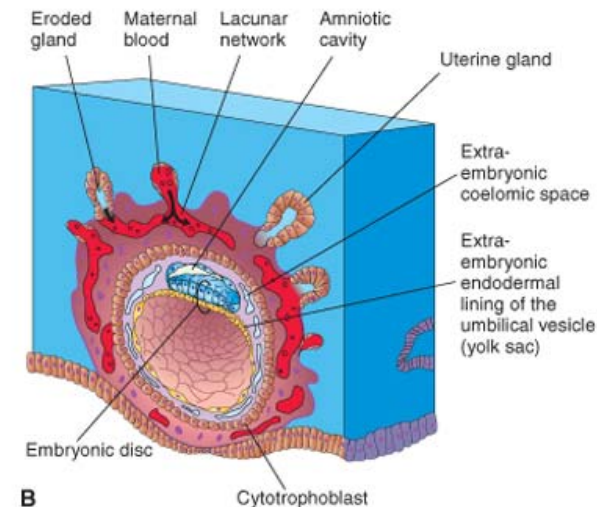
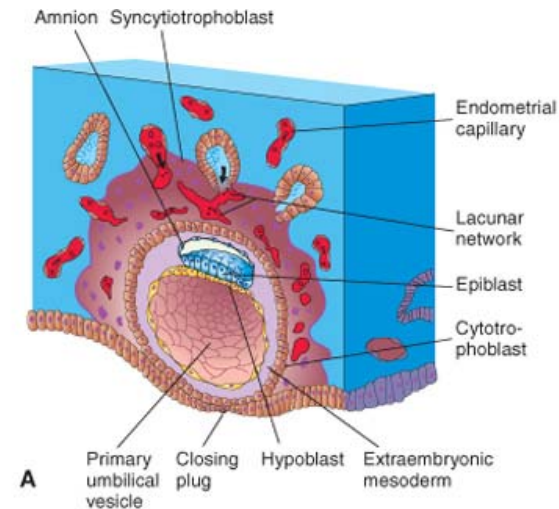


Placenta & Uteroplacental Circulation

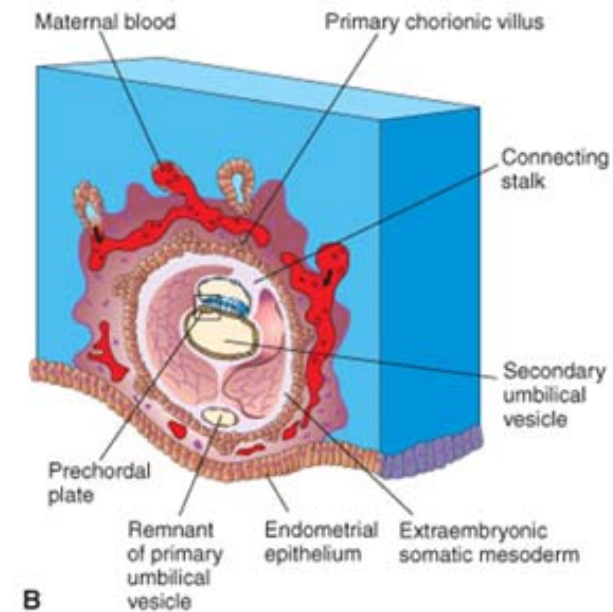
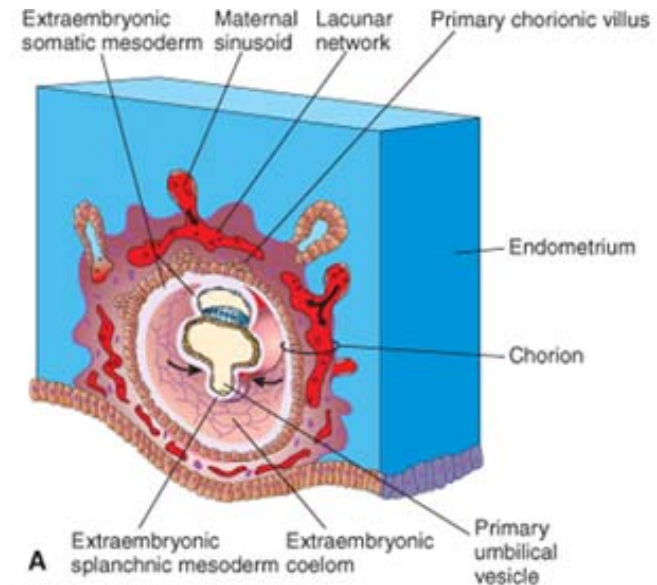
Uteroplacental circulation (2nd week)

