**SECOND WEEK OF DEVELOPMENT**

The following events take place during the second week of development;

1. Completion of implantation of the blastocyst.
2. Formation of bilaminar embryonic disc (epiblast and hypoblast).
3. Formation of extra embryonic structures (amniotic cavity, amnion, umbilical vesicle, connecting stalk and chorionic sac).

DAY 8

The blastocyst is partially embedded in the endometrium. The synctiotrophoblast continues its invasion of the endometrium, thereby eroding endometrial blood vessels and endometrial glands. More cells in the cytotrophoblast divide and migrate into the synctiotrophoblast, where they fuse and lose their individual cell membranes. Cells of the inner cell mass or embryoblast also differentiate into two layers (hypoblast and epiblast) which together form a flat ovoid shaped disc called the bilaminar embryonic disc.

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 membrane. This membrane lines the inner surface of the cytotrophoblast. The exocoelomic membrane together with the hypoblast forms the lining of the exocoelomic cavity or primitive yolk sac or primary umbilical vesicle.

DAYS 11 AND 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. 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 yok sac cells form a fine, loose connective tissue called the extra embryonic mesoderm. Soon, large cavities develop in the extra embryonic mesoderm and when these become confluent, they form a new space known as the extra embryonic cavity or coelom. 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 spread locally and penetrate in to the synctiotrophoblast, forming cellular columns called primary villi which are surrounded by syncytium. The primary yolk sac becomes reduced in size and becomes the secondary yolk sac which contains no yok but is important for the transfer of nutrients between the fetus and mother. The extra embryonic coelom expands and forms a large cavity called the chorionic cavity. The extra embryonic mesoderm lining the inside of the cytotrophoblast is the known as the chorionic plate. The only place where extra embryonic mesoderm traverses the chorionic cavity is in the connecting stalk. With the development of blood vessels, the connecting stalk becomes the umbilical cord.

CLINICAL CORRELATE

He synctiotrophoblast 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 the maternal blood or urine during pregnancy as early as day 10 of pregnancy and is the basis of pregnancy tests. Enough hCG is produced by the synctiotrophoblast 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.