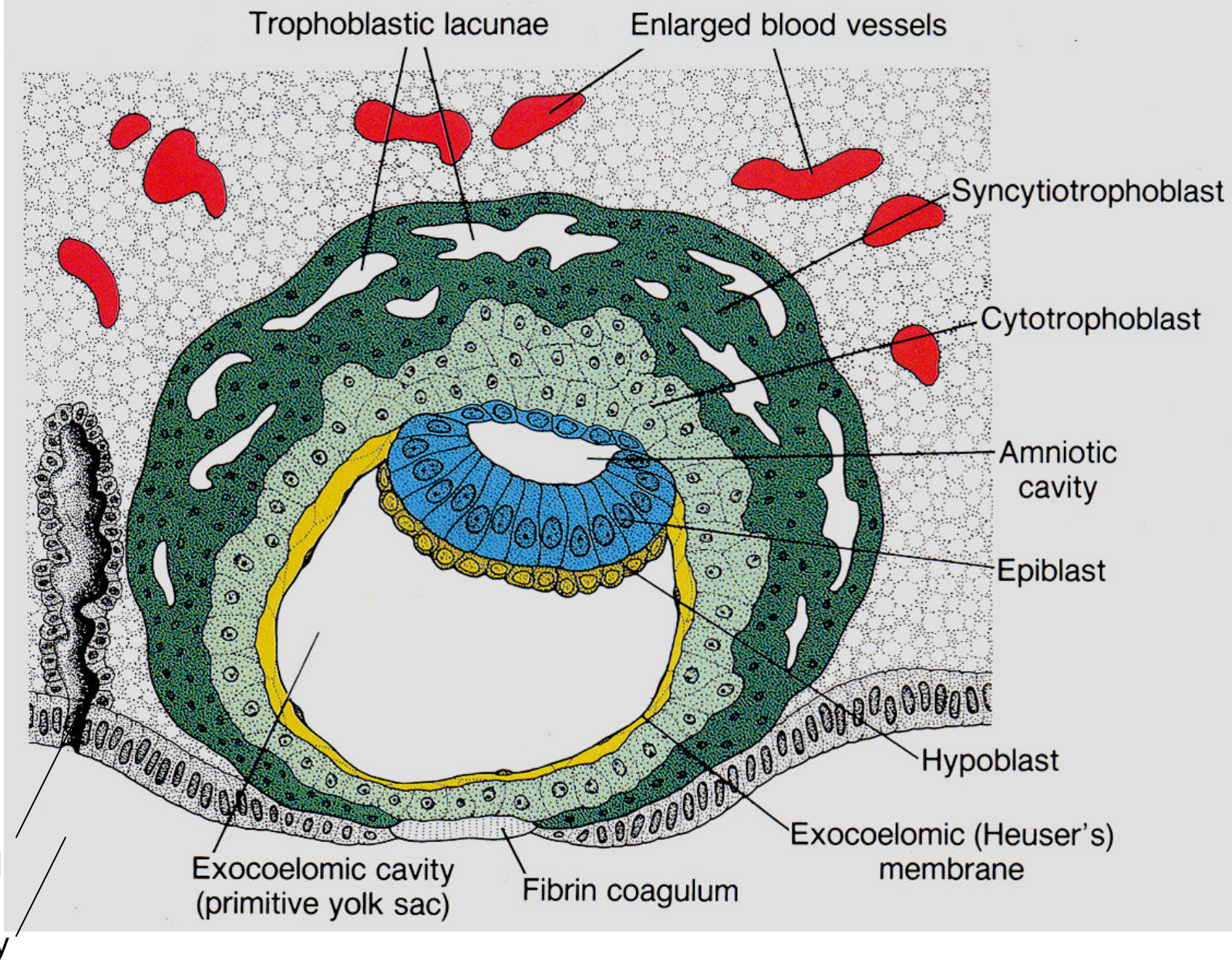
Fused decidua parietalis,
chorion laeve and amnion



