

OLASHINA-SADIQ BOLAOLUWATITO

18/MHS01/284

MEDICINE AND HEALTH SCIENCES

MEDICINE AND SURGERY

EMBRYOLOGY ASSIGNMENT

Discuss ovulation

Ovulation is the release of mature secondary oocyte from the ovary. Few days before ovulation the Follicle stimulating hormone (FSH) and Luteinizing hormone (LH) influence the secondary follicle to grow rapidly to achieve a diameter of 25mm to become a Graafian follicle.

An abrupt increase in luteinizing hormone causes:

- Completion of meiosis I
- And the follicle to enter preovulatory mature vesicular stage

The abrupt increase in luteinizing hormone is caused by the coincidence with the final development of the vesicular follicle.

Meiosis II is also initiated, but the secondary oocyte is arrested approximately 3 hours before ovulation at metaphase II. It is arrested by cystotic factor. In the meantime, the surface of the ovary begins to bulge locally at the surface, an avascular spot.

For the secondary oocyte to be released the luteinizing hormone performs two functions which are:

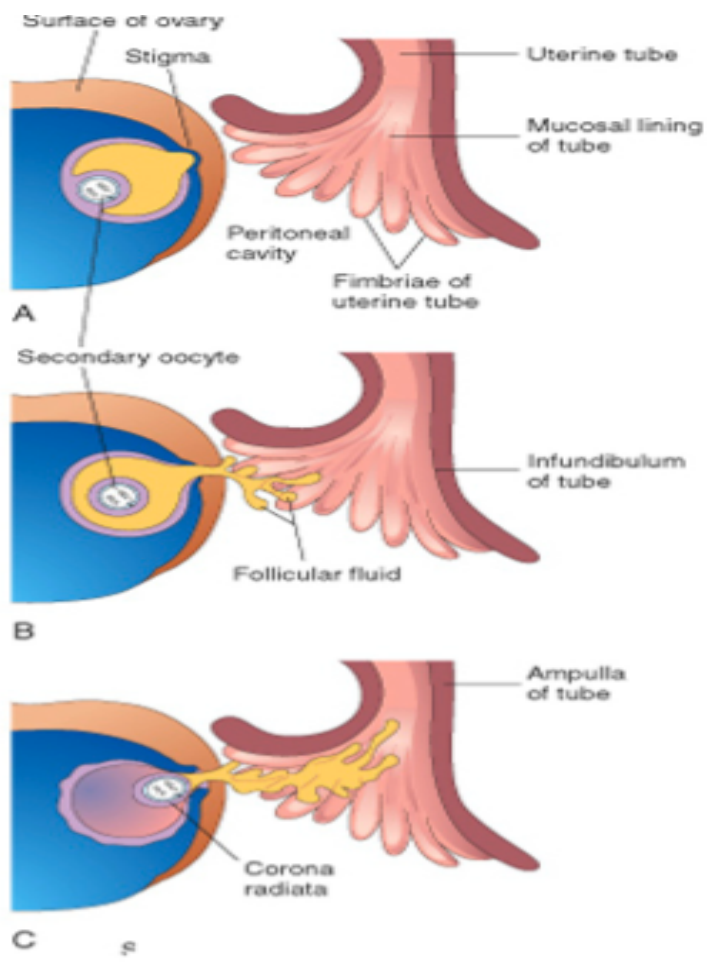
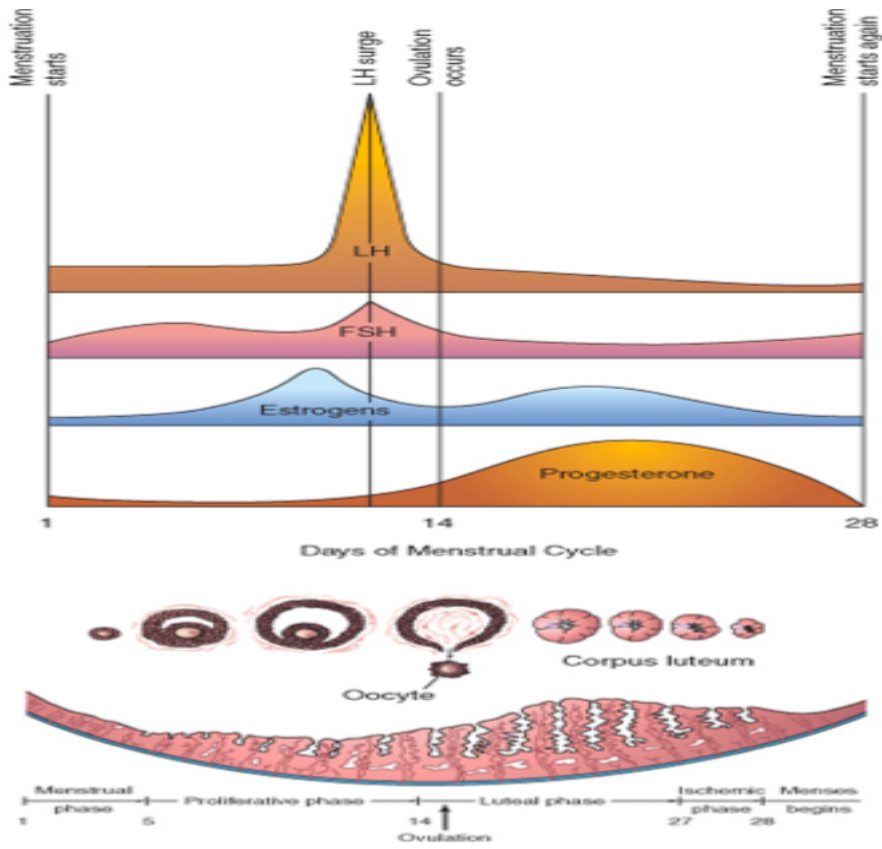
- It increases the collagenase activity, resulting in digestion of collagen fibers around the follicle
- Prostaglandin levels also increase in response to the luteinizing hormone surge which causes local muscle contractions in the ovarian wall to release oocytes.

