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DEPARTMENT: MEDICINE AND SURGERY

MATRIC NO: 18/MHS02/189

COURSE: EMBRYOLOGY (ANA 205)

ASSIGNMENT

1. Discuss ovulation

ANSWER

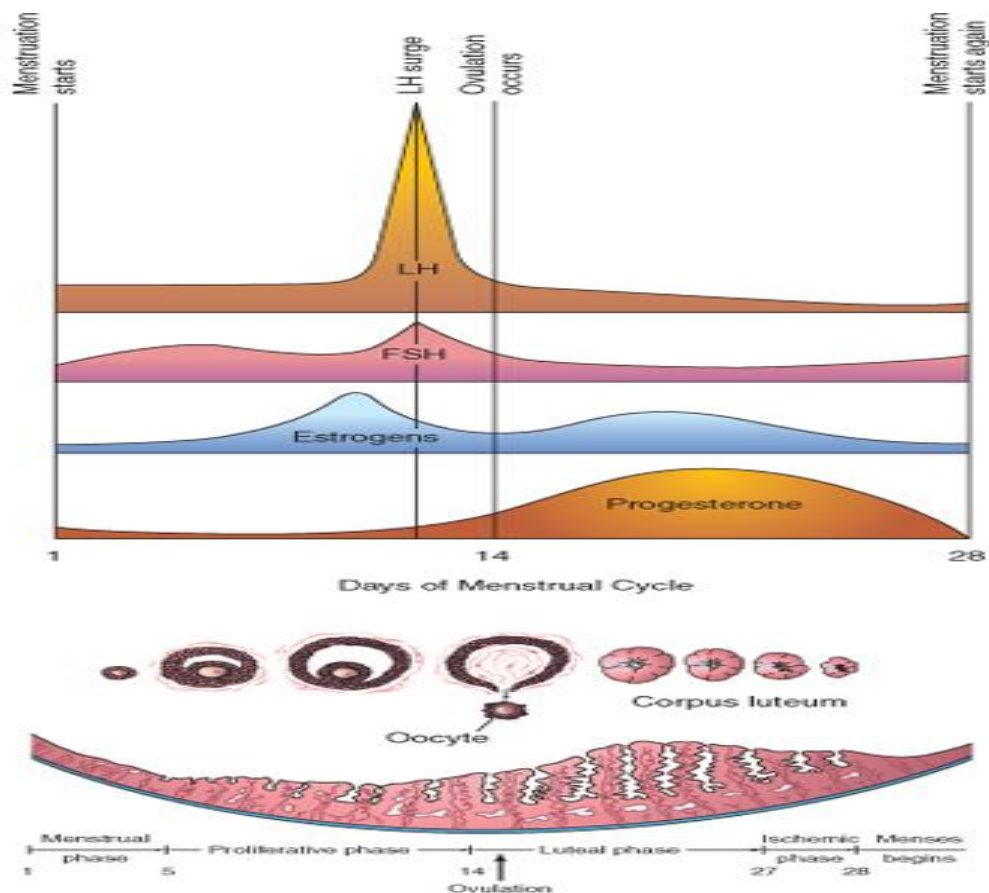
Ovulation is the release of a matured oocyte from the ovarian follicle

Few days before ovulation, the follicle stimulating hormone and luteinizing hormone causes the secondary follicle to grow rapidly to a diameter of about 25mm or more to form the Graafian follicle.

Due to the abrupt increase in the luteinizing hormone, it causes the primary oocyte to complete meiosis 1 and the follicle enters into the pre-ovulatory matured vesicular stage.

