

OMOREGIE ESOSA IVY

18/MHS01/299

200 LEVEL

DEPARTMENT OF MEDICINE AND SURGERY

EMBRYOLOGY ASSIGNMENT:

1. Discuss Ovulation.
2. Differentiate btw meiosis 1 and meiosis 2.
3. Discuss the stages involved in fertilization.
4. Differentiate between monozygotic and dizygotic twins.

ANSWERS:

OVULATION is the release of an oocyte from the ovarian follicle. Ovulation normally occurs near the middle of the menstrual cycle. It is triggered by surge of luteinizing hormone, which is provoked by high estrogen level in the blood.

1. Coincident with final development of vesicular follicle, there is an abrupt increase in luteinizing hormone which causes
 - The primary oocyte to complete meiosis 1.
 - The follicle to enter preovulatory mature vesicular stage.

The secondary oocyte is arrested at metaphase 2 due to cytostatic factor approximately 3 hours before ovulation. In the meantime, the surface of the ovary begins to bulge and at the apex, the stigma appears.

FOR OVULATION TO TAKE PLACE 2 events take place (caused by luteinizing hormone surge)

- i) Collagenase activity is increased, resulting in digestion of collagen fibers surrounding the follicle.
- ii) Prostaglandin levels increase causing local muscular contraction of the ovarian wall. These contractions extrude the oocyte and surrounding follicular cells causing OVULATION.

During ovulation, women may feel variable amount of abdominal pain called *mittelschmerz*. This abdominal pain is caused by slight bleeding into the peritoneal cavity.

Failure of women to ovulate is known as *anovulation* and it is caused by low gonadotropin levels. In these cases, doses of agents that stimulate gonadotropin release can be administered and ovulation can be employed. The downside of such drugs is that it could cause the risk of multiple pregnancies.

2.

MEIOSIS 1	MEIOSIS 2
It reduces chromosome number in the daughter cell	Equalizes the chromosome number of both parent and daughter cells
Chromosomal crossing occurs during prophase 1	No chromosomal cross-over occurs during prophase 2
Preceded by interphase	No interphase takes place

Homologous chromosomes are present at the beginning	Individual, bivalent chromosomes are present at the beginning
It is a complex division	It is a relatively simpler division

3. A sequence of events take place before fertilization can take place. They include;

- Passage of sperm through the corona radiata.
- Penetration of the zona pellucida.
- Fusion of plasma membranes of the oocyte and sperm.
- Completion of the second meiotic division of oocyte and formation of female pronucleus.
- Formation of male pronucleus.
- Formation of zygote.

* For sperms to pass through the corona radiata they must undergo *capacitation* (the removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane that overlies the acrosomal region of the spermatozoa).

* During the penetration of the zona pellucida, the intact acrosome of the sperm binds with a zona glycoprotein on the zona pellucida. Release of acrosin allows sperms to penetrate the zona pellucida resulting in contact with the plasma membrane of the oocyte. As soon as the head of a sperm comes in contact with the oocyte surface, the permeability of the zona pellucida changes and lysosomal enzymes are released from cortical granules lining the plasma membrane of the oocyte. These enzymes change properties of the zona pellucida to prevent sperm penetration and inactivate binding sites for spermatozoa on the zona pellucida surface. Only one sperm seems to be able to penetrate the oocyte.

* During fusion of plasma membranes of the oocyte and sperm, the plasma or cell membranes of the oocyte and sperm fuse and break down at the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte but the sperms plasma membrane remains behind.

* For completion of 2nd meiotic division to be completed, the oocyte has to be fertilized by the sperm, forming a mature oocyte and a 2nd polar body. The nucleus of the mature oocyte is now called the *female pronucleus*.

* Within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus and the tail of the sperm degenerates. The oocyte now contains 2 pronuclei, each having haploid number of chromosomes (23). The two pronuclei fuse into a single diploid collection of chromosomes, the oocyte containing two haploid nuclei then becomes zygote.

4.

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
Formed from the fertilization of an oocyte by a sperm, with the division of the zygote into two	Two different sperms fertilize two different oocyte to form two zygotes
The fetuses share a placenta	The fetuses don't share a placenta
The have a common amniotic sac	They do not have a common amniotic sac
They have the same sex	May or may not have the same sex
They are identical in appearance	They are non-identical in appearance