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18/MHS01/243

MEDICINE AND SURGERY

EMBRYOLOGY.

QUESTIONS.

1. Discuss ovulation
2. Differentiate between meiosis I and meiosis II
3. Discuss the stages involved in fertilization.
4. Differentiate between monozygotic and dizygotic twins.

ANSWERS.

1. **Ovulation**; Ovulation is the release from eggs from the ovary. It is the release of a mature secondary oocyte. Ovulation is part of the menstrual cycle. Under the influence of the follicle stimulating hormone and the leutenizing hormone, the secondary oocyte increases in size rapidly and reaches a diameter of about 25mm and then it is called the mature secondary follicle or the graafian follicle and this occurs just a few days before ovulation occurs. This growth coincides with an abrupt increase in the flow of the Leuthenizing hormone which causes the primary oocyte to complete meiosis I and also causes the follicle to enter the preovulatory mature vesicular stage.

The surface of the ovary then begins to have a bulge and a spot which is called the stigma appears at the top. In order for the oocyte to be released, Collagen fibres surrounding the follicle begin to digest and Prostaglandin levels begin to increase which causes contractions in the ovarian wall and these two changes are caused by the increase of the leuthenizing hormone.

The contractions which occur in the wall of the ovary release the oocyte along with the surrounding follicular cells around the cumulous oophorus and this causes ovulation.

After this, some of the cumulus oophorus cells rearrange themselves around the zona pellucida and then a structures called the corona radiata is the formed.

2. Differences between Meiosis I and Meiosis II

The differences between the two are as follows;

MEIOSIS I	MEIOSIS II
Reduction of the number of chromosomes in daughter cells	There is an equal number of chromosomes in both daughter and parent cells
Homologous chromosomes are present at the beginning	Individual, bivalent chromosomes are present at the beginning
Meiosis is a heterotypic division	Meiosis 2 is a homotypic division
Chromosomal cross over occurs at prophase 1	No chromosomal cross over occurs during prophase 2

3. STAGES INVOLVED IN FERTILIZATION; Fertilization has the following stages;

1. Passage of sperm through the corona radiata; This occurs after the sperms have undergone capacitation ie the removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane that underlies the acrosomal region of the spermatozoa.
2. Penetration of the Zona Pellucida; The release of acrosin allows sperms to penetrate the zona pellucida thereby coming in contact with the plasma membrane of the oocyte. As soon as the head of the sperm comes in contact with the surface of the oocyte, the permeability of the zona pellucida changes.
3. Fusion of plasma membranes of the oocyte and the sperm; The plasma membrane of the sperm and the oocyte fuse and break down at the area of fusion.

4. Completion of the second meiotic division of oocytes and formation of the female pronucleus; Penetration of the oocyte by a sperm activates the oocyte into completing the second meiotic division and forming a mature oocyte and a second polar body. The nucleus of the mature oocyte is now called the female pronucleus.
5. Formation of the male pronucleus; the nucleus of the sperm enlarges to form the male pronucleus inside the cytoplasm of the oocyte then the tail of the sperm degenerates.
6. The two pronuclei then fuse to form a single diploid aggregation of chromosomes. The chromosomes in the zygote become arranged on a cleavage spindle in preparation for cleavage of the zygote.

4. DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS.

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
Formed by one sperm and one egg	Formed by two different sperms and two different eggs
Have identical DNA	Do not have identical DNA
Share the same placenta	Do not share the same placenta
Share the same amniotic sacs	Have different amniotic sacs
They are usually identical and have the same sex	They are usually non identical and have separate sexes