NAME: EBHODAGHE FAVOUR IGHODALO

MATRIC NO: 18/MHS01/125

DEPARTMENT: MEDICINE AND SURGERY

COURSE TITLE: EMBRYOLOGY

1) DISCUSS OVULATION.

Ovulation is the release of a secondary oocyte from the ovarian follicle. Few days before ovulation, under the influence of follicle stimulating hormone and luteinizing hormone, the secondary follicle grows rapidly to a diameter of about 25 mm to become mature vesicular or mature secondary or Graafian follicle. With the final development of the vesicular follicle, there is a coincident abrupt increase in luteinizing hormone that causes;

I. the primary oocyte to complete meiosis I.

II. 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. Meanwhile, the surface of the ovary begins to bulge locally, and at the apex, the stigma, appears. Ovulation usually follows the luteinizing hormone peak by 12 to 24 hours.

For the oocyte to be released, two events occur which are caused by the surge of luteinizing hormone:

I. Increase in collagenase activity, resulting in digestion of collagen fibers (connective tissue) surrounding the follicle.

II. Prostaglandin levels also increase in response to the luteinizing hormone surge and cause local muscular contractions in the ovarian wall. These contractions extrude the oocyte, which together with its surrounding follicular cells from the region of the cumulus oophorus, causing ovulation in which the 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 THE MEIOSIS I AND MEIOSIS II.

MEIOSIS I	MEIOSIS II
Synapsis, crossing over and chiasma formation occurs.	Synapsis, crossing over and chiasma formation does not occur.
Centromeres do not split.	Centromeres split.
Formation of two diploid daughter cells.	Formation of four haploid daughter cells.

Homologous chromosomes separate.	Sister chromatids separate.
Involves reduction of number of chromosome.	Involves division of the remaining chromosome.

3) DISCUSS THE STAGES INVOLVED IN FERTILIZATION.

Fertilization is the union of the sperm and oocyte.The fertilization process takes approximately 24 hours. The usual site of fertilization is the ampulla of the uterine tube. The stages involved include:

I. 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). Only capacitated sperms can pass freely through the corona radiata.

II. 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 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 .

III. 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 .

IV. Completion of the second meiotic division of oocyte and formation of female pronucleus:

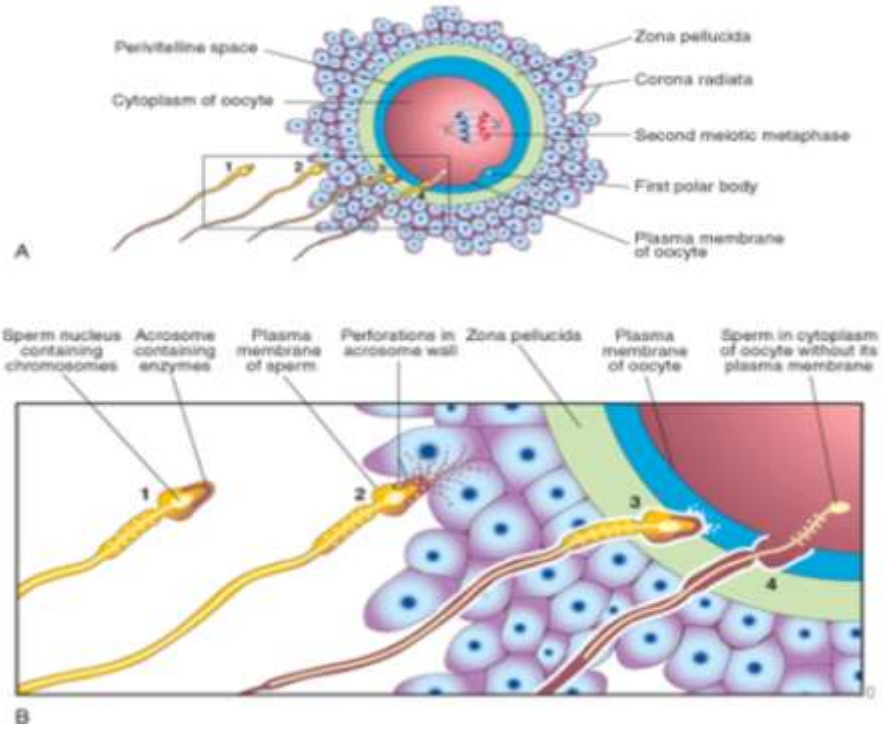
Penetration of the oocyte by a sperm activates the oocyte into completing the second meiotic division and forming a mature oocyte and a second polar body. The nucleus of the mature ovum/oocyte is now called the female pronucleus

