

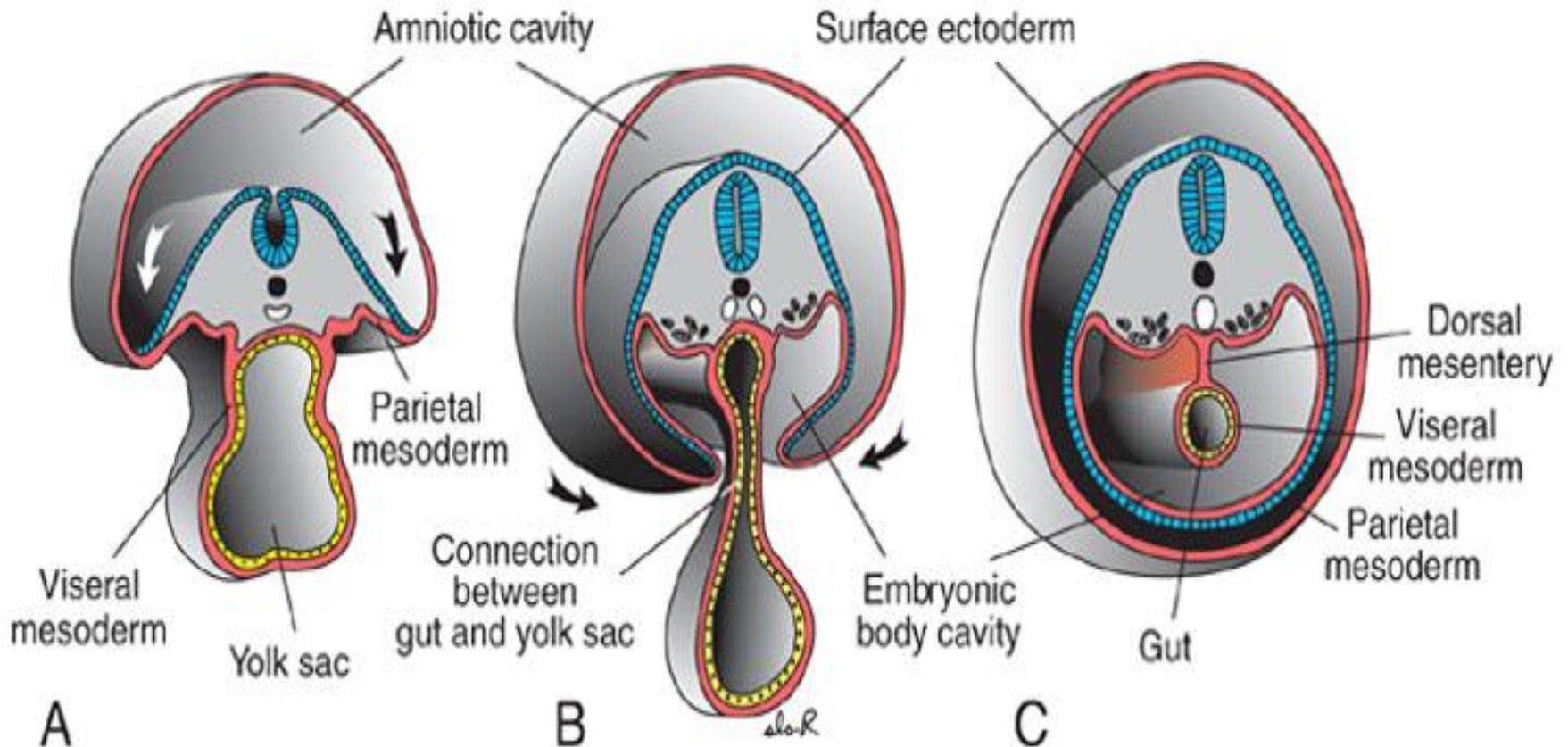


Fetal membranes

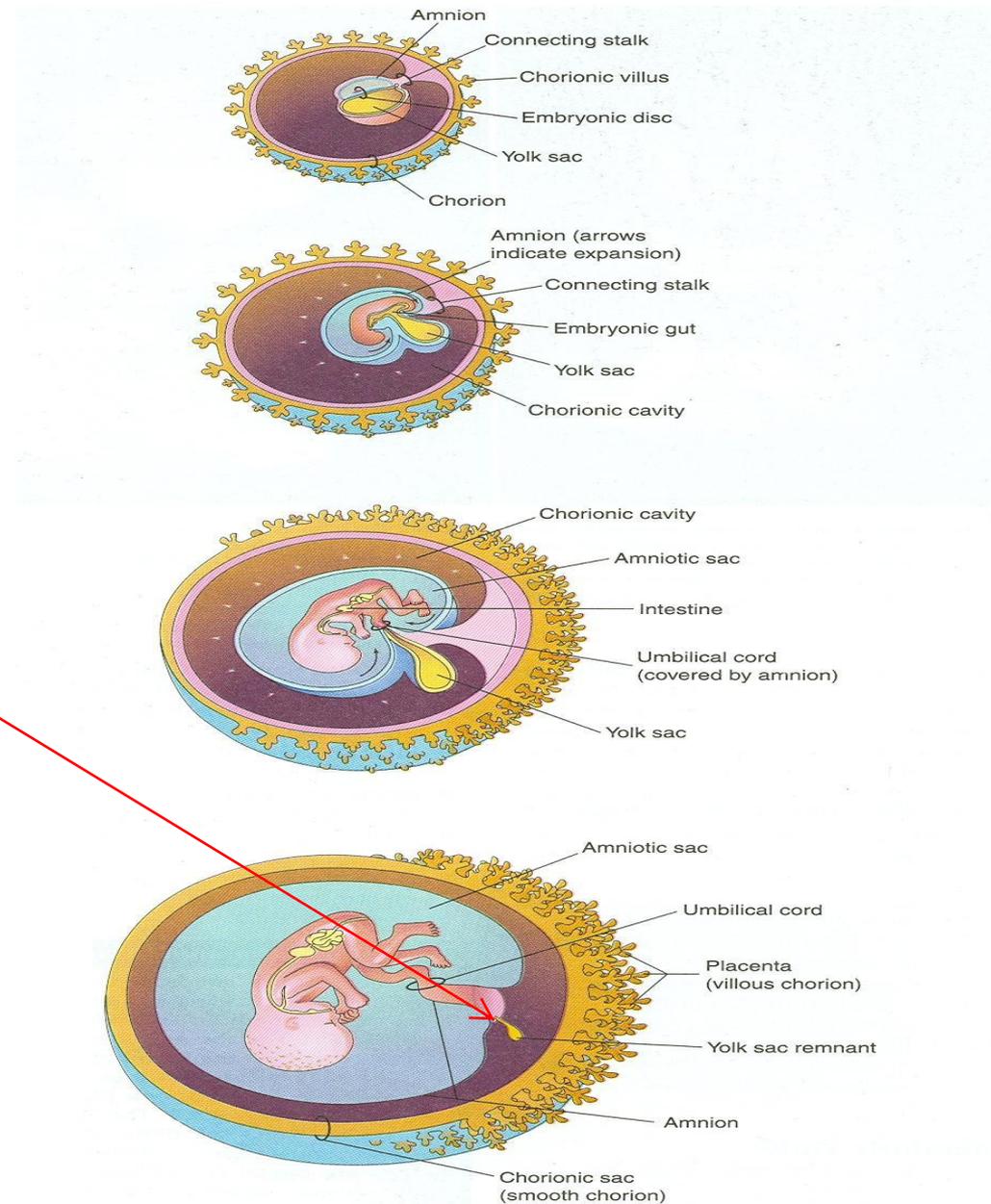
Fetal membrane

- Chorion
- Amnion
- Yolk sac
- Allantois
- Umbilical cord

Yolk sac: it is a membranous sac attached to the embryo, convey nourishment to the embryo (e.g. in birds), in humans, Incorporate into the endoderm of embryo as a primordial gut and the primordial germ cells appear in the endodermal lining of the wall of the yolk sac in the 3rd week



