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18/MHS01/009

ANA 205

General Embryology

College Of Medicine And Health Sciences

Medicine And Surgery

1. Discuss ovulation

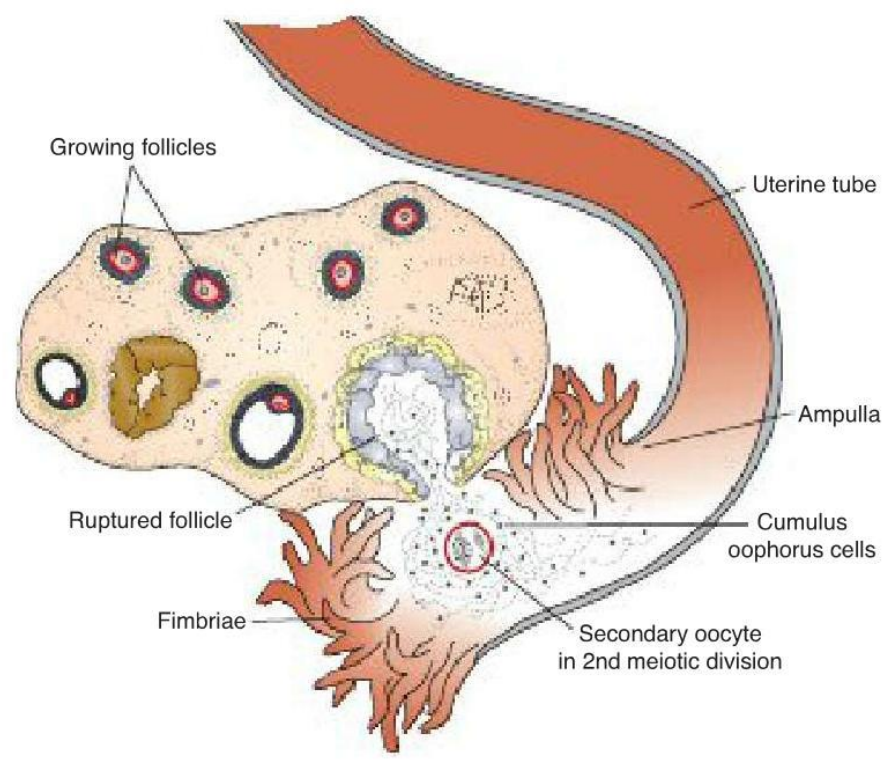
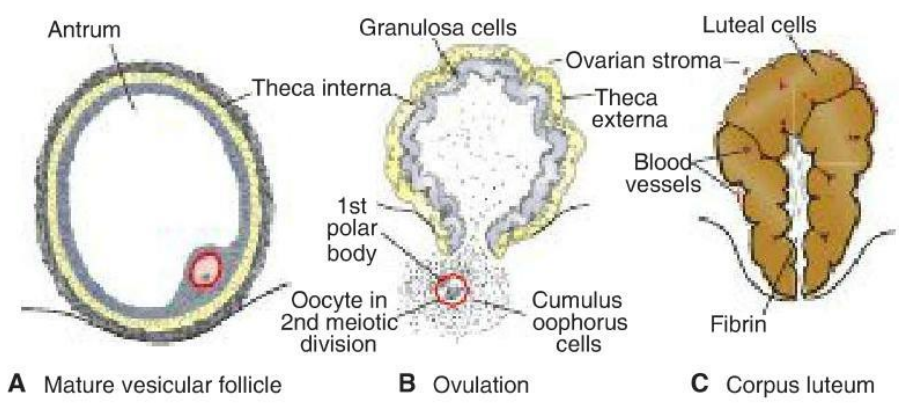
Ovulation is the release of a secondary oocyte from the ovarian follicle. Prior to it, there is an increase in luteinizing hormone (LH).

This increase causes:

- i. The primary oocyte to complete meiosis I
- ii. The follicle to enter the preovulatory mature vesicular stage
- iii. Meiosis II is initiated but arrested in metaphase approximately three hours before ovulation.
- iv. The surface of the ovary begins to bulge locally and an avascular spot called the stigma forms at the apex.
- v. Collagenase is secreted causing the breakdown of collagen fibres around the follicle
- vi. Prostaglandin levels increase and cause local muscular contraction in the ovarian wall. These contractions lead to the expulsion of the oocyte along with surrounding follicular cells, which rearrange to form a corona radiata. This causes ovulation.

The clinical correlation of ovulation is mittelschmerz. It is a pain caused by slight bleeding into the peritoneal cavity during ovulation.

The symptoms of ovulation are generally changes in cervical mucus, increased libido, and tenderness of the breast, swollen vulva and slight drop in basal body temperature.



