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MATRIC NUMBER: - 18/MHS01/020

### EMBRYOLOGY ASSIGNMENT

#### 1. Discuss Ovulation.

Ovulation is the release of an oocyte from the ovarian follicle/ graffian follicle. A few days before ovulation, under the influence of Follicle Stimulating hormone and Luteinizing Hormone. Secondary or vesicular follicle enlarges to a diameter of about 25mm to become the graffian follicle. At this time, there is an increase in production of Luteinizing hormone, which causes the primary oocyte to complete meiosis 1 and the vesicular follicle to enter pre-ovulatory mature vesicular stage.

Meiosis II is also initiated, but the secondary oocyte is arrested in metaphase stage by cytostatic factors approximately 3 hours before ovulation. The surface ovary begins to bulge and at the apex, the stigma appears. For the oocyte to be released, 2 events occur which are triggered by LH surge:-

- 1) Increase in collagenase activities, which causes the digestion of collagen fibers surrounding the follicle.
- 2) Increase in prostaglandin levels which cause local muscular contractions in the ovarian wall.

This causes ovulation in which the oocyte floats out. Some of the cumulus oophorus cells then rearrange themselves around the zona pellucida to form corona radiata.

#### 2. Differentiate between Meiosis 1 and Meiosis 2

	Meiosis 1	Meiosis 2
Crossing over	Occurs in prophase I	Does not occur
Synapsis	Occurs in prophase I	Does not occur
Number of daughter cells	2	4
Splitting of centromeres	Does not occur. As it is Homologous chromosomes that separate.	Occurs in Early Anaphase, sister chromatids separate, centromeres first and begin to move to opposite poles of the equator.
Chiasma formation	Occurs in prophase 1	Does not occur

#### 3. Discuss the stages involved in Fertilization.

Fertilization is the fusion of an oocyte with a sperm cell. It takes place at the ampulla of the uterine tube. It includes the following stages:-

- I) Passage through the corona radiata

- II) Penetration of the Zona pellucida
- III) Fusion of plasma membranes of oocyte and sperm
- IV) Completion of Meiosis II and formation of female pro nucleus
- V) Formation of male pro nucleus
- VI) Fusion of male and female Pro-nuclei to form an ootid, which becomes a Zygote.

**PASSAGE THROUGH THE CORONA RADIATA:** - For sperms to pass through the corona radiata, they must have been capacitated i.e. removal of glycoprotein coat and seminal plasma protein from the plasma membrane that overlies the acrosomal region.

**PENETRATION OF THE ZONA PELLUCIDA:** - The zona is a glycoprotein shell surrounding the egg that facilitates sperm binding and induces acrosome reaction. The acrosome binds with a zona glycoprotein in the zona pellucida this causes release of acrosin which allows sperm to penetrate the zona pellucida thereby coming in contact with the plasma membrane of the oocyte. As soon as the head of sperm comes in contact with the oocyte, the permeability of the zona pellucida changes, lysosomal enzymes are released from cortical granules. This enzymes prevents penetration of sperms and inactivates the binding sites in the zona pellucida

**FUSION OF PLASMA MEMBRANE OF OOCYTE AND SPERM:** - Plasma membrane of oocyte and sperm fuse and break down at area of fusion.

**COMPLETION OF MEIOSIS II AND FORMATION OF FEMALE PRO-NUCLEUS:-**  
When sperm comes in contact with oocyte, it activates the oocyte into completing the second meiotic division forming a mature oocyte and a second polar body, this mature oocyte is called the female pro-nucleus.

**FORMATION OF MALE PRONUCLEUS:** - Within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form male pro-nucleus, the tail degenerates.

**FUSION OF BOTH PRO-NUCLEI:** - Female pro-nucleus and male pro-nucleus fuse together to form an Ootid which becomes a zygote. The chromosomes of the zygote then become arranged in a cleavage spindle in preparation for cleavage of zygote.

4) Differentiate between Monozygotic and dizygotic twins.

<b>MONOZYGOTIC TWINS</b>	<b>DIZYGOTIC TWINS</b>
They are identical.	They are non-identical.
Formed from a single sperm and a single oocyte.	Formed from 2 sperm and 2 oocyte.
They are of the same sex.	They could be of same sex or different sexes.
Single blastocyst is formed which split into two.	Resulting zygotes forms 2 blastocysts which are embedded separately in the endometrium.
They share a common amniotic sac, chorionic sac and placenta.	They mostly have 2 amnions, 2 chorionic sacs and 2 placentas.