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18/MHS01/273

EMBRYOLOGY ASSIGNMENT

1. Discuss Ovulation.

Ovulation is the release of eggs from the ovaries of the female. This events occurs when the ovarian follicles ruptures and releases the secondary oocyte ovarian cells. Ovulation occurs about midway through the menstrual cycle, after the follicular phase, and is followed by the luteal phase. Ovulation is characterized by a sharp spike in the levels of luteinizing hormone(LH) and follicle stimulating hormone (FSH), resulting from the peak of estrogen levels during the follicular phase. The few days surrounding ovulation (from approximately days 10 to 18 of a 28-day cycle), constitute the most fertile phase. The time from the beginning of the last menstrual period is, on average of 14.6 days, but with substantial variation among females and between cycles in any single female, with an overall 95% prediction interval of 8.2 to 20.5 days.

The process of ovulation is controlled by hypothalamus of the brain and through the release of the hormones mentioned earlier and these hormones are secreted in the anterior lobe of the pituitary gland, Luteinizing Hormone(LH) and Follicle Stimulating Hormone(FSH). In the preovulatory phase of the menstrual cycle, the ovarian follicle will undergo a series of transformation called Cumulus expansion, which is stimulated by FSH. After this is done, a hole called stigma will form in the follicle, and the secondary oocyte will leave the follicle through this hole. After ovulation, during the luteal phase, the egg will be available for fertilization by the sperm. In addition, the uterine lining(endometrium) is thickened to be able to receive a fertilized egg. If no conception occurs, the endometrium as well as the blood will be shed during. menstruation.

2. Difference between Meiosis1 and Meiosis 2

MEIOSIS 1	MEIOSIS 2
Homologous chromosomes separates	Sister chromatids separate

Produces 4 haploid daughter cells	Produces 2 diploid daughter cells
Equatorial plane is centered	Equatorial plane is rotated 90 degrees
Crossing over or Genetic recombination occurs	Crossing over or Genetic recombination is absent
Reductive division occurs in meiosis 1	Equational division occurs in meiosis 2
Synapsis and Chiasma formation occurs	Synapsis and Chiasma formation absent
The centromere does not spilt	The centromere will spilt

3. Discuss the stages involved in fertilization

Stages of fertilization includes

a. Passage of a sperm through the corona radiata: for sperms to pass through the corona radiata, they must be capacitated i.e. removal of glycoprotein coat and seminal plasma proteins from the plasma membrane that overlies the acrosomal region of the spermatozoa.

b. Penetration of the zona pelliucida: The zona is glycoprotein shell surrounding the egg that facilitate and maintains sperm binding and induces the acrosome reaction. The intact acrosome of the sperm binds with the zona glycoprotein zona protein 3 on the zona [pellucida, release of acrosomal enzymes acrosin allows sperm to penetrate the zona pellicida, thereby coming in contact with the plasma membrane of the oocyte as soon as the head of a sperm comes in contact with the oocyte surface, the permeability of the zona pellucida changes. Lysosomal enzymes are released when a sperm comes in contact with the oocyte surface.

c. Fusion of plasma membranes of the oocyte and sperm: the plasma membrane of the oocyte and sperm fuse and break down at the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte but the sperm's plasma membrane remains behind.

d. Completion of the second meiotic division of oocytes and formation of female pronucleus: penetration of the oocyte by the sperm activates the oocyte into completing the second meiotic division and forming a mature oocyte and a second polar body. The nucleus of the mature ovum or oocyte is now called the female pronucleus

e. Formation of the male pronucleus: within the cytoplasm of the oocyte, the nucleus of the sperm enlarges to form the male pronucleus and a tail of the sperm degenerates. Since all sperms mitochondria within the zygote are maternal origin i.e. all mitochondrial DNA is of maternal origin. Morphologically, the male and female pronuclei are indistinguishable, the oocyte contains 2 pronuclei, each having haploid number of chromosome (23) and the oocyte containing two haploid pronuclei is called ootid.

f. The 2 pronuclei fuse into a single diploid aggregation of chromosomes, the ootid becomes a zygote

The chromosomes in the zygote becomes arranged on a cleavage spindle in preparation for cleavage of the zygote.

4. Differences between Monozygotic twins and Dizygotic twins

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
They are also called uniovular twins	They are called binovular twins
They are identical twins	They are fraternal or Dichorionic twins
Twins share one placenta	Twins have separate placenta

Incidence is independent of race, age and parity	Incidence is independent of race, age , parity and ovulation inducing drugs
1/3 twins	2/3 twins