

PLACENTA

Formation and Role

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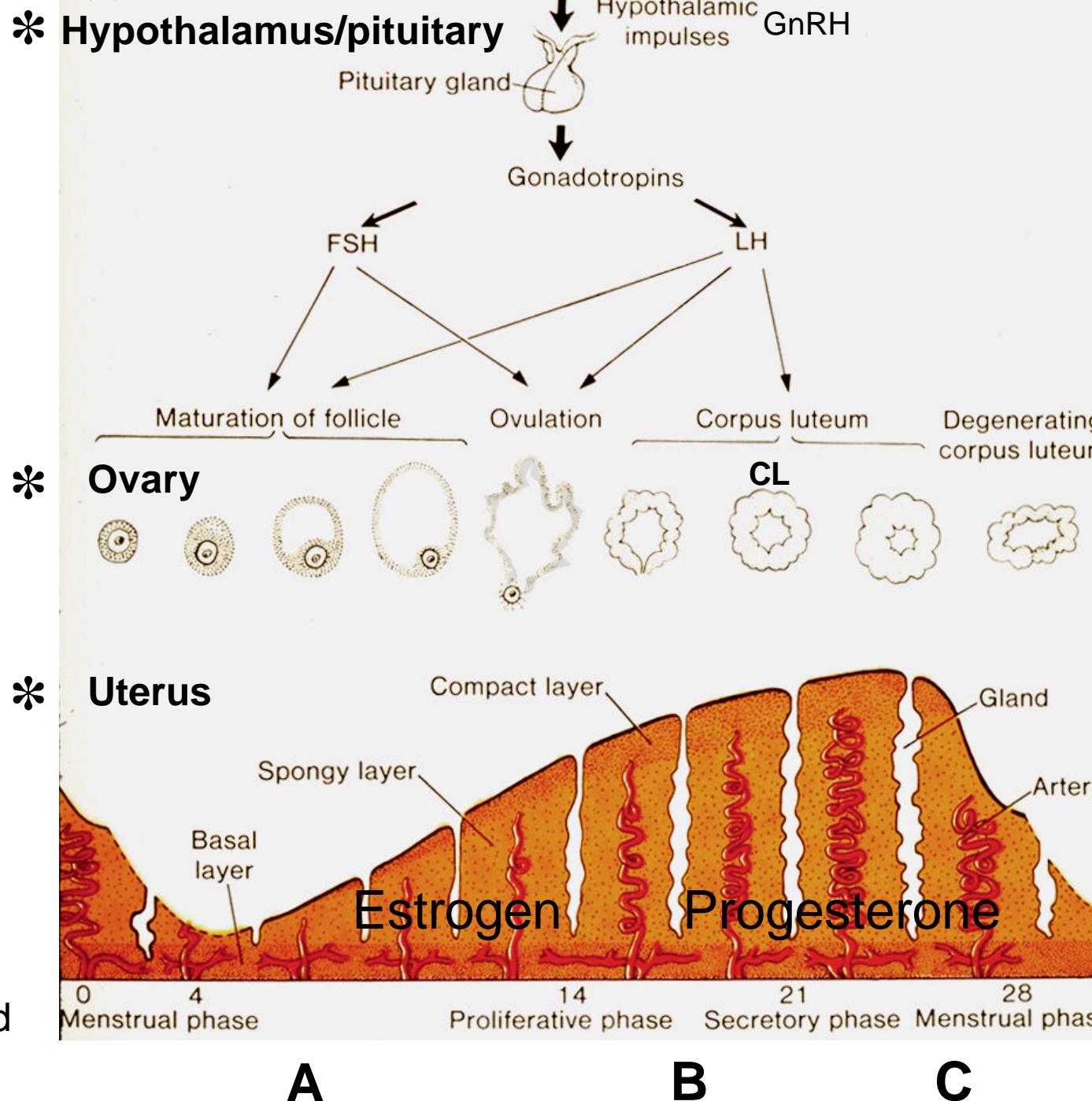
Preparation of the Uterus

Menstrual cycle

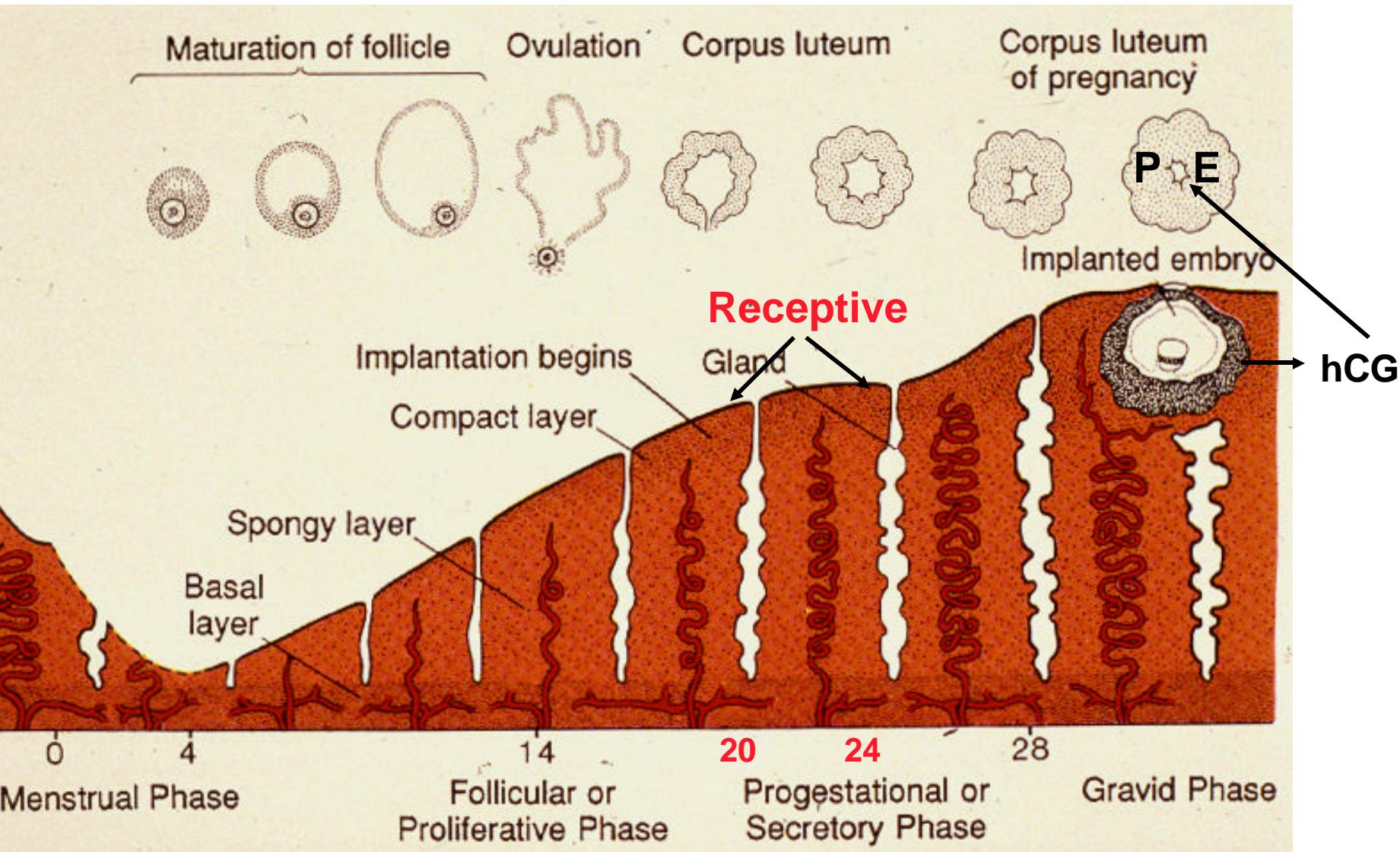
A. Estrogen from growing follicle stimulates regrowth of endometrium.

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.