Fetus 12 weeks

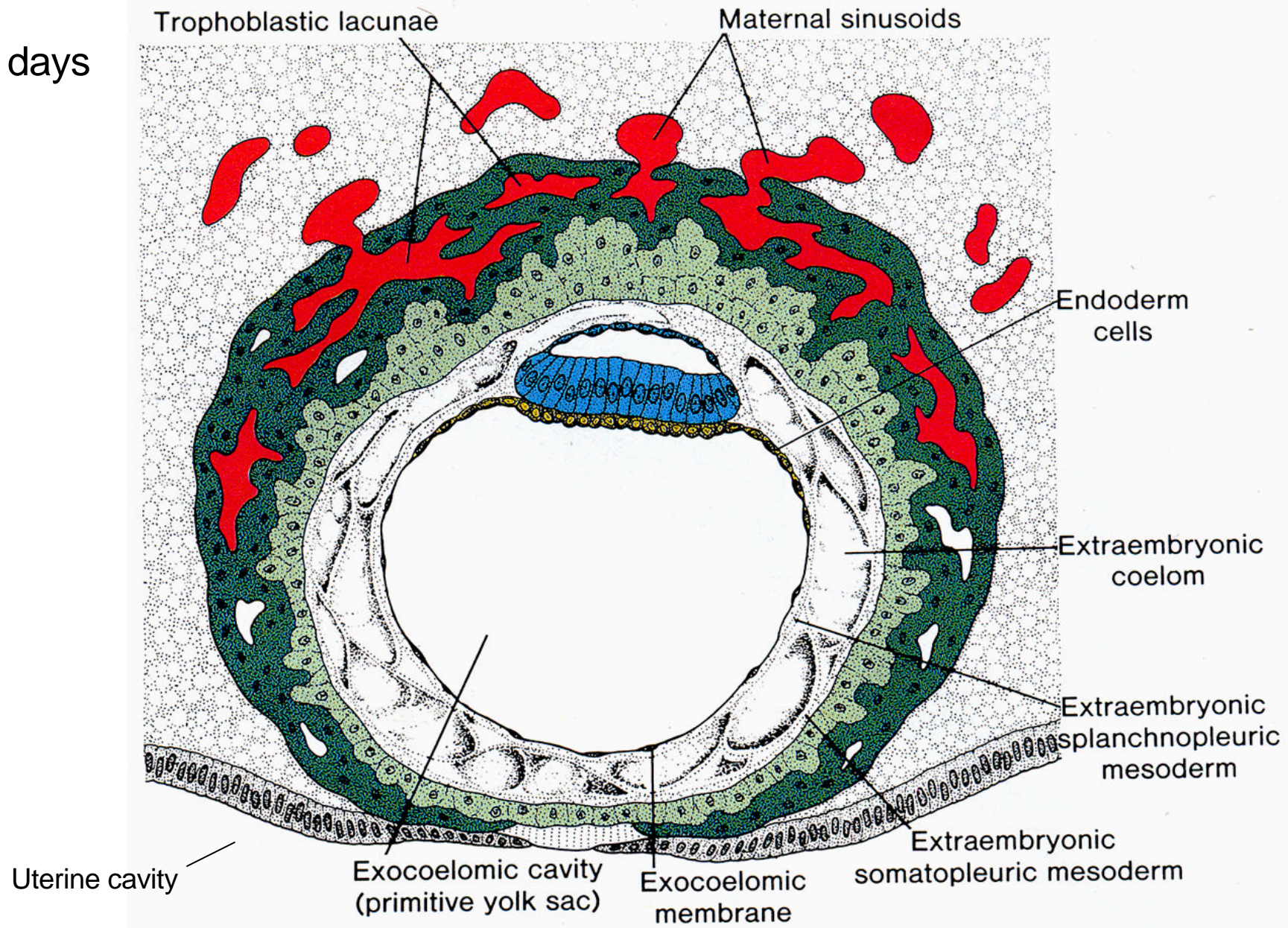
Lacunae in syncytiotrophoblast

9 days



Maternal blood in lacunae of syncytiotrophoblast Lacunar circulation

