**NAME: AFOLABI KING SAMUEL**

**MATRIC NUMBER: 18/MHS01/030**

**DEPARTMENT: MEDICINE AND SURGERY**

**COLLEGE: MEDICINE AND HEALTH SCIENCES**

**COURSE: EMBRYOLOGY**

**OVULATION**

Ovulation can be defined as the release of an oocyte from the Ovarian follicle. It is triggered by the surge of LH production. The secondary follicle grows to become a mature vesicular follicle (Graafian follicle), a few days before ovulation and this occurs under the influence of FSH(follicle stimulating hormone) and LH (luteinizing hormone).

During the final development of the vesicular follicle, the surge in LH causes the following;

* The primary oocyte completes meiosis 1
* The follicle enters the preovulatory mature vesicular stage.

The secondary oocyte is arrested at metaphase stage of meiosis 2 approximately 3 hours before ovulation.

The surface of the ovary begins to bulge locally, and at the top, the stigma(an avascular spot) appears. The surge in LH causes 2 events to occur, which enable the oocyte to be release. The events are;

* It increases collagenase activity, resulting in digestion of collagen fibers surrounding the follicle.
* Prostaglandin levels increase and cause local muscular contractions in the ovarian wall which pushes out the oocyte from the ovary(Ovulation).

The oocyte is released together with its surrounding follicular cells to form the cumulus oophorus. The corona radiata is formed by some of the cumulus oophorus cells.

**2. THE DIFFERENCES BETWEEN MEIOSIS I AND MEIOSIS II**

|  |  |  |
| --- | --- | --- |
|  | **MEIOSIS I** | **MEIOSIS II** |
| 1 | It is a reductive division | It is an equational division |
| 2 | The number of chromosomes is reduced to half | The number of chromosomes remains the same |
| 3 | Crossing over occurs | Crossing over does not occur |
| 4 | Two daughter cells are formed | Four daughter cells are formed |
| 5 | Cells produced are diploid(2n) | Cells produced are haploid(n) |
| 6 | 46 homologous duplicated chromosomes undergo meiosis 1 | 23 duplicated chromosomes undergo meiosis II |
| 7 | Synapsis occurs | Synapsis does not occur |
| 8 | It is a complicated and long duration division | It is a simple and short duration division |
| 9 | The chromosomes remain in the replicated state | The two chromatids of a replicated chromosome separate |

**FERTILIZATION AND ITS EVENTS**

Fertilization is a series of coordinated events that includes the following stages;

1. **Passage of the sperm through the corona radiata**: For a sperm through pass through the corona radiata it must be capacitated (removal of the glycoprotein coat and the seminal plasma proteins from the plasma membrane overlying the acrosomal region of the spermatozoa)
2. **Penetration of the sperm through the zona pellucida:** The zona pellucida is a glycoprotein shell that surrounds the egg. It facilitates and maintains sperm binding, and also induces acrosomal reaction.

The intact acrosome of the sperm binds to a zona glycoprotein( zona protein 3) on the zona pellucida. The Acrosome then secretes an enzyme called Acrosin which enables the sperm to pass through the zona pellucida, thereby coming in contact with the plasma membrane of the egg. The permeability of the zona pellucida changes immediately a sperm contacts the membrane of the oocyte. The cortical granules lining the membrane of the oocyte secrete lysosomal enzymes. This enzyme alter the properties of the zona pellucida to;

* Prevent sperm penetration
* Inactivate binding site for spermatozoa on the zona pellucida

1. **Fusion of the plasma of the sperm and the oocyte:**

The plasma membrane of the oocyte and the sperm fuse and break down at the area of fusion. The head and the tail of the sperm enters the cytoplasm of the oocyte but the plasma membrane of the sperm is left behind.

1. **Completion of the second meiotic division and the formation of the female pronucleus:**

The penetration of the oocyte by the sperm activates the oocyte to complete the second meiotic division to form a mature oocyte and a secondary polar body. The nucleus of the mature ovum or oocyte is called the Female pronucleus.

1. **Formation of the male pronucleus:**

In the cytoplasm of the oocyte nucleus of the sperm enlarges to form the male pronucleus and the tail degenerates.

1. **Zygote formation:**

The female and male pronuclei fuse and give rise to the Ootid. The ootid forms the zygote.

**NOTE:** The usual site of fertilization is the ampulla of the uterine tube ant the fertilization process takes approximately 24hours.

DIFFERENCES BETWEEN MONOZYGOTIC TWINS AND DIZYGOTIC TWINS

|  |  |  |
| --- | --- | --- |
|  | **MONOZYGOTIC TWINS** | **DIZYGOTIC TWINS** |
| 1 | A single sperm fuses with a single oocyte | Two different sperms fuse with two different oocytes |
| 2 | The zygote divides at the stage of Blactocyst | The zygote does not divide |
| 3 | The Embryoblast divides | The embryoblast does not divide |
| 4 | They are genetically identical | They are genetically unidentical |
| 5 | They share the same chorionic sac | They have different chorionic sacs |
| 6 | They share the same placenta | They have different placentas |
| 7 | They share the same amniotic sac | They have different amniotic sacs |
| 8 | They have the same sex | They are of different sex |
| 9 | They look alike | They do not look alike |