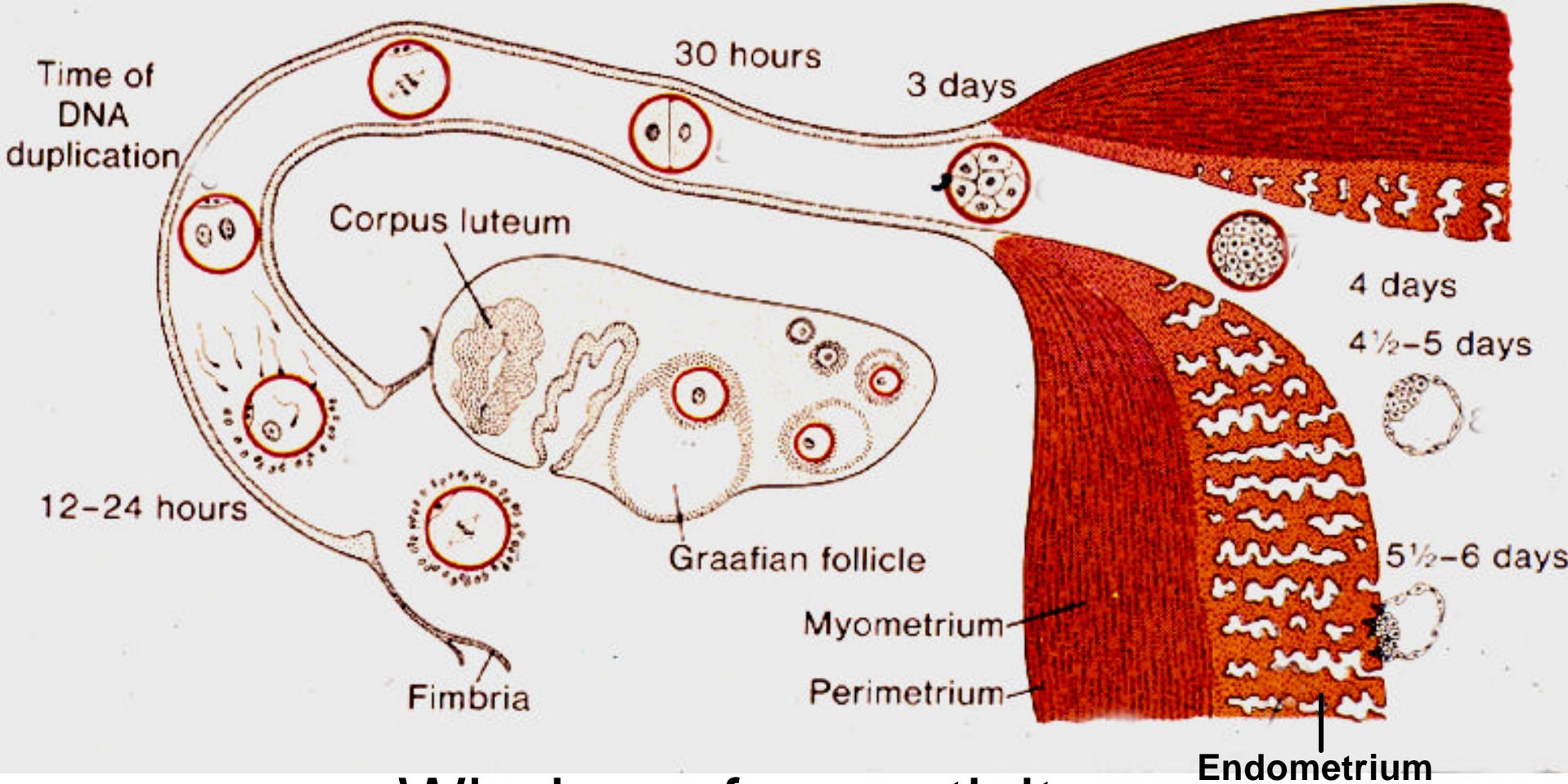


Pregnancy



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

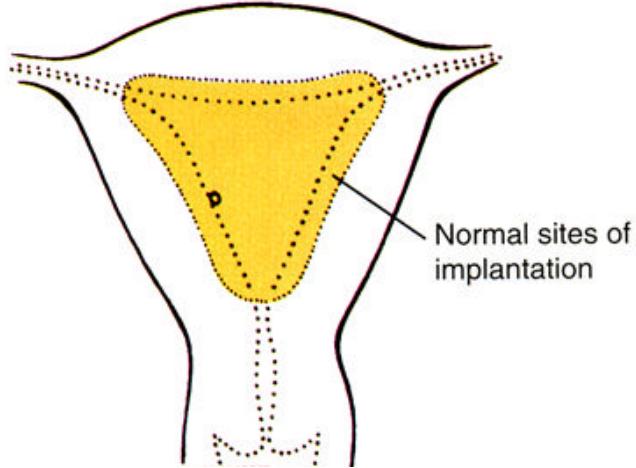


Window of receptivity

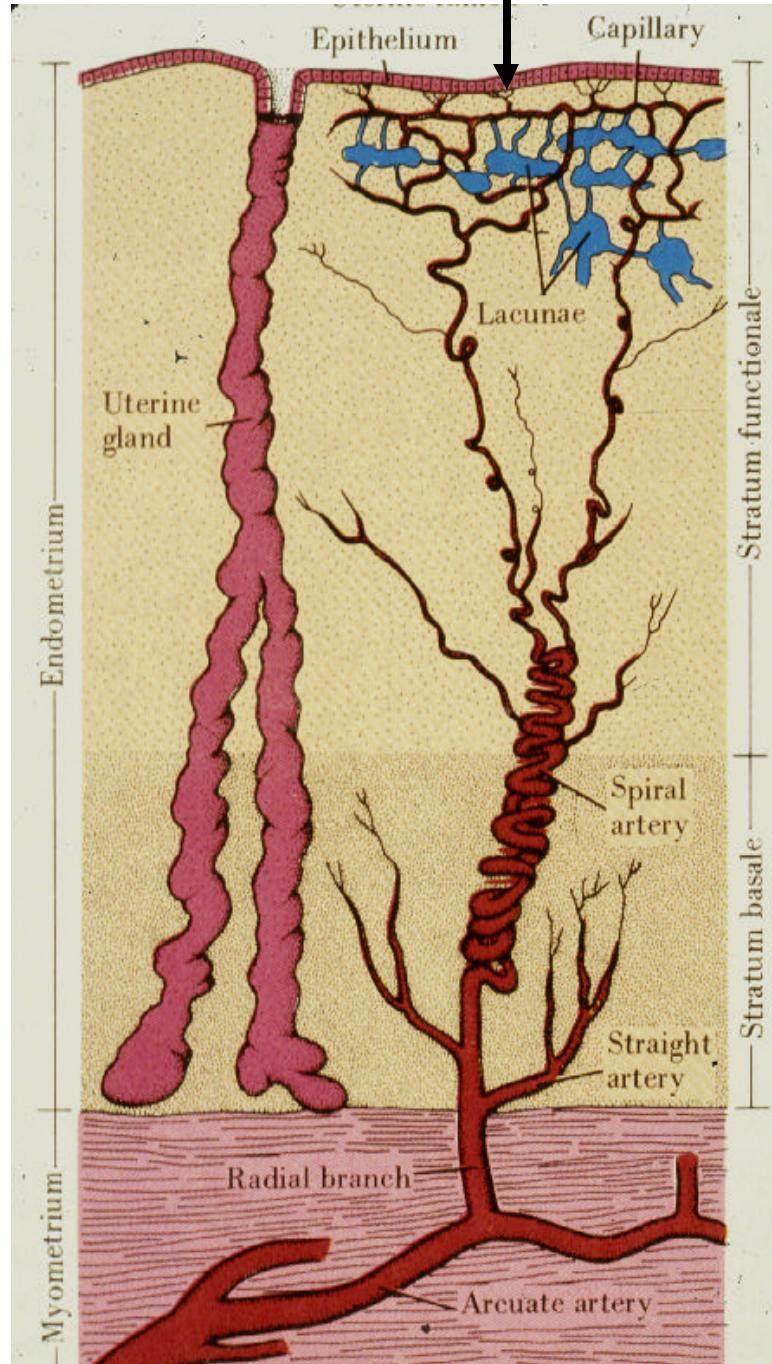
Endometrium - edematous, secretory
Decidual reaction

