



# Human Embryology-6

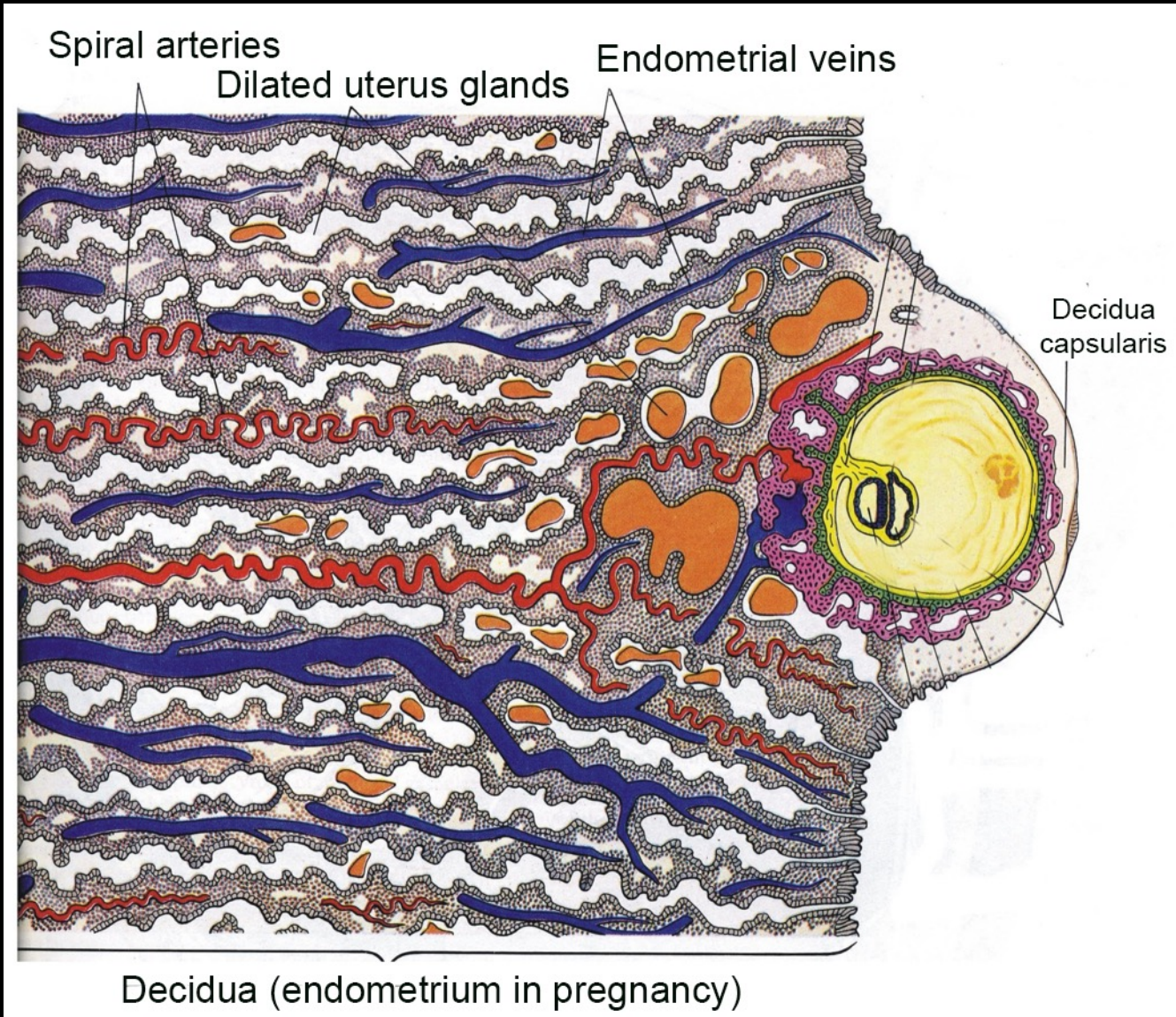
- ✓ Placenta
- ✓ Amnion
- ✓ Umbilical Cord
- ✓ Multiple Births

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Department of Histology and Embryology

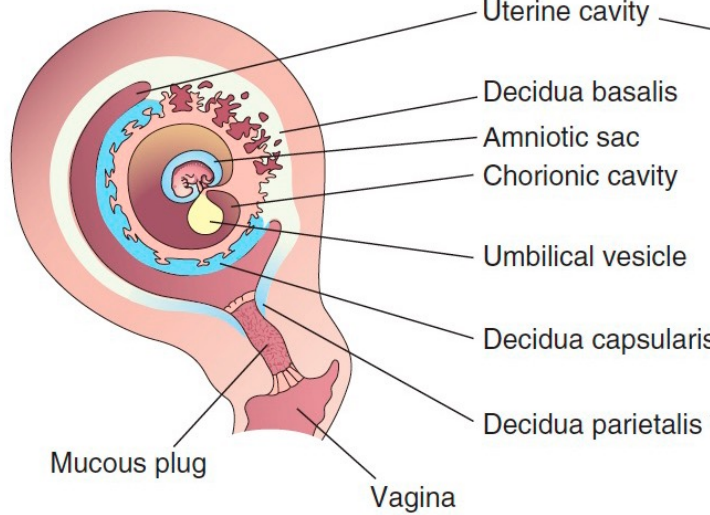
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Placenta = Decidua Basalis + Villous Chorion  
(Maternal part) (Fetal part)