At the release of the oocyte, the cumulus oophorus floats out with the secondary oocyte rearranging itself as the corona radiate around the zona pellucida.

Clinical correlates

During ovulation, some women feel a variable amount of abdominal pain called *mittelschmerz/middle pain* because it occurs near the middle of the menstrual cycle. Mittelschmerz could be used as a sign of ovulation. Some other signs are:

- Changes in the cervical mucus.
- Increase libido/increase urge for sex
- Tenderness of the breast
- Swollen vagina.
- Slight decrease of basal body temperature



Differentiate between meiosis I and meiosis II

Meiosis I	Meiosis II
Meiosis I reduces the ploidy level from $4n$ to $2n$.	Meiosis II divides the remaining set of chromosomes from $2n$ to n .
Meiosis I results in two daughter cells	Meiosis II results in four daughter cells.
Meiosis I involves synapses, crossing over and chiasma formation.	Synapses, crossing over and chiasma formation are absent in meiosis II.
Meiosis I involves 46 duplicated homologous chromosomes.	Meiosis II involves 23 duplicated homologous chromosomes.
The chromatids don't split in meiosis I.	The chromatids split in meiosis II.

Discuss the stages involved in fertilization

1. Passage of sperm through the corona radiata:

The glycoprotein coat and seminal protein are removed from the plasma membrane that overlies the acrosomal region of the spermatozoa.

2. Penetration of the zona pellucida:

The acrosomal reaction occurs after the binding to the zona pellucida. The intact acrosome of the sperm binds with the glycoprotein (zona protein 3) on the zona pellucida. The reaction causes the release of hyaluronidase and acrosin enzymes. Once there is penetration of the zona pellucida, the acrosin prevents entry of other sperms.

3. Fusion of the plasma membrane of oocyte and sperm:

The region of the head and tail of the sperm enter the cytoplasm leaving the plasma membrane behind.

