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MATRIC NUMBER: 18/MHS01/090

1. Ovulation is the release of a secondary oocyte from the ovarian follicle. It is coincident with the final development of the vesicular follicle. There is an abrupt increase in luteinizing hormone that causes the primary oocyte to complete meiosis I and also causes the follicle to enter the preovulatory mature vesicular stage. Meiosis is also initiated but the secondary oocyte is arrested in metaphase II approximately 3 hours before ovulation. Then the surface of the ovary begins to bulge at the apex and stigma appears. Two events occur for the oocyte to be released and it is called by LH increase which are; increase in collagenase activity which leads to digestion of collagen fibers surrounding the follicle and increase in prostaglandin levels which causes muscular contractions in the ovarian wall. The contraction releases the secondary oocyte and the surrounding follicular cells from the region of the cumulus oophorus out of the ovary. The released follicular cells then re-arrange themselves around the zona pellucida to form the corona radiata.
2. (I) In meiosis 1, synapsis is present WHILE in meiosis 2, synapsis is absent.  
(II) In meiosis 1, crossing over is present WHILE in meiosis 2, crossing over is absent.  
(III) In meiosis 1, there is alignment of 46 homologous duplicated chromosomes at the metaphase plate WHILE in meiosis 2, there is alignment of 23 duplicated chromosomes at the metaphase plate.  
(IV) In meiosis 1, there is separation of 46 homologous duplicated chromosomes from each other WHILE in meiosis 2, there is alignment of 23 duplicated chromosomes at the metaphase plate.
3. Stages of fertilization are:
  - Passage of sperm through the corona radiata
  - Penetration of the zona pellucida
  - Fusion of the plasma membrane of the sperm and the oocyte
  - Completion of the second meiotic division and the formation of female pronucleus
  - Formation of male pronucleus
  - Formation of zygote

**Passage of sperm through the corona radiata:** for sperms to pass through the corona radiata, they must have been capacitated (removal of glycoprotein coat and seminal plasma protein from the plasma membrane that overlies the acrosomal region of the spermatozoa).

**Penetration of the zona pellucida:** on the surface of the zona pellucida there are binding sites. The acrosome binds to the zona pellucida. When the acrosome binds to zona pellucida, it releases acrosin so that the spermatozoan can pass through the zona pellucida. As soon as the head of the sperm comes in contact with the oocyte surface, there will be release of lysosomal enzymes from the cortical granules that lines the surface of the oocyte to close the binding site of the zona pellucida.

**Fusion of plasma membrane of sperm and oocyte:** the plasma membrane of the sperm and oocyte fuse. The head and tail of the sperm enters the cytoplasm but the plasma membrane remains behind.

**Completion of second meiotic division and formation of female pronucleus:** as soon as the sperm enters the region of the oocyte, second meiotic division is completed forming a mature oocyte and second polar body. The nucleus of the mature oocyte is called the female pronucleus.

**Formation of the male pronucleus:** within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus and the tail of the sperm degenerates.

**Formation of zygote:** the male and female pronucleus fuse to form ootid and the ootid becomes zygote.

4. (I) Monozygotic twins form from single zygote WHILE dizygotic twins from two zygotes.  
(II) Monozygotic twins are genetically identical WHILE dizygotic twins are genetically not identical.  
(III) Monozygotic twins are of the same sex WHILE dizygotic twins are of the same sex or of different sex.  
(IV) Monozygotic twins resemblance are similar WHILE dizygotic twin resemblance are just like any other two siblings.  
(V) Monozygotic twins mostly have diamniotic, monochorionic, with single placenta WHILE dizygotic twins mostly have two amnions, two chorions, and two placentas.  
(VI) Monozygotic twins are often called conjoined twins WHILE dizygotic twins are not seen as conjoined twins.  
(VII) Monozygotic incidence is more common WHILE dizygotic incidence is less common.