- It is large at **32** days (at early development)
- by 10th week, regresses to 0.5 cm as a remnant structure which is connected to **the midgut** by a narrow yolk stalk
- at 20 weeks becomes very small, usually not visible thereafter.

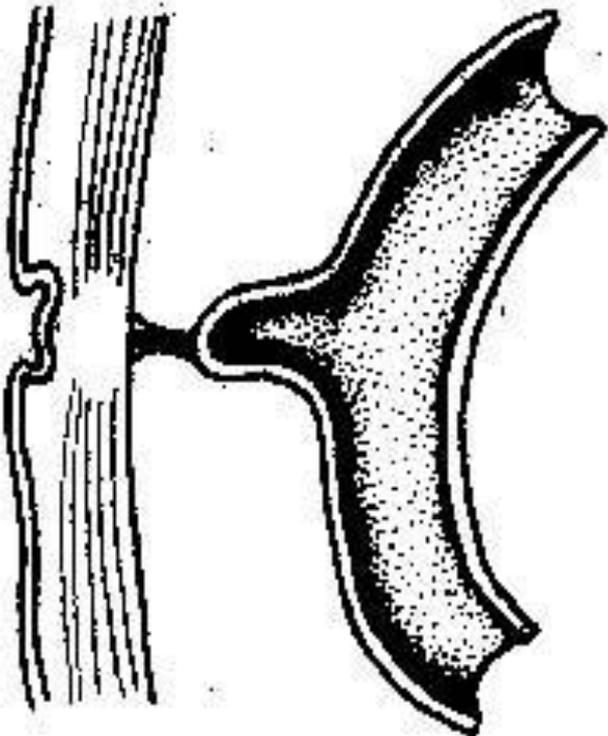


Abnormalities:

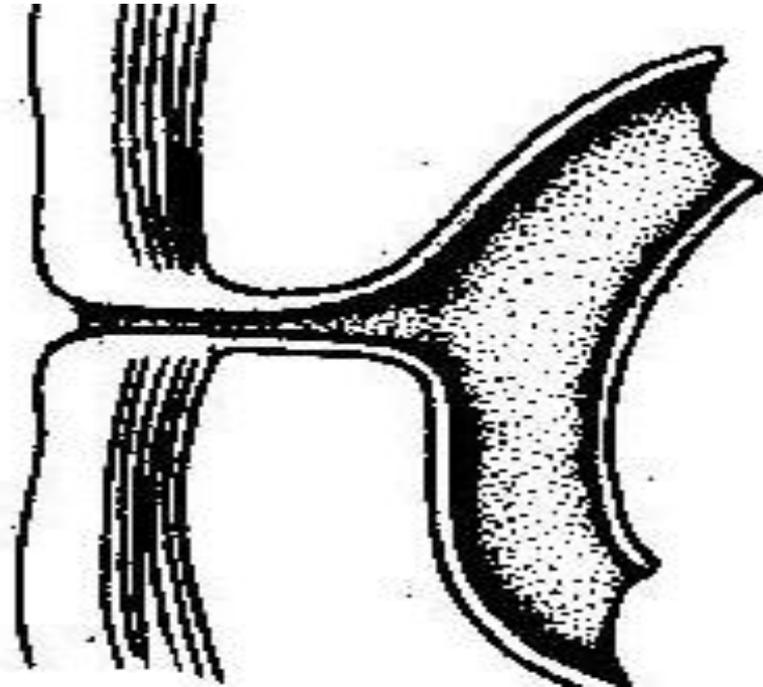
Sometimes it **persists** throughout the pregnancy but of no significance

