

Name: Osiba Emmanuel Olaoluwa
Department: Medicine and Surgery
Matric number: 18/mhs01/321
Course: Embryology

Assignment

1. *Discuss ovulation*

Ovulation is the release of the secondary oocyte from the ovarian follicle into the Fallopian tube of the uterus.

Somewhere at the middle of the period of the reproductive cycle, there is surge (abrupt increase) in LH (luteinizing hormone) as a result of return of estrogen produced by the follicular cells of the most matured follicle selected for ovulation back to the hypothalamus and the anterior pituitary lobe of the of the pituitary gland. The action of LH includes the following,

- it dilates the blood vessels going towards the graffian follicle.
- it stimulates theca cell surrounding the follicle to produce proteolytic enzymes (collagenase) which helps to break down collagen proteins of the connective tissue surrounding the follicle.

Further development of the follicle makes it bigger and makes it produce a nipple like projection on the surface of the ovary which is approximately 2.5cm in size and the projection is called stigma. The pressure around the stigma increases, blood flow around the area reduces i.e avascular. Blood flow at every other part of the graffian follicle increases which leads to secretion of prostaglandins which further help to dilate blood vessels.

Within few hours (approximately 3 hours before rupture), first meiotic division will end and second meiotic division will commence. A rupture of the follicle occurs at the stigma which will cause the release of the ovum(secondary oocyte) surrounded by corona radiata(formerly known as cumulus oophorus). The ovum is released into the Fallopian tube which earlier acts by mopping the surface of the stigma. The ovum leaves behind the follicular cells and theca cells which will now be called corpus luteum.

2. *Differentiate between meiosis one and meiosis two*

- a. Synapsis, chiasma formation and crossing over takes place in meiosis one but absent in meiosis 2
- b. Meiosis 1 is preceded by interphase while no interphase takes place before meiosis 2
- c. Meiosis 1 takes a longer time compared to meiosis 2
- d. Meiosis 1 starts with a diploid cell and ends in a haploid cell while meiosis 2 begins with a haploid cell and ends up with a haploid cell.
- e. Meiosis 1 ends with two daughter cells while meiosis 2 ends with four daughter cells.

3. *Discuss the stages involved in fertilization.*

Fertilization is the fusion of the sperm and the oocyte to give us a zygote. This process takes place in the ampulla of the uterine tube.

It includes the following stages

- a. **Passage of sperm through the corona radiata:** for sperms to pass through the corona radiata,

there must be the removal of the glycoproteins and seminal plasma proteins from the head of the sperm and this process is called capacitation.

b. **Penetration of the zona pellucida:** the acrosome initiates the acrosome reaction.

Acrosome of the sperm binds with its receptors on the zona pellucida which then cause release of acrosomal enzymes(acrosin) which allows the sperm to pass through the pellucida. As soon as the sperm penetrates the pellucida and moves towards the oocyte membrane, the cortical granules on the membrane of the oocyte releases lysosomal enzymes which will deactivate the binding sites of sperm on the zona pellucida so as to prevent the entry of another sperm or polyspermy.

c. **Fusion of the plasma membrane of the oocyte and the sperm:** the head and the tail of the sperm enters into the ovum leaving behind its cell membrane.

d. **Completion of second meiotic division and formation of female pro nucleus:** As soon the sperm(head and tail only) enters the ovum, the oocyte is activated so that it finishes its second meiotic division and then forms the mature oocyte and the second polar body. The nucleus of the mature oocyte is the female pro nucleus.

e. **Formation of the male pro nucleus:** the male nucleus expands so as to form the male pro nucleus, the tail then degenerates. The male and female pro nucleus are now indistinguishable with each containing haploid (23) number of chromosomes.

f. **Formation of zygote:** The two pro nucleus then fuse together forming the Optus before further forming the zygote.

4. *Differentiate between monozygotic twins and dizygotic twins.*

a. Monozygotic twins involves one sperm and one ovum while dizygotic twins involves two sperms and two ova.

b. In monozygotic twins, the twins are of the same sex while dizygotic twins can occur in same sex or different sex

c. In monozygotic twins, type of placenta depends on the time of splitting of embryo while in dizygotic twins, there is presence of chorionic tissue between two amniotic sac

d. Monozygotic twins is also known as maternal or identical twins while dizygotic twins is also known as fraternal or non identical twins.