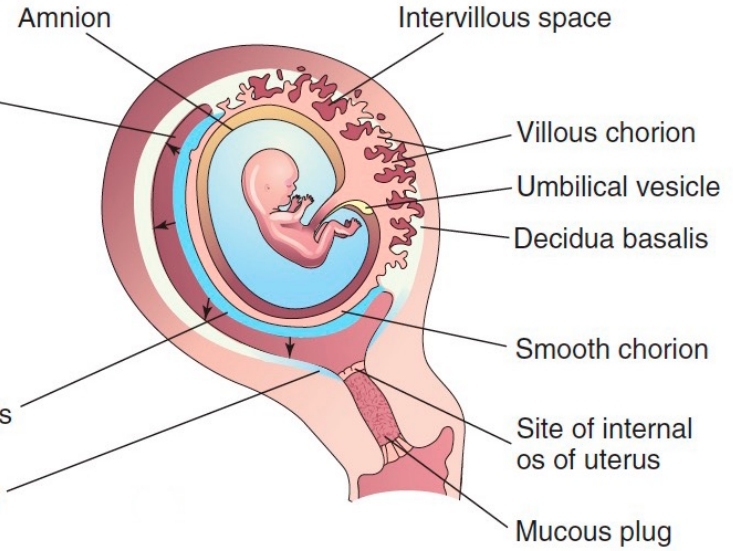




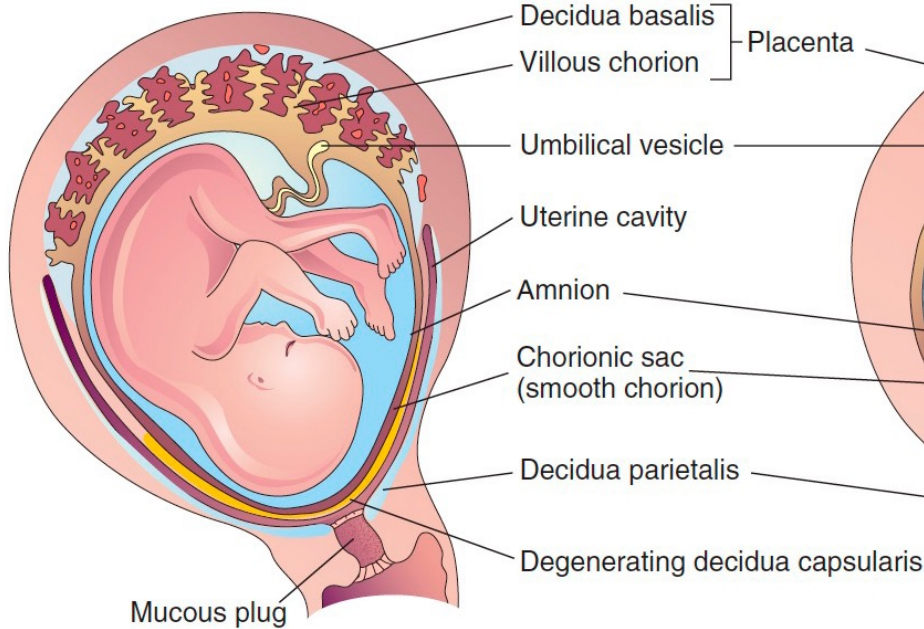
## 5<sup>th</sup> Week



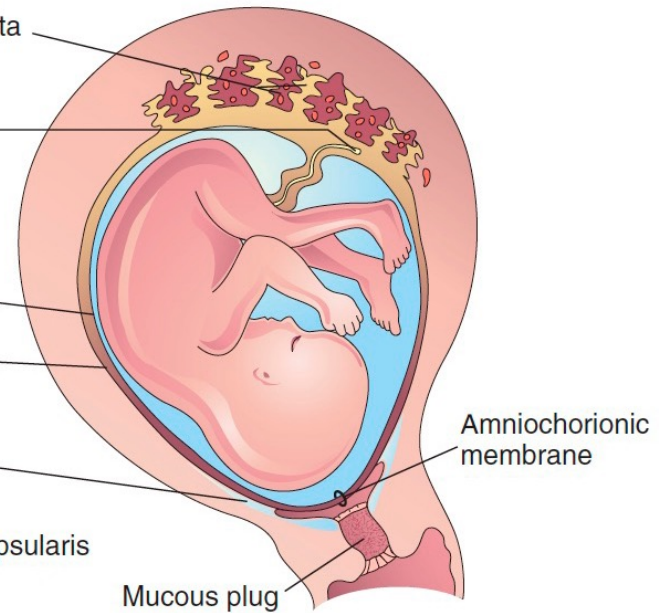
