

1) Discuss ovulation

Ovulation is the release of egg from the ovary and it takes approximately one day. Ovulation is the second stage under the ovarian cycle. Ovulation is triggered by a surge of luteinizing hormone (LH) which is elicited by high level of estrogen, ovulation which coincides with the menstrual cycle occurs monthly except during pregnancy. Follicle stimulating hormone (FSH) also triggers ovulation. The secondary oocyte is released from the ovarian cycle, When the egg is released it travels through the fallopian tube to the uterus. Few days prior to ovulation the secondary follicle becomes mature vesicular/ mature secondary or graafian follicle. In the process of ovulation, the ovarian follicles release the secondary oocyte ovarian cells, the primary oocyte completes meiosis 1. Meiosis 2 is also initiated but the secondary oocyte is arrested approximately 3 hours before ovulation. During ovulation the wall of the uterus thickens and bulge leading to the appearance of the stigma. Other signs of ovulation include; change in cervical mucus, increase in libido, increase in basal temperature

For the oocyte to be released, two events occur due to the surge of luteinizing hormone (LH) , these two events are;

- There is an increase in collagenase activity thereby resulting in the digestion of collagen fibers surrounding the follicle
- Prostaglandin levels also increase in response to the LH surge and cause local muscular contractions in the ovarian wall

Failure to ovulate is known as anovulation and the administration of stimulating gonadotropin agents release and hence ovulation can be employed.

2) Differentiate between meiosis 1 and meiosis 2

| Meiosis 1 | Meiosis 2 |
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| . There is synapses formation, crossing over and chiasma formation | There is no synapses formation, crossing over and chiasma formation |

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| . In metaphase 1 there is alignment of 46 homologous duplicated chromosomes at the equator | In metaphase 2 there is alignment of 23 homologous duplicated chromosomes at the equator |
| . In anaphase 1 there is separation of 46 homologous duplicated chromosomes to 26 homologous duplicated chromosomes, the centromere does not split | In anaphase 2 there is separation of 23 homologous duplicated chromosomes to 23 homologous single stranded chromosomes, the centromere will split |
| . In telophase 1 two daughter cells are formed, 23 homologous duplicated chromosomes | In telophase 2 four daughter cells are formed, 23 single stranded chromatids |

3) Discuss the stages involved in fertilization

Fertilization is the union of the sperm and oocyte and it takes approximately 24 hours. It is the first event to occur during the first week of human development. There are six stages involved in fertilization. They are as follows;

- Passage through the corona radiata: the cell must be capacitated and glycoprotein and cellular plasma protein will be removed from the region of the head of the sperm.
- Penetration of the zona pellucida: acrosome binds with the zona pellucida and will release acrosin which is a lysosomal enzyme. Along the cell membrane there is presence of cortical granule which will close binding sites and receptors by sending signals to the zona pellucida to avoid polyspermy.
- Fusion of the plasma membrane of the sperm and the oocyte: head and tail of the sperm will proceed to enter the cytoplasm of the oocyte.
- Completion of the second meiotic division and formation of the female pronucleus: immediately the head of the sperm enters the cytoplasm of the oocyte the second meiotic division is completed. The female oocyte then forms the female pronucleus.
- Formation of male pronucleus: the tail of the sperm will degenerate while the main nucleus left will enlarge to become male nucleus.

- Formation of zygote: the male female pronucleus will fuse to form ootid which will develop to form zygote.

4) Differentiate between monozygotic twins and dizygotic twins

Monozygotic twins

Dizygotic twins

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| . One zygote divides into two and it is fertilized by one sperm | Two sperm fertilizes two different oocyte |
| . They are genetically alike and look alike | They are genetically unidentical and are fraternal |
| . They have the same sex(gender) | They have different sex(gender) |
| . They share the same placenta, amniotic sac but do not share the same umbilical cord | They do not share placenta, amniotic sac or umbilical cord |
| . They can also be called identical twins | They can also be called fraternal twins |
| . They are less common | They are more common |