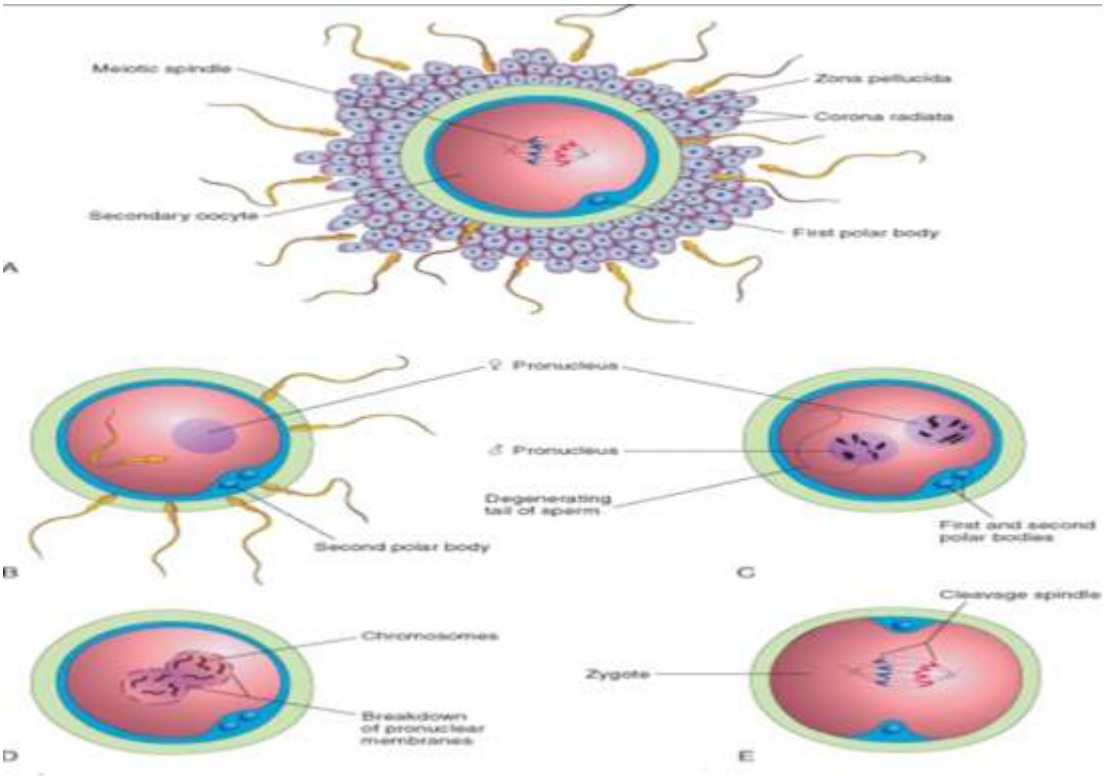
V. Formation of the male pronucleus:

Within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus and the tail of the sperm degenerate. Since all sperm mitochondria degenerate, all mitochondria within the zygote are of maternal origin (i.e., all mitochondrial DNA is of maternal origin). Morphologically, the male and female pronuclei are indistinguishable. The oocyte now contains 2 pronuclei, each having haploid number of chromosomes(23). The oocyte containing two haploid pronuclei is called an ootid.

VI. 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 TWINS AND DIZYGOTIC TWINS.

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
They are twins of the same sex.	They are twins of different sex.
They are seen as conjoined twins.	They are not seen as conjoined twins.
They have similar resemblance.	Their resemblance is like any other sibling.
Form single zygote.	Form two zygotes.
They are mostly diamniotic, monochorionic with single placenta.	They mostly have two amnions, two chorions and two placenta.