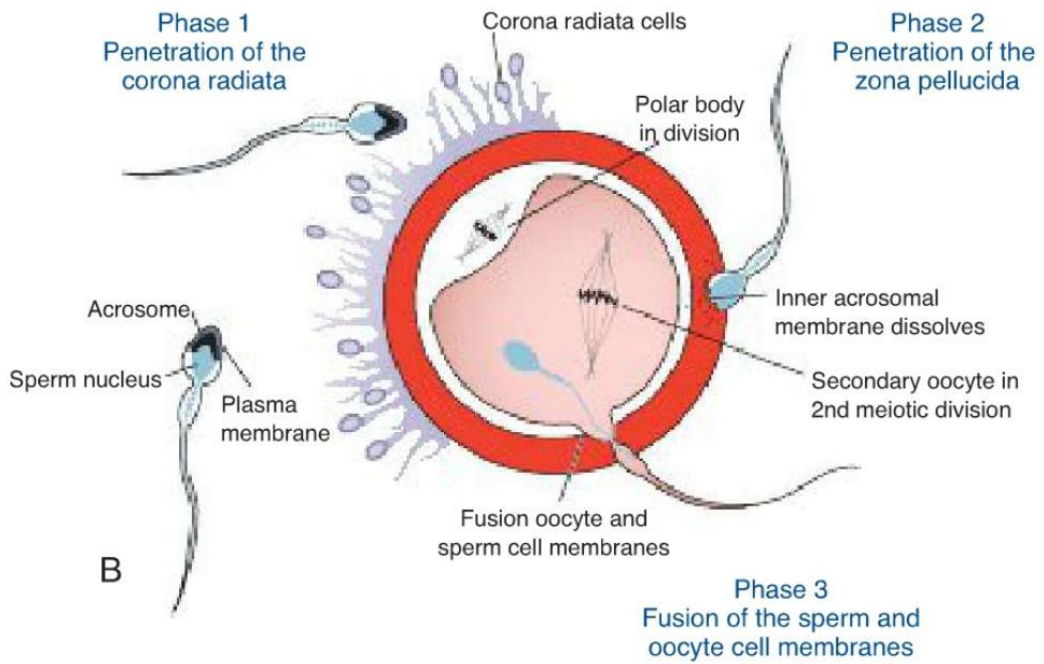
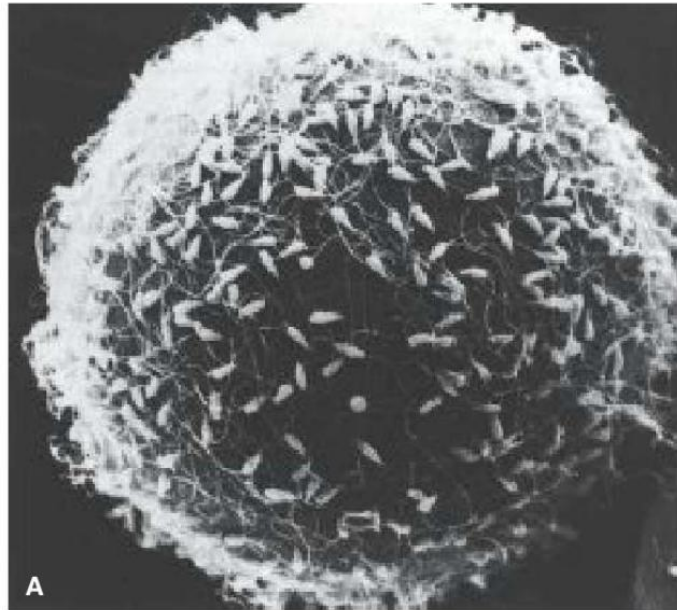
2. Differentiate between meiosis I and II

Meiosis I	Meiosis II
a) Homologous chromosomes separate	a) Sister chromatids separate
b) 2 daughter cells are produced	b) 4 daughter cells are formed
c) Daughter cells are diploid	c) Daughter cells are haploid
d) Crossing over occurs in meiosis I	d) Crossing over does not occur in meiosis II
e) Chiasma is formed	e) No chiasma formation
f) Centromere is not split	f) Centromere is split
g) Chromosomes are double stranded	g) Chromosomes are single stranded
h) Synapses of homologous chromosomes occurs	h) No synapses of chromosomes

3. Discuss the stages involved in fertilization

This is the union of the sperm and oocyte usually at the ampulla of the uterine tube. It takes place over a period of twenty-four hours. It comprises of the following steps:

- i. Passage of a sperm through the corona radiata: Freshly ejaculated sperm undergo a seven-hour process called capacitation where its glycoprotein coat and seminal proteins are removed from the acrosomal membrane. Capacitated sperms release the enzyme hyaluronidase from the acrosome. This enzyme causes the dispersal of the corona radiata.
- ii. Penetration of the zona pellucida: Binding sites exist on the surface of the zona pellucida. The receptors there bind with the acrosome to release acrosin. This enables the sperm to move through the zona pellucida. The cortical granules on the cell membrane close the binding sites of the zona pellucida once a sperm has gotten through the zona pellucida. This prevents polyspermy.
- iii. Fusion of plasma membranes of sperm and oocyte: The plasma membrane of the sperm fuses to the plasma membrane of the oocyte. The inner structures (head and tail) of the sperm go into the cytoplasm leaving behind its plasma membrane.
- iv. Completion of second meiotic division and formation of female pronucleus: As soon as the sperm enters the cytoplasm, second meiotic division is completed. The division gives rise to a female pronucleus and second polar body.
- v. Formation of male nucleus: The sperm tail degenerates and the nucleus left behind enlarges to form the male pronucleus.
- vi. Formation of zygote: The oocyte containing two pronuclei is called an ootid. As the pronuclei fuse, the ootid becomes a zygote.



4. Differentiate between monozygotic and dizygotic twins

Monozygotic Twins	Dizygotic Twins
a) They are genetically and physically identical. b) They are always the same sex c) This occurs from the fusion of a single oocyte and sperm. d) It occurs from a division in the embryoblast. e) They share a common amniotic sac, chorionic sac and placenta.	a) They are genetically and physically different. b) They can be different sexes c) This results from simultaneous ovulation from both ovaries. d) There is no division in the embryoblast. e) They share different amniotic sac, chorionic sac and placenta.