- By the 9th day, lacunae (small spaces) develop in the syncytiotrophoblast
- By the 12th day the dispersed lacunae form **lacunar networks**
- Meanwhile, endometrial capillaries form sinusoids
- Blood will flow between the sinusoids and the lacunar networks forming the uteroplacental circulation



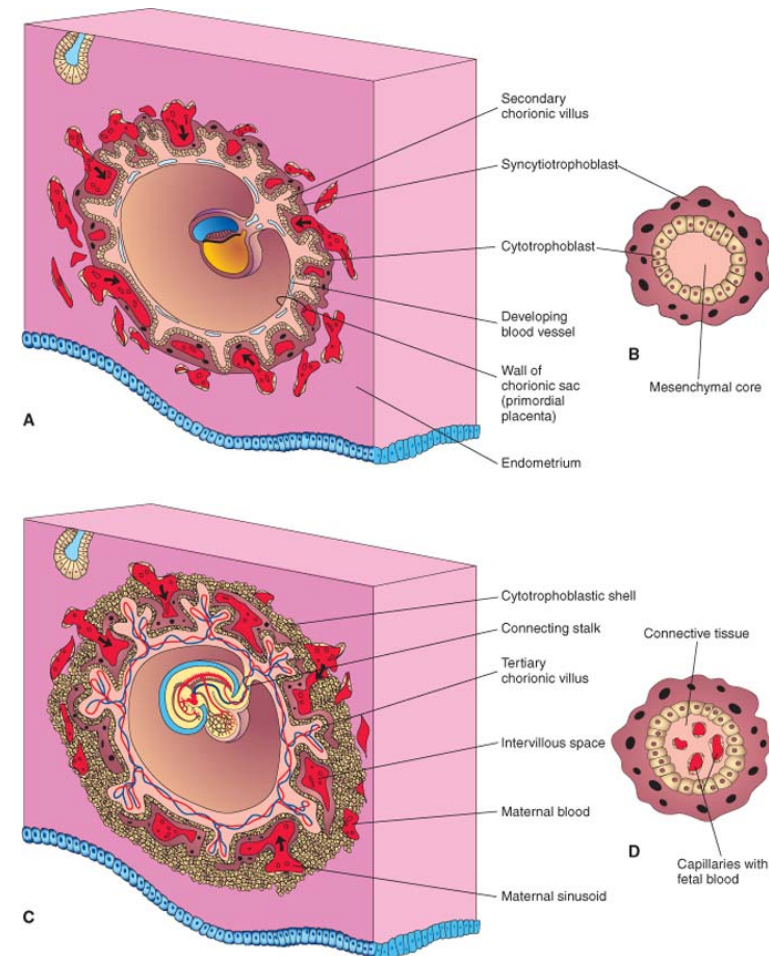
Development of chorionic sac

- **Primary chorionic villi** begin to appear by the end of the second week, induced by the extraembryonic somatic mesoderm
- Extraembryonic somatic mesoderm + cytotrophoblast + syncytiotrophoblast = **Chorion** = walls of chorionic (gestational) sac
- The Extraembryonic coelom become **chorionic cavity**



Development of the chorionic villi

- Primary chorionic villi → **secondary chorionic villi** (with mesenchymal tissue inside) → **tertiary chorionic villi** (with blood vessels inside)
- Cytotrophoblastic cells proliferate and form **cytotrophoblastic shell** that surrounds the chorion and attach it to the endometrium
- exchange occur between the embryonic blood in the BV of the tertiary chorionic villi and the maternal blood in the **intervillous spaces**