## 12<sup>th</sup> Week



## 18<sup>th</sup> Week

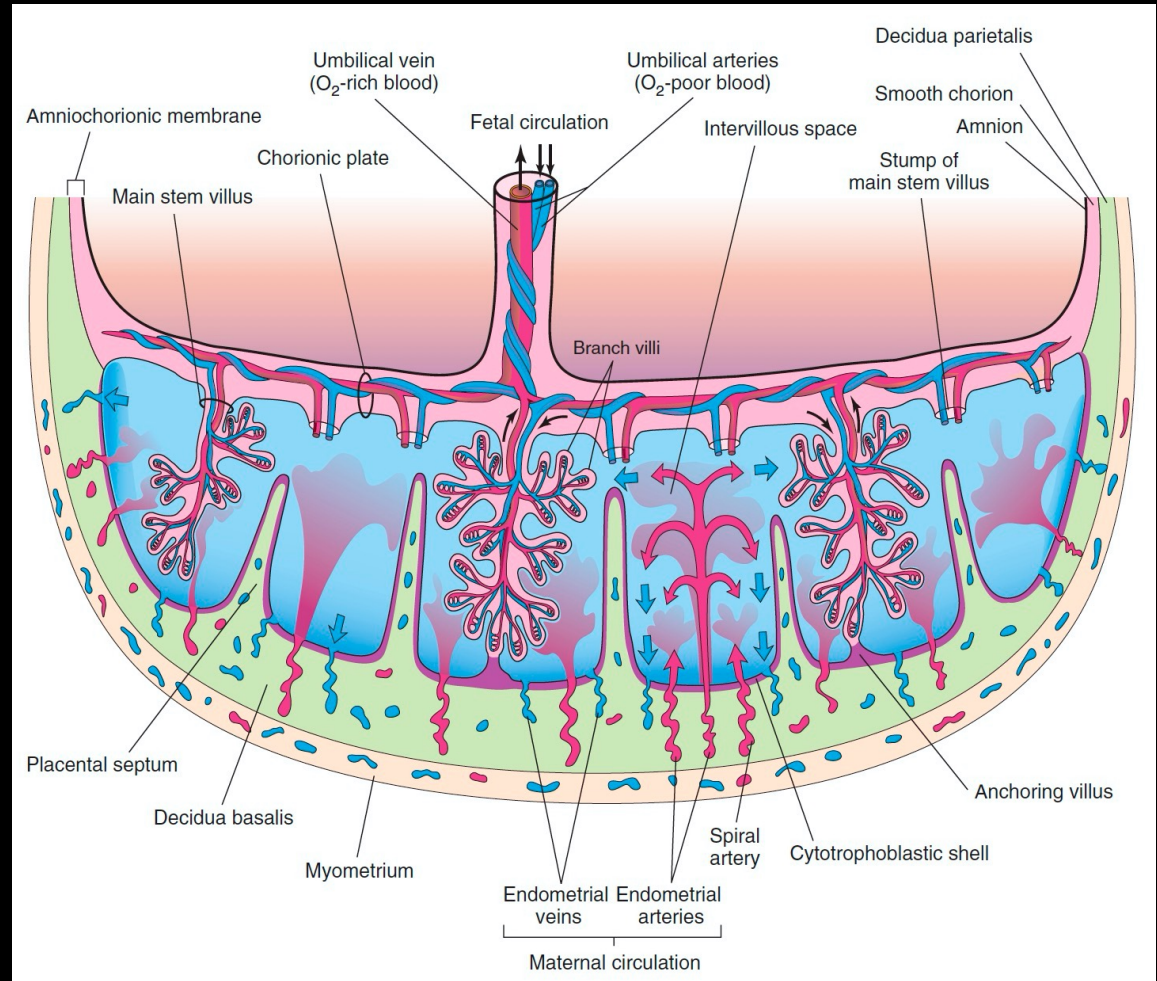
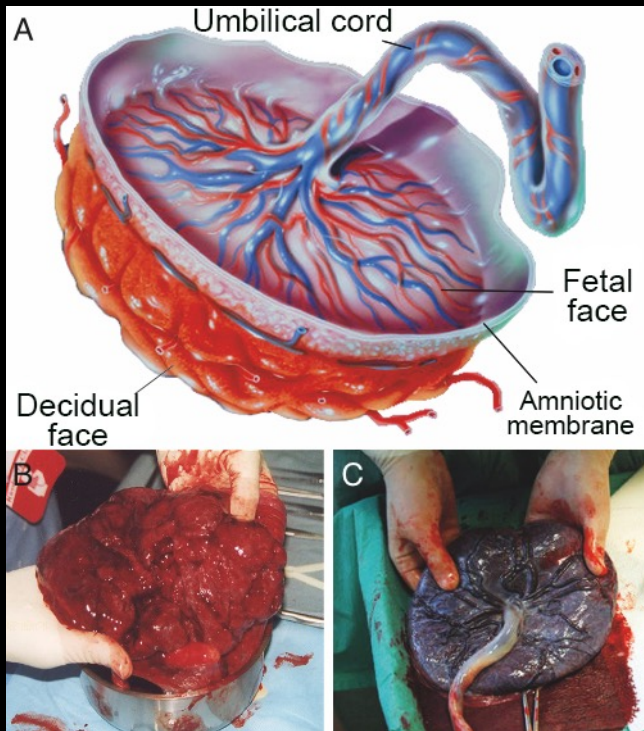


