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**COLLEGE: MEDICINE AND HEALTH SCIENCES**

**DEPARTMENT: MEDICINE AND SURGERY**

**COURSE: EMBRYOLOGY**

**ASSIGNMENT**

## **1. OVULATION**

Ovulation is the release of a secondary oocyte from the ovarian follicles. A few days before ovulation the secondary follicle grows rapidly under the influence of follicle stimulating hormone and luteinizing hormone to become mature vesicular/mature secondary/ graafian follicle. Coinciding with the final developmental stages of the follicle is an abrupt increase in the luteinizing hormone. This increase 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.

While all these are happening, the surface of the ovary begins to bulge locally and at the apex, an avascular spot called stigma appears. For the oocyte to be released two main events occur which is a result of luteinizing hormone surge, these are;

- i. Increase in collagenase activity resulting in digestion of collagen fibers surrounding the follicle.
- ii. Prostaglandin levels also increase and cause local muscular contractions in the ovarian wall

These contractions extrude the oocyte alongside its surrounding follicular cells from the region of the cumulus oophorus. Some of these cells rearrange themselves around the zona pellucida to form the corona radiata.

## 2. DIFFERENCE BETWEEN MEIOSIS 1 AND 2

	MEIOSIS I	MEIOSIS II
STARTING NO OF CHROMOSOMES	46 homologous duplicated chromosomes	23 homologous duplicated chromosomes
SYNAPSIS	Present	Absent
CROSSING OVER	Present	Absent
CHIASMA FORMATION	Present	Absent
ANAPHASE STAGE	Centromeres do not split	Centromeres split
DAUGHTER CELLS	2 daughter cells	4 daughter cells

## 3. STAGES OF FERTILIZATION

Fertilization is the union of sperm and oocyte. The site of fertilization is the ampulla. This process takes approximately 24 hours. Here six major events occur;

- I. Passage of sperm through the corona radiata: For this to occur the sperm must be capacitated; removal of seminal plasma protein and glycoprotein coat from the plasma membrane that overlies the acrosome.
- II. Penetration of zona pellucida: The zona pellucida is a glycoprotein coat covering the egg. For the sperm to pass through the zona pellucida, the acrosome releases the acrosomal enzyme acrosin to allow permeability. Immediately the sperm enters the permeability of the zona pellucida changes; it won't allow any more sperms in. When a sperm comes in contact with the oocyte surface, the cortical granules lining the plasma membrane of the oocyte releases lysosomal enzymes.
- III. Fusion of plasma membranes of oocyte and sperm: The head and tail of the sperm without its plasma membrane enter the cytoplasm of the oocyte. The membranes of the sperm and oocyte fuse and break down at the area of fusion.
- IV. Completion of second meiotic division of oocyte and formation of female pronucleus: Penetration of oocyte by sperm causes the oocyte to complete meiosis 2 and form a mature oocyte and a second polar body. The nucleus of this mature oocyte is now called female pronucleus.
- V. Formation of male pronucleus: Within the cytoplasm of the oocyte the nucleus of the sperm enlarges to form the male pronucleus and the tail degenerates.

VI. Formation of zygote: the pronuclei fuse into a single diploid aggregate called an ootid. The ootid becomes a zygote.

#### 4. DIFFERENCES BETWEEN MONOZYGOTIC AND DIZYGOTIC TWINS

	MONOZYGOTIC TWINS	DIZYGOTIC TWINS
NO OF SPERMS	One	Two
PHYSICAL IDENTITY	Same	Different
SEX	Same	Different
PLACENTA	Same	Different
AMNIOTIC SAC	Same	Different
CHORIONIC SAC	Same	Different
NO OF OOCYTE	One	Two
GENETIC IDENTITY	Same	Different