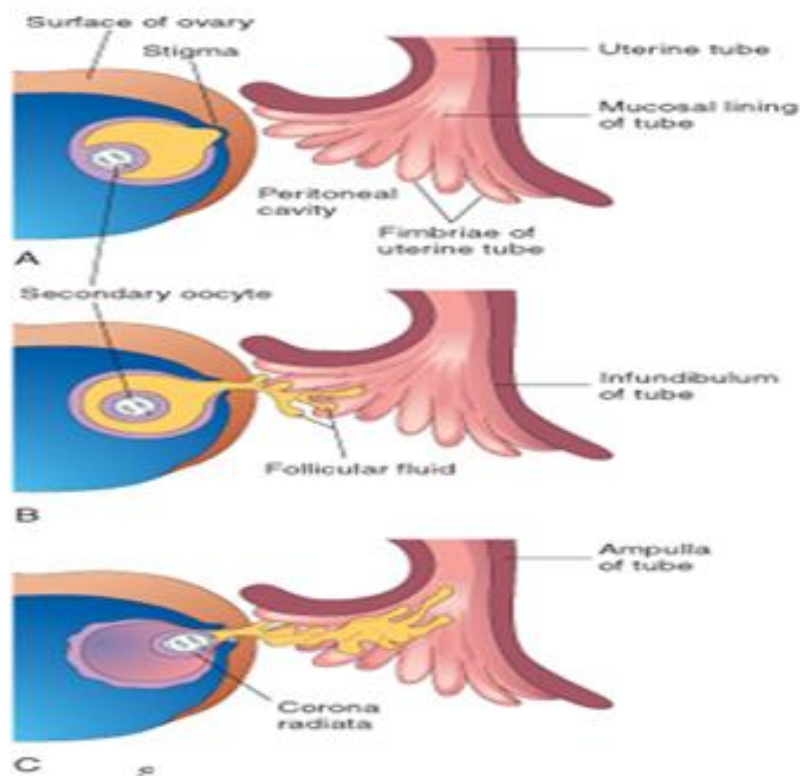
Meiosis 2 is initiated and the secondary oocyte is arrested at approximately 3 hours before ovulation.

In the meantime, the surface of the ovary will begin bulge out locally at the apex, an avascular spot called the stigma appears.



For the oocyte to be released, two events will take place due to the abrupt increase of the luteinizing hormone. These events include;

- ❖ The increase in the collagenase activity results in the digestion of collagen fibers surrounding the follicle making the follicle weak.
- ❖ Prostaglandin level also increases and helps in the local muscular contraction of the ovarian wall, allowing the oocyte and its surrounding follicular cells to float from the region of the cumulus oophorus.
- ❖ Some of the cells of the cumulus oophorus which floats out with the secondary oocyte rearrange themselves around the zona pellucida to form the corona radiata.



2. Differentiate between meiosis 1 and meiosis 2.

ANSWER

MEIOSIS 1	MEIOSIS 2
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1. PROPHASE

PROPHASE 1	PROPHASE 2
Synapsis occurs of 46 duplicated homologous chromosomes.	No synapsis of the 23 duplicated homologous chromosomes.
Crossing over occurs of the 46 duplicated homologous chromosomes.	No crossing over of the 23 duplicated homologous chromosomes.
a. Chiasma formation occurs of the 46 duplicated homologous chromosomes.	No chiasma formation of the 23 duplicated homologous chromosomes.

2. METAPHASE

METAPHASE 1	METAPHASE 2
a. Alignment of the 46 duplicated homologous chromosomes at the equatorial plane.	Alignment of the 23 duplicated homologous chromosomes at the equatorial plane.