## 22<sup>nd</sup> Week



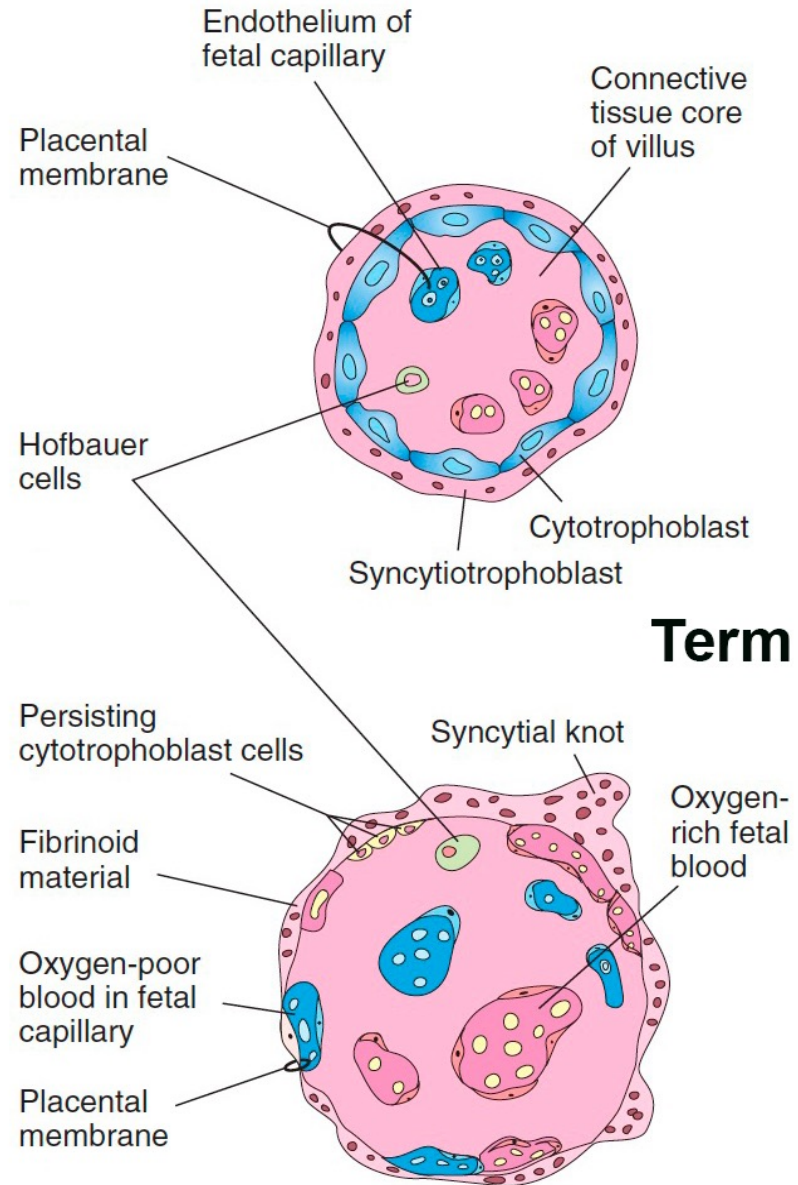
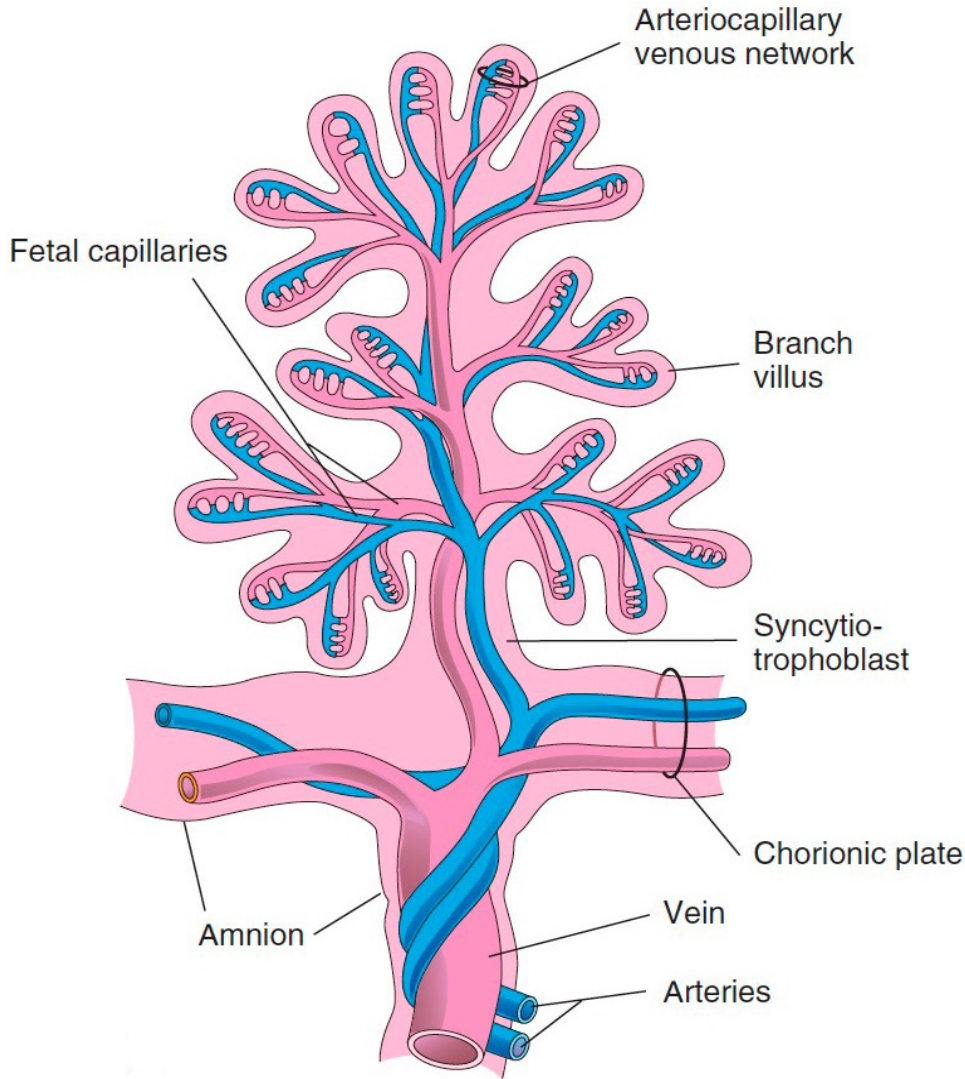
# Term Placenta

- Disc shape
- 15-20 cm in diameter
- 3 cm thickness
- 500-600 g in weight
- 15-20 cotyledons





