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18/MHS01/263

Embryology Assignment

1. Discuss Ovulation

Ovulation is the release of a secondary oocyte from the ovarian follicle. A few days before ovulation, the secondary follicle grows rapidly to a diameter of about 25mm and becomes a mature secondary follicle under the influence of Follicle Stimulating Hormone and Luteinizing hormone. The abrupt increase of luteinizing hormone during the final stages of the Graafian follicle that causes:

* The completion of meiosis 1 by the primary oocyte
* The Graafian follicle to enter the preovulatory mature vesicular stage

Meosis 2 is initiated but the secondary oocyte is arrested in metaphase 2 approximately three hours before ovulation but in the meantime, the surface of the ovary begins to bulge at the apex forming the stigma.

The surge in luteinizing hormone causes two events necessary for the release of oocytes:

* There is an increase in prostaglandin levels which causes local muscular contractions in the ovarian wall
* There is an increase in collagenase activity which causes the breakdown of collagen fibres surrounding the follicle

 These events extrude the oocyte from the ovary and some follicular cells rearrange themselves around the zona pellucida to form the corona radiata

1. Differentiate between meosis 1 and meosis 2

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| --- | --- |
| Meiosis 1 | Meiosis 2 |
| Is a reductive division | Is an equational division |
| Crossing over occurs | Crossing over does not occur |
| Duration is long | Duration is short |
| Ends with 2 daughter cells | Ends with 4 daughter cells |
| Homologous chromosome pairs separate | Sister chromatids separate |

1. Discuss the stages involved in Fertilization
* Passage of a sperm through the corona radiata

The follicular cells of the corona radiata surrounding the oocyte are dispersed due to the action of the enzyme hyaluronidase released from the acrosome

* Penetration of the zona pellucida and acrosome reaction

Enzymes released from the acrosome cause lysis of the zona pellucida forming a path for the sperm to enter the oocyte. Once the sperm enters the zona pellucida and the head of the sperm touches the oocyte, the permeability of the zona pellucida changes to prevent other sperms from entering the oocyte.

* Fusion of the cell membranes of oocyte and sperm

The cell membranes of the sperm and oocyte fuse and break down and the head and tail of the sperm enter the cytoplasm of the oocyte.

* Completion of the second meiotic division of the oocyte and formation of the female pronucleus

The penetration of the oocyte by the sperm activates the oocyte into completing the second meiotic division to form a mature oocyte and a second polar body . Following decondensation of the maternal chromosomes the nucleus of the mature oocyte becomes 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

* Formation of the zygote

The male and female pronuclei fuse into a single diploid aggregation and becomes a zygote

1. Differentiate between monozygotic and dizygotic twins

Monozygotic(identical) twins are developed from a single zygote which splits to form two embryos while Dizygotic(fraternal) twins are developed from separate individual eggs which are fertilized by separate sperm cells