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

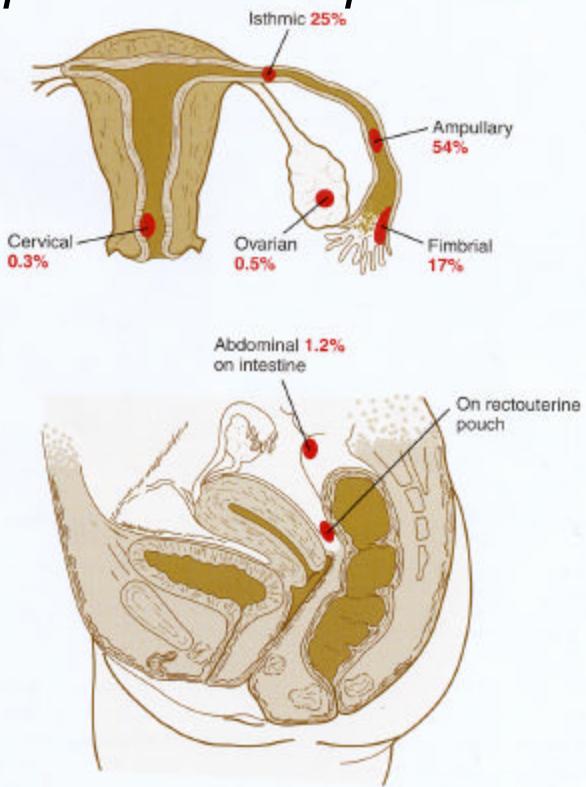
Normal implantation site



Implantation

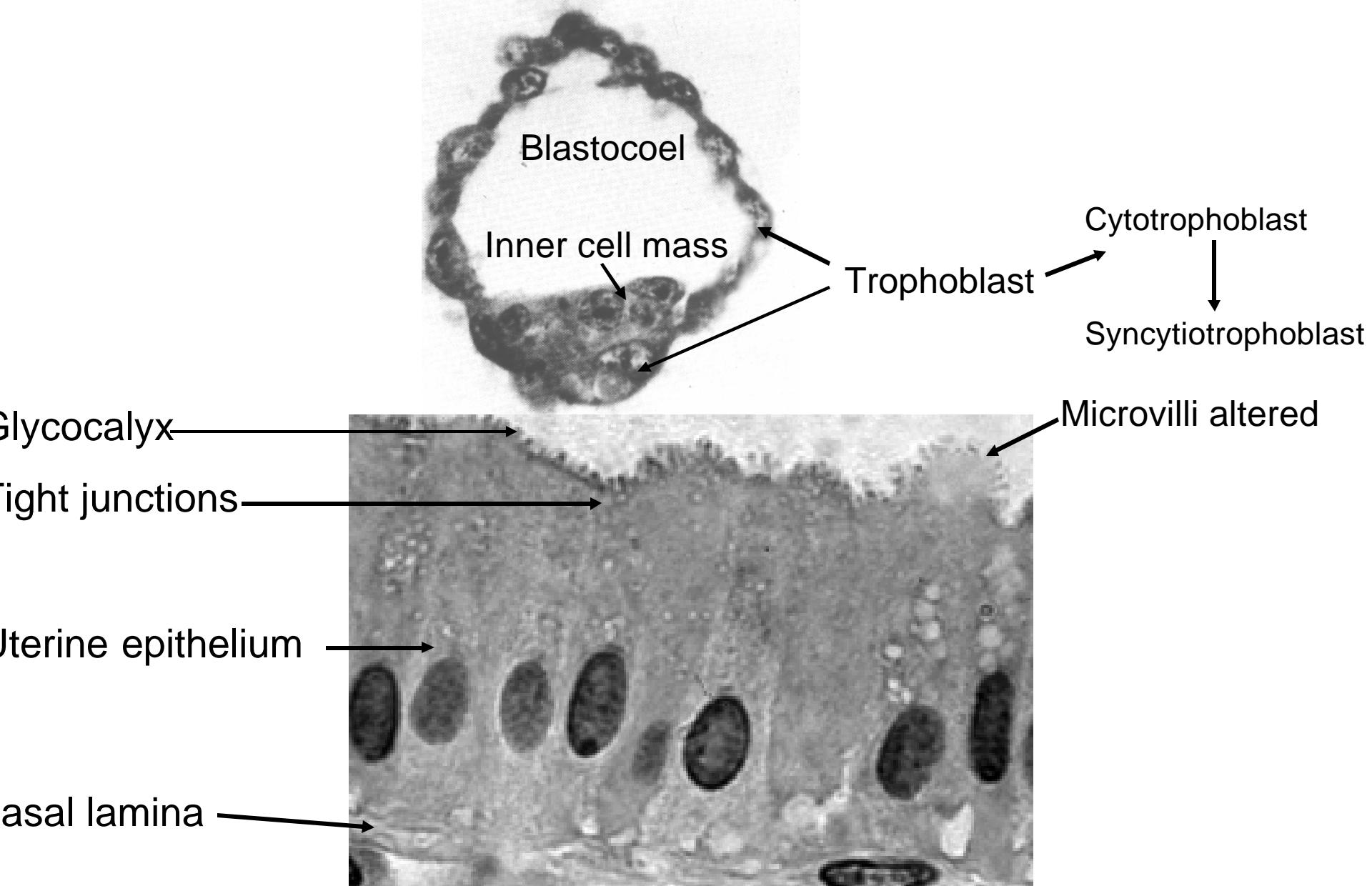


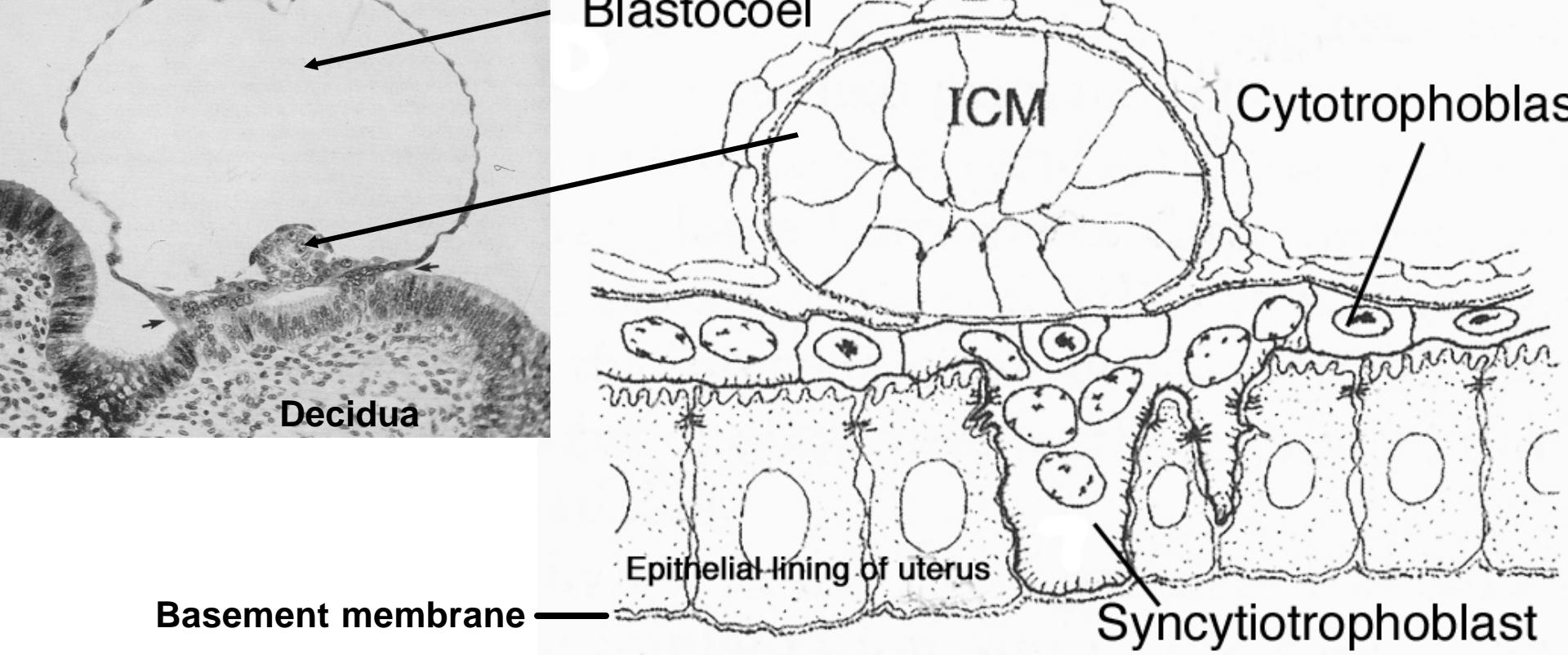
Ectopic sites of implantation



Implantation

Adhesion & Penetration





Peri-implantation dialogue

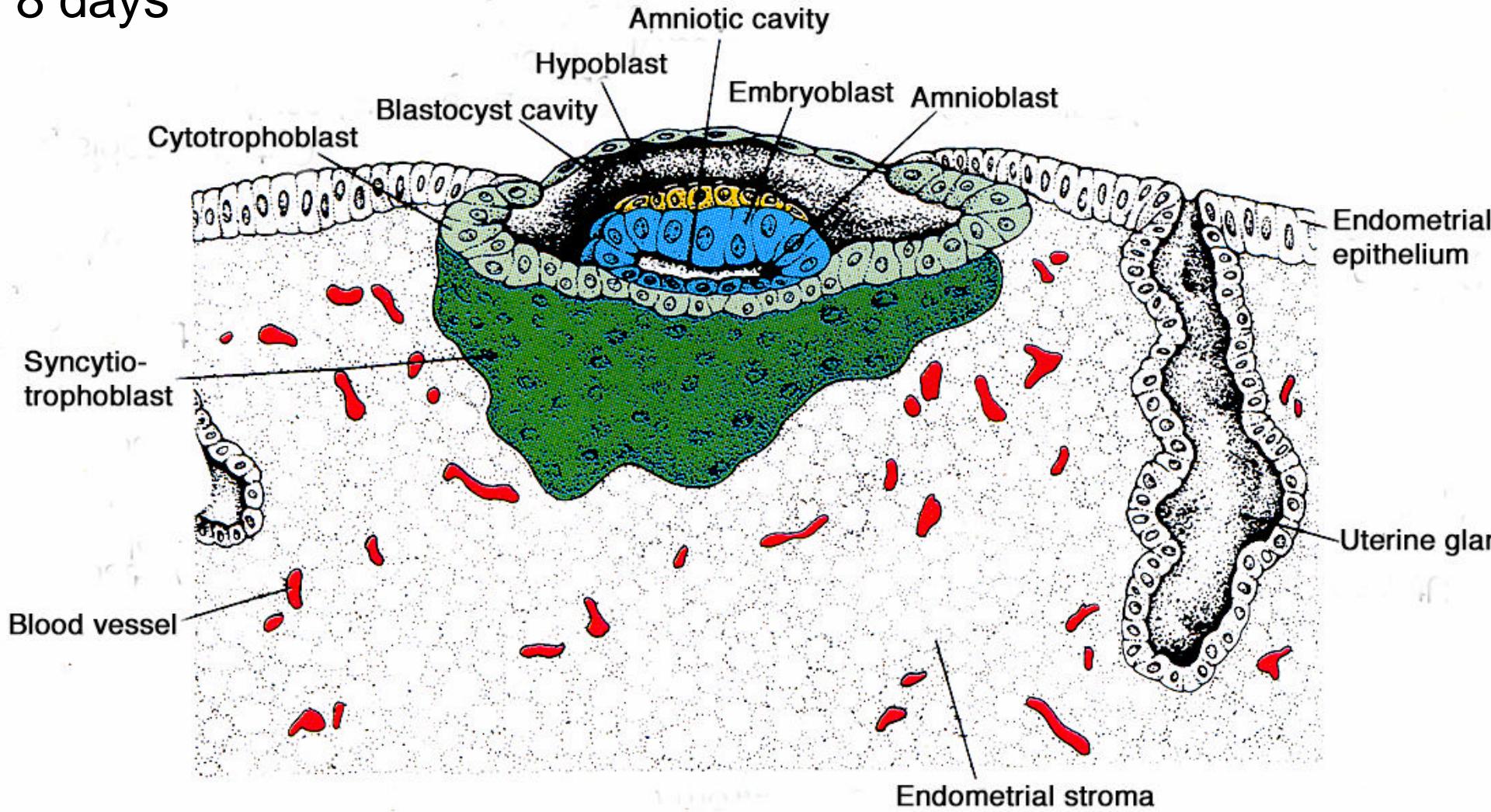
