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Embryology Assignment

**Discuss the Second week of Development**

The major events that take place during the 2nd week of development

* *Completion of implantation of the blastocyst*
* *Formation of bilaminar embryonic disc(epiblast and hypoblast)*
* *Formation of extraembryonic structures(amniotic cavity, amnion, umbilical vesicle [yolk sac], connecting stalk, and chorionic sac*

Day 8

* *At the eighth day of development, the blastocyst is partially (slowly) embedded in the endometrium* and *the syncytiotrophoblast continues its invasion of the endometrium, thereby eroding endometrial blood vessels and endometrial glands*
* *More cells in the cytotrophoblast divide and migrate into the syncytiotrophoblast, where they fuse and lose their individual cell membranes*
* *Cells of the inner cell mass or embryoblast also differentiate into 2 layers:*
1. *the* ***hypoblast*** *layer, which is made up of small cuboidal cells, and it is adjacent(nearer) to the blastocyst cavity*
2. *the* ***epiblast*** *layer which is made up of high columnar cells, and it adjacent to the amniotic cavity*
* *The hypoblast and epiblast layers* ***together*** *form a flat ovoid shaped disc called the* ***bilaminar embryonic disc***
* *At the same time, a small cavity appears within the epiblast which enlarges to form the amniotic cavity*
* *Epiblast cells adjacent to the cytotrophoblast are called* ***amnioblasts***
* ***Amnioblasts*** *together with the rest of the epiblast, line the amniotic cavity*
* *The endometrium adjacent to the implantation site is edematous and highly vascular*

Day 9

* *The blastocyst is more deeply embedded in the endometrium, and the penetration defect in the surface epithelium is closed by a coagulum called* ***fibrin***
* *Vacuoles appear at the region of the trophoblast and they fuse to form lager lacunae*
* *This phase of trophoblast development is known as the* ***lacunar stage***
* *The cells of the hypoblast adjacent to the cytotrophoblast form a thin membrane called the* ***exocoelomic (Heuser’s) membrane ,****this* *membrane lines the inner surface of the cytotrophoblast*
* *The* ***exocoelomic (Heuser’s) membrane*** *together with the hypoblast forms the lining of the* ***exocoelomic cavity,*** *or* ***primitive yolk sac*** *or* ***primary umbilical vesicle***

Day 10-12

* *The blastocyst is completely embedded in the endometrium,*
* *and the surface epithelium almost entirely covers the original defect in the uterine wall*
* *The blastocyst now produces a slight protrusion into the lumen of the uterus*
* *cells of the syncytiotrophoblast penetrate deeper into the stroma(tissue) and erode the endothelial lining of the endometrial capillaries. These ruptured endometrial capillaries are called* ***sinusoids***
* *The lacunae then begin to communicate with the sinusoids, and maternal blood enters the lacunar system*
* *The communication of the eroded endometrial capillaries with the lacunae establishes the* ***primordial uteroplacental circulation***
* *When maternal blood flows into the lacunae, oxygen and nutritive substances are available to the embryo*
* *A new population of cells appears between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity*
* *These cells which are derived from yolk sac cells form a fine, loose connective tissue called the* ***extraembryonic mesoderm***
* *Soon, large cavities develop in the extraembryonic mesoderm, and when these become confluent, they form a new space known as the* ***extraembryonic cavity,*** *or* ***chorionic cavity*** *or* ***extraembryonic coelom***
* *This space surrounds the primitive yolk sac and amniotic cavity, except where the germ disc is connected to the trophoblast by the connecting stalk (which develops into the umbilical cord)*
* *The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the* ***extraembryonic somatic mesoderm***
* ***Extraembryonic somatic mesoderm also forms the connecting stalk***
* *The lining covering the yolk sac is known as the* ***extraembryonic splanchnic mesoderm***
* *As the conceptus implants, the endometrial connective tissue cells undergo a transformation, called* ***decidual reaction***
* *During this transformation, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm, and they are known as* ***decidual cells***
* *The primary function of the decidual reaction is to provide nutrition for the early embryo and an immunologically privileged site for the conceptus*

Day 13

* *The surface defect in the endometrium has been completely covered by the surface epithelium*
* *Occasionally bleeding occurs at the implantation site as a result of increased blood flow into the lacunar spaces*
* *Cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by syncytium*
* *Cellular columns with the syncytial covering are known as* ***primary villi***
* *The primary yolk sac becomes reduced in size and is known as the****secondary yolk sac***
* *This new cavity is known as the* ***secondary yolk sac*** *or* ***definitive yolk sac*** *or the* ***secondary umbilical vesicle***
* *In humans the yolk sac****contains no yolk****but is important for the transfer of nutrients between the fetus and mother*
* *This yolk sac is much smaller than the original exocoelomic cavity or primitive yolk sac*
* *During its formation, large portions of the exocoelomic cavity are pinched off to form* ***exocoelomic cysts***
* ***Exocoelomic cysts*** *are often found in the extraembryonic cavity or chorionic cavity or extraembryonic coelom*
* *Meanwhile, the extraembryonic coelom expands and forms a large cavity called the* ***chorionic cavity***
* *The extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the chorionic plate*
* *The only place where extraembryonic mesoderm traverses the chorionic cavity is in the* ***connecting stalk***
* *With development of blood vessels, the connecting stalk becomes the* ***umbilical cord***

***Clinical correlate***

* *The syncytiotrophoblast produces a hormone called the* ***human chorionic gonadotrophin (hCG)****, which enters the maternal blood via lacunae keeps the corpus luteum secreting estrogens and progesterone*
* *hCG maintains the hormonal activity of the corpus luteum in the ovary during pregnancy*
* *hCG can be detected in maternal blood or urine as early as****day 10****of pregnancy and is the basis for pregnancy tests*
* *Enough hCG is produced by the syncytiotrophoblast at the end of the second week to give a positive pregnancy test, even though the woman is probably unaware that she is pregnant*
* ***Extrauterine Implantation***
* *Blastocysts may implant outside the uterus*
* *These implantations result in* ***ectopic pregnancies***
* *95% to 98% of ectopic implantations occur in the uterine tubes, most often in the* ***ampulla*** *and* ***isthmus***