12 days

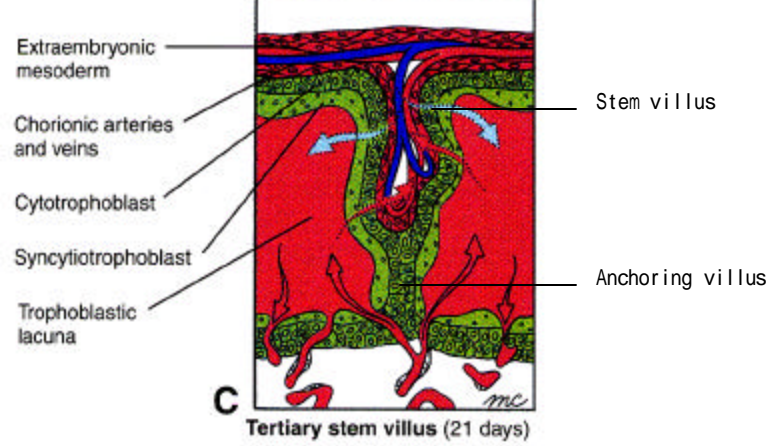
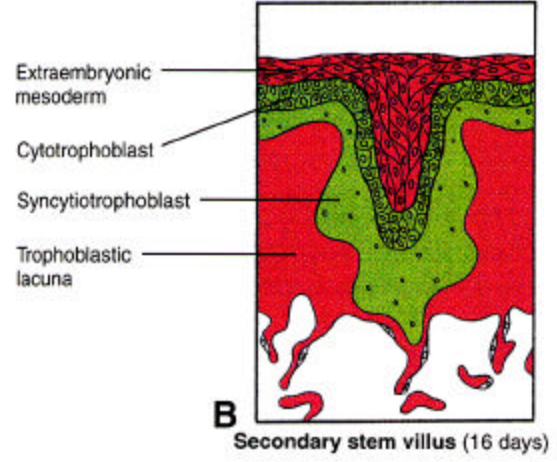
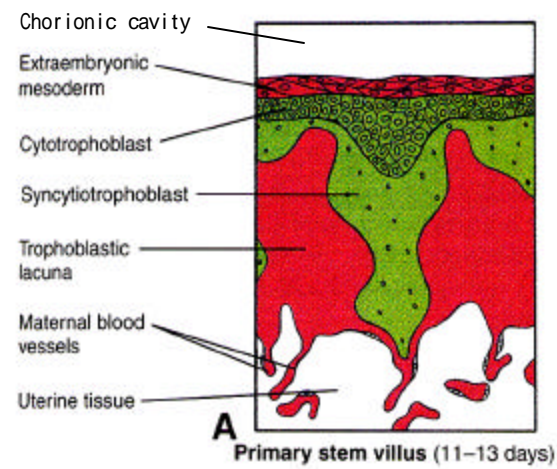