Embryo: hCG and other factors and receptors

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

Adhesion & Penetration

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

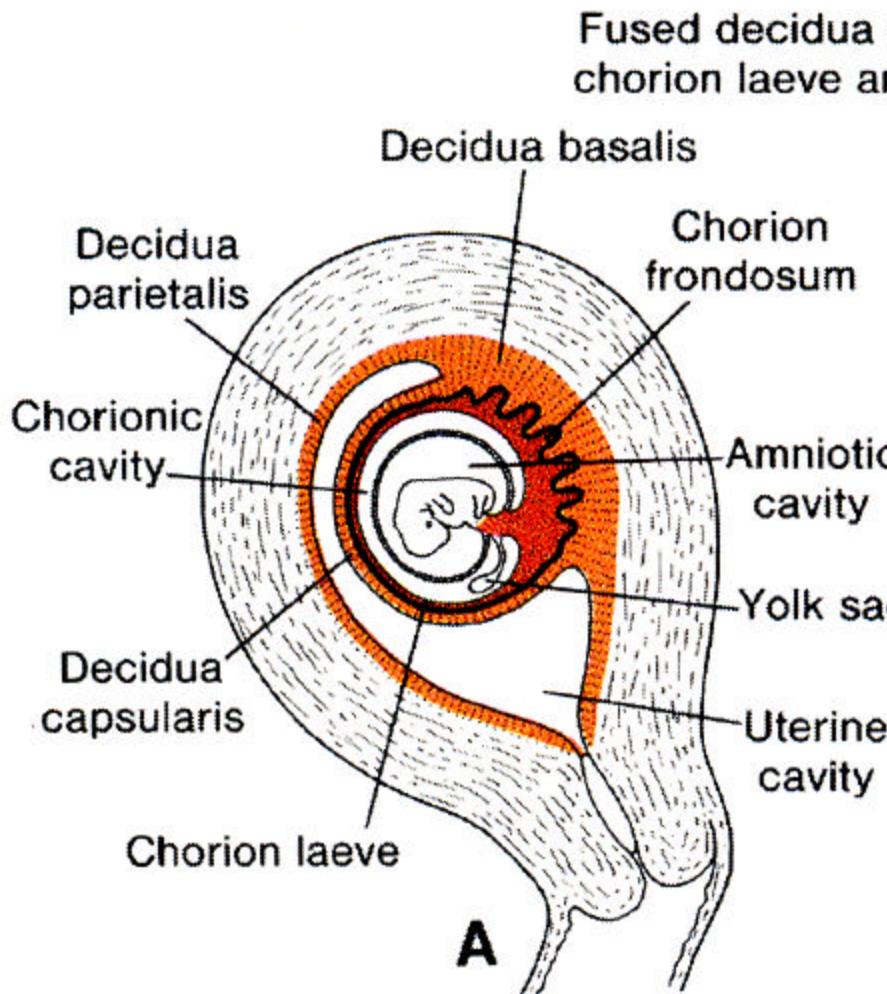
8 days



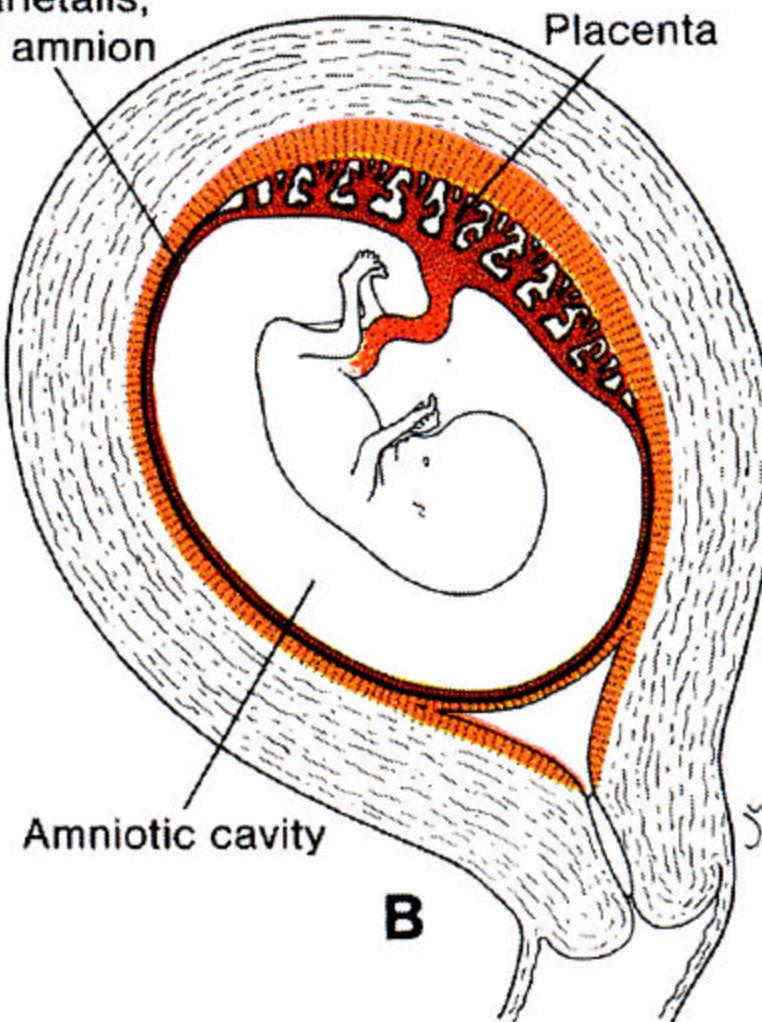
Embryo - Endometrium - Allograft - Why no immune rejection?