In about 2% of adults the proximal intra-abdominal part of yolk stalk persists as an ileal diverticulum or Meckel diverticulum

① Meckel's **diverticulum**



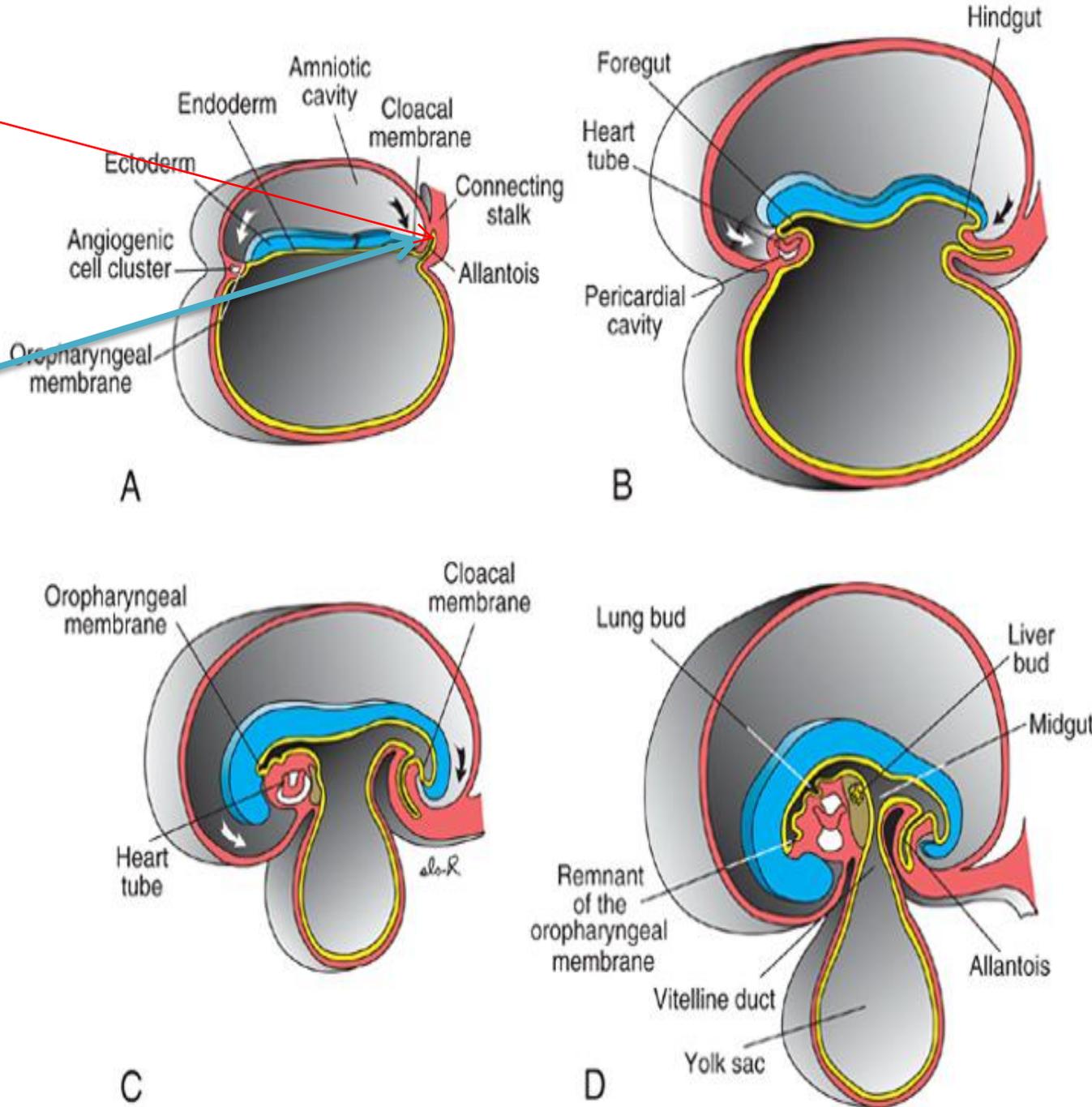
② Umbilical **fistula**



allantois, an extra-embryonic membrane of reptiles, birds, and mammals arising as a pouch, or sac, from the **hindgut**

In the 3rd week it appears as a tubular diverticulum from the caudal wall of yolk sac that extends into the connecting stalk

During the 2nd month, the extraembryonic part of the allantois **degenerates**



Functions of Allantois

Blood formation occurs in the wall during the 3rd to 5th week

Its blood vessels **persist** as the **umbilical vein and arteries**

Becomes **Urachus** and after birth is transformed into

median umbilical ligament

extends from the apex of the bladder to the umbilicus

Abnormality:

Urachal fistula



Amniotic Fluid

The amniotic cavity is filled with a clear, watery fluid which is produced in part by amniotic cells but is derived primarily from maternal blood