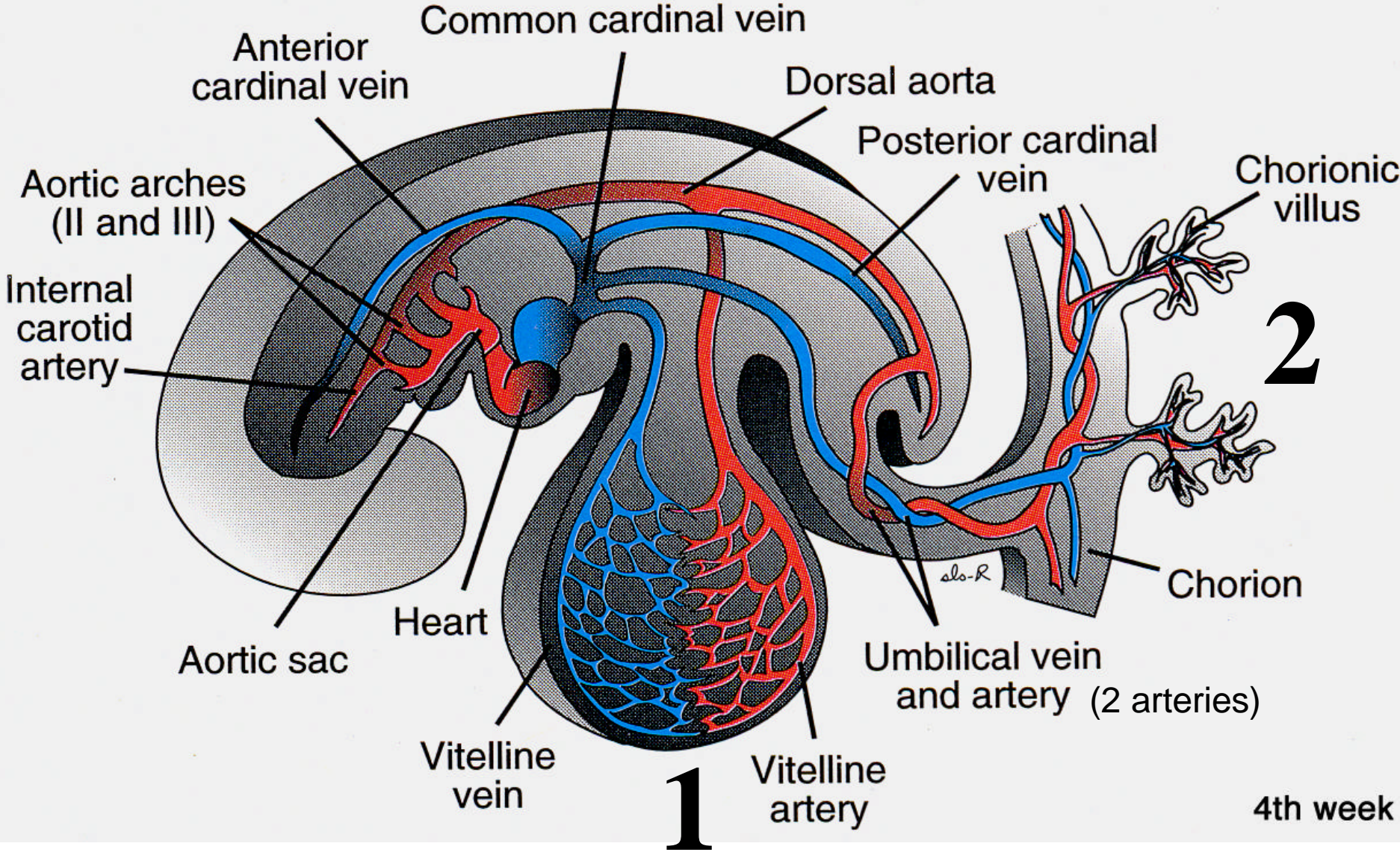
Chorionic villi

Primary villi - 11-13 days
Cytotrophoblast covered by syncytiotrophoblast