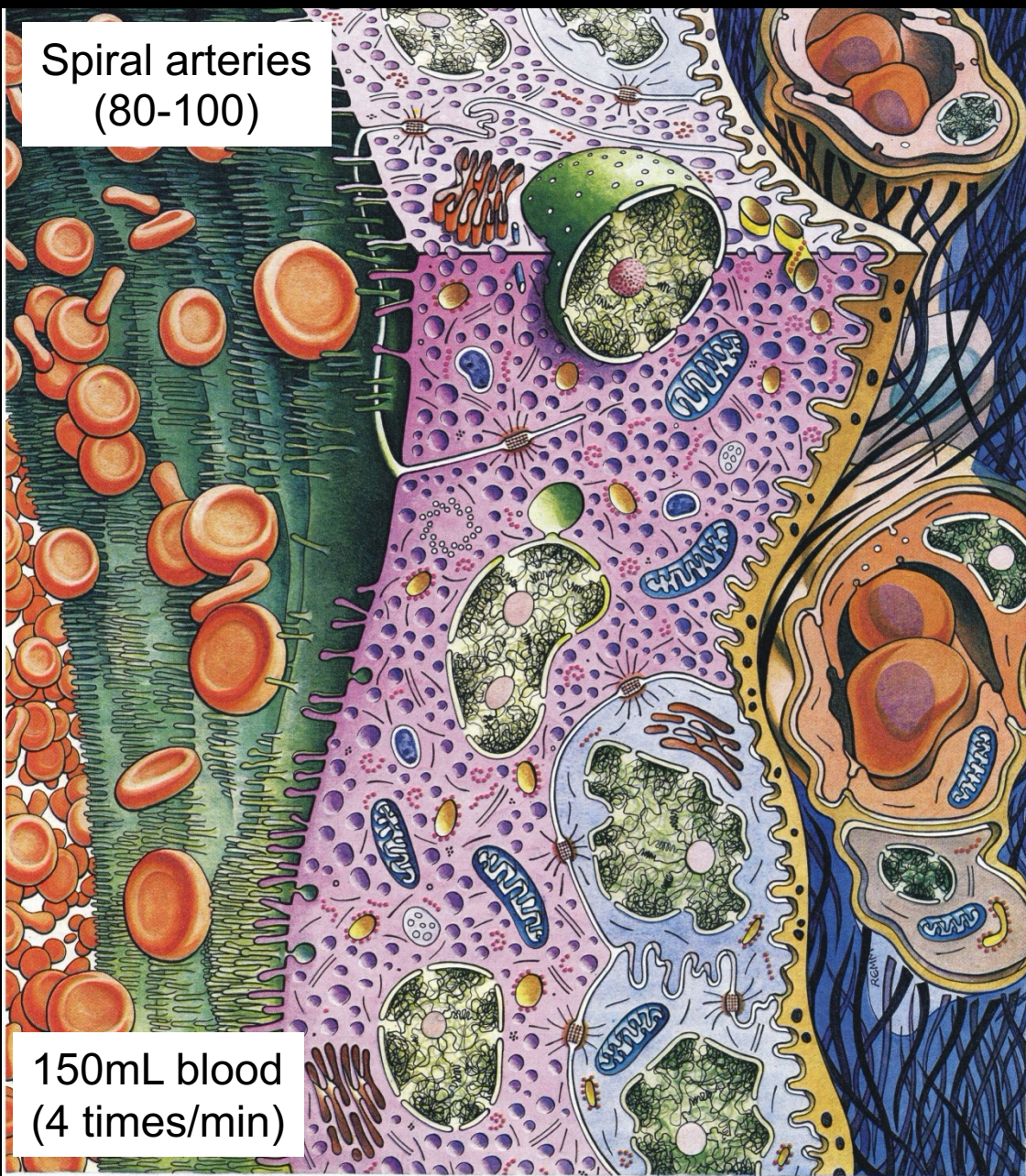
# Chorion villi (4-14m<sup>2</sup> surface)



**Term**



Spiral arteries  
(80-100)



150mL blood  
(4 times/min)

Maternal Blood

Syncytiotrophoblast

Cytotrophoblast

Fetal  
mesenchyme

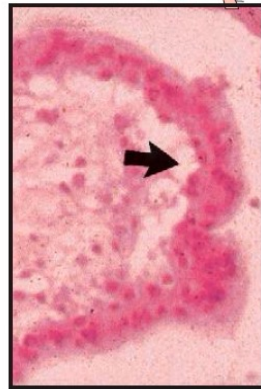
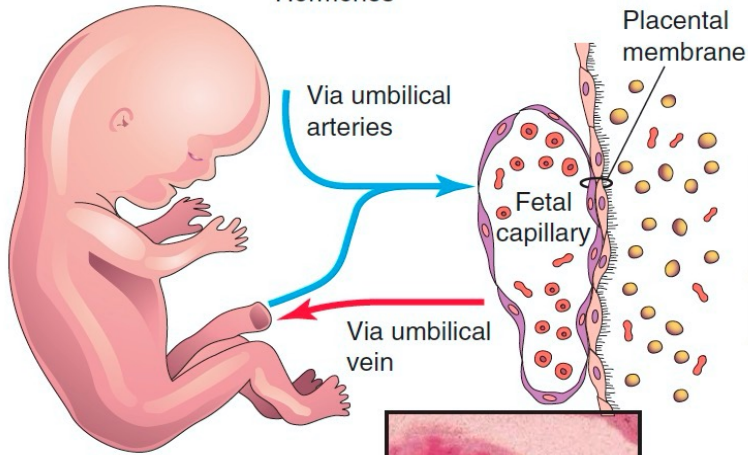
# Transfer across Placenta barrier