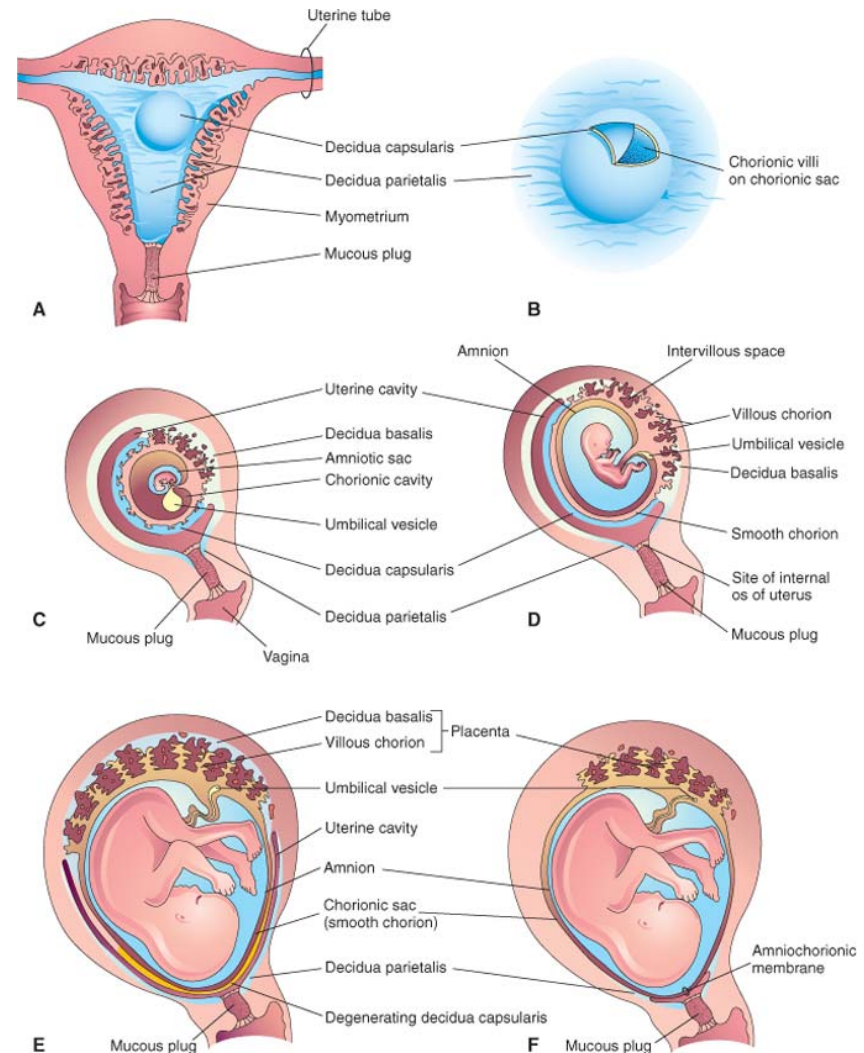


The Placenta

- Placenta is the site of exchange (nutrients and wastes) between the mother and the fetus
- Placenta is composed from two parts:
 - **Fetal portion**, which is part of the chorion; the **villous chorion**
 - **Maternal portion**, which develop from the endometrium; the **decidua basalis**