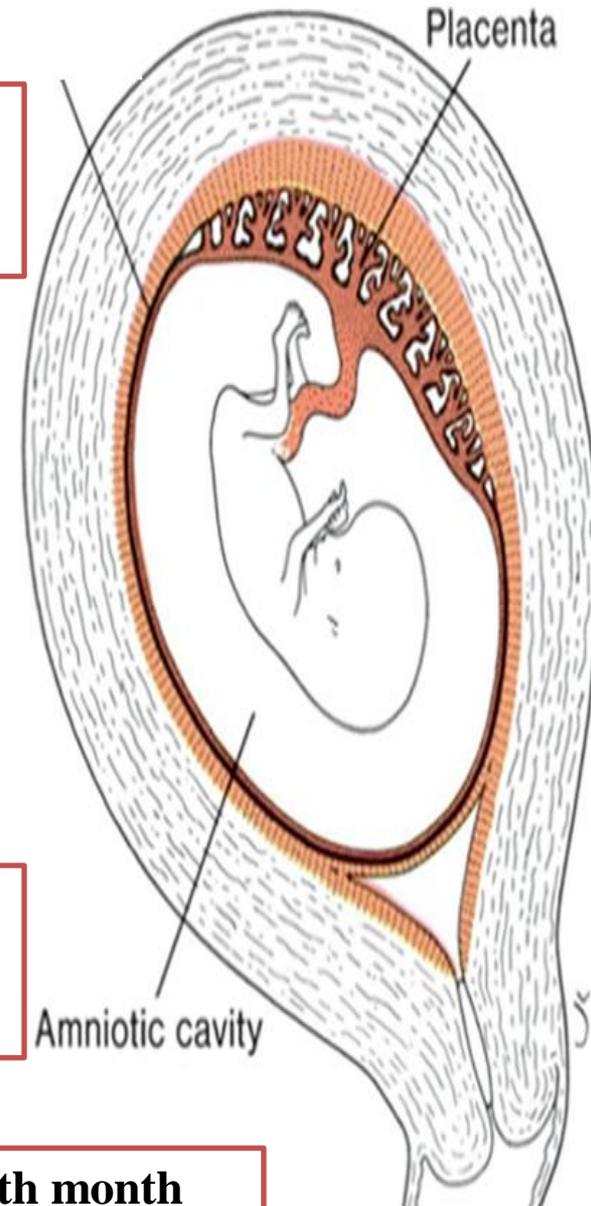
The amount of fluid increases from approximately 30 ml at 10 weeks of gestation to 450 ml at 20 weeks to 800 to 1000 ml at 37 weeks

serves as a protective cushion. The fluid
1- prevents adherence of the embryo to the amnion
2- allows for fetal movements

The volume of amniotic fluid is replaced every 3 hours

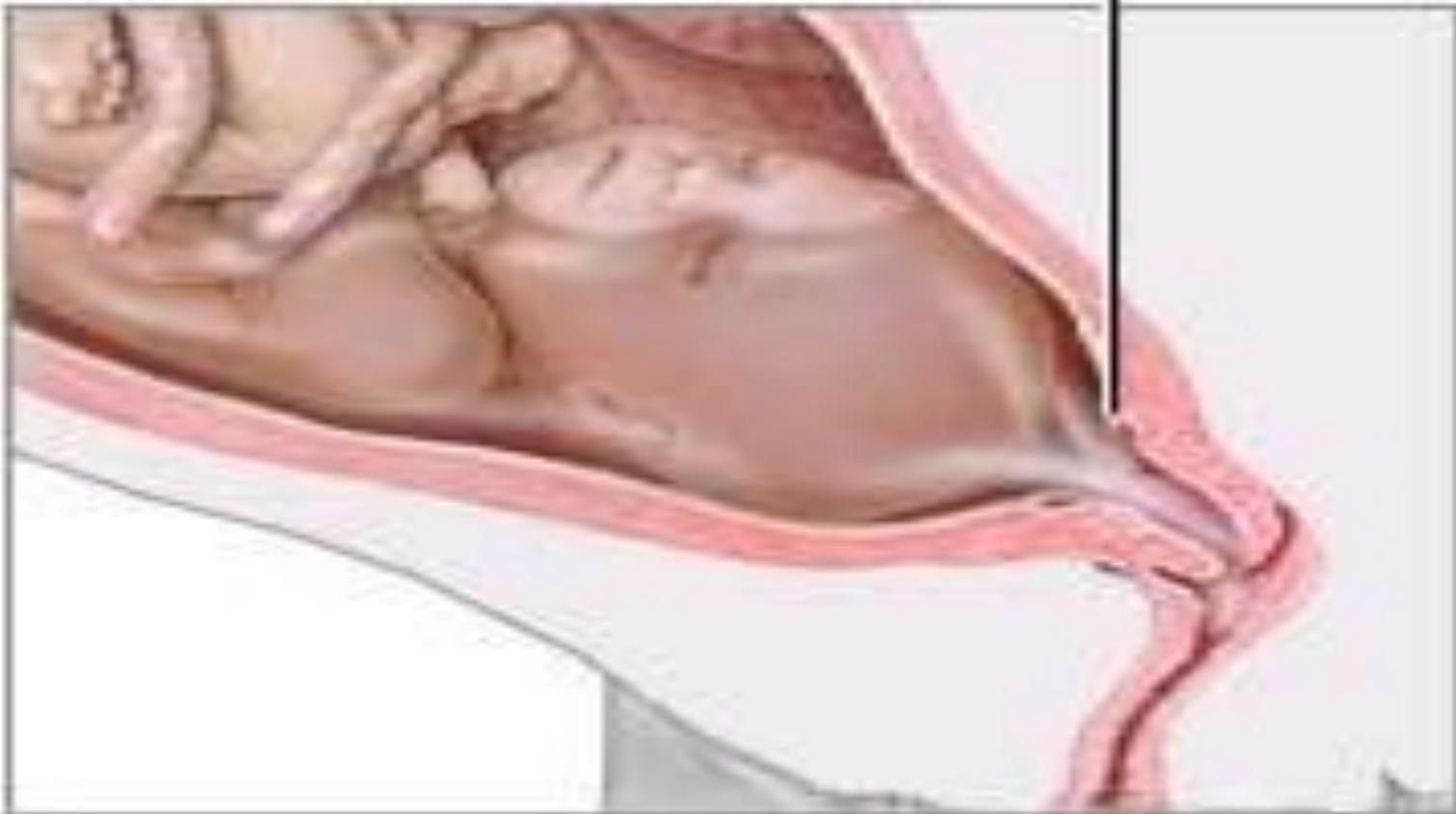
From the beginning of the fifth month, **the fetus swallows** its own amniotic fluid and it is estimated that it drinks about 400 ml a day, about half of the total amount