## Waste Products

Carbon dioxide, water, urea, uric acid, bilirubin

## Other Substances

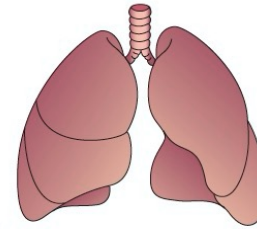
Red blood cell antigens  
Hormones



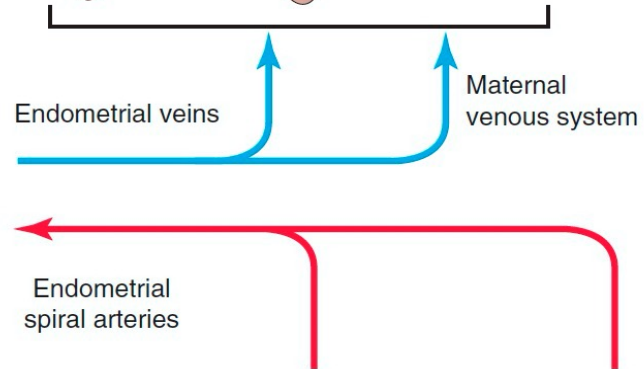
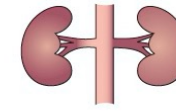
Intervillous space

## Maternal

Lungs



Kidneys



## Oxygen and Nutrients

Water  
Carbohydrates  
Amino acids  
Lipids  
Electrolytes  
Hormones  
Vitamins  
Iron  
Trace elements

## Harmful Substances

Drugs (e.g., alcohol)  
Poisons and carbon monoxide  
Viruses  $\left\{ \begin{array}{l} \text{Rubella} \\ \text{Cytomegalovirus} \end{array} \right.$   
*Toxoplasma gondii*

## Other Substances

Antibodies, IgG, and vitamins

## Nontransferable Substances

Bacteria, heparin, IgS, and IgM



# Endocrine Placenta

(Production of protein hormones by syncytiotrophoblast)

- hCG (human Chorionic Gonadotropin) (LH-like)
  - First secreted during the second week, peaks in the 8<sup>th</sup> week and then declines.
  - Detection in maternal serum and urine indicates the pregnancy.
  - Maintains the corpus luteum, preventing the onset of menstrual periods.
  - Also assists the male fetus by stimulating the testes to produce testosterone.
- hC Somatomammotropin (Placental Lactogen)
  - Helps to develop fetal metabolism, growth and development.
  - Works with Growth Hormone to stimulate Insulin-like growth factor production.
- hC Thyrotropin.
- hC Corticotropin.



