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DEPARTMENT: MEDICINE AND SURGERY

LEVEL: 200L

QUESTION:

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

Answers:

1) Ovulation is the release of an oocyte from the ovarian follicle

In a few days before ovulation, under the influence of FSH and LH, the secondary follicle grows rapidly to a diameter of about 25 mm to become mature secondary follicle

Coincident with final development of the secondary follicle, there is an abrupt increase in LH that causes the primary oocyte to complete meiosis I and the follicle to enter the preovulatory mature vesicular stage

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

- I. it increases collagenase activity, resulting in digestion of collagen fibers (connective tissue) surrounding the follicle
- II. Prostaglandin levels also increase in response to the LH surge and cause local muscular contractions in the ovarian wall and those contractions extrude the oocyte, which together with its surrounding follicular cells from the region of the cumulus oophorus and this causes ovulation in which oocyte floats out of the ovary
 - Some of the cumulus oophorus cells then rearrange themselves around the zona pellucida to form the corona radiata

2)

MEIOSIS 1	MEIOSIS 2
Synapsis occurs	Synapsis does not occur
Crossing over occurs	Crossing over does not occur
Chiasma formation is present	Chiasma formation is not present
Homologous chromosomes separate	Sister chromatids separate
2 diploid daughter cells are formed	4 haploid daughter cells are formed

- 3) Fertilization: occurs in the ampulla of the uterine tube it takes 24hrs and there are stages involved.

- Passage of sperm through the corona radiata: For the sperm to penetrate the corona radiata it has to be capacitated (removal of glycoprotein coat and seminal plasma protein from the plasma membrane that overlies the acrosomal region of the spermatozoan)
- Penetration of the zona pellucida: the zona is a glycoprotein shell surrounding the egg. On the zona pellucida there are binding sites. Acrosome contain an enzyme Acrosin. This acrosin allows for penetration of the zona pellucida. There by coming in contact with the plasma membrane of the oocyte. When the head of the sperm comes in contact with the oocyte surface, lysosomal enzymes are released to change the permeability of the zona pellucida so that another sperm will not pass through.
- Fusion of the plasma membrane of the oocyte and sperm: The plasma membrane of the sperm and oocyte fuse together. The head and tail of the sperm enters the cytoplasm of the oocyte, but the plasma membrane of the sperm is left behind.
- Completion on the second meiotic division of the oocyte and formation of the female pronucleus: Penetration of the oocyte by the sperm activates the oocyte into completing the second meiotic division which forms a mature oocyte and second polar body. The nucleus of the mature oocyte is now called the female pronucleus.
- Formation of male pronucleus: Within the cytoplasm of the oocyte the nucleus of the sperm enlarges to form the male pronucleus and the tail of the sperm degenerate.
- Formation of zygote: male pronucleus and female pronucleus fuse to form an ootid which becomes a zygote.

- 4) Monozygotic twins which results from the fertilization of 1 egg and 1 sperm. The fertilized embryo then splits within days after fertilization resulting into 2 individuals which usually share the same chromosomes. Monozygotic twins are also known as identical or maternal twins.

While

Dizygotic twins results from the fertilization of 2 different eggs with 2 different sperms. Dizygotic twins are also known as non-identical or fraternal twins. They normally don't look 100% alike and sometimes have appearances similar to each other in the way non-twins sibling have.