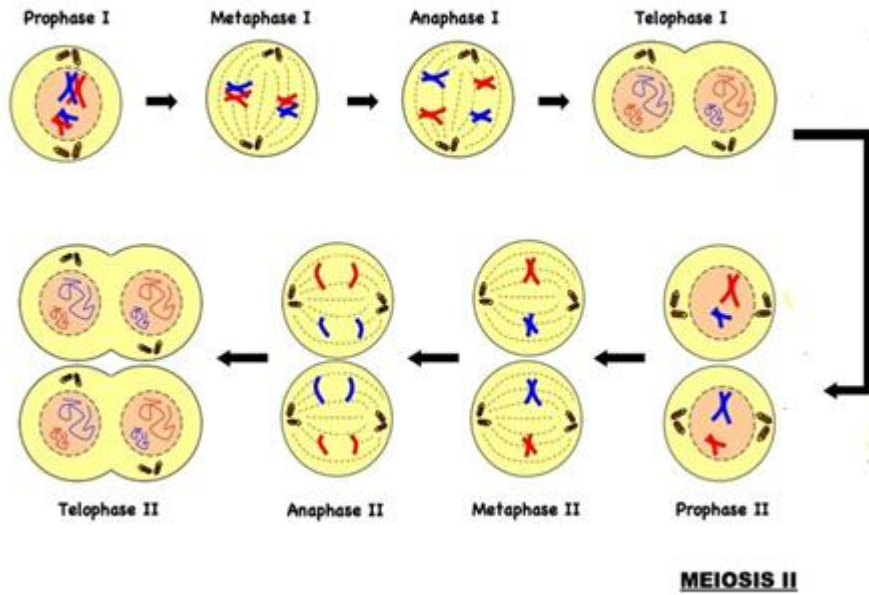
3. ANAPHASE

ANAPHASE 1	ANAPHASE 2
a. Separation of the 46 duplicated homologous chromosomes and centromere do not split.	Separation of the 23 duplicated homologous chromosomes and centromere will split.

4. TELOPHASE

TELOPHASE 1	TELOPHASE 2
a. Two daughter cells are formed with 23 duplicated homologous chromosomes (2n).	Four daughter cells are formed with 23 single stranded chromosomes (n).

MEIOSIS I



3. Discuss the stages involved in fertilization

ANSWER

Fertilization is the fusion of the sperm and oocyte.

The usual site for fertilization is the ampulla of the uterine tube. The fertilization process takes approximately 24 hours. It is a sequence of coordinated events which include the following stages;

- ❖ Passage of the sperm through the corona radiata;
- ❖ Penetration through the zona pellucida;
- ❖ Fusion of the plasma membrane of the sperm and oocyte;
- ❖ Completion of the second meiotic division of the oocyte and formation of the female pronucleus;
- ❖ Formation of the male pronucleus;
- ❖ Formation of the zygote.

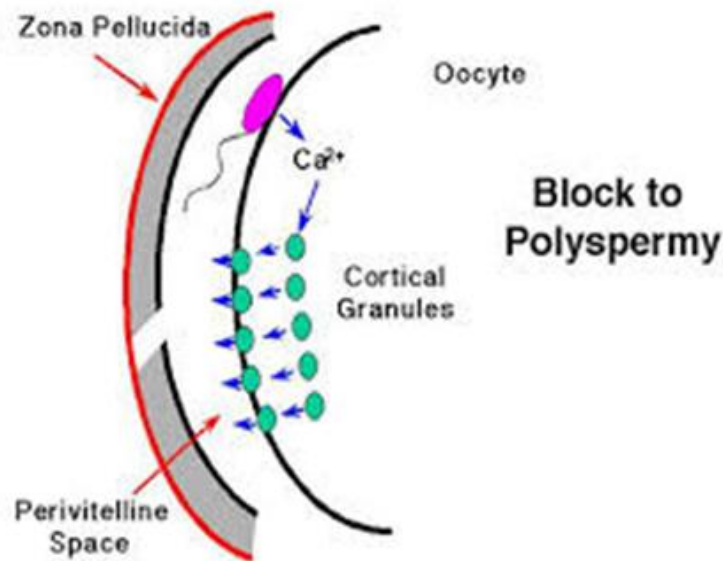
❖ Passage of the sperm through the corona radiata

Capacitation will occur which is the removal of the glycoprotein material and seminal plasma protein from the region of the head of the sperm.

❖ Penetration through the zona pellucida

After capacitation, the acrosome of the sperm will bind with zona glycoprotein on the zona pellucida to release an acrosomal enzyme called acrosine which allows the sperm to penetrate through the zona pellucida and binds with the plasma membrane of the oocyte.

As soon as the sperm binds to the plasma membrane of the oocyte, a lysosomal enzyme from the cortical granules will send a signal to the region of the zona pellucida to close it's binding site to avoid polyspermy.



