Name: Pedro Gloria Igoni

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Embryology assignment:

i.Discuss ovulation

ii. Differentiate between meiosis1 and meiosis 2

iii. Discuss stages involved in fertilization

iv. Differentiate between monozygotic and diabetic twins

Ovulation is defined as the release of a mature secondary oocyte from the ovarian follicle.

A few days before ovulation the secondary follicle, under the influence of luteinizing Hormone grows rapidly until it reaches 25mm, then it becomes the mature secondary follicle or the Graafian follicle. Coincident with final development of the mature secondary follicle, there is an abrupt increase in Luteinizing Hormone which causes two events to occur;

1. Meiosis I is completed
2. The follicle enters a pre-ovulatory mature vesicular stage

Meiosis II is initiated but the secondary oocyte is arrested by cytostatic factors. A stigma appears on the surface of the ovary (avascular spot).

For the oocyte to be released, two events occur which are caused by the surge in luteinizing Hormone;

a). it increases collagenase activity, resulting in the digestion of collagen fibres surrounding the follicle

b). prostaglandin levels also increase in response to the surge in Luteinizing Hormone, which causes local muscular contraction in the walls of the ovary to facilitate release of the oocyte.

The cells of the cumulus ophorus floats out alongside the secondary oocyte and rearranges themselves around the zona pellucida of the secondary matured oocyte to form the CORONA RADIATA

2.

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| PROPERTY | MEIOSIS 1 | MEIOSIS 2 |
| DEFINITION | Meiosis 1 is the first cell division of meiosis | Meiosis 2 is the second cell division of meiosis |
| NUMBER OF CELLS PRODUCED | Two daughter cells produced | Four daughter cells produced |
| CHROMOSOME NUMBER | Becomes half | Does not divide into half |
| CROSSING OVER AND GENETIC RECOMBINATION | Crossing over and genetic recombination occurs | Crossing over and genetic recombination does not occur |
| SPLITTING OF CENTROMERE | Centromere does not split | Centromere splits and sister chromatids separate |
| INTERPHASE BEFORE 1 | There is interphase before meiosis1 | There is no interphase between meiosis 1 and 2 |
| NATURE | heterotypic | homotypic |

3. Discuss the stages of fertilization

Fertilization is defined the union of the matured sperm and matured oocyte to produce a zygote.

There are six stages of fertilization;

1. Passage of the corona radiata
2. Penetration of the zona pellucida
3. Fusion of the plasma membrane of the sperm and oocyte
4. Completion of meiosis 2 and production of the female pronucleus
5. Formation of the male pronucleus
6. Formation of the zygote
7. Passage of the corona radiata; the sperm passes the corona radita and capitation occurs. Capacitation is the removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane of the sperm
8. Penetration of the zona pellucida; for penetration to occur, the acrosome will bind with the zona pellucida. The acrosome, secretes lysosomal enzymes called acrosine that assists the sperm’s passage. The binding sites of the zona pellucida, there are some receptors that facilitate binding. On the cell membrane of the oocyte there are cortical granules that signal the zona pellucida to close their binding sites after a sperm has passed.
9. Fusion of the plasma membrane of the sperm and oocyte; the head and the tail of the sperm will enter leaving behind the plasma membrane.
10. Completion of meiosis 2and formation of the female pronucleus: as soon as the head and tail of the sperm enters the region of the oocyte, 2nd meiotic division is completed, the female nucleus becomes the female pronucleus.
11. Formation of the male pronucleus: the tail of the sperm degenerates and the nucleus becomes the male pronucleus. The energy of the zygote is of maternal origin as the tail containing the mitochondria has degenerated.
12. Formation of the zygote; the male and the female pronuclei undergo fusion to form OOTID which develops into the zygote
13. Differentiate between monozygotic and dizygotic twins.

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| Monozygotic twins | Dizygotic twins |
| Gender is different | They may be of different gender |
| They are genetically unidentical | They are genetically identical |
| They share the same placenta, chorionic sac, umbilical cord | They have separate placenta, chorionic sac and umbilical cords |
| They are often called conjoined twins | They are not seen as conjoined twins |
| Monozygotic twins develop from one fertilized embryo splitting into two | Dizygotic twins are developed by two simultaneous fertilisation events |