Fetal **urine is added daily to the amniotic fluid in the fifth month** but this urine is mostly water, since the placenta is functioning as an exchange for metabolic wastes



During childbirth, the amnio-chorionic membrane forms a hydrostatic wedge that helps to **dilate** the cervical canal.

Ruptured amnionic sac



1-Hydramnios or polyhydramnios
is the term used to describe an excess of amniotic
fluid (1500–2000 ml)

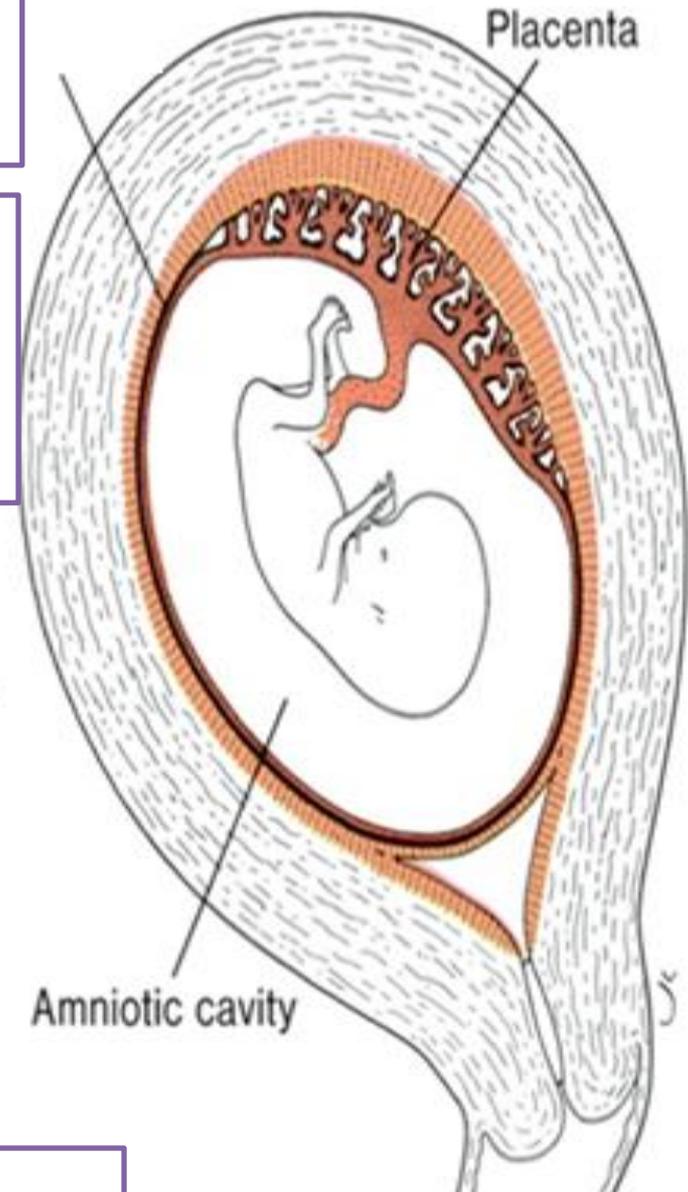
Primary causes of hydramnios include
idiopathic causes (35%)
maternal diabetes (25%)
congenital malformations including
1- central nervous system disorders (e.g., **anencephaly**)

2-Gastrointestinal defects
(atresias, e.g., esophageal)
that prevent the infant from swallowing the fluid

