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CLASS: 200 LEVEL

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DEPARTMENT: MEDICINE AND SURGERY

**COLLEGE: MEDICINE AND HEALTH
SCIENCES**

COURSE: ANA 209 (EMBRYOLOGY)

DATE: THURSDAY 30TH APRIL, 2020

ASSIGNMENT

1) Discuss ovulation.

ANSWER

Ovulation is the shedding of the ovum from the ovary. The ovarian follicle is at first very small compared to the thickness of the cortex of the ovary. As it enlarges, it becomes so big that it not only reaches the surface of the ovary, but also forms a bulging in this situation. Ultimately, the follicle ruptures and the ovum is shed from the ovary. Just before ovulation the follicle may have a diameter of 15mm. The stroma and theca on this side become very thin. An avascular area (stigma) appears over the most convex point of this follicle. At the same time, the cells of the cumulus oophorus become loosened by accumulation of intercellular fluid between them. The following factors may lead to ovulation:

- Ovulation occurs due to high concentration of luteinizing hormones in blood
- A high concentration of luteinizing hormones leads to increase activity of the enzyme collagenase, which in turn digests the collagen fibres surrounding the follicle.

- Increase in concentration of prostaglandins causes contraction of smooth muscle in the wall of ovary.
- The increased pressure of fluid in the follicular cavity is also a significant factor for ovulation to occur.
- However, the enzymatic digestion of the follicular wall seems to be the main factor responsible for ovulation.

2) Differentiate between meiosis I and meiosis II

ANSWER

- In meiosis I, homologous chromosomes separate, while in meiosis II, sister chromatids separate.
- Meiosis I produces 4 haploid daughter cells, whereas Meiosis II produces 2 diploid cells.
- Genetic recombination (crossing over) occurs only in meiosis I.

3) Discuss the stages involved in fertilization.

ANSWER

Fertilization of the ovum occurs in the ampulla of the uterine tube. Out of a few hundred capacitated sperms, which surround the ovum, the second

meiotic division (which was so far incomplete) is completed, and the second polar body is extruded. The nucleus of the ovum becomes the far pronucleus. The head of the spermatozoon separates from the middle piece and tail and transforms itself into the male pronucleus. Soon thereafter, the pronuclei lose their nuclear membranes. The 23 chromosomes of the female pronucleus and the 23 of the male pronucleus get mixed up and form 23 pairs i.e. 46 chromosomes. These 46 chromosomes undergo changes like those in a typical mitotic division leading to the formation of an embryo having two cells.

4) Differentiate between monozygotic twins and dizygotic twins.

ANSWER

Dizygotic twins which result from the fertilization of two different eggs with 2 different sperms. They can be girl/girl, boy/boy or girl/boy. They can also be referred to as fraternal or non-identical twins. They normally don't look alike and sometimes have appearances similar to each other in the same way non-twin siblings have while monozygotic twins result from the fertilization of one egg and one sperm. The fertilized embryo then splits

within days after fertilization resulting in two individuals which usually share the same chromosomes. They are also referred to as identical or maternal twins. Mostly they have similar appearances.

5) Discuss the second week of development

ANSWER

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

- Completion of implantation of the blastocyst
- Formation of bilaminar embryonic disc
- Formation of extra embryonic structures such as amniotic cavity, connecting stalk, chorionic sac, yolk sac etc.

On day 8, the blastocyst is partially embedded in the endometrium; syncytiotrophoblast enters the endometrium and erodes the endometrium. The cells of the cytotrophoblast begin to divide and differentiate and move into the region of the syncytiotrophoblast. The inner cell mass is called the embryoblast which will differentiate into epiblast and hypoblast. The amnioblast surrounds the amniotic cavity. The epiblast and hypoblast give rise to the bilaminar germ disc.

On day 9, the blastocyst is deeply embedded in the endometrium. The fibrin coagulum closes the surface endothelium and causes a blockage.

Another membrane then develops adjacent to the hypoblast called the exocoelomic membrane or the Heuser's membrane. The lacunae develop in the region of the syncytiotrophoblast.

Within day 10 to 12, the blastocyst is completely embedded, it begins to rupture the capillaries in the endometrium, and these ruptured capillaries are called sinusoids. An utero-placenta

circulation is established. A space of mesoderm develops between the region of the cytotrophoblast and the exocoelomic membrane and the region of the cytotrophoblast and amnioblast. The space of membrane is called extra embryonic coelom which divides the mesoderm into two. A reaction takes place during development called the decidal reaction.

On day 13, the cytotrophoblast develops into the syncytium; the connective stalk gives rise to the future umbilical cord. The extra embryonic cavity enlarges and gives rise to chorionic cavity. The primary lobe sac becomes smaller and develops into secondary umbilical vesicle or secondary

lobe sac. The exocoelomic cyst is removed from the yolk sac.