Maternal - Decidual reaction altered immune system

Embryonic - HLA-G



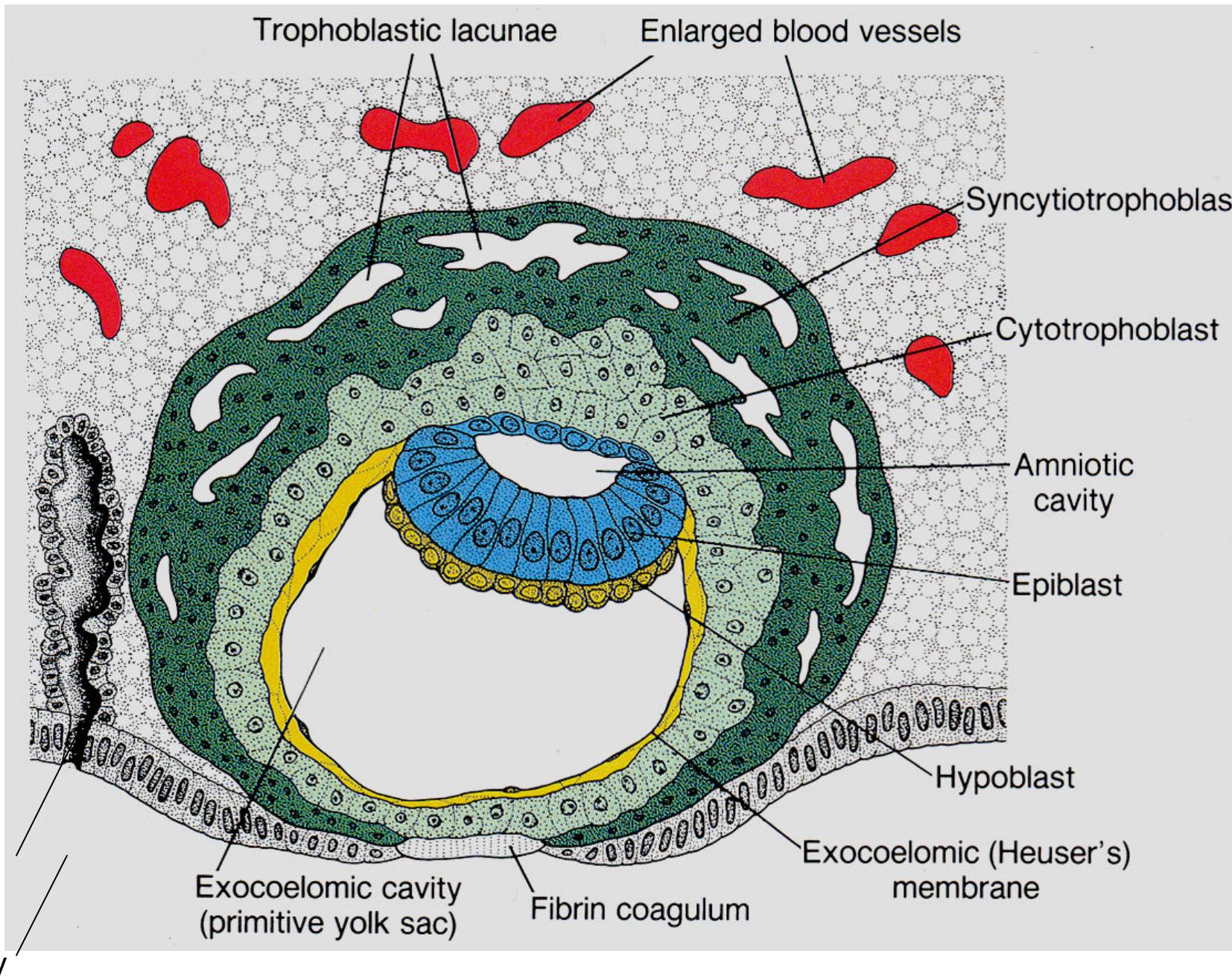
Embryo 8 weeks



Fetus 12 weeks

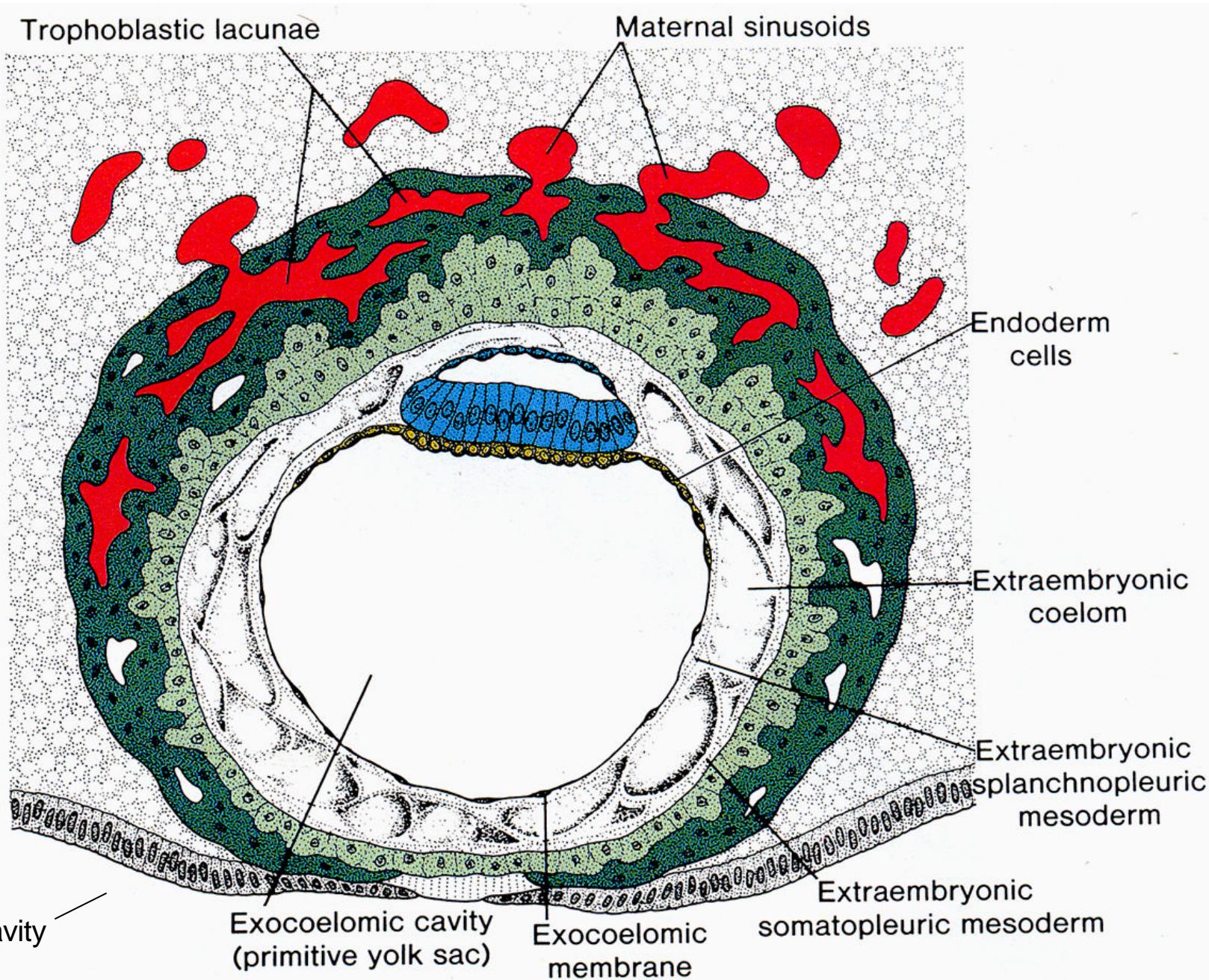
Lacunae in syncytiotrophoblast

9 days



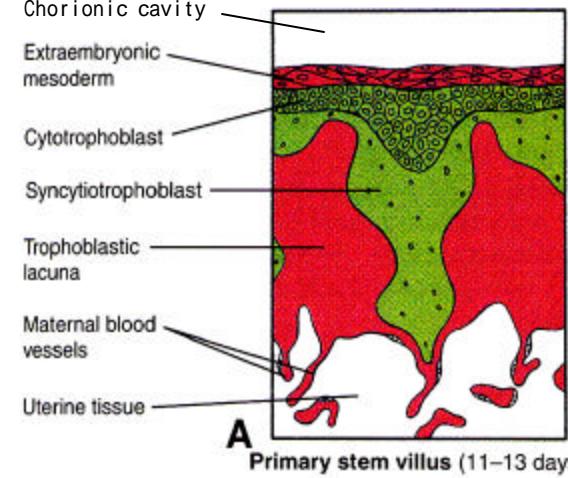
Maternal blood in lacunae of syncytiotrophoblast Lacunar circulation

