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Bilaminar embryo (week 2 /8-14 days)

Embryoblast (inner cell mass)

1. The embryoblast differentiates into two distinct cell layers: the dorsal epiblast and the ventral hypoblast. The epiblast and hypoblast together form a flat, ovoid-shaped disk known as the bilaminar embryonic disk.

2. A small cavity appears between the epiblast and trophoblast forming the amniotic cavity. Few cells of trophoblast delaminate and form the roof of the amniotic cavity. The cells derived from trophoblast are called angiogenic cells and secrete amniotic fluid within the amniotic cavity

3. The cells of the endoderm proliferate and line the cavity of blastocyst. The cavity of blastocyst/blastocele is now called primary yolk sac. The flattened cells lining the primary yolk sac form the Heuser's membrane

4. The epiblast and hypoblast fuse to form the prochordal plate, which marks the future site of the mouth. Trophoblast (outer cell mass)

A. Syncytiotrophoblast. The syncytiotrophoblast is the outer multinucleated zone of the trophoblast where no mitosis occurs (i.e., it arises from the cytotrophoblast). During this period, the syncytiotrophoblast continues its invasion of the endometrium, thereby eroding endometrial blood vessels and endometrial glands. Lacunae form within the syncytiotrophoblast and become filled with maternal blood and glandular secretions. The isolated lacunae fuse to form a lacunar network through which maternal blood flows, thus establishing early uteroplacental circulation. Although a

primitive circulation is established between the uterus and future placenta, the embryoblast receives its nutrition via diffusion only at this time.

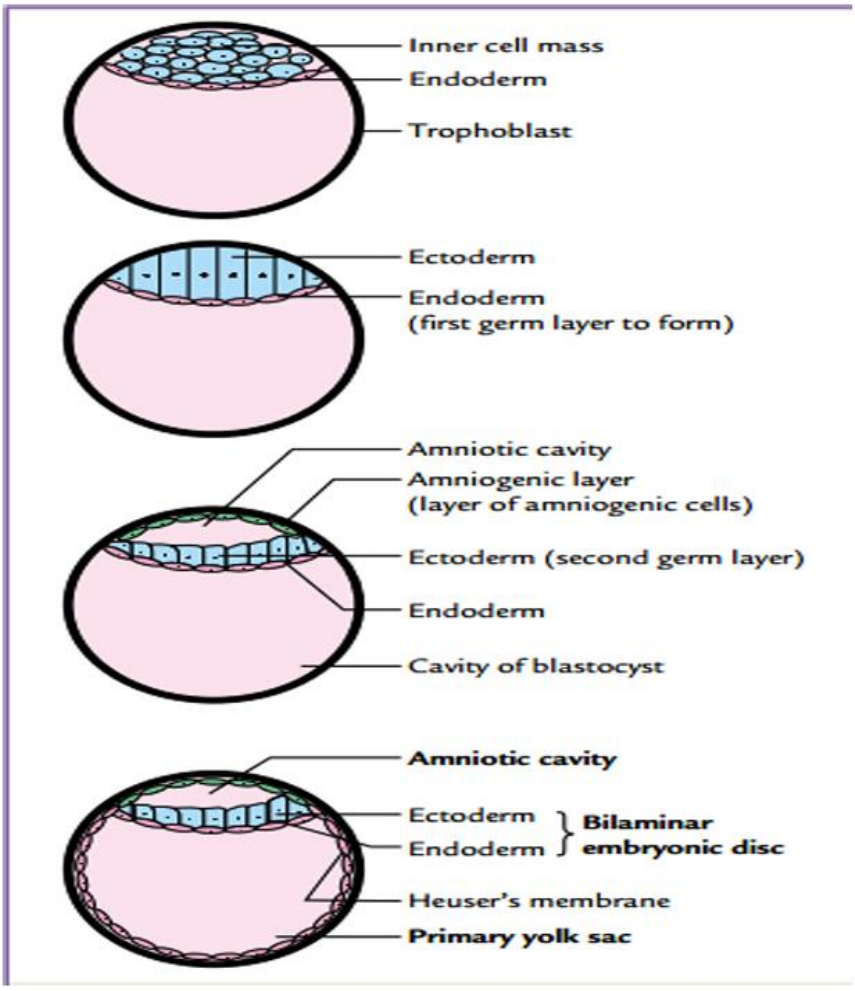

Fig 1:formation of bilaminar embryonic disc. Also note the formation of aminiotic cavity and primary yolk sac.

