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MATRIC NUMBER: 18/MHS01/117

DEPARTMENT: MEDICINE AND SURGERY

ASSIGNMENT TITLE: EMBRYOLOGY

COURSE CODE: ICBS

COURSE: INTEGRATED CORE BASIC SCIENCES.

### ASSIGNMENT QUESTIONS

- Discuss ovulation.
- Differentiate between meiosis 1 and meiosis 2.
- Discuss the stages involved in fertilization.
- Differentiate between monozygotic twins and dizygotic twins.

### DISCUSS OVULATION

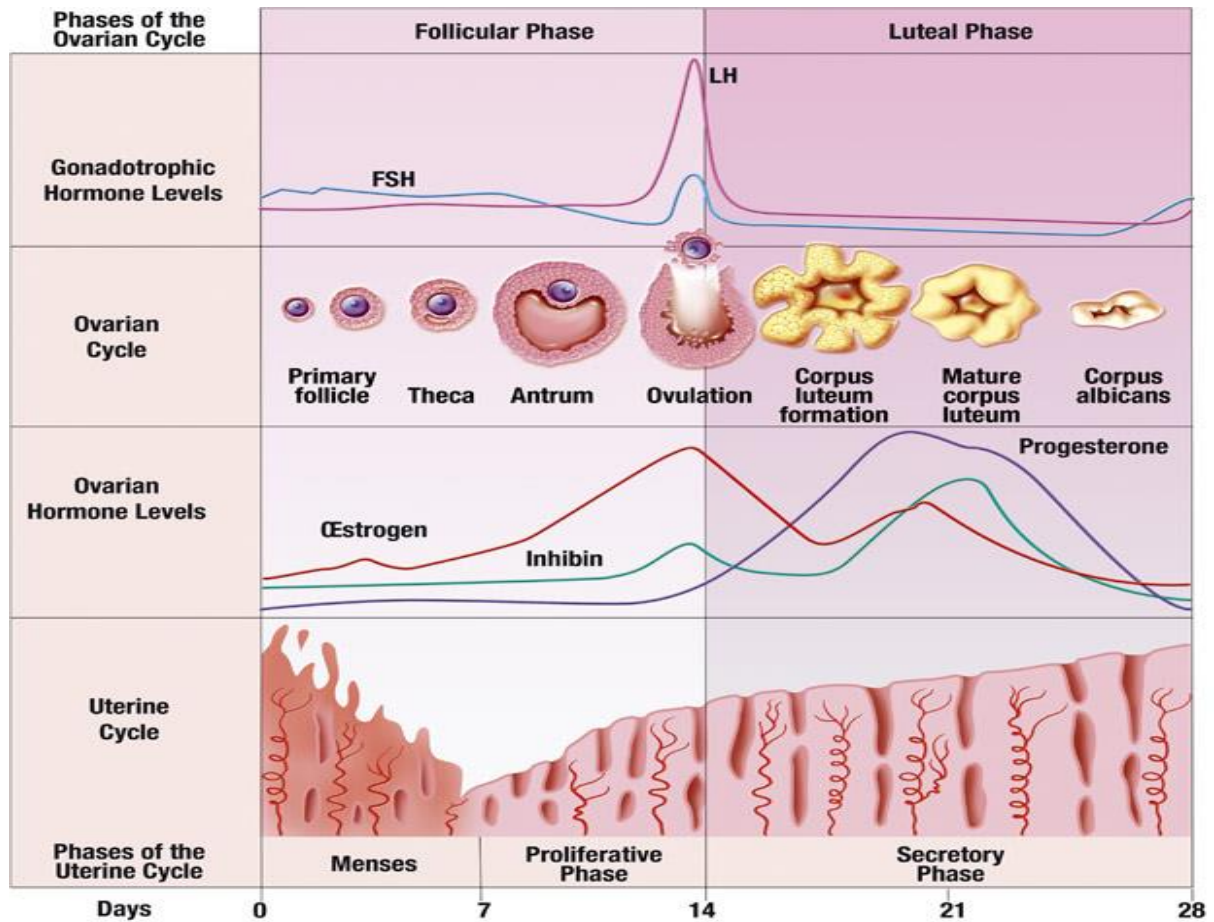
Ovulation refers to the release of an egg or oocyte or germ during menstruation in females. It is released on reaching maturity. The oocyte travels down the fallopian tube where it may unite with sperm cell and becomes fertilised.

Usually under the influence of the follicle stimulating hormone (FSH) and the luteinizing hormone (LH) secreted by the anterior lobe and pituitary glands controlled by the hypothalamus, the secondary follicle grows at a fast rate to about 25mm in diameter to become mature vesicular or Graafian follicle.

Ovulation is usually defined by a period of elevated hormones like the luteinizing hormone which causes:

- The primary oocyte to finish the process of meiosis 1. It also causes the follicle to enter the pre-ovulatory mature vesicular stage.
- This increase in Luteinising hormone also kicks off the process of meiosis 2 but is arrested approximately 3 hours before ovulation.
- The enzymes to be secreted and forms a stigma/hole on the surface of the ovary.

Other activities also take place in order for ovulation to occur, like the increase in the activities of the enzyme, collagenase. There is also increase in the levels of prostaglandin causing muscular contractions in the walls of the ovary.