2 days

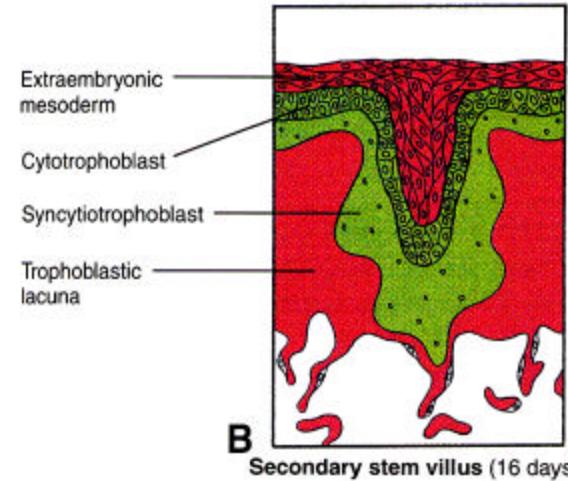


Chorionic villi

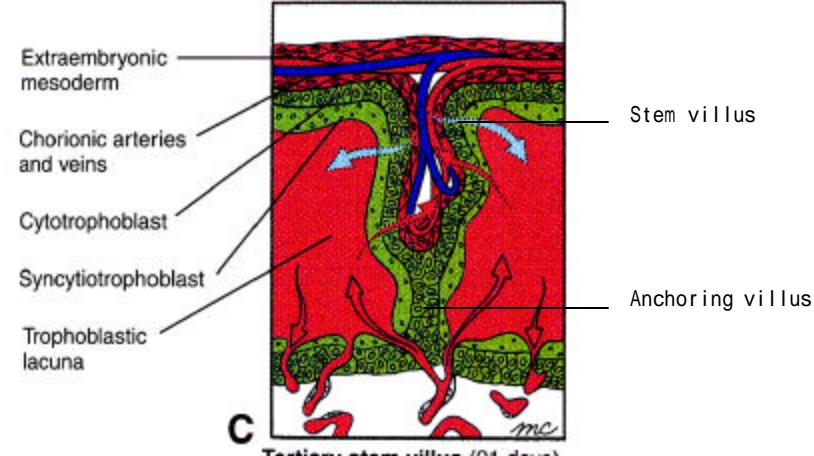
Primary villi - 11-13 days
Cytotrophoblast covered by syncytiotrophoblast



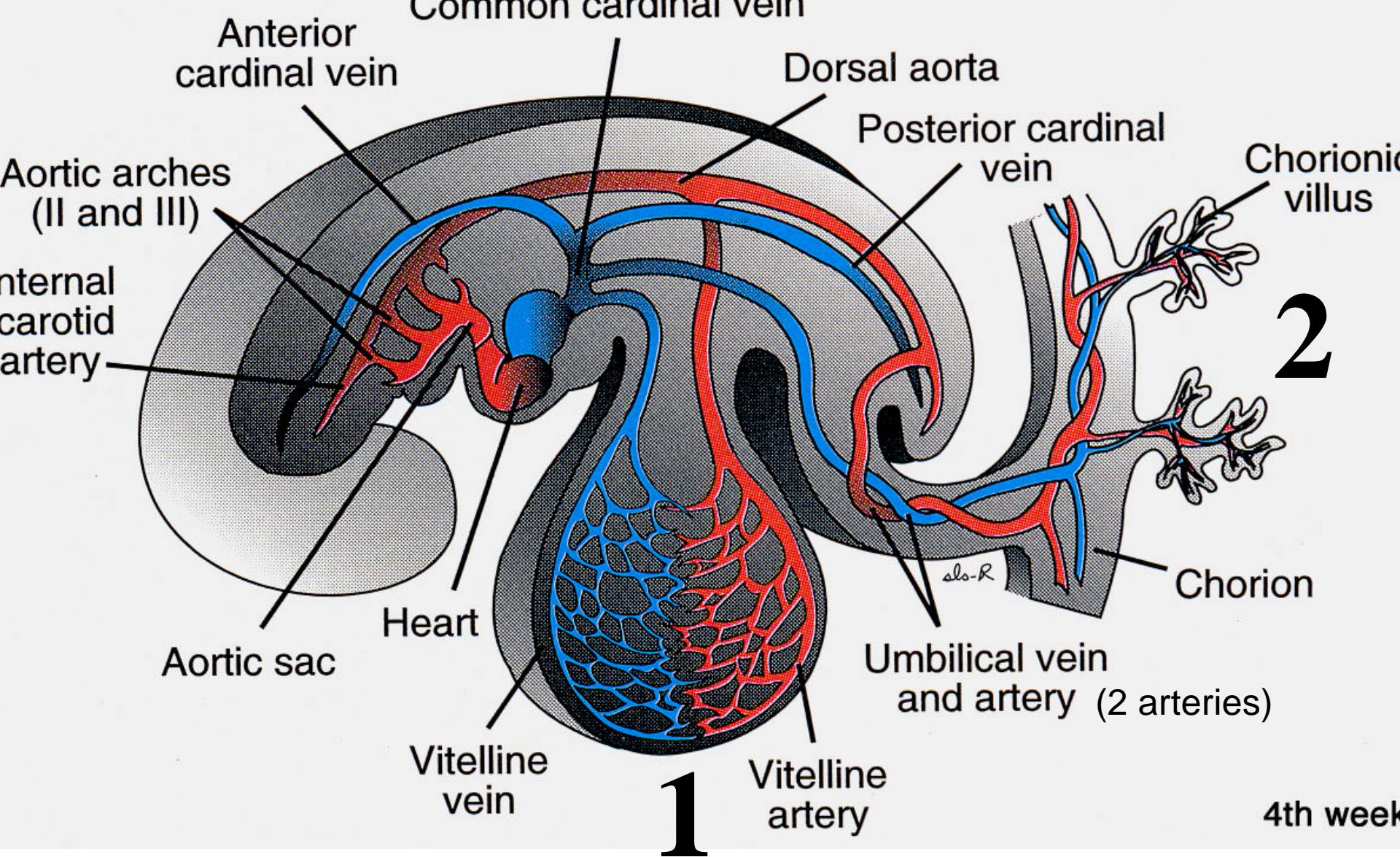
A Primary stem villus (11–13 days)



B Secondary stem villus (16 days)

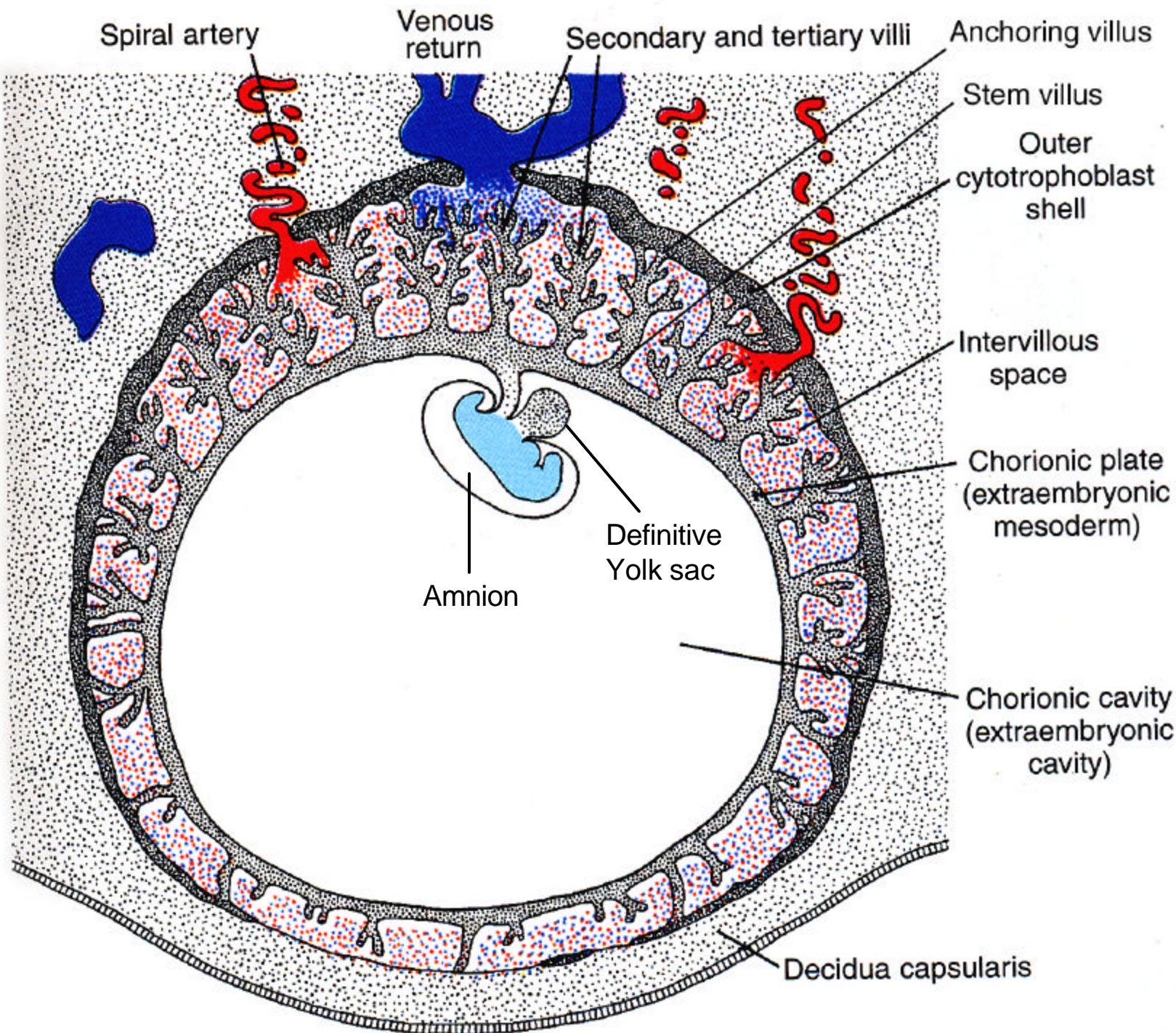


C Tertiary stem villus (21 days)