B. Cytotrophoblast.

The cytotrophoblast is mitotically active as new cytotrophoblastic cells migrate into the syncytiotrophoblast, thereby fueling the growth of the syncytiotrophoblast. In addition, cytotrophoblastic cells also produce local mounds called primary chorionic villi that bulge into the

surrounding syncytiotrophoblast.

Human chorionic gonadotropin (HCG)

1. hCG is a glycoprotein produced by the syncytiotrophoblast that stimulates the production of progesterone by the corpus luteum of the ovary. This is clinically

significant because progesterone produced by the corpus luteum is essential for the

maintenance of pregnancy until week 8. The placenta then takes over progesterone

production.

2. hCG can be assayed in maternal blood at day 8 or maternal urine at day 10 and

is the basis of pregnancy testing..

3. Low hCG values may predict a spontaneous abortion or indicate an ectopic pregnancy.

4. High hCG values may indicate a multiple pregnancy, hydatidiform mole, or gestational trophoblastic neoplasia (GTN) (such as choriocarcinoma).

hydatidiform mole

Molar pregnancy is an abnormal form of pregnancy in which a non-viable fertilized egg implants in the uterus. A molar pregnancy is a gestational trophoblastic disease which grows into a mass in the uterus that has swollen chorionic villi. These villi grow in clusters that resemble grapes. A molar pregnancy can develop when fertilized egg had not contained an original maternal nucleus.

	Complete Mole	Partial Mole
Karyotype	46,XX (46,XY)	69,XXY
hCG	↑↑↑↑	↑
Uterine Size	↑	-
Convert to Choriocarcinoma	2%	Rare
Fetal Parts	No	Yes
Components	2 sperm + empty egg	2 sperm + 1 egg
Risk of Complications	15-20% malignant trophoblastic disease	Low risk of malignancy (<5%)

The products of conception may or may not contain fetal tissue. It is characterized by the presence of a hydatidiform mole (or hydatid mole, mola hydatidosa

1- Molar pregnancies usually present with painless vaginal bleeding in the fourth to fifth month of pregnancy.

2- uterus may be larger than expected

3- ovaries may be enlarged.

4- There may also be more vomiting (hyperemesis).

5- Sometimes there is an increase in blood pressure along with protein in the urine.

6- Blood tests will show very high levels of human chorionic gonadotropin (hCG) Gestational trophoplast neoplasma GTN is a malignant tumor of the trophoblast that may occur following a normal or ectopic pregnancy, abortion, or a hydatidiform mole and include increased quantitative chorionic gonadotropin (the "pregnancy hormone") levels with vaginal bleeding.

Development of Extraembryonic Mesoderm

The extraembryonic mesoderm develops from the epiblast and consists of loosely arranged cells that fill the space between the exocoelomic membrane and the cytotrophoblast. Large spaces develop in the extraembryonic mesoderm and coalesce to form the extraembryonic coelom.

The extraembryonic coelom divides the extraembryonic mesoderm into the extraembryonic somatic mesoderm and extraembryonic visceral mesoderm.

The extraembryonic somatic mesoderm , lines the trophoblast, forms the connecting stalk, and covers the amnion. The extraembryonic visceral mesoderm covers the yolk sac. As soon as the extraembryonic somatic mesoderm and , extraembryonic visceral mesoderm form, one can delineate the chorion, which consists of the extraembryonic somatic mesoderm, cytotrophoblast, and syncytiotrophoblast. As the chorion is delineated, the extraembryonic coelom is now called the chorionic cavity. The conceptus is sus- pended by the connecting stalk within the chorionic cavity.