Secondary villi - 16 days
Core of extraembryonic mesenchyme

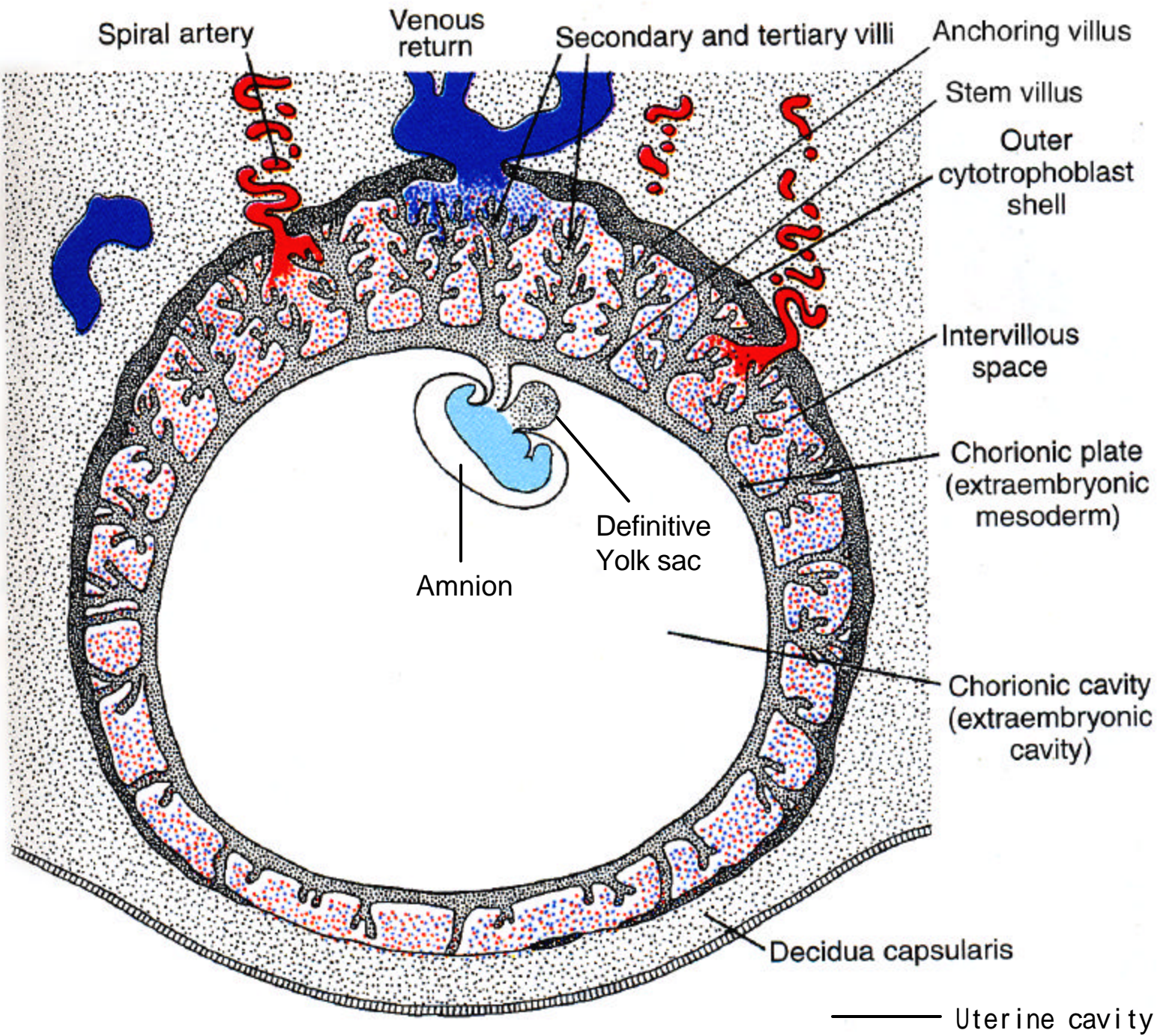
Tertiary villi - 21 days
Embryonic blood vessels