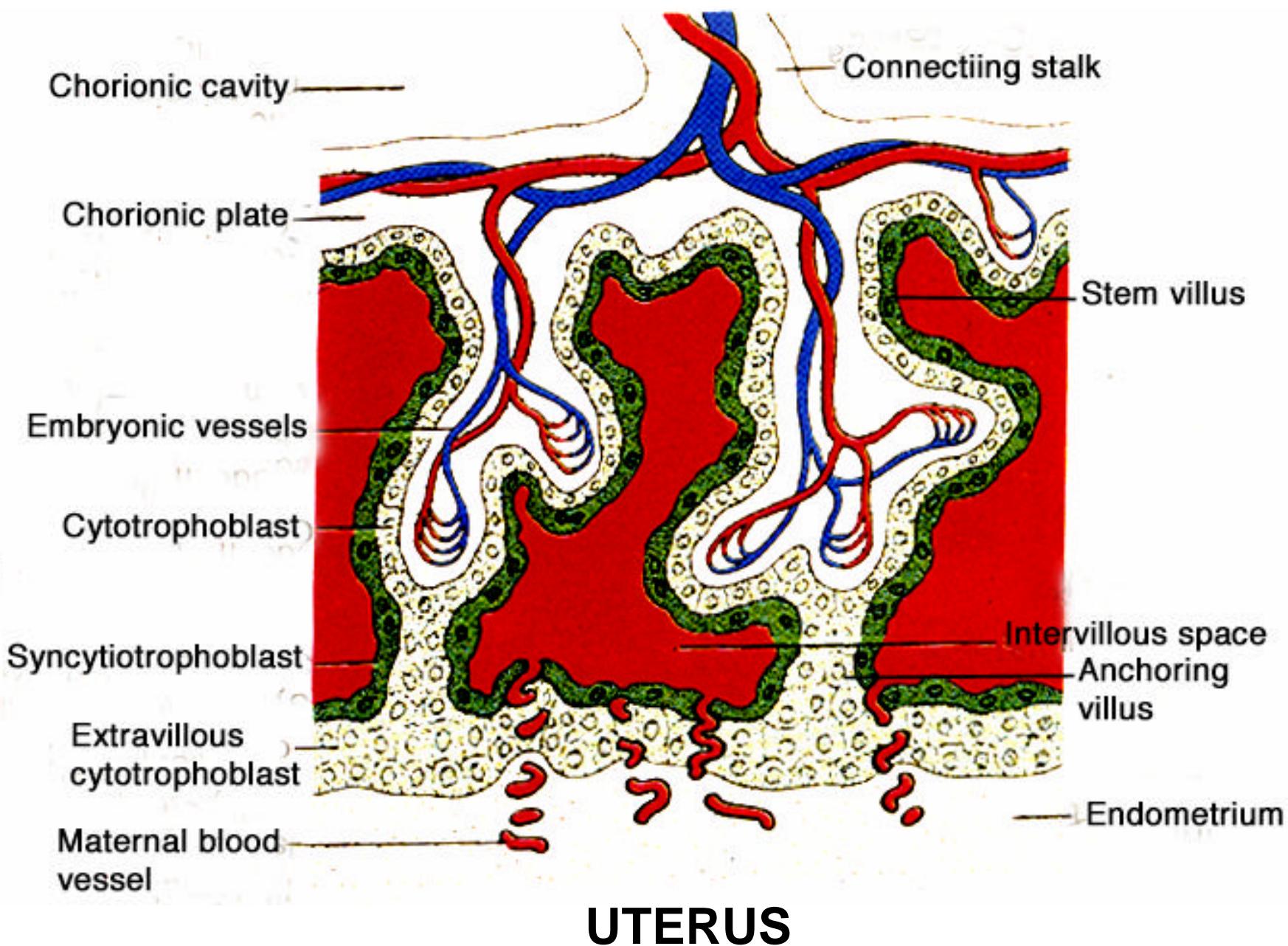


1. Vitelline circulation - yolk sac
2. Chorionic circulation - placenta

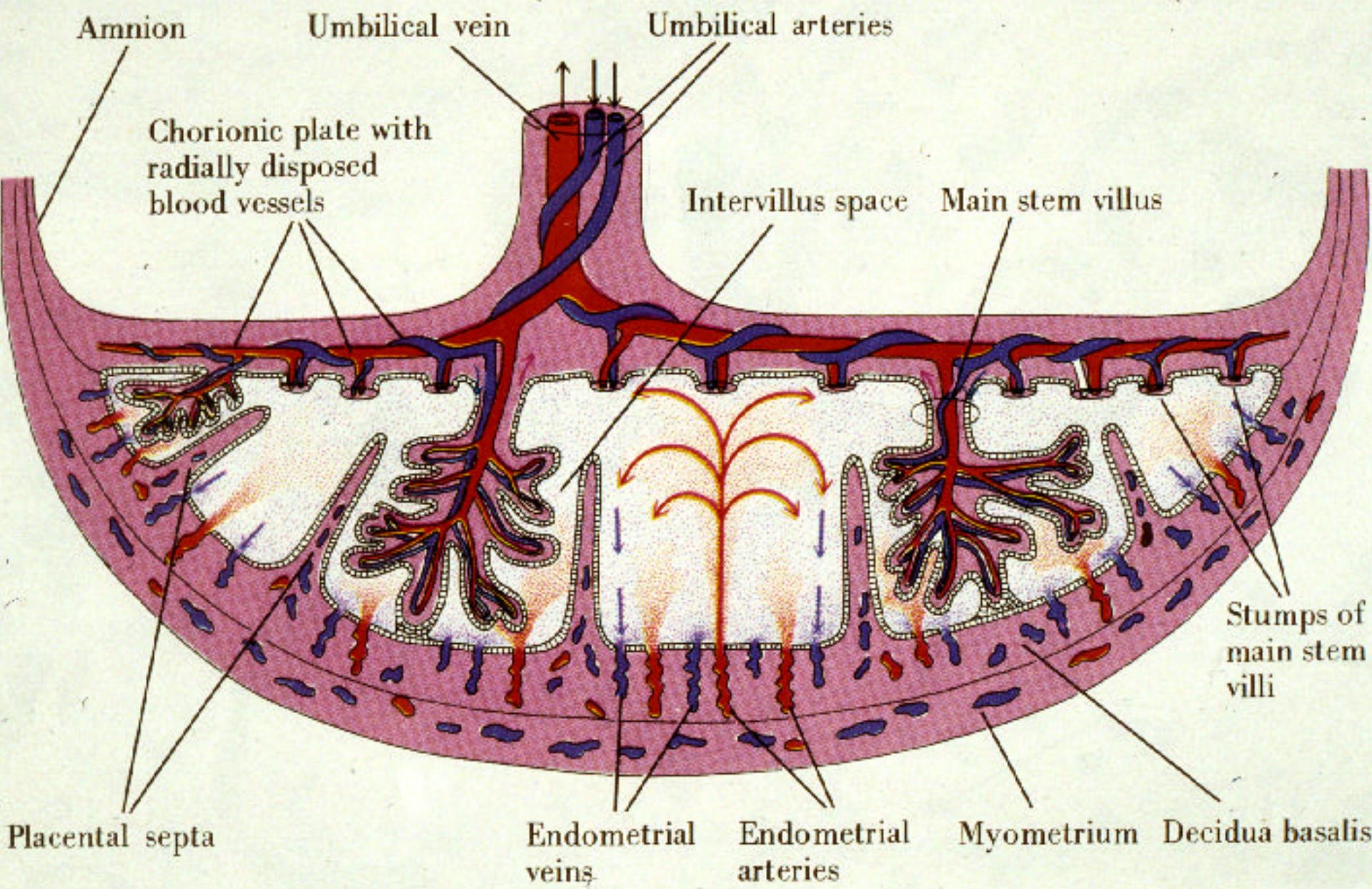
weeks

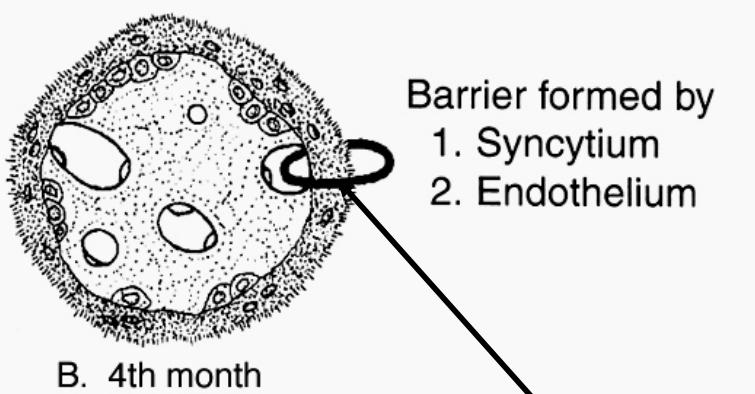
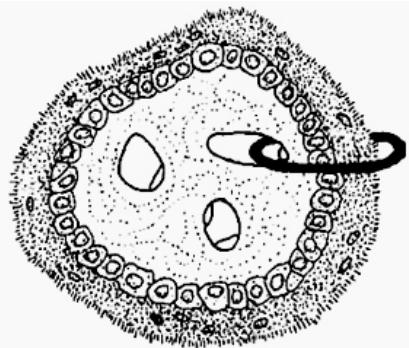
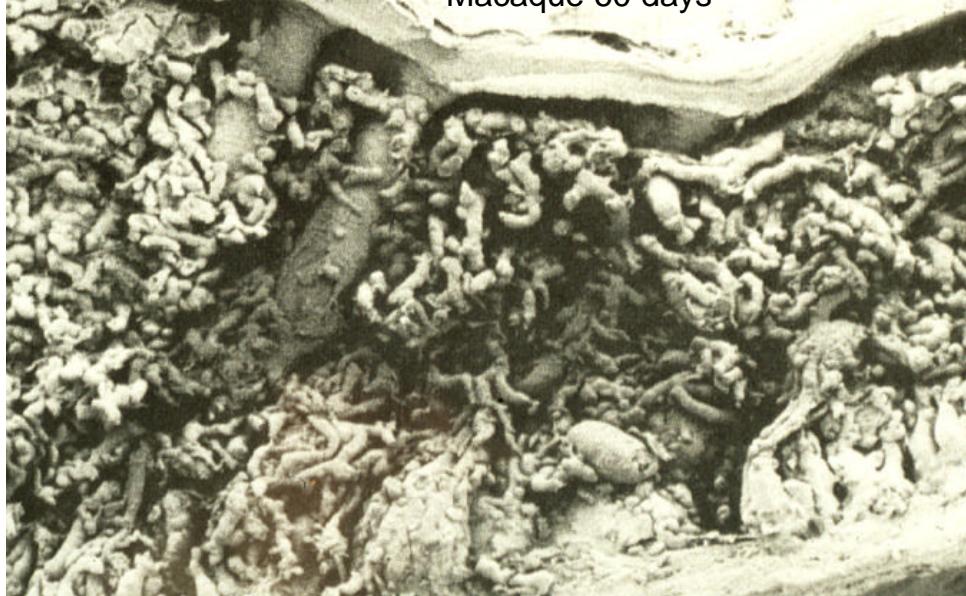
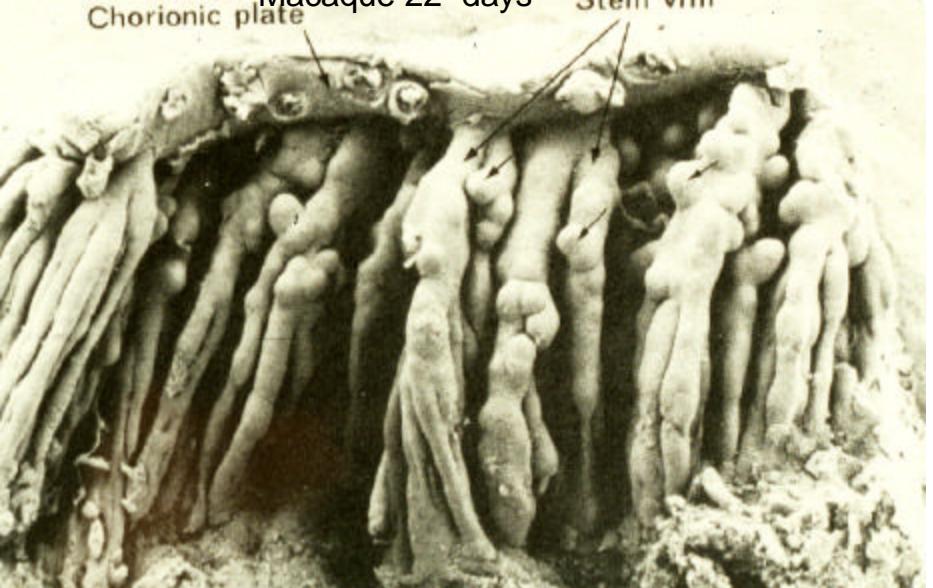


EMBRYO



FETAL CIRCULATION





