NAME: ALOWOLODU EMMANUEL

MATRIC NO: 18/MHS01/071

DEPT: MBBS

ASSIGNMENT

1. DISCUSS OVULATION

Ovulation is the release of an oocyte from the ovarian follicle. Few days before ovulation the secondary follicle grows rapidly under the influence of follicle stimulating hormone and luteinizing stimulating hormone to a diameter of about 25mm to become graafian/matured secondary/matured vesicular follicle

Coincident with final development of the vesicular follicle, there is an abrupt increase in luteinizing hormone that causes

- The primary oocyte to complete meiosis 1
- The follicle to enter the preovulatory matured vesicular stage

Meiosis 2 is also initiated, but the secondary oocyte is arrested in metaphase approximately 3 hours before ovulation. 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 luteinizing hormone surge:

- increase 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

We should note that ovulation is triggered by a surge of luteinizing hormone production and it usually follows the luteinizing hormone peak by 12 to 24 hours and also the luteinizing hormone surge, elicited by the high estrogen level in the blood, appears to cause the stigma to balloon out, forming a vesicle

2. DIFFERENTIATE BETWEEN MEIOSIS 1 AND MEIOSIS 2

- Meiosis 1 is a heterotypic division while meiosis 2 is a homotypic division
- In meiosis 1 the chromosome number in the daughter cell reduces while in meiosis 2 the chromosome number of both parent and daughter cells are equalized
- Meiosis 1 is a complex division and takes more time to complete while meiosis 2 is comparatively less simple and takes less time to complete
- In meiosis 1 homologous chromosomes are present at the beginning while in meiosis 2 individual, bivalent chromosomes are present at the beginning
- Meiosis 1 is preceded by interphase while no interphase take place in meiosis 2
- In meiosis 1 individual chromosomes are present in the daughter nuclei while in meiosis 2 sister chromosomes are present in the daughter nuclei
- Chromosomal cross-over occurs during prophase 1 in meiosis 1 while there is no chromosomal cross-over occurring during prophase 2 in meiosis 2

3. DISCUSS THE STAGES INVOLVED IN FERTILIZATION

The sequence of event in fertilization includes the following stages:

(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).

(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 and when a sperm comes in contact with the oocyte surface, lysosomal enzymes are released from cortical granules lining the plasma membrane of the oocyte, these enzymes alter properties of the zona pellucida to prevent sperm penetration and inactivate binding sites for spermatozoa on the zona pelluicida surface and 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 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 degenerates.

We should note that all mitochondria within the zygote are of maternal origin because all sperm mitochondria degenerate.

Morphologically, the male and female pronuclei are indistinguishable and 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.t

4. DIFFERENTIATE BETWEEN MONOZYGOTIC TWINS AND DIZYGOTIC TWINS

- DEVELOPMENT: Monozygotic twins develop from the splitting of the same fertilized egg into two while dizygotic twins develop from two different eggs fertilized by two different sperm cells
- GENETIC CODE: monozygotic twins are nearly identical while dizygotic twins are not identical, they are like any other siblings

- GENDER: monozygotic twins have same gender while in dizygotic twins gender may be same or different
- BLOOD TYPE: monozygotic twins have the same blood type while dizygotic twins blood type may be different
- APPEARANCE: monozygotic twins are extremely similar although may not be exactly identical due to environmental factor while dizygotic twins appear as similar as any other siblings.