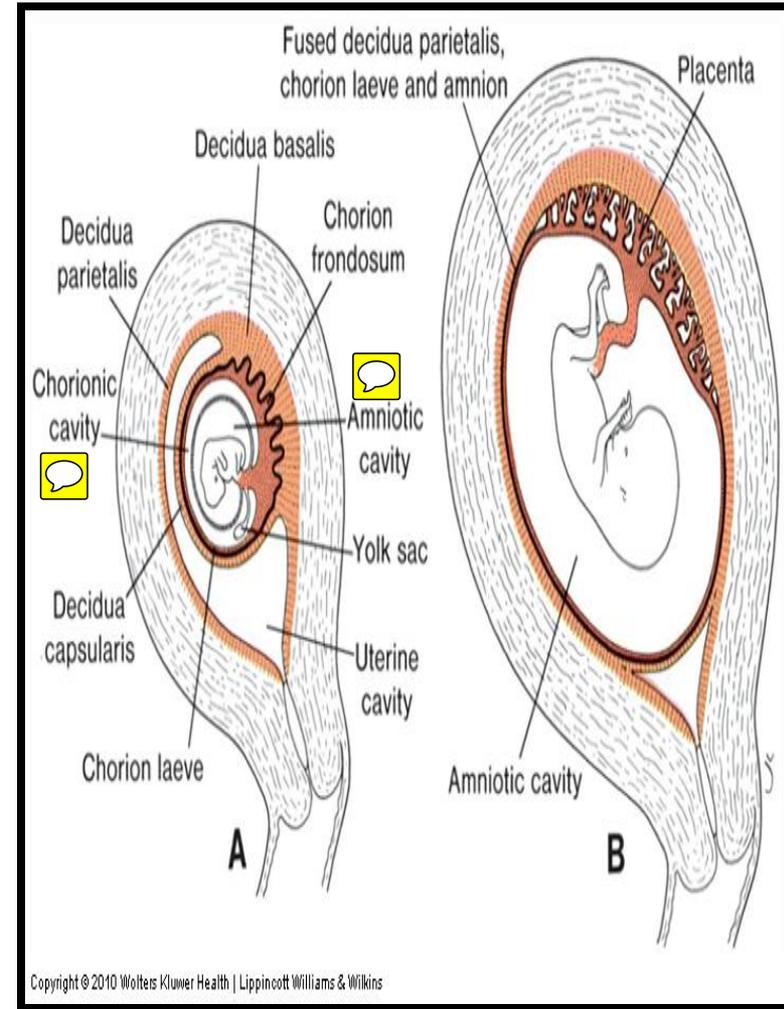
2-Oligohydramnios refers to a decreased
amount (less than 400 ml)

Oligohydramnios is a rare occurrence that
may result from **renal agenesis**

Premature rupture of the amnion,
the most common cause of **preterm** labor
occurs in 10% of pregnancies



With growth of the **chorionic vesicle** the **decidua capsularis** becomes stretched and **degenerates** Subsequently **the chorion laeve comes into contact with the uterine wall** (**decidua parietalis**) on the opposite side of the uterus and the two fuse **obliterating the uterine lumen.**



Similarly, fusion of the amnion and chorion to form the **amniochorionic membrane** **obliterates the chorionic cavity** *It is this membrane that ruptures during labor (breaking of the water).*

