

**NAME: CHIKEZIE CHIDIEBERE BENEDICTA**

**MATRIC NUMBER: 18/MHS01/115**

**DEPARTMENT: MEDICINE AND SURGERY**

**COURSE TITLE: GENERAL EMBRYOLOGY**

**ASSIGNMENT**

## OVULATION

It is the release of mature oocytes from the ovary of a female at the middle of the ovarian cycle. It occurs under the influence of follicle stimulating hormone and luteinizing hormone. The ovarian follicles undergo a sudden growth spurt which produces a cystic swelling or bulge on the surface of the ovary. It forms a small avascular spot called the stigma, on the swelling.

Ovulation is triggered by a surge in Luteinizing hormone production. The Luteinizing hormone surge and high estrogen levels causes the stigma to balloon out, forming a vesicle.

Luteinizing hormone surge causes:

- Increase in collagenase activity where collagen helps to break down follicular cells surrounding the oocyte
- Increase in prostaglandins level which causes lower muscular contractions in the ovarian walls.

Stimulation by prostaglandins results in intrafollicular pressure and contraction of smooth muscles in the theca externa. This causes the stigma to rupture and expel the secondary oocyte with the follicular fluid.

The expelled secondary oocyte is surrounded by the zona pellucida and the corona radiata. This forms the Oocyte-Cumulus complex. Prior to ovulation, the secondary oocyte and some cells of the cumulus oophorus detach and float out with the secondary oocyte. They rearrange themselves around the mature oocyte to give rise to the corona radiata.

## DIFFERENCES BETWEEN MEIOSIS I AND MEIOSIS II

MEIOSIS 1	MEIOSIS 2
It gives rise to two daughter cells	It gives rise to four daughter cells.
First cell division of meiosis	Second cell division of meiosis
Heterotypic division	Homotypic division
Interphase precedes it	Interphase does not precede it
It takes longer time	It takes shorter time
No splitting of centromeres and sister chromatids do not separate	There is splitting of chromosomes and separation of sister chromatids
Crossing over and chiasmata formation occurs	No crossing over and no chiasmata formation

It consists of Prophase 1, Metaphase 1, Anaphase 1 and Telophase 1	It consists of Prophase 2, Metaphase 2, Anaphase 2 and Telophase 2
--	--

## FERTILIZATION

It is the process whereby a sperm fuses with a mature oocyte to form an ootid which eventually gives rise to a zygote, a specialized, totipotent cell. Fertilization takes place in the Ampulla of the uterine tube.

The stages involved in fertilization are:

- Penetration of corona radiata
- Passage of corona radiata
- Fusion of plasma membrane of sperm and oocyte
- Completion of 2<sup>nd</sup> meiotic division and formation of female pro-nucleus
- Formation of male pro-nucleus

### Penetration of the corona radiata

Capacitated sperms act on the corona radiata and seminal proteins and glycoproteins are removed from the surface of the sperm.

### Passage through the zona pellucida

The sperm releases an enzyme called “acrosin”, which helps it bind to the receptors on the surface of the zona pellucida. After the passage of the sperm through the corona radiata, cortical granules are released by the plasma membrane and send signals to the corona radiata to close its binding site. This is a block to Dispermy.

### Fusion of plasma membrane of sperm and oocyte

Plasma membrane of sperm fuses with that of the oocyte. The sperm moves into the cytoplasm of the oocyte leaving the plasma membrane of the head and tail of the sperm behind.

### Completion of second meiotic division and formation female pro-nucleus

As soon as the sperm enters into the region of the cytoplasm of the female oocyte, second meiotic division is completed. The female nucleus enlarges to give rise to the female pro-nucleus.

### Formation of male pro-nucleus

The male nucleus also enlarges to form the male pro-nucleus as soon as the tail degenerates. The mitochondria on the tail will also be lost, hence, all energy used up during the processes is maternal in origin.

#### Formation of zygote

The male and female pro-nucleus fuse together to form an ootid, which eventually give rise to a zygote.

#### DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
Develop from one zygote which splits into two equal parts	Develop from two separate zygotes which are fertilized simultaneously and separately
They are genetically identical	They are not genetically identical
They are of the same sexes	They may be of different sexes
They share the same amniotic sac, placenta and chorion	The two zygotes have two different amniotic sac, chorion and placenta
Blood types are the same	Blood types are different
They have the same appearance	They may have similar or different appearances.
They are also known as maternal or identical twins	They are also known as paternal or fraternal twins.
One-third of the twins in the world are monozygotic	Two-third of the twins in the world are dizygotic
It is not hereditary	It is hereditary