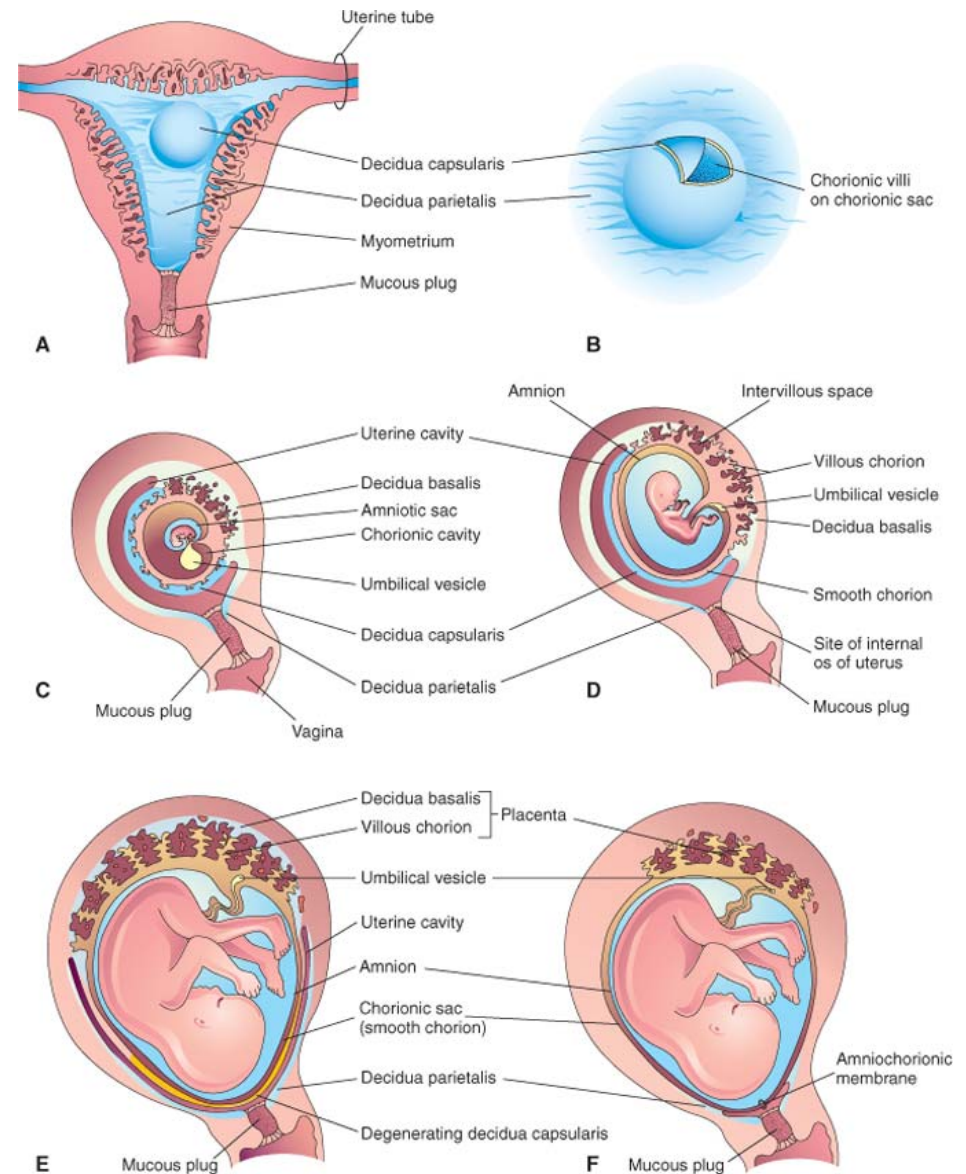
The Placenta

- **Decidua** is the functional part of endometrium that will be expelled after parturition
- The decidua composed of three regions:
 - **Decidua basalis**, which is the maternal portion of the placenta
 - **Decidua capsularis**; part of the endometrium surrounding the chorion (**smooth chorion** by the 8th week) and facing the uterine cavity
 - **Decidua parietalis** (decidua vera); the remaining part of decidua lining the uterus