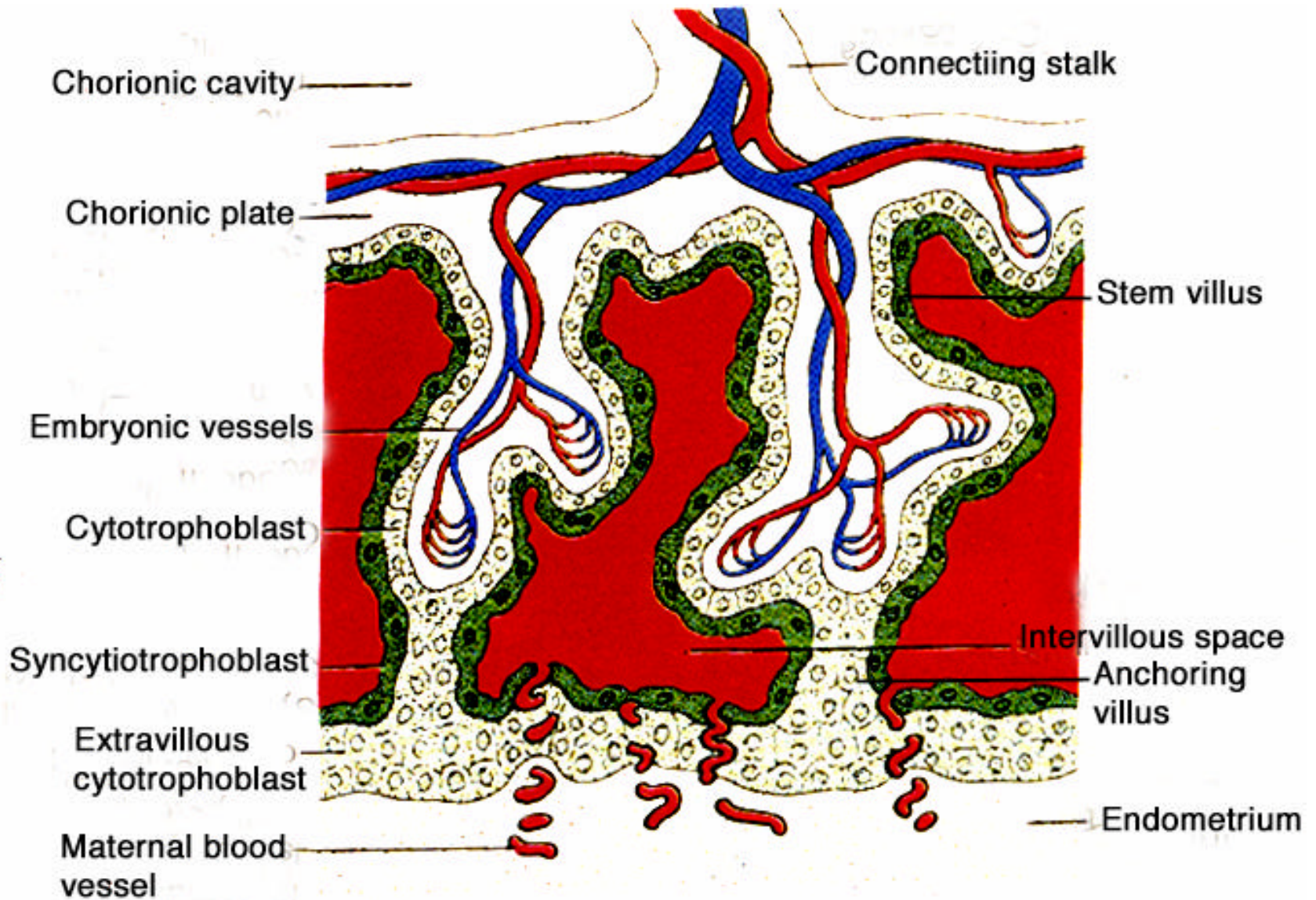


1. Vitelline circulation - yolk sac
2. Chorionic circulation - placenta

4 weeks

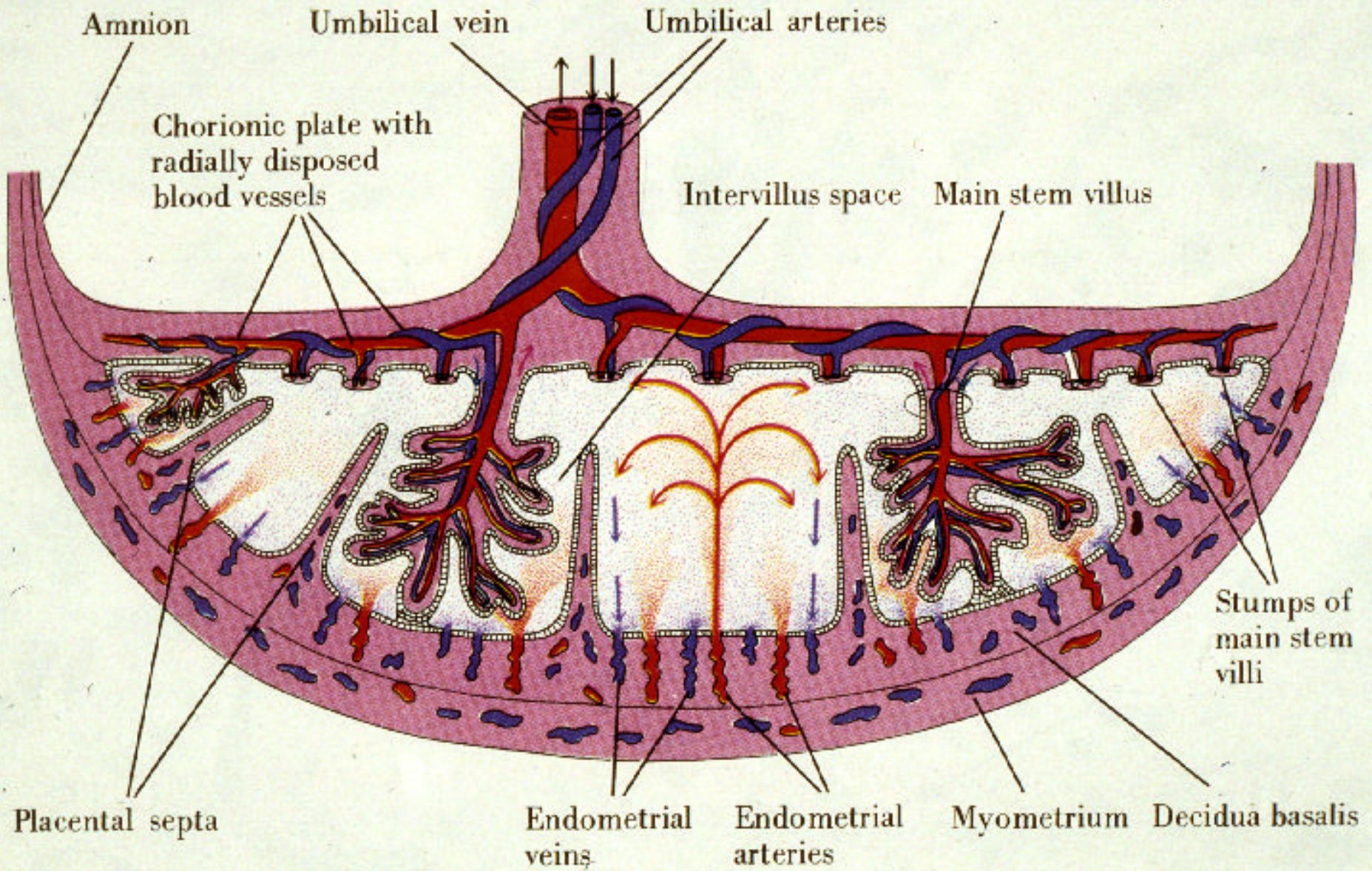


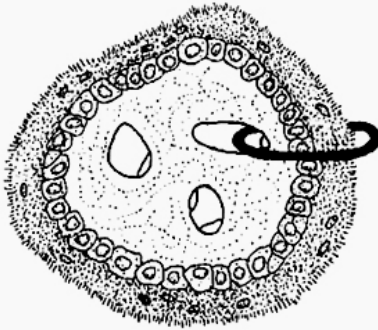
EMBRYO



UTERUS

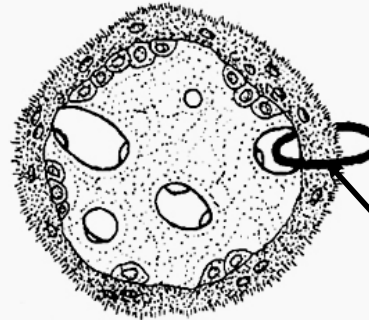
FETAL CIRCULATION





- Barrier formed by
1. Syncytium
 2. Cytotrophoblast
 3. Connective tissue
 4. Endothelium

