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18/MHS01/265

EMBRYOLOGY

ASSIGNMENT

1. Discuss Ovulation

Ovulation is the release of a secondary oocyte from the ovarian follicle. Few days before ovulation, under the influence of FSH and LH, the secondary follicle grows rapidly to a diameter of about 25mm to become a mature vesicular/mature secondary or graafian follicle .During the final development of the vesicular follicle, there is an abrupt increase in LH which causes the primary oocyte to complete meiosis 1 and the follicle to enter the preovulatory mature vesicular stage. Meiosis 2 is also initiated but the secondary oocyte is arrested in metaphase approximately 3 hours before ovulation.

In the meantime, the surface of the ovary begins to bulge locally, and at the apex, an avascular spot, the stigma appears. For the oocyte to be released, two events occur which are caused by LH surge; collagenase activity and increased, resulting in digestion of collagen fibers surrounding follicle. Prostaglandin levels also increase and cause local muscular contractions in the ovarian wall.

Those contraction extrude the oocyte, which together with its granulosa cells from the region of the cumulus oophorous causes ovulation in which the oocyte floats out the ovary.

Some symptoms of ovulation are mittelschmerz, changes in cervical mucus, tenderness of breast, increased libido and swollen vagina or vulva

2.

STAGES	MEIOSIS I	MEIOSIS II
PROPHASE	<ul style="list-style-type: none">• Nucleus envelope is disassembled• Synapsis occurs• Crossing over occurs• Chiasma is present	<ul style="list-style-type: none">• Nuclear envelope dissolves• Synapsis is absent• Crossing over is absent• Chiasma is absent
METAPHASE	<ul style="list-style-type: none">• 46 homologous duplicated chromosomes are aligned.	<ul style="list-style-type: none">• 23 duplicated chromosomes are aligned

ANAPHASE	<ul style="list-style-type: none"> • 46 duplicated chromosomes are separated to form 23 duplicated chromosomes • Centromere does not split 	<ul style="list-style-type: none"> • 23 duplicated chromosomes are separated to form 23 single chromosomes • Centromere splits
	<ul style="list-style-type: none"> • It is preceded by inter phase 	<ul style="list-style-type: none"> • No interphase

3. The process of fertilization takes approximately 24 hours. There are six stages involved in fertilization;

a) Passage of sperm through the corona radiata:

For sperms to pass through the corona radiata, they must have been capacitated (removal of the glycoprotein coat and seminal plasma proteins from the plasma membrane that overlies the acrosomal region of the spermatozoa)

b) Penetration of the zona pellucida:

The zona is a glycoprotein shell surrounding the egg that maintains sperm binding and induces acrosome reaction.

Sperm acrosome binds with a zona glycoprotein and releases an enzyme called acrosine which allows the sperm to penetrate the zona pellucid, thereby coming in contact with the plasma membrane of the oocyte.

When the sperm comes in contact with the oocyte surface, the permeability of the zona pellucid changes and lysosomal enzymes are released from cortical granules lining the plasma membrane of the oocyte. These enzymes prevent sperm penetration and inactivate binding sites for spermatozoa on the zona pellucid surface in order to prevent polyspermy.

c) Fusion of Plasma membrane of the oocyte and sperm:

The plasma membrane of the oocyte and sperm fuse and break down at the area of fusion. The head and tail of the sperm enter the cytoplasm of the oocyte but the sperm's plasma membrane remains behind.

d) Completion of the second meiotic division of the oocyte and formation of female pronucleus:

As soon as the head and tail of the sperm enters the oocyte, the second meiotic division is completed and a mature oocyte and a second polar body is formed.

The nucleus of the mature oocyte is now called the female pronucleus.

e) 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 degenerates.

f) Formation of zygote:

The female pronucleus and male pronucleus fuse into a single diploid aggregation of chromosomes to form an ootid which develops into a zygote.

4.

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
They are formed from a single zygote	They are formed from two zygotes
They are genetically identical	They are not genetically identical
They are of the same sex	They can be of the different sex
They have a common amnion	They have two different amnions
They have a single placenta	They have two different placentae
They are monochorionic	They have two chorions
Incidence is more common	Incidence is less common