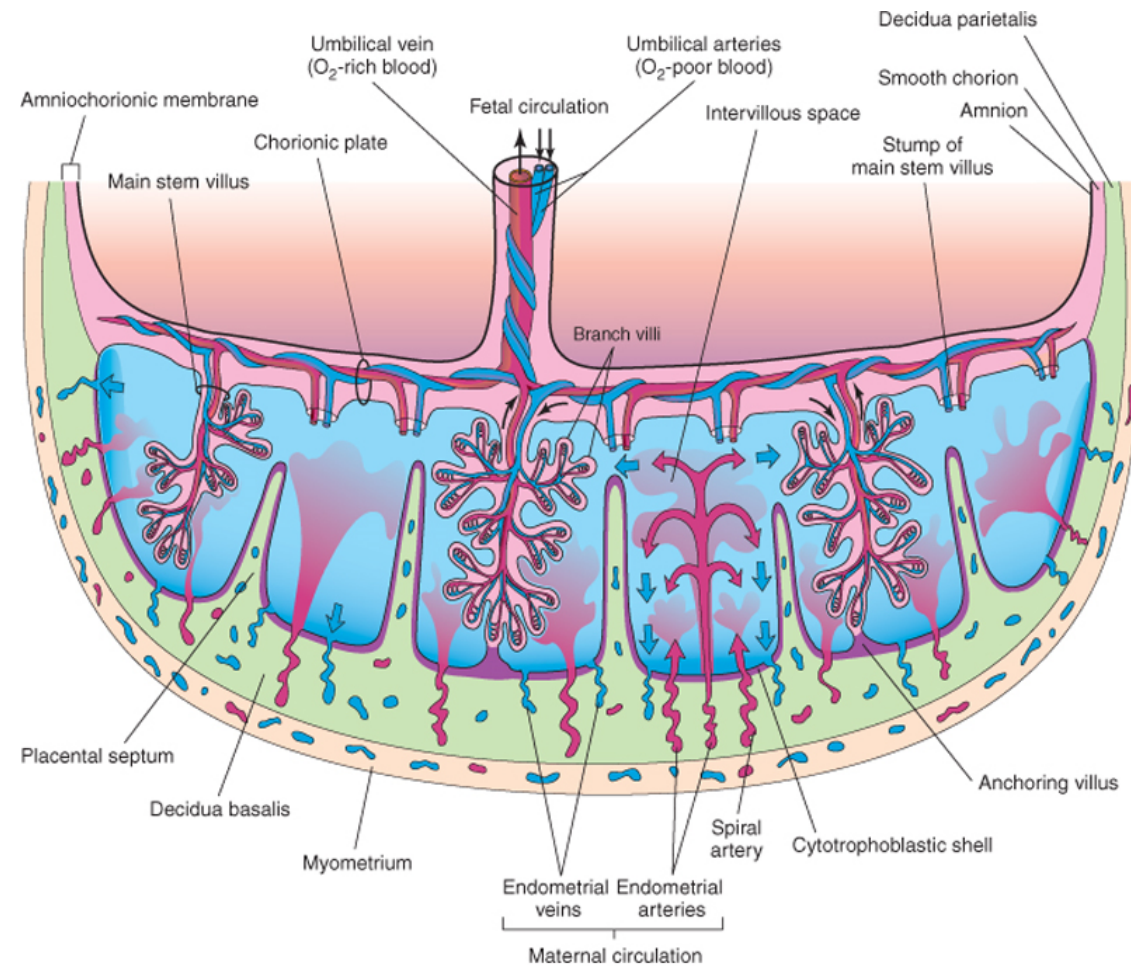
The placenta

- At the end of the 20th week,
 - the placenta is enlarged
 - The amnion fuse with the chorionic sac forming **amniochorionic membrane**
 - The decidua capsularis degenerate and the amniochorionic membrane adhere to the decidua parietalis



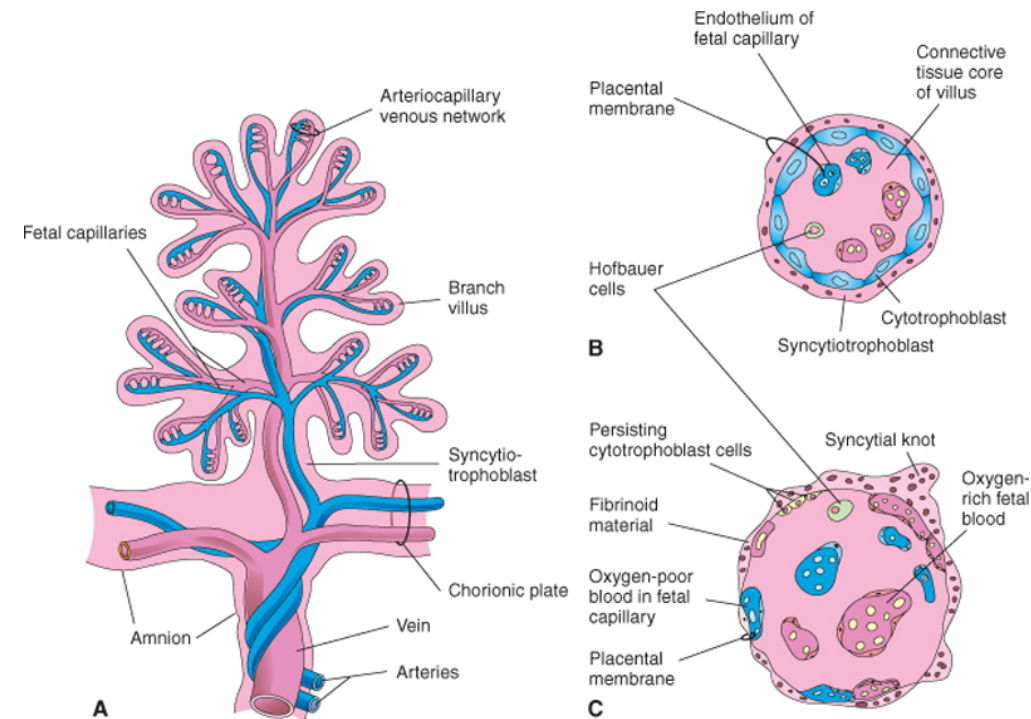
Full term placenta

- In the full term placenta:
 - Cytotrophoblastic shell will anchor the fetal placenta to the decidua basalis
 - Placental septa will develop from the decidua basalis toward the **chorionic plate** dividing the fetal placenta into cotyledons
 - Each cotyledon contains two or three **stem villi** (anchoring villi), which are surrounded by the **intervillous spaces** that develop from the lacunar networks