A. 4th week

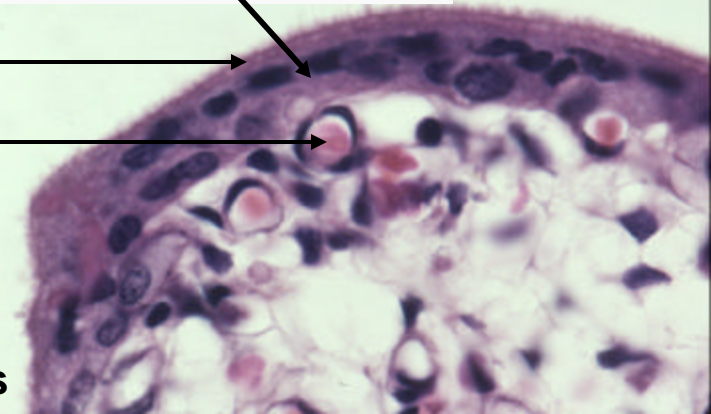


- Barrier formed by
1. Syncytium
 2. Endothelium

B. 4th month

Syncytiotrophoblast

Embryonic vessel



4 months

Metabolic needs

Peri-implantation: 0-2 weeks

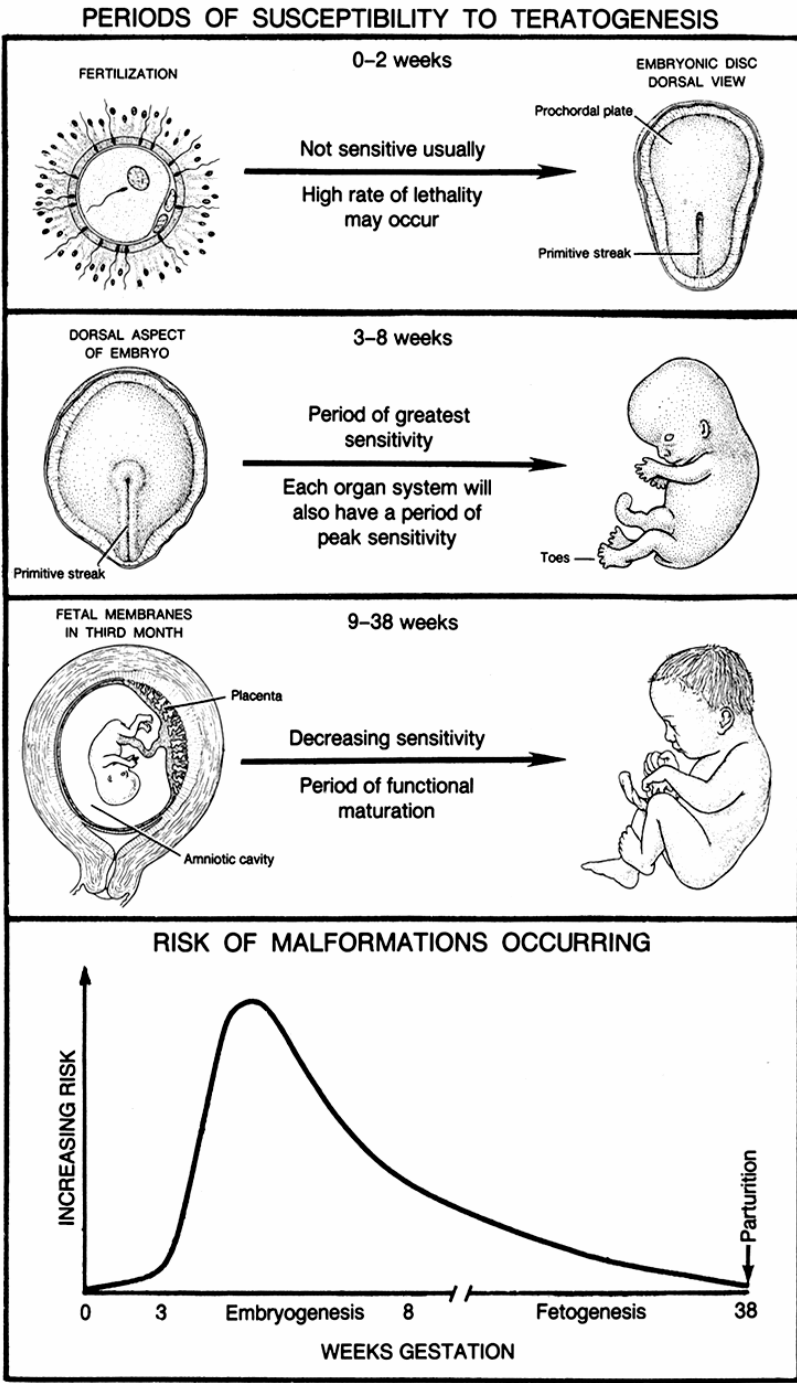
Uterine glands
Endometrial stroma - glycogen

Embryonic: 3-8 weeks

Maternal plasma in lacunae
anaerobic metabolism

Fetal: 9 weeks - birth

Maternal whole blood 12 wks
aerobic metabolism



FORMATION AND ROLE OF THE PLACENTA

1. Preparation of the uterus

Window of receptivity

2. Implantation (nidation)

Apposition, Adhesion

Penetration of endometrial epithelium

Invasion of decidua

3. Establishment of a hemochorial placenta

Lacunar

Development of chorionic villi

Intervillous

Maternal plasma only

Whole blood