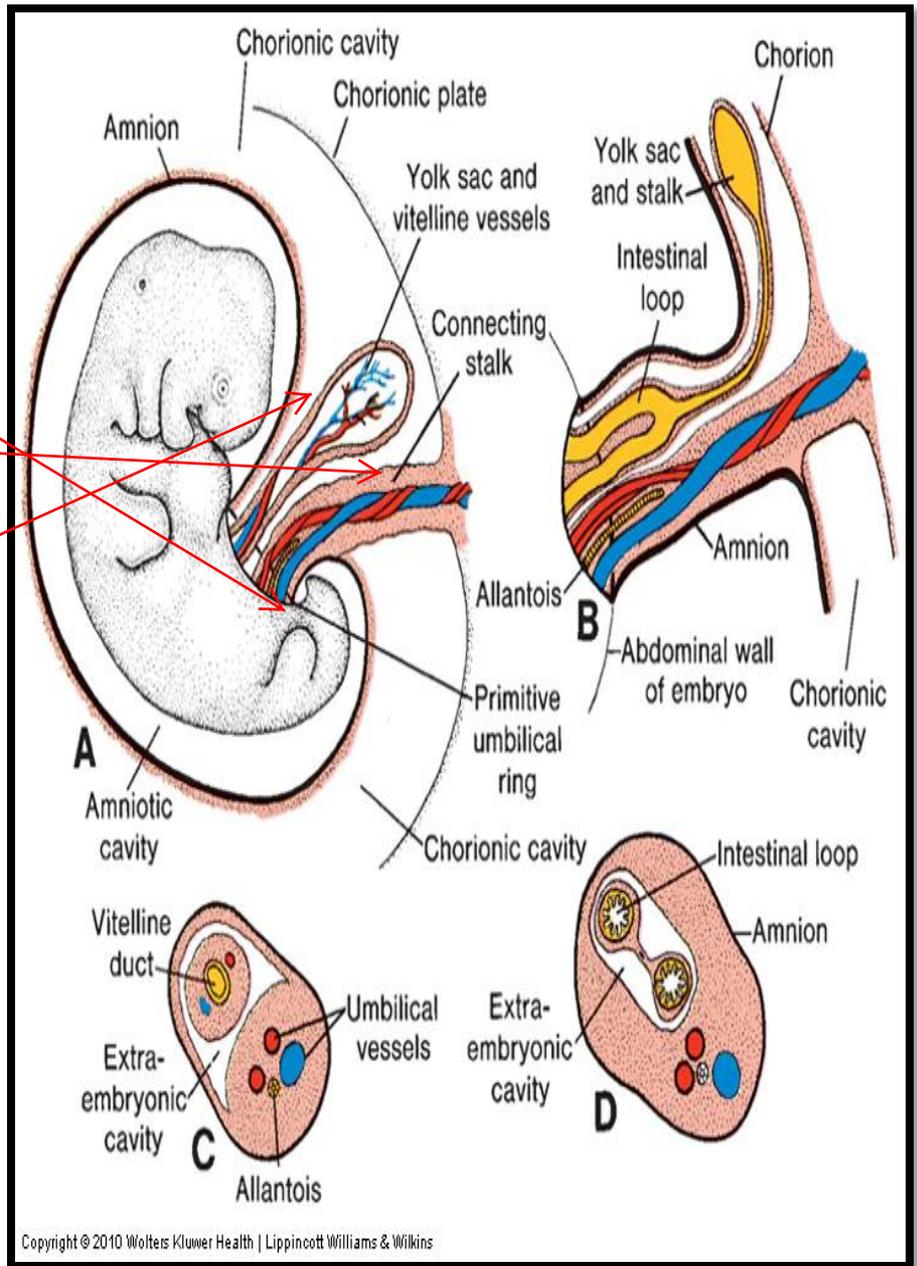
Umbilical cord

At the fifth week
of development, the following structures
pass through the
1-primitive umbilical ring

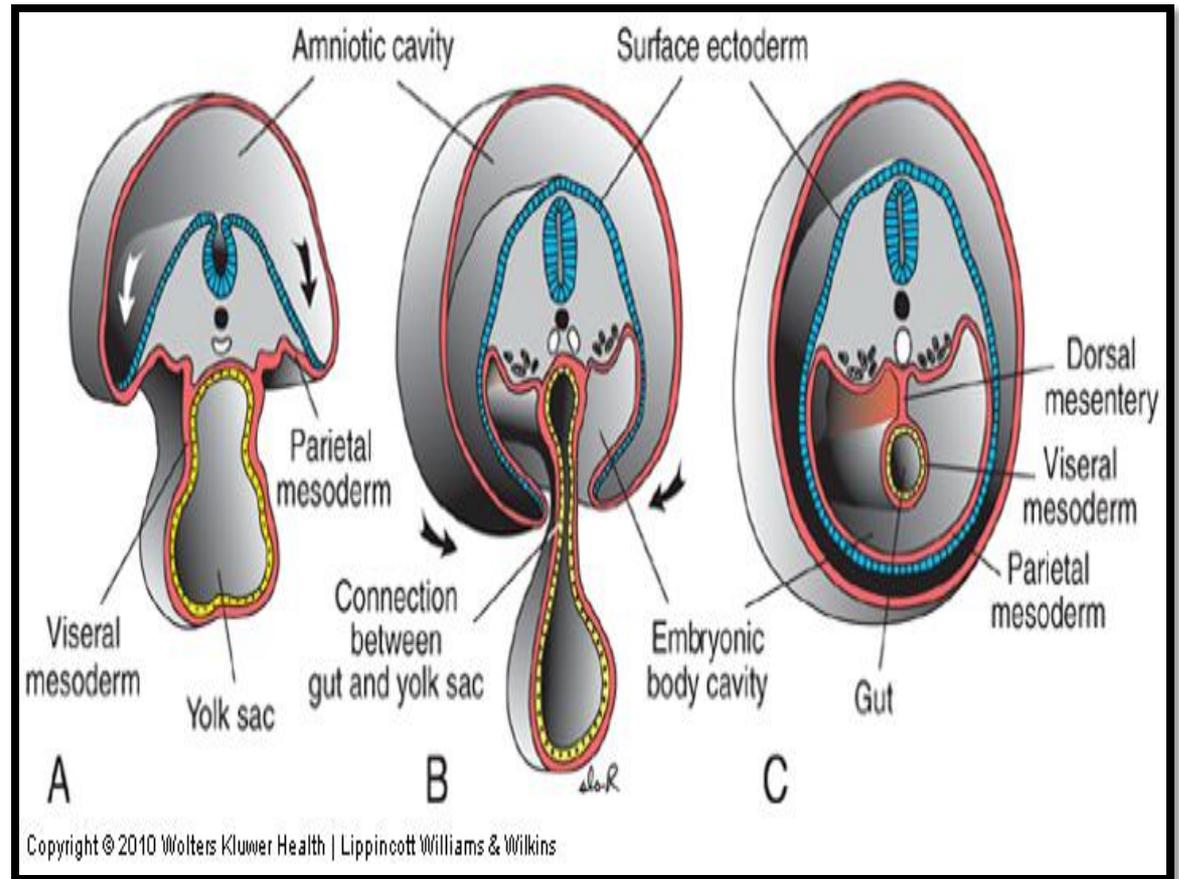
(1) **The connecting stalk, containing the allantois and the umbilical vessels, consisting of two arteries and one vein**

(2) **The yolk stalk (vitelline duct), accompanied by the vitelline vessels**

(3) **The canal connecting the intraembryonic and extraembryonic cavities**



During further development, the amniotic cavity enlarges rapidly at the expense of the chorionic cavity. As a result the amnion begins to envelop the connecting and yolk sac stalks, crowding them together and giving rise to