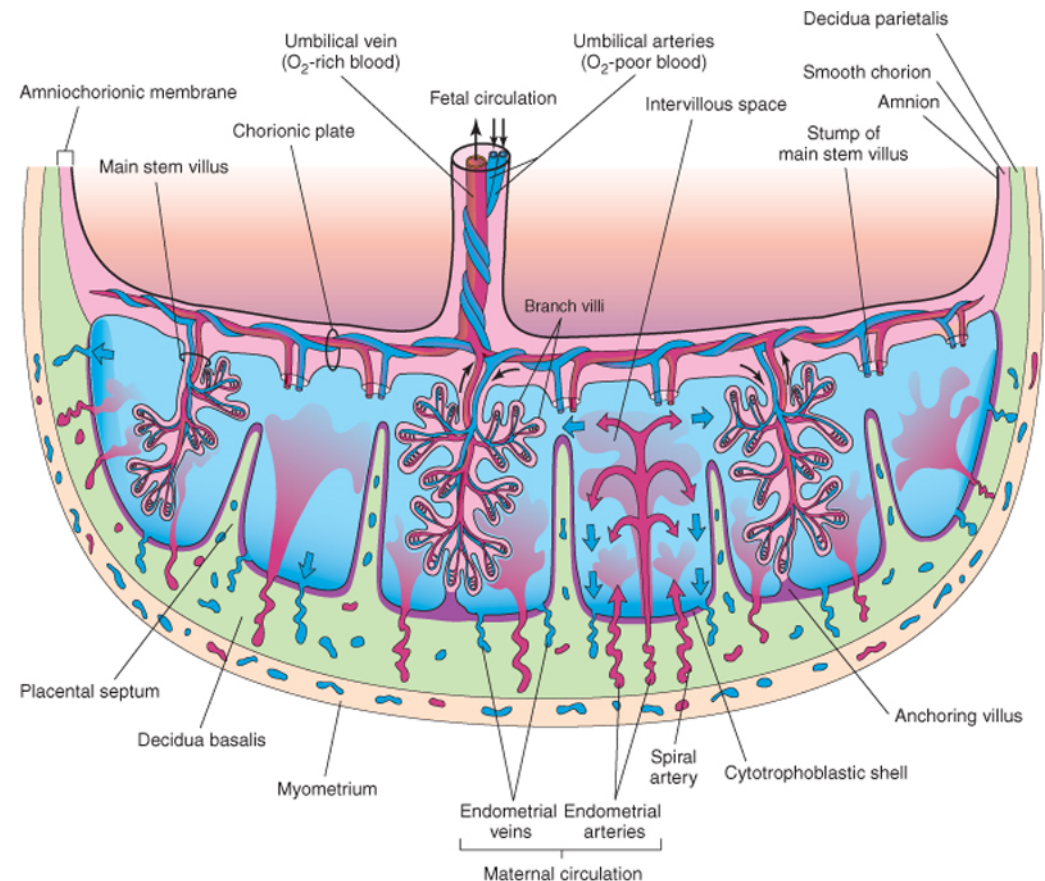
Full term placenta

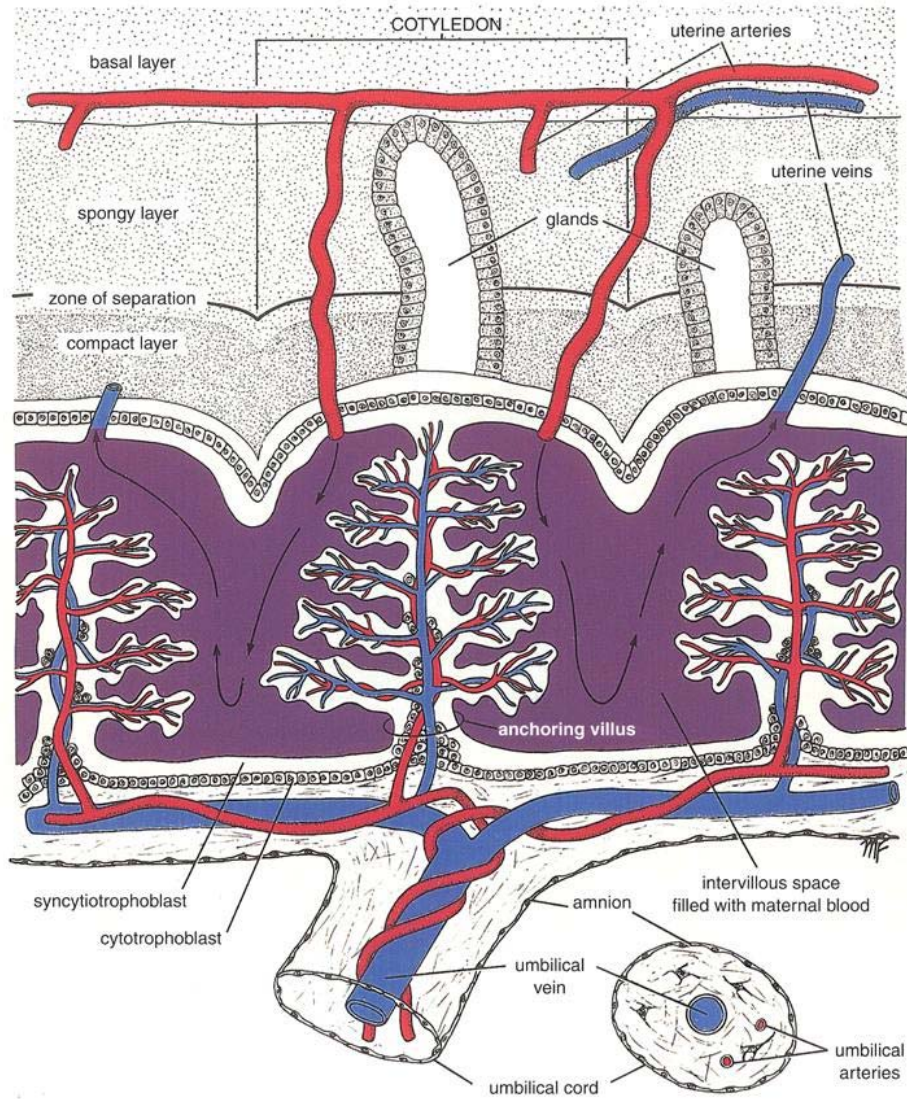
- Each stem chorionic villus contain many **branch villi**
- Chorionic villi contain fetal blood vessels that is branched from BV in the chorionic plate, which are branched from the umbilical BVs
- Exchange happen through the **placental membrane**, which consists from:
 - Syncytiotrophoblast
 - Cytotrophoblast
 - Connective tissue
