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COURSE: EMBRYOLOGY

DEPARTMENT/COLLEGE: MBBS/MHS

1. **Discuss ovulation.**

Ovulation is the release of an oocyte from the ovarian follicle to be fertilized. For fertilization to occur two stages which are caused by LH must take place;

1. it increases **collagenase activity**, resulting in **digestion of collagen fibers** (connective tissue) surrounding the follicle

2. Prostaglandin levels also increase in response to the LH surge and cause local muscular contractions in the ovarian wall.

❖ **Note:**

- Ovulation is triggered by a surge of LH production
- Ovulation usually follows the LH peak by 12 to 24 hours
- The **LH surge**, elicited by the high estrogen level in the blood, appears to cause the stigma to balloon out, forming a vesicle.

2. Differentiate between meiosis 1 and meiosis 2

Meiosis 1	Meiosis 2
Chiasma is present in prophase	Chiasma is absent in prophase
Chromosomal crossing over occurs in prophase	Chromosomal crossing over doesn't occur in prophase
Synapses occurs in prophase	Synapses doesn't occur
It is preceded by interphase	It is not preceded by interphase

3. Differentiate between monozygotic and dizygotic twins

Monozygotic twins	Dizygotic twins
They look alike	They don't look alike
They are of the same gender	They are of different gender
They share the same amniotic sack	They don't share the same amniotic sack
They are genetically identical	They are of different genetic make up
They share the same placenta but have two different umbilical cords	They don't share the same placenta

4. Discuss the stages involved in fertilization

Fertilization is the union of the sperm and oocyte (i.e. from when the sperm and oocyte meet to when a zygote is formed). Its usual site of fertilization is the **ampulla** of the uterine tube and fertilization takes 24hours. The stages involved in fertilization are;

1. Passage of the sperm through the corona radiata
2. Penetration of zona pellucida
3. Fusion of plasma membrane of sperm and oocyte

4. Completion of second meiotic division and formation of female pronucleus
5. Formation of male pronucleus
6. Formation of zygote

1. Passage of the 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). During the passage of the sperm through the corona radiata, the sperm loses its membrane, exposing the acrosome which binds with the zona pellucida.

2. Penetration of the zona pellucida: The intact acrosome of the sperm binds with a zona glycoprotein on the pellucida. The acrosome releases an enzyme **acrosin** which allows the sperm to penetrate the zona pellucida, thereby coming in contact with the plasma membrane of the oocyte. As soon as the head of the sperm comes in contact with the oocyte surface, the permeability of the zona pellucida changes.

3. Fusion of plasma membrane of sperm and oocyte:

The plasma or cell membranes 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.

4. Completion of second mitotic division and formation of

female pronucleus: *Penetration of the oocyte by a sperm* activates the oocyte into completing the second meiotic division *and forming a mature oocyte and a second polar body*. The nucleus *of the* mature ovum/oocyte is now called the female pronucleus.

- **5. 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.

6. Formation of zygote.