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

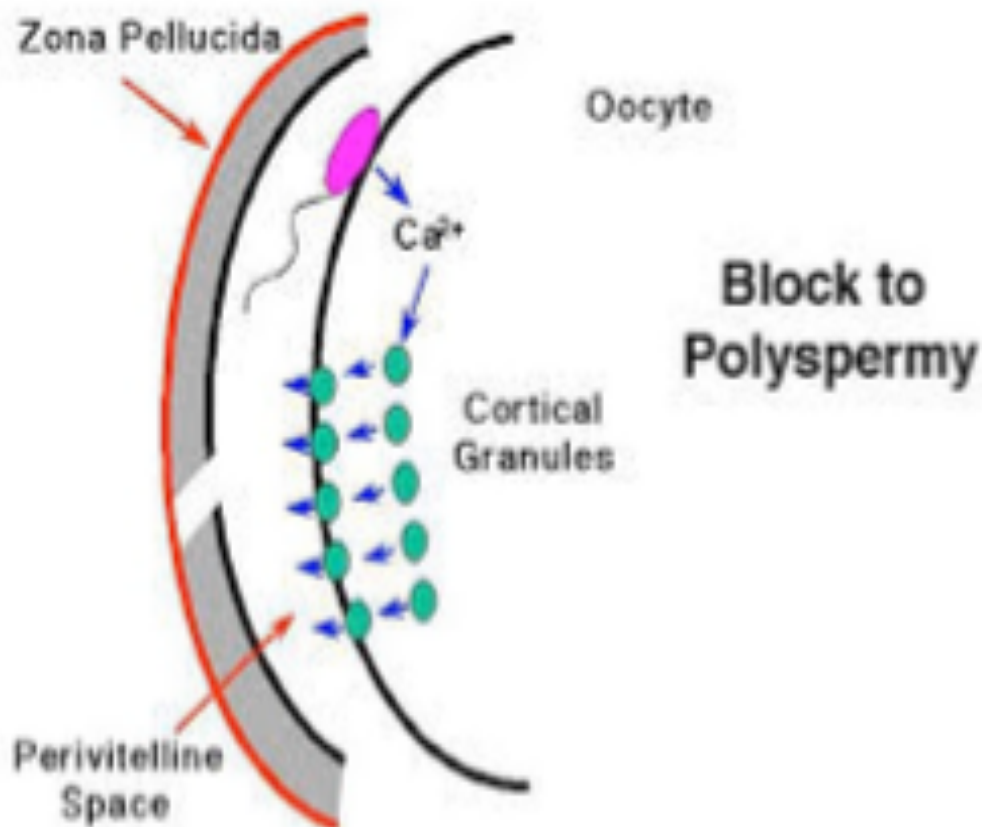
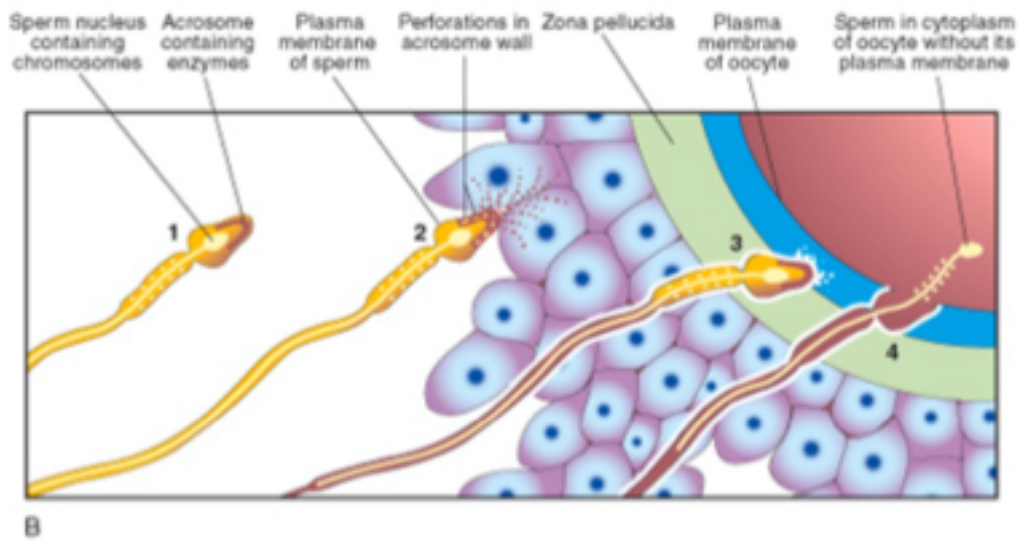
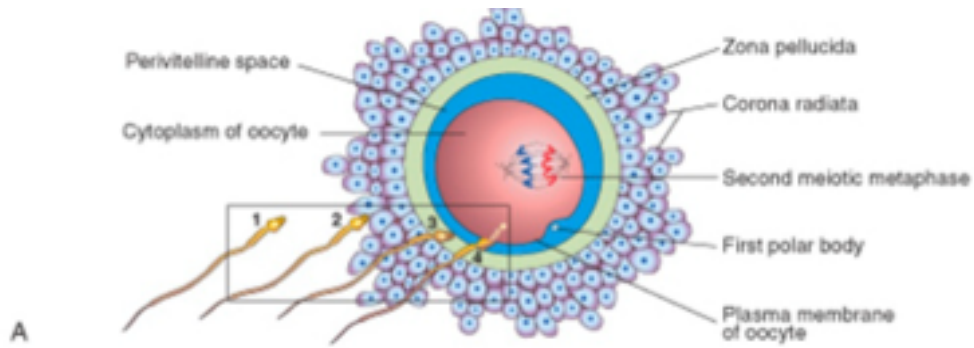
As soon as the head and tail of the sperm enter the cytoplasm, second meiotic division is complete and the female nucleus becomes the female pronucleus.

5. Formation of male pronucleus:

The tail will degenerate while the nucleus will enlarge and become the male pronucleus.

6. Formation of zygote:

The female and male pronucleus form the ootid which develops to form the zygote



Diferenciate between monozygotic and dizygotic twins.

Monozygotic twins	Dizygotic twins
The zygotes are formed by one egg and sperm.	The zygotes are formed by two sperms and two eggs.
They are usually genetically identical.	They are genetically unidentical.
They are usually of the same sex and look alike.	They are usually not of the same sex and don't look alike.
They share the same placenta, chorion and amnion.	They don't share the same placenta, chorion and amnion.
The zygote divides during formation of blastocyst.	The zygote doesn't divide because the embryos develop separately.