 - Capillaries endothelium
- Cytotrophoplastic cells begin to disappear and then capillaries come in direct contact with syncytiotrophoblast



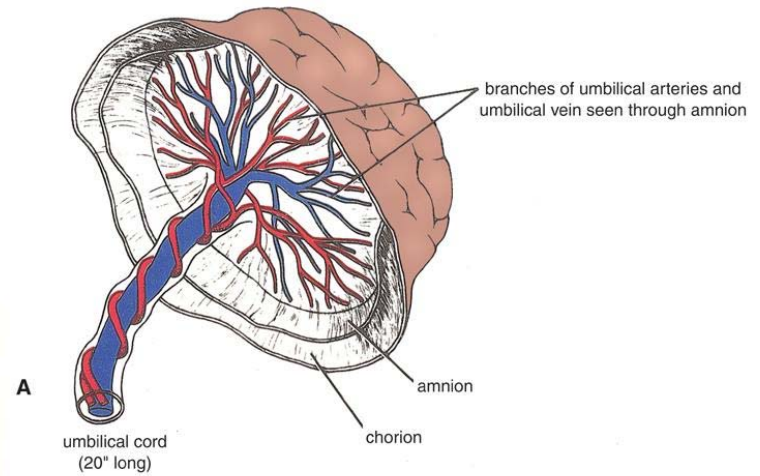
Full term placenta

- The maternal blood in the intervillous spaces comes from the **spiral endometrial arteries**, which discharge blood through the cytotrophoblastic shell
- The deoxygenated blood in the intervillous spaces drained by the **endometrial veins**