❖ Fusion of the plasma membrane of the sperm and oocyte

The head and tail of the sperm will enter into the cytoplasm of the oocyte leaving behind the plasma membrane of the sperm.

❖ Completion of meiosis 2 and formation of the female pronucleus

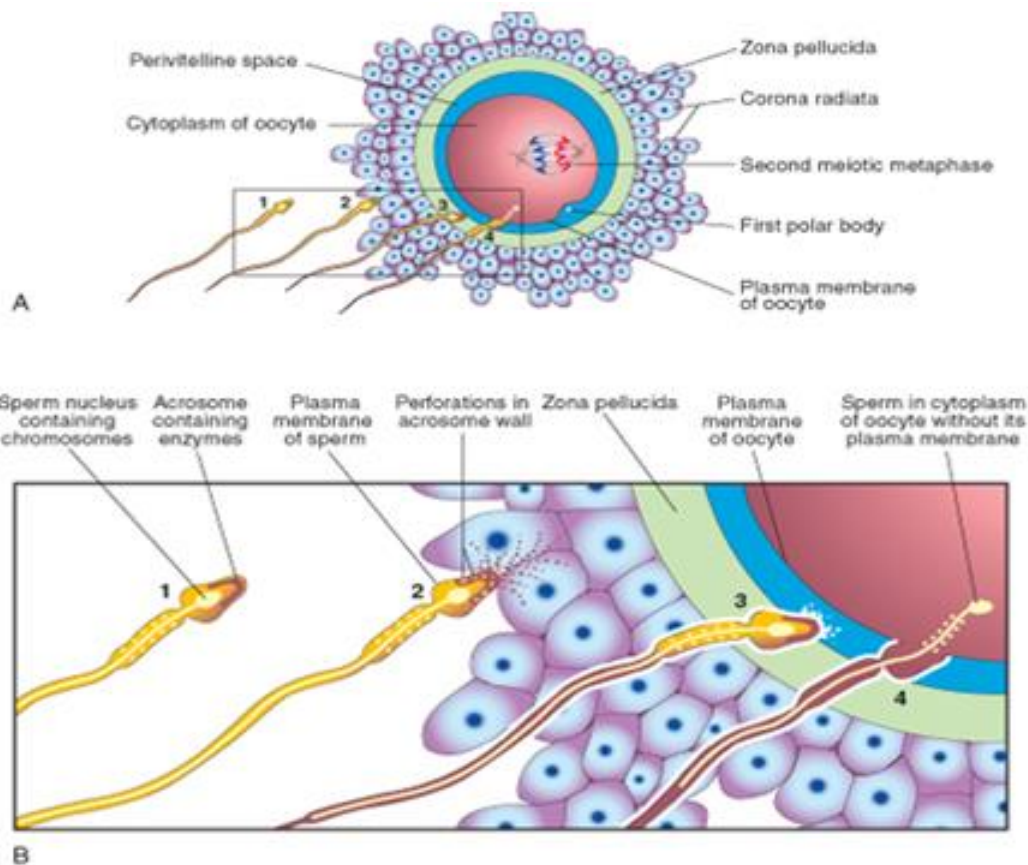
As soon as the head and tail of the sperm enter into the cytoplasm of the oocyte, 2nd meiotic division is completed and the female nucleus becomes pronucleus.

❖ Formation of male pronucleus

The tail will degenerate and the male nucleus becomes pronucleus

❖ Formation of the zygote

The male and female pronucleus fuses to form an **OOTID** which later becomes the zygote.



4. Differentiate between monozygotic twins and dizygotic twins

ANSWER

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
1. Formation occurs when a sperm fuses with the oocyte to give rise to a zygote which divides	Formation occurs when two different sperm fertilizes two oocyte
2. It is not common	It is more common
3. They are genetically identical	They are genetically unidentical
4. They look alike	They do not look alike
5 Same sexes	Different sexes
6. They share the same placenta, amniotic sac and chorionic sac but two umbilical cord	Placenta, chorionic sac, amniotic sac and umbilical cord are different