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Questions :

- 1).Discuss ovulation
- 2).Differentiate between meiosis 1 and meiosis 2
- 3).Discuss the stages involved in fertilization
- 4).Differentiate between monozygotic and dizygotic twins

Solution

Ovulation

Introduction This is the second stage of the ovarian cycle .This is defined as the release of the mature secondary oocyte. During the post natal development during oogenesis, the cytotstatic factor causes a size of further development at metaphase 11 approximately three hours before ovulation, during this period the oocytes bulges and becomes filled with a vascular spot known as the stigma

Discussion: Two important events occurs before the release of the secondary oocyte which includes

- a) The increase in production of luteinizing hormone due to the increase in estrogen production in the blood approximately 12-36 hours before ovulation
- b) Increase in secretion of prostaglandin hormone

The increase in luteinizing hormone causes a collagenase activity i.e. the weakening of the connective tissue later surrounding the oocyte follicles

The increase in secretion of prostaglandin results into contraction and increases pressure on the ovarian wall resulting into the expulsion of the stigma causes the release of the secondary oocyte (ovulation), cummulus oophorus, ovarian follicle .the cells of the follicle surrounds the oocyte to form the Corona radiata

Differences between meiosis 1 and meiosis 2

Introduction: meiosis 1 is majorly about cell reduction while meiosis 2 is about cell division

Discussion:

Meiosis 1	Meiosis 2
Synapsis occurs at prophase 1	No synapsis
Crossing over occurs at prophase 1	No crossing over
Chiasma is formed at prophase 1	No chiasma formation
At metaphase it involves the alignment of 46 homologous duplicated chromosome	At metaphase it involves the alignment of 23 homologous chromosome
Two daughter cells are formed at telophase	Four daughter cells formed at telophase
The centromere do no split	The centromere splits

Stages involved in fertilization

Introduction: fertilization is the series of events that involves the fusion of the male pronucleus and the female pronucleus to form the ootid which matures into the zygote

Discussion: the stages involved are 6 namely:

- 1) Penetration of corona radiata
- 2) Penetration of zona pellucida
- 3) Fusion of male and female plasma membrane
- 4) Formation of female pronucleus and completion of second mitotic division
- 5) Formation of male pronucleus
- 6) Formation of ootid

Penetration of Corona Radaita : for this to occur, capacitation must first occur. capacitaion is the removal of the glycoprotein and plasma protein substances from the acrosome of the sperm because only capacitated sperm can penetrate the Corona radiata i.e. after capacitation occurs the sperm penetrates the Corona Radaita

Penetration of Zona pellucida : the zona pellucida is a glycoprotein amorphous accelular substance present on the surface of the oocyte. The sperm attached to the receptors on the zona Pellucida secreting an enzyme known as acrosine causing the zona Pellucida to loosen it's rigidity aiding the penetration of the sperm by changing it permeability .As soon as the sperm penetrates a lysosomal enzyme from the cortical granules are released to block further penetration of sperm avoiding dispermy (penetration of two sperms)

Fusion of plasma membrane: The head and tail of the sperm enters the cytoplasmic region of the egg leaving behind its plasma membrane, the plasma membrane and that of the oocyte therefore fuses together and breaks down at site of fusion

Formation of female pronucleus: immediately after the completion of the second mitotic division the pronucleus for female is produced

Formation of male pronucleus: The head of the sperm loses its DNA, mitochondria left with the nucleus, the nucleus therefore becomes the male pronucleus

Formation of ootid: The male and female pronucleus fuses to form an ootid which becomes the Zygote

3) Differences between monozygotic and dizygotic twins

Introduction: monozygotic twins are formed when the sperm fuses with the oocyte to produce Zygote, the zygote then divides. This division occurs during the formation of blastocyst at the region of embryoblast while dizygotic twins are formed two sperms fertilize two oocytes respectively and they are more common than monozygotic twins

Monozygotic twins	Dizygotic twins
They are genetically identical	They aren't identical
They have the same sexes	They can be of different sexes
They share the same placenta	They share different placenta
They share the same amniotic sac	They share different amniotic sac
They share the same chorionic sac	They share different chorionic sac