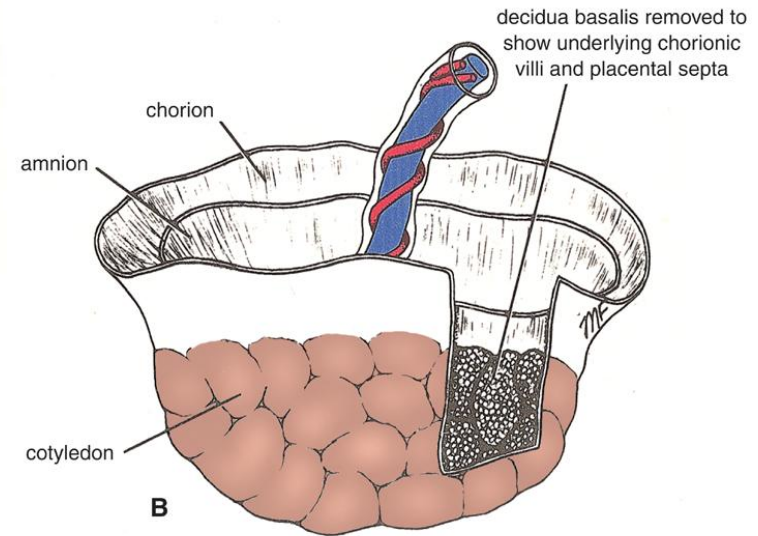




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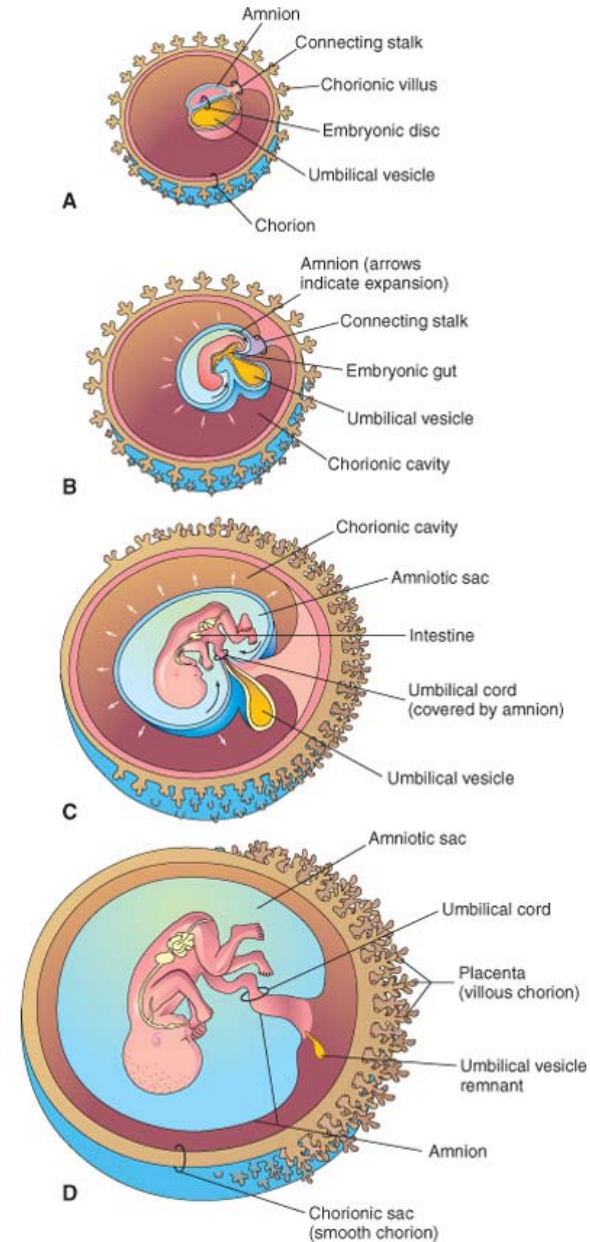
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Amnion

- The **amnion** consists of the **amniotic sac** that is filled with **amniotic fluid**
- The amniotic sac attached to the embryonic disc and with the folding of the embryo it surrounds the embryo attaching to it ventrally and covering the umbilical cord
- The amnion enlarges obliterating the chorionic cavity and come in contact with the chorionic sac



Amniotic fluid

- Source of amniotic fluid:
 - Secreted from the amniotic cells
 - From maternal tissue, through fetal membranes
 - From decidua parietalis through amniochorionic membrane
 - From blood in the intervillous space through chorionic plate
 - From the fetus
 - Through the skin before skin keratinization
 - From fetal respiratory tract
 - Fetal urine by 11th week
- Amniotic fluid diffuse back to maternal tissue
 - Directly through the fetal membranes
 - Indirectly by fetal blood stream; fetal swallow the amniotic fluid which is absorbed into the blood stream and then either return to mother blood through placenta or excreted as fetal urine

Amniotic fluid

- Amniotic fluid functions
 - Protection of the fetus
 - Helps control fetal temperature
 - Fetal fluid and electrolytes homeostasis
 - Aids in fetal development
 - Symmetrical external growth
 - Muscular development through movement
 - Lung development

The umbilical vesicle (yolk sac)

- Yolk sac forms in the 2nd week ventral to the embryonic disk
- When the embryo begins folding the yolk sac will be incorporated with the umbilical cord and connected to the midgut with **yolk stalk**
- By the end of the 6th week the yolk stalk detaches from the midgut loop
- By the 20th week , yolk sac is very small and usually not visible
- Yolk sac significance
 - Nutrition to embryo in the 2nd And 3rd weeks
 - Blood vessels development
 - Participate in forming the respiratory and GI tracts
 - Origin of the germ cells