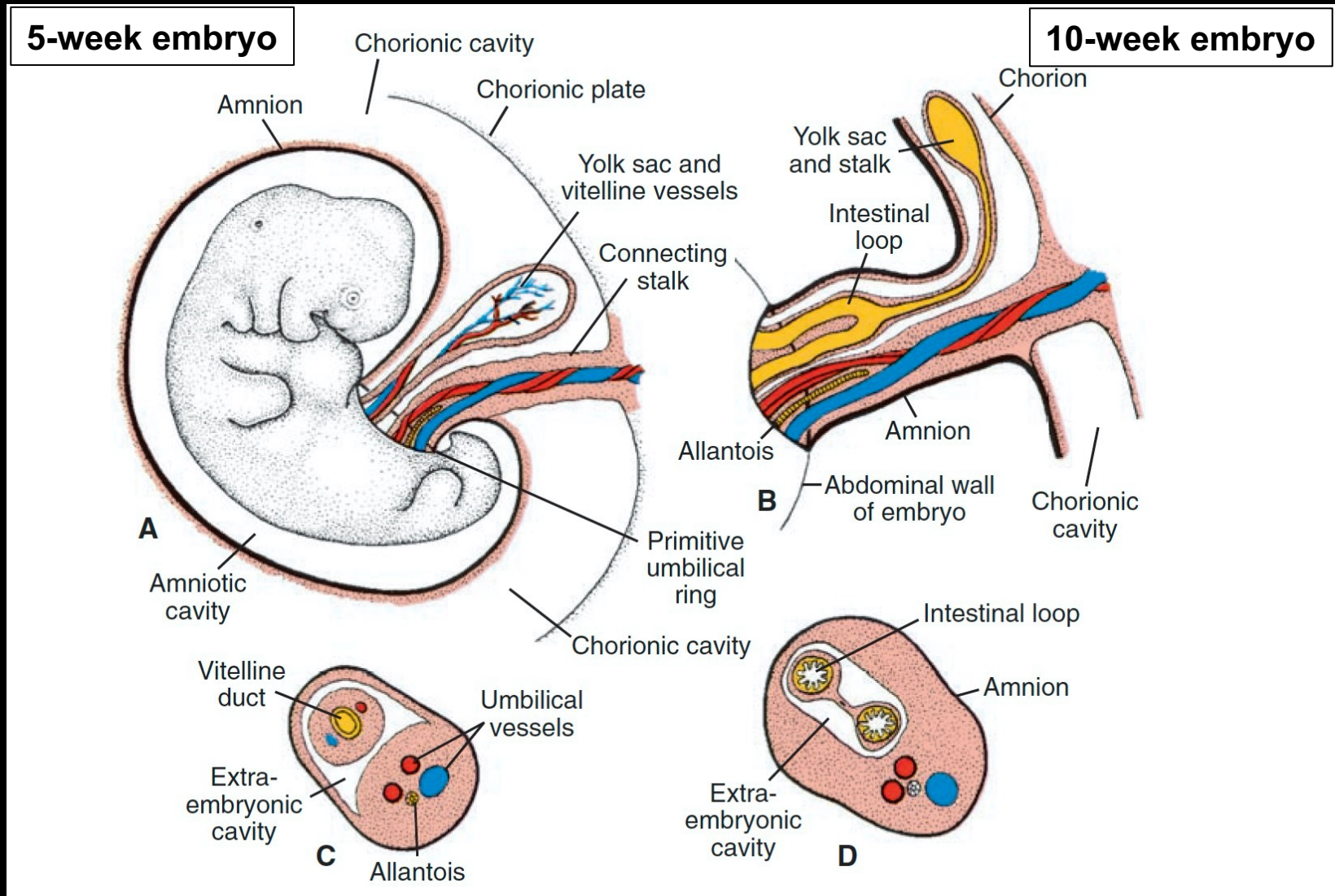
# Placental Steroid Hormones

(Production of protein hormones by syncytiotrophoblast)

- Progesterone (PG)
  - Placenta forms PG from maternal cholesterol and pregnenolone.
  - Secreted in all stages of pregnancy indicating that PG is essential for the maintenance of pregnancy
  - Necessary to prevent spontaneous abortion because it prevents contractions of the uterus and is necessary for implantation
- Estrogen
  - Produced in large quantities by syncytiotrophoblast
  - Proliferation effect involves the enlargement of the breasts and uterus, allowing for growth of the fetus and production of milk. Estrogen is also responsible for increased blood supply towards the end of pregnancy through vasodilation.

# Amnion and Umbilical Cord

Amnion = Amniotic membrane + Amniotic fluid





## Umbilical cord (Chorda umbilicalis)

### Outer Layer

- Amniotic membrane

### Inner Layer (Stroma)

- Subamniotic stroma
- Intervascular stroma
  - (Wharton's jelly)
- Perivascular stroma

### Core (Umbilical blood vessels)

- Umbilical arteries (2)
- Umbilical vein (1)

# Multiple Pregnancies (1.5-2.9%)

- **Dizygotic (fraternal)**  
(1:35-100)
- **Monozygotic (identic)**  
(1:350)
- **Trizygotic-tetrazygotic**
- **15 zygotic !!!**

