

NAME: ESOWE

PRINCE DAVID. C.

MATRIC NO:

18/MHS01/154

DEPARTMENT:

MBBS

COURSE: ICBS

TITLE:

EMBRYOLOGY

1. Discuss Ovulation.

- Answer: *This is the* release of an oocyte from the ovarian follicle
- In a few days before ovulation, under the influence of **FSH** and **LH**, the secondary follicle grows rapidly to a diameter of about 25 mm to become mature vesicular/ mature secondary or Graafian follicle
- Coincident with final development of the vesicular follicle, there is an abrupt increase in LH that causes;
 - a. the primary oocyte to complete meiosis I
 - b. and the follicle to enter the preovulatory mature vesicular stage
- Meiosis II is also initiated, but the secondary oocyte is arrested in metaphase approximately 3 hours before ovulation
- In the meantime, the surface of the ovary begins to bulge locally, and at the apex, an avascular spot, the stigma, appears, for the oocyte to be released, 2 events occur which are caused by LH surge:
- it increases collagenase activity, resulting in digestion of collagen fibers (connective tissue) surrounding the follicle

- Prostaglandin levels also increase in response to the LH surge and cause local muscular contractions in the ovarian wall
- Those contractions extrude the oocyte, which together with its surrounding follicular (granulosa) cells from the region of the cumulus oophorus,
- this causes ovulation in which oocyte floats out of the ovary
- Some of the cumulus oophorus cells then rearrange themselves around the zona pellucida to form the corona radiata.

2. Differentiate between meiosis 1 and meiosis 2

Answer:

- ✓ In meiosis 1, homologous chromosomes separate, while in meiosis 2, sister chromatids separate
- ✓ Meiosis 2 produces 4 haploid daughter cells, whereas meiosis 1 produces 2 diploid daughter cells.
- ✓ Genetic recombination(crossing over) only occurs in meiosis 1

3. Discuss the stages involved in fertilization.

Answer:

The stages of fertilization:

A. **Passage of a sperm through the corona radiata:**

For sperms to pass through the corona radiata, they must have been capacitated (removal of the glycoprotein coat and seminal plasma proteins from

the plasma membrane that overlies the acrosomal region of the spermatozoa)

B. Penetration of the zona pellucida:

The zona is a glycoprotein shell surrounding the egg that facilitates and maintains sperm binding and induces the acrosome reaction

The intact acrosome of the sperm **binds** with a zona glycoprotein (ZP3/ zona protein 3) on the zona pellucida.

Release of acrosomal enzymes (acrosin) allows sperm to penetrate the zona pellucida, thereby coming 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.

When a sperm comes in contact with the oocyte surface, lysosomal enzymes are released from cortical granules lining the plasma membrane of the oocyte.

In turn, these enzymes alter properties of the zona pellucida to :prevent sperm penetration and inactivate binding sites for spermatozoa on the zona pellicida surface,only one sperm seems to be able to penetrate the oocyte .

C. 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 sperm's plasma membrane remains behind.

D. Completion of the second meiotic division of oocyte and formation of 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 ovum/oocyte is now called the female pronucleus.

E. Formation of the male 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

F. The 2 pronuclei fuse into a single diploid aggregation of chromosomes, the ootid becomes a zygote

- ✓ The chromosomes in the zygote become arranged on a cleavage spindle in preparation for cleavage of the zygote.

4. Differentiate between monozygotic and dizygotic twins

Answer:

- ✓ Monozygotic twins are also known as identical twins while dizygotic twins are fraternal twins
- ✓ Dizygotic twins are formed from the fertilization of two different eggs by two different sperm cells while monozygotic twins are formed from the splitting of the same fertilized egg into two
- ✓ Monozygotic twins always have the same blood type while dizygotic twins may have different blood types.
- ✓ Monozygotic twins may be contained in one sac in utero while dizygotic twins develop separate sacs in utero.