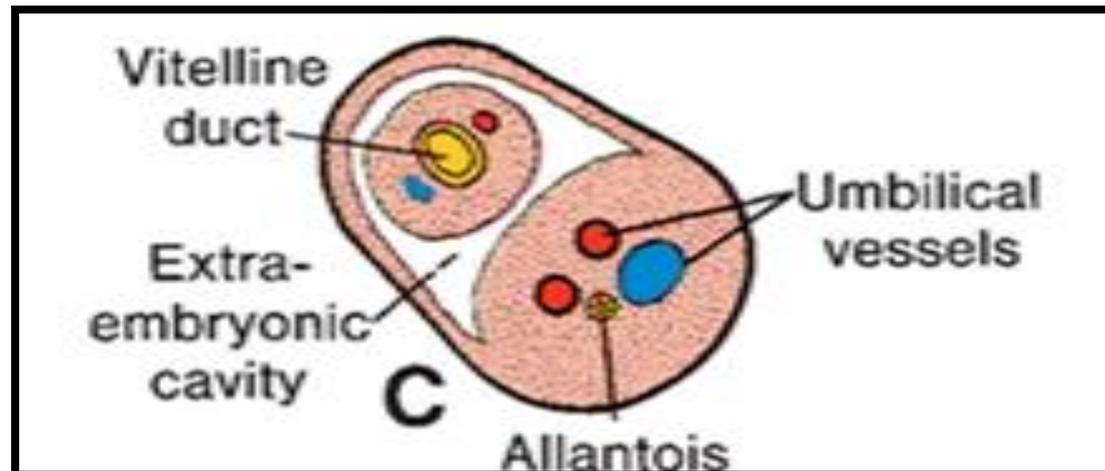
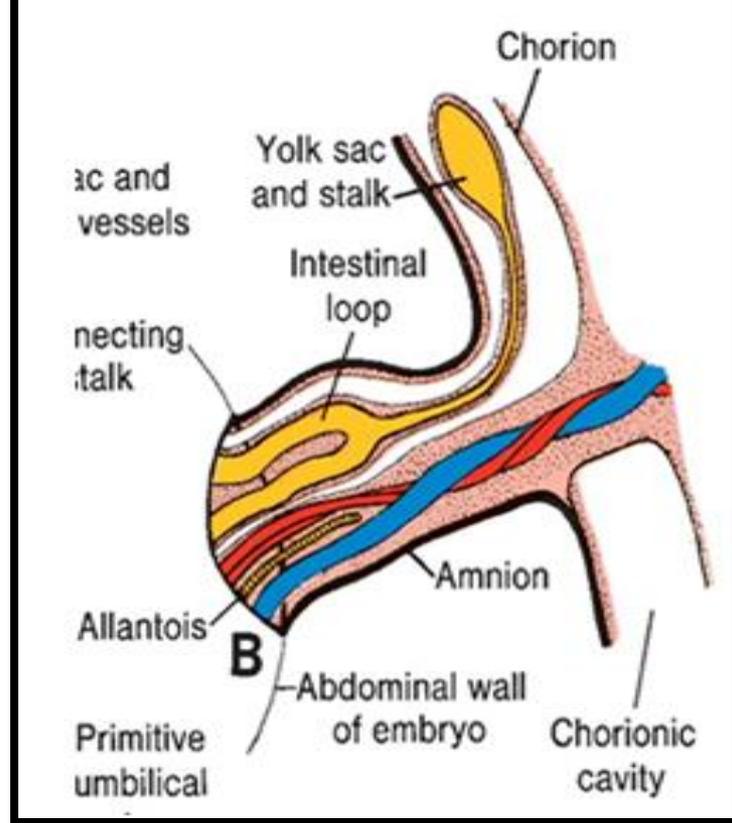


2- the primitive umbilical cord

The abdominal cavity is temporarily too small for the rapidly developing intestinal loops and some of them are pushed into the extraembryonic space in the umbilical cord. These extruding intestinal loops form a physiological umbilical **hernia**

At approximately the end of the **third month** the loops are withdrawn into the body of the embryo and the cavity in the cord is **obliterated**.

3- When the allantois and the vitelline duct and its vessels are also obliterated, all that remains in the cord **are the umbilical vessels surrounded by the jelly of Wharton.**





Summary of the Umbilical cord:

- Covered with amniotic membrane
- Contains
 - 1 umbilical vein
 - 2 umbilical arteries
 - degenerated yolk sac and allantois
- connects fetus with placenta

➤ Length 50 cm

Abnormality: >80 cm (long), An extremely long cord may encircle the neck of the fetus, usually without increased risk

<35 cm (short) may cause difficulties during delivery by pulling the placenta from its attachment in the uterus

Umbilical vessels are longer than the cord, so twisting and bending of the vessels are common

They frequently form loops, producing false knots, that are of no significance

In about 1% of pregnancies, true knots form in the cord and cause fetal death

During the embryonic period, more similarities than differences exist in the external genitalia . It is impossible to tell by ultrasound examination whether the primordial sexual organ (genital tubercle at 5 weeks and phallus at 7 weeks) will become a penis or a clitoris

Sex differences are not clear **until** the early fetal period (10th–12th week). Sex chromatin patterns and chromosomal analysis (fluorescence in situ hybridization) of embryonic cells obtained during amniocentesis can show the chromosomal sex of the embryo

Ultrasound examinations have shown that mature embryos (8 weeks) and young fetuses (9 weeks) show spontaneous movements, such as twitching (sudden jerking movements) of the trunk and limbs. Although the fetus begins to move its back and limbs during the 12th week, the mother cannot feel the fetus move until the 16th to 20th week. Women who have had several children usually detect this movement, called quickening, sooner than women who are pregnant for the first time because they know what fetal movements feel like. Quickening is often perceived as a faint flutter or a quivering motion.

Folic acid supplementation before conception and during early pregnancy is effective in reducing the incidence of neural tube defects (e.g., spina bifida). It has been shown that the risk of having a child with neural tube defect is significantly lower when a vitamin supplement containing 400 mg of folic acid is consumed daily. However, no consensus exists that vitamins are helpful in preventing these defects in most at-risk pregnancies.