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COURSE: EMBRYOLOGY

ASSIGNMENT

1. DISCUSS OVULATION.

Ovulation is the shedding of the ovum from the ovary. The ovarian follicle is at first very small compared to the thickness of the cortex of the ovary. As it enlarges, it becomes so big that it not only reaches the surface of the ovary, but also forms a bulging in this situation. Ultimately, the follicle ruptures and the ovum is shed from the ovary.

For ovulation to occur, the lieutinizing hormone must be present. It causes the primary oocyte to complete MEIOSIS 1. It also makes the follicle enter the preovulatory mature vesicular stage. The secondary oocyte is arrested in MEIOSIS 2 approximately 3 hours before ovulation by the cytostatic factor. The Cumulus Oophorus flows out from the oocyte and surrounds cells and the cell is called CORONA RADIATA.

For the oocyte to be released, 2 events occur which are caused by the LH surge;

1. It increases collagenase activity, resulting in digestion of collagen fibres surrounding the follicle.
2. Prostaglandin levels also increase in response to the LH surge and causes local muscular contraction in the ovarian wall. Those contractions extrude the oocyte.

Just before ovulation, the follicle may have a diameter of 15mm. The stroma and theca on this side of the follicle become very thin. An avascular area appears over most convex point of the follicle. At the same time, the cells of the cumulus oophorus become loosened by accumulation of intercellular fluid between them.

The following factors may lead to ovulation;

1. The increased pressure of fluid in the follicular cavity.
2. Enzymatic digestion of the follicular wall seems to be the main factor responsible for ovulation.
3. DIFFERENCES BETWEEN MEIOSIS 1 AND MEIOSIS 2

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| MEIOSIS 1 | MEIOSIS 2 |
| This is a heterotypic division. | This is a homotypic division. |
| Reduces the chromosome number in the daughter cell. | Equalizes the chromosome number of both parent and daughter cells. |
| Homologous chromosomes are present at the beginning. | Individual, bivalent chromosomes are present at the beginning. |
| Prophase 1, metaphase 1, Anaphase 1, Telophase 1 are the stages involved. | Prophases 2, Metaphase 2, Anaphase 2, and Telophase 2 are the stages involved. |
| Individual chromosomes are present in the daughter nuclei. | Sister chromosomes are present in the daughter nuclei. |
| Chromosomal cross over occurs | No crossing over. |
| A complex division and takes time. | Comparatively less complex and takes a shorter time. |

DISCUSS THE STAGES INVOLVED IN FERTILIZATION.

Fertilization is the union of the sperm and the oocyte. The usual site of fertilization is the Ampulla. It involves various stages which are;

1. Passage of sperm through the corona radiata.
2. Sperm penetrates the Zona Pellucida. The acrosome and the plasma membrane over the head of the sperm disappear. The glycoprotein of the zona pellucida is responsible for the induction of the acrosomal reaction. The release of the acrosomal enzymes helps the sperm to penetrate the zona. Alterations taking place in the plasma membrane of the oocytes and in the zona pellucida ensure that no other spermatozoon can enter the oocyte.
3. Plasma membrane of the oocyte and sperm fuse. Head and tail of sperm enter the oocyte. The plasma membrane of the sperm is left outside the oocyte. The oocyte completes its second meiotic division. When spermatozoon comes in contact with the oocyte, plasma membranes of the two cells fuses. This probably occurs at receptor sites that are specific for a species. Both the head and the tail of the spermatozoon enter the cytoplasm of the ovum.
4. Completion of second meiotic division and formation of female pro nucleus. A sperm enters the oocyte and this completes meiosis 2. At this point a female pro nucleus is formed. The nucleus of the ovum is the female pro nucleus.
5. Formation of male pro nucleus. For the formation of the male pro nucleus, the tail will degenerate and the existing nucleus will become bigger. The head of the spermatozoon is separated from the middle piece and tail, and transforms itself into the male pro nucleus.
6. Formation of zygote. The female pro nucleus and male pro nucleus will undergo fusion to form an ootid which will in turn end up becoming the zygote.

DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

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| MONOZYGOTIC TWINS | DIZYGOTIC TWINS |
| They are developed by the splitting of fertilized embryo into two. | Developed by separate simultaneous fertilization events. |
| Genetic codes are nearly identical. | Genetic codes are same as every other sibling. |
| Gender is the same. | Gender is different. |
| Blood types are the same. | Blood types are different. |
| Appearance is extremely similar but may be affected by environmental factors. | Appearance is similar as any other siblings. |
| Single or double placenta | Double placenta |
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