## Helin's Rule

Twin:  $1:80^1$

Triplet:  $1:80^2=1:64.000$

Quadruplet:  $1:80^3=1:512.000$



**Dizygotic (freternal)**  
(2 ova 2 spermatozoa)

**Twinning**

1/3 girl/girl  
1/3 girl/boy  
1/3 mix

**Triplets**

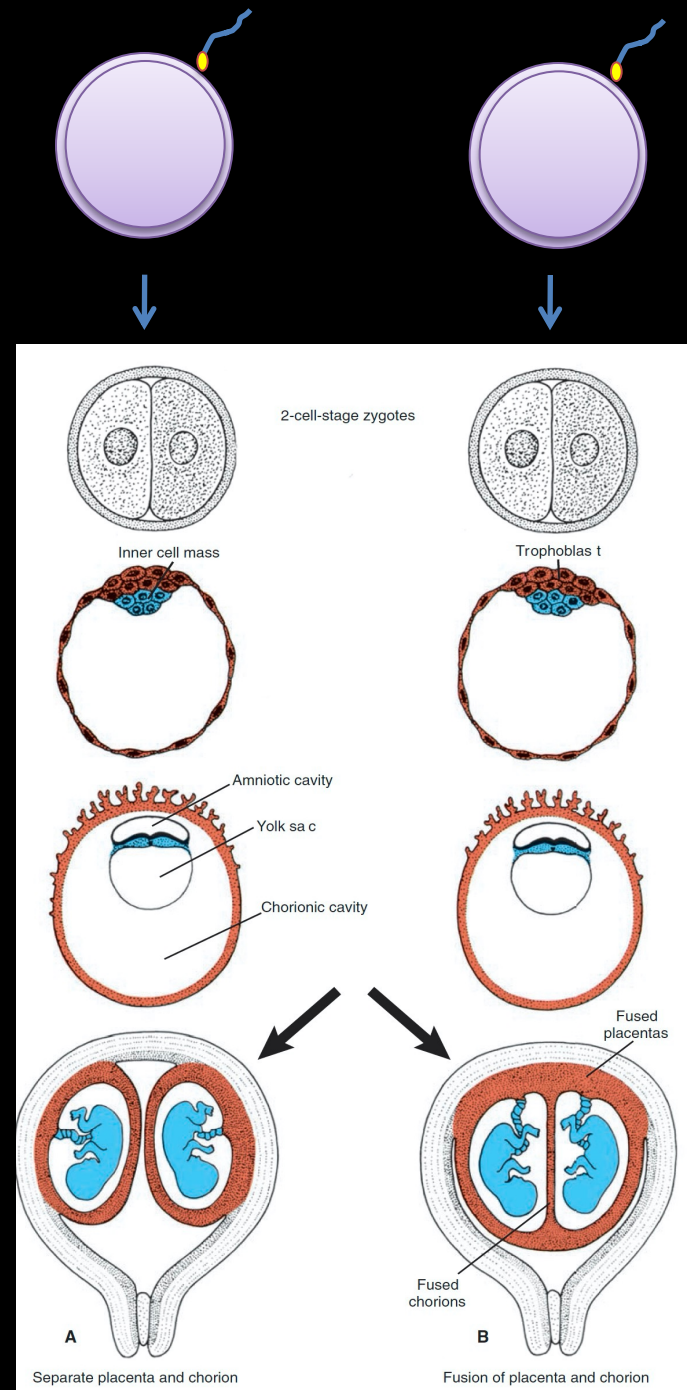
18% all boys  
21% all girls  
61% mix

**Quadriplets**

5% all boys  
10% all girls  
87% mix

**Quintuplets**

4% all boys  
4% all girls  
92% mix



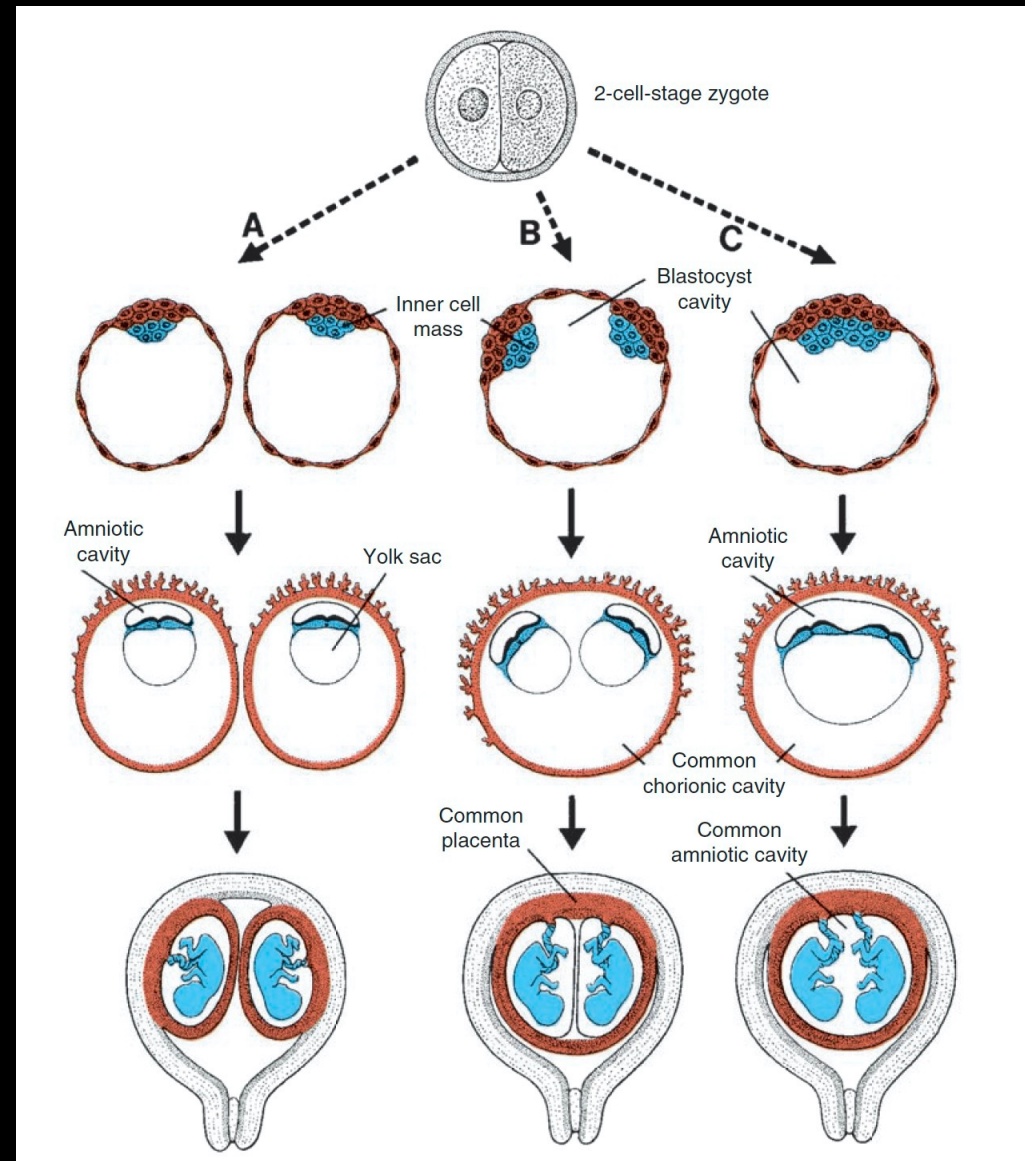
**Monozygotic (identic)**  
(1 ovum 1 spermatozoon)

**Twinnings**  
More in boys

**Triplets**  
6% monozygotic (identic)  
28% trizygotic (fraternal)  
66% mix (identic and fraternal)

**Quadriplets**  
3% monozygotic  
36% trizygotic  
62% mix

**Quintuplets**  
0% monozygotic  
11% trizygotic  
89% mix



Dichorionic  
Diamniotic  
(30%)

Monochorionic  
Diamniotic  
(60-70%)

Monochorionic  
Monoamniotic  
(1-2%)



# Conjoined twins = Siamese twins

- If the embryonic disc does not divide completely or adjacent embryonic discs fuse, various types of conjoined monozygotic twins may form
- It occurs due to separation defect in around 8<sup>th</sup> day
- They are in the same sex
- The incidence of conjoined twins is 1 in 50,000 to 100,000 births.
- More frequent in boys
- Some conjoined twins can be successfully separated by surgical procedures
- More frequent in India and Africa



Siamese Twins  
Chang and Eng Bunker  
(1811-1874)

# Separation Defects in Conjoined Twins

