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COURSE: EMBRYOLOGY

MATRICULATION NUMBER: 18/MHS01/202

DEPARTMENT: MBBS

1. Discuss Ovulation

Ovulation is the release of an oocyte from the ovarian follicle. It is triggered by a surge of Luteinizing Hormone production and usually follows the luteinizing hormone peak by 12 to 24 hours. It occurs at the middle of every menstrual cycle under normal conditions in females. Few days before ovulation, under the influence of Follicle Stimulating Hormone and Luteinizing Hormone, the secondary follicle grows rapidly to a diameter of approximately 25 mm to become mature vesicular or Graafian follicle. Increase in Luteinizing Hormone causes the following: the primary oocyte to complete meiosis I and the follicle to enter the pre-ovulatory mature vesicular stage. Meiosis II is also initiated, but the secondary oocyte is arrested in the metaphase stage approximately 3 hours before ovulation. However, the surface of the ovary begins to bulge locally, and at the apex, the stigma appears. There is also an increase in collagenase activity and prostaglandin due to the increase in Luteinizing Hormone and in order for the oocyte to be released.

2. Differentiate between Meiosis I and Meiosis II

S/N	STAGES	MEIOSIS I	MEIOSIS II
1.	PROPHASE	>synapsis occurs >crossing over is present > Chiasma is formed	>synapsis does not occur >absence of crossing over > Chiasma formation is absent
2.	METAPHASE	Alignment of 46 homologous duplicated chromosomes	Alignment of 23 homologous duplicated chromosomes
3.	ANAPHASE	>Separation of 46 homologous duplicated chromosomes >Centromeres do not split	>Separation of 23 homologous duplicated chromosomes >Centromeres split

4.	TELOPHASE	Two daughter cells are formed	Four daughter cells are formed
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3. Discuss the stages involved in fertilization

Stages involved in fertilization include the following:

- i. **PASSAGE OF THE SPERM THROUGH THE CORONA RADIATA:** All sperms must be capacitated (removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane) before being allowed to pass through the corona radiata.
- ii. **PENETRATION OF THE ZONA PELLUCIDA:** The zona pellucida is a glycoprotein shell which surrounds the egg that maintains sperm binding and induces the acrosome reaction. The release of acrosin allows sperm to penetrate the zona pellucida enabling contact with the plasma membrane of the oocyte. Immediately both come in contact, the permeability of the zona pellucida changes.
- iii. **FUSION OF THE PLASMA MEMBRANE OF THE SPERM AND OOCYTE:** The plasma or cell membranes of the oocyte and the sperm fuse and break down in the area of fusion.
- iv. **COMPLETION OF THE SECOND MEIOTIC DIVISION AND THE FORMATION OF THE FEMALE PRONUCLEUS:** Penetration of the oocyte by a sperm activates the oocyte into completing the second meiosis division and forming a mature oocyte and a second polar body.
- v. **FORMATION OF THE MALE PRONUCLEUS:** The male pronucleus is formed in the cytoplasm of the oocyte and from the enlargement of the sperm nucleus.
- vi. **FORMATION OF THE ZYGOTE:** The indistinguishable male and female pronuclei are contained in the oocyte, the oocyte is referred to as OOTID. After the fusion of the two prouclei, the ootid becomes the zygote.

4. Differentiate between monozygotic and dizygotic twins.

Monozygotic twins	Dizygotic twins
Two offspring developed from one zygote	Two offspring developed from two zygotes
Involves one sperm and one ovum	Involves two sperms and two ova

Share the same amniotic sac and have separate placentas	Have separate placentas, amniotic sac
Have the same genetic features	Have different genetic features
It is not hereditary	It is hereditary
Same gender	Can be same or different gender
Same appearance	Same or different appearances