Syncytiotrophoblast

Embryonic vessel

4 months



Metabolic needs

Peri-implantation: 0-2 weeks

Uterine glands

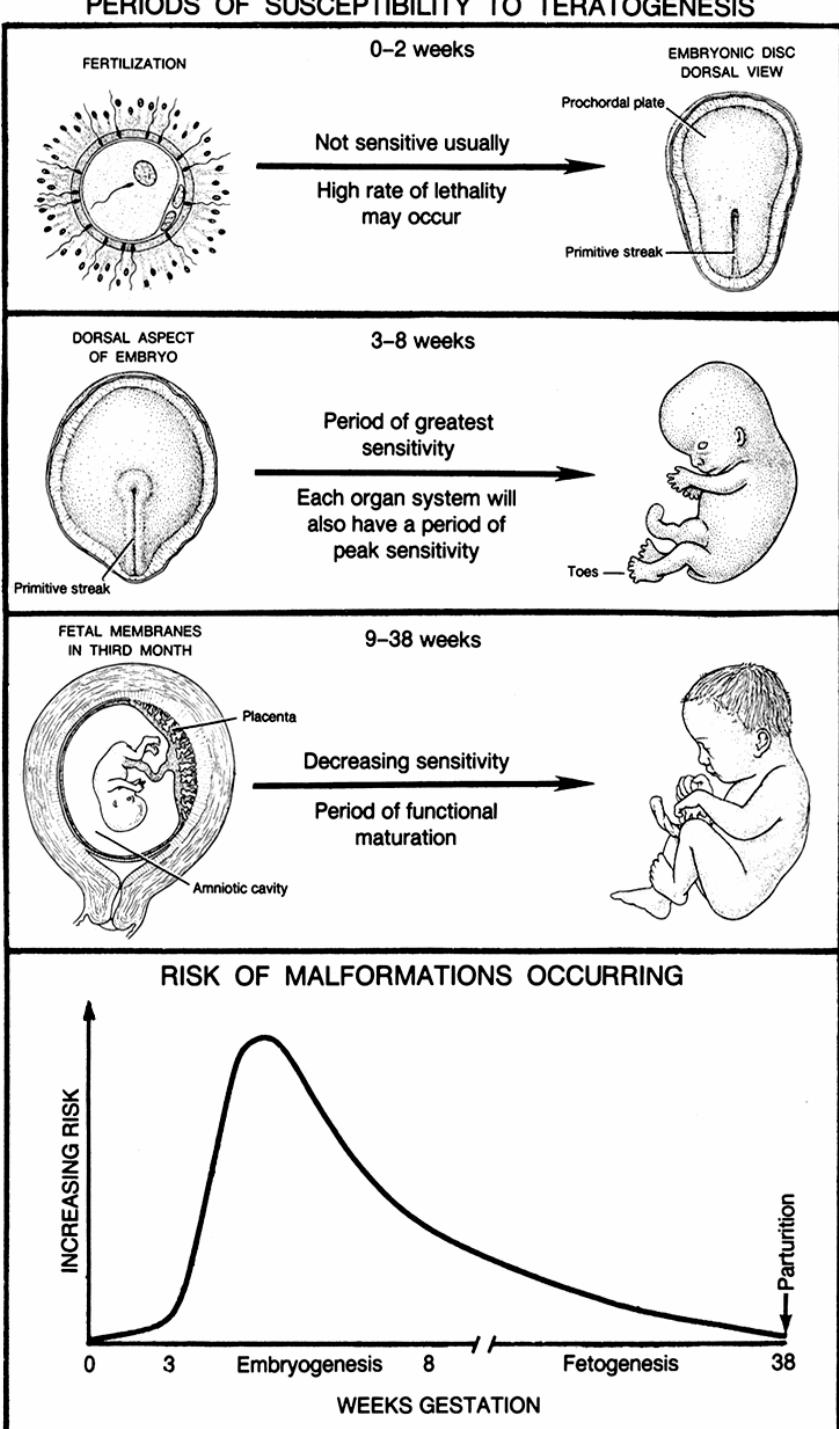
Endometrial stroma - glycogen

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 hemochorionic placenta

Lacunar

Development of chorionic villi

Intervillous

Maternal plasma only

Whole blood