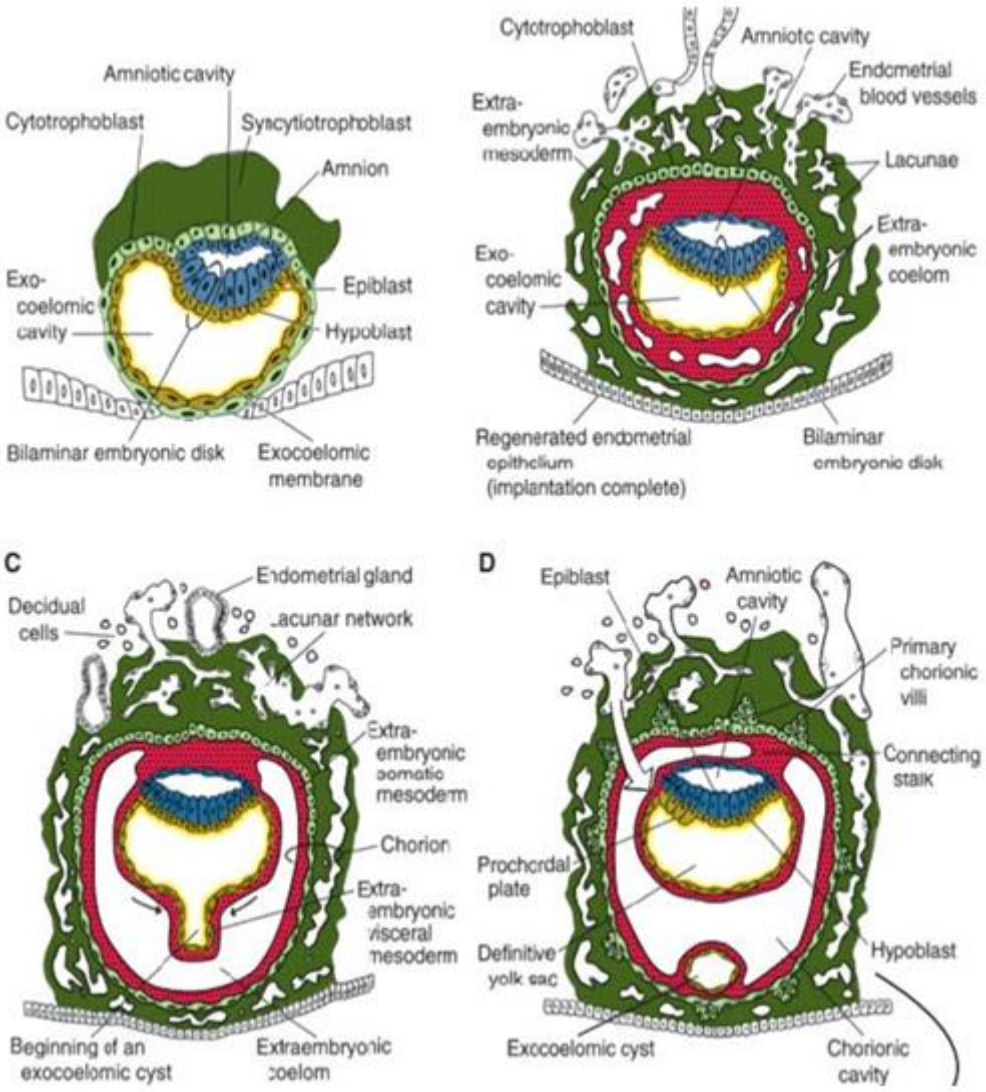

Figure. (A) Day 8 blastocyst is shown partially implanted into the endometrium. Extraembryonic mesoderm (EEM) has not formed yet. (B) Day 12 blastocyst is shown completely implanted within the endometrium, and epithelium has regenerated. This type of implantation is known as interstitial implantation. EEM begins to form. (C) Day 13 blastocyst. A lacunar network forms, establishing an early uteroplacental circulation. An exocoelomic cyst begins to pinch off (small arrows). (D) Day 14 blastocyst. The embryoblast can be described as two balloons (amniotic cavity and yolk sac) pressed together at the bilaminar embryonic disk. The curved open arrow indicates that the embryoblast receives maternal nutrients via diffusion. (E) A sonogram at about week 3 shows a hyperechoic rim representing the chorion (thick arrow) surrounding the chorionic cavity (or gestational sac). Within the chorionic cavity, two tiny cystic areas (i.e., the amnion and yolk sac) separated by a thin echogenic line (i.e., embryonic disk) can be observed. Note the hyperechoic base of the endometrium (long arrows) and two endometrial cysts (short arrows).