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Matric No : 18/MHS01/077

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Embryology Assignment

OVULATION: this can be defined as the release of secondary oocyte from the ovarian follicle. Around the middle of the ovarian cycle, under the influence of follicle stimulating hormone and Lutenizing hormone, it undergoes a sudden growth spurt, producing a cystic swelling or bulge on the surface of the ovary. A small avascular spot, the stigma, soon appears on this swelling. Before ovulation, the secondary oocyte and some cells of the cumulus oophorus detach from the distended follicle.

During ovulation, the walls of the uterus also thicken to prepare for a fertilized egg. But if the egg is not fertilized, the uterine lining is shed about two weeks later, causing menstrual flow to begin. But simply having her period does not always indicate that a woman is o Many women have an ovulatory cycle — the buildup of the lining of the uterus — Ovulation is the release of an egg from one of a woman's ovaries. After the egg is released, it travels down the fallopian tube, where fertilization by a sperm cell may occur.

Ovulation typically lasts one day and occurs in the middle of a woman's menstrual cycle, about two weeks before she expects to get her period. But the timing of the process varies for each woman, and it may even vary from month to month.

1. Differences between meiosis 1 and meiosis II

Meiosis I	Meiosis II
1. Homologous chromosome separates	Sister chromatids separate
2. Produces two diploid daughter cells	Produces four haploid daughter cells
3. Crossing over occurs	Crossing over doesn’t occur
4. Reduction division	Equational division
5. Long duration of time	Short duration of time
6. Prophase splits into five sub phases	Prophase doesn’t occur in subphases

7. Sister chromatids of prophase have convergent arm	Sister chromatids of prophase have divergent arm

2. Stages involved in fertilization

A. Passage of sperm through the corona radiata: For sperm to.pass through the corona radiata, it must be capacitated i.e removal of the glycoprotein coat and seminal plasma protein that overlies the acrosomal region of the spermatozoa. The **sperm** first burrow **through** the cells of the **corona radiata**. Then, upon contact with the zona pellucida, the **sperm** bind to receptors in the zona pellucida. This initiates a process called the acrosomal reaction in which the enzyme-filled "cap" of the **sperm**, called the acrosome, releases its stored digestive enzymes.

B. Penetration of the zona pellucida: Passage of a sperm through the zona pellucida is the important phase in the initiation of fertilization. For fertilisation to occur, a spermatozoon needs to cross the zona pellucida, which is a glycoprotein layer surrounding the oocyte. Crossing the zona pellucida requires an acrosome reaction where enzymes released from the spermatozoon head locally digest and soften the Zona pellucida so that the spermatozoon can penetrate deeper. Here, a biomechanical sperm-oocyte interaction model that considers the AR using the finite element method was formulated. The enzyme esterase, acrosin and neuroaminidase appear to cause lysis of the zona pellucida thereby forming a path for the sperm to enter the oocyte.

C. Fusion of the cell.membranes of the oocyte and sperm: The plasma or cell membranes of the oocyte and sperm fuses and break down in the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte but the sperm,s cell membrane and mitochondria remain behind.

D. Completion of the second meiotic division of the oocyte and formation of the female pronucleus: Penetration of the oocyte by a sperm activates the oocyte into.completing the second meiotic division and forming a mature oocyte and a second polar body.

E. 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. During the growth of the pronuclei, they replicate their haploid and two chromatids. The oocyte containing the two haploid pronuclei called an ootid, tge nearly mature oocyte after the first meiotic divisions have been completed. As the pronuclei fuse into the single diploid aggregation of chromosomes, the ootid becomes a zygote. The chromosomes in the zygote become arranged on a cleavage spindle in preparation for cleavage of the zygote.

DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
1. Developed by the splitting of fertilized embryo into two	Developed by two separate simultaneous fertilization event
2. Cause is not known	Caused either by IVF, fertility drugs or hereditary predisposition.
3. Genetic codes are nearly identical	Genetic code is same as other siblings.
4. Gender is the same	Gender is different
5. Blood type is the same	Blood type is different
6. Appearance is extremely similar but may be affected by environmental factors	Appearance is similar like any other siblings
7. One third of the twins in the world are monozygotic	Two third of the twins in the world are dizygotic
8. Can either be a Di-di, mono-di, mono-mono twins	Only Di-di twins
9. Develop one amniotic sac	Develop two separate amniotic sac