**DIFFERENTIATE BETWEEN MEIOSIS 1 AND MEIOSIS 2.**

	MEIOSIS 1	MEIOSIS 2
1.	The process involves reduction division i.e reduction of chromosomes.	The process involves equational division i.e dividing the remaining set of chromosomes.
2.	Synapsis/pairing occurs.	Synopsis does not occur.
3.	Crossing over takes place.	Crossing over does not take place.
4.	There is chiasma formation.	No chiasma formation.
5.	Centromere does not split in anaphase.	Centromere splits in anaphase.

6.	Formation of two secondary gametocytes.	Formation of four gametes.
7.	Alignment of 46 homologous duplicated chromosomes at metaphase plate.	Alignment of 23 homologous duplicated chromosomes at metaphase plate.
8.	Separation of 46 homologous duplicated chromosomes from each other.	Separation of 23 homologous duplicated chromosomes.
9.	They form 23 homologous duplicated chromosomes.	They form 23 homologous single chromosomes.
10.	Preceded by interphase stage.	Interphase does not take place.

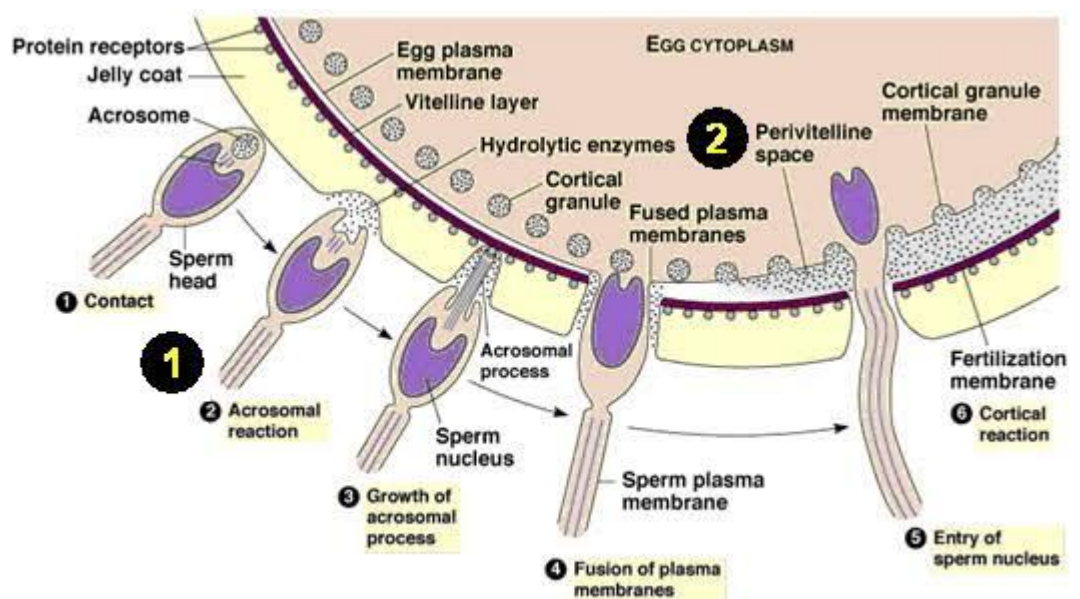
### STAGES INVOLVED FERTILIZATION.

Fertilization can be seen as the union of the Male and female gametes to form a zygote. It takes place usually at the ampulla of the uterine tube for approximately 24 hours. Below are the stages involved in fertilization:

- **Movement of sperm through the corona radiata;** in order for sperm to pass through the corona radiata, the must undergo capacitation which is the removal of the glycoprotein material and seminal plasma protein which covers the autosomal region of the sperm.
- **Penetration of the zona pellucida;** the condition for which sperm penetrates the zona pellucida is when acrosomes bind to the zona pellucida. There are binding sites on zona pellucida and enzymes contained in acrosome, acrosin. The sperm releases across on getting to the binding sites which in turn helps in breaking down and make passage through the zona pellucida. After passing through, there are cortical granules which sends message to the zona pellucida to close its binding sites thus only one sperm can cross the zona pellucida in order to prevent polyspermy.
- **The fusion of plasma membrane of the sperm and oocyte;** there is the fusion of the plasma membranes of oocyte and sperm. The head and tail of sperm enters the cytoplasm leaving the plasma membrane of the sperm behind.
- **Completion of the second meiotic division of oocyte and the formation of the female pronucleus;** immediately after the

sperm enters the region of the oocyte, the second meiotic division is completed. The female nucleus becomes the female pronucleus.

- **Formation is the male pronucleus;** it occurs with the degeneration of the tail of sperm. The remaining nucleus enlarges to become the male pro nucleus. **Note:** all the mitochondria of the sperm degenerate along with the tail of sperm which indicates that the mitochondria within the zygote are of maternal origin.
- **Formation of zygote;** there is the fusion of the male pro pronucleus and the female pronucleus to form an **ootid**. The ootid later develops into a zygote.



### DIFFERENCES BETWEEN MONOZYGOTIC TWINS AND DIZYGOTIC TWINS.

	MONOZYGOTIC TWINS	DIZYGOTIC TWINS
1.	A sperm fuses with oocyte.	Two sperm fuse with an oocyte.
2.	Are genetically identical	Are genetically not identical.
3.	Are of the same sex.	Are of different sexes.
4.	Sharing of the same chorionic sac, placenta and amniotic sac.	No sharing of chorionic sac, amniotic sac and placenta. All are separated.
5.	Are formed from one zygote.	Are formed from two different zygote.
6.	Incidence is more common	Incidence is less common.