

NAME: AGOYI RUTH ONIZE

MATRIC NUMBER: 18/mhs01/039

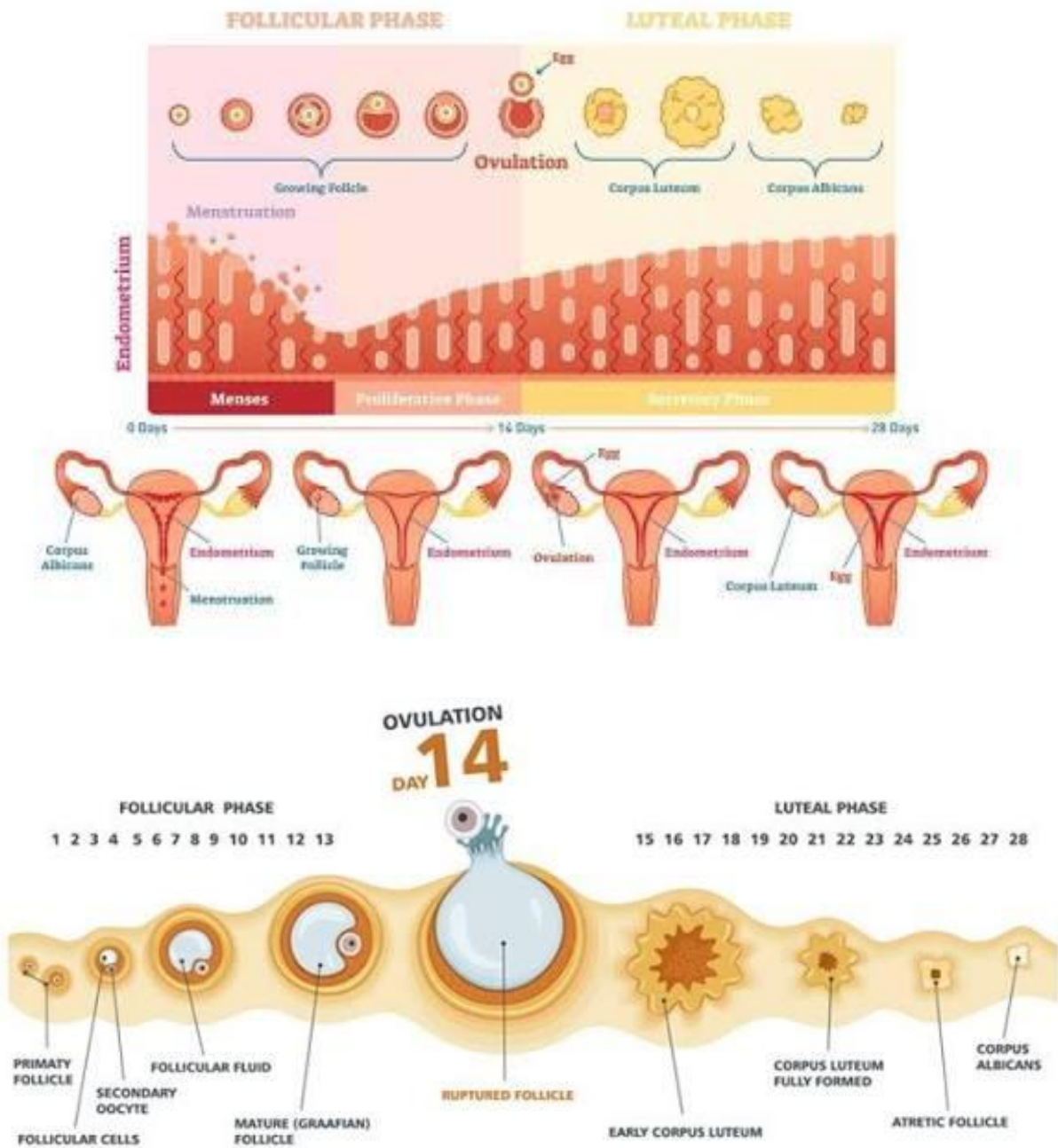
COURSE: EMBRYOLOGY

QUESTION1: DISCUSS OVULATION

Ovulation is the process by which the ovarian follicle releases an oocyte. The follicle stimulating hormone triggers the release of the ovarian follicle while the luteinizing hormone triggers the final stages of maturation of the ovarian follicle and also triggers ovulation. When there is an increase in luteinizing hormone, the primary oocyte completes meiosis1 and causes the follicle to enter the preovulatory mature vesicular stage. Before the release of the oocyte can happen, two events must occur and they are the increase in collagenase activity which would cause the digestion of collagen fibres around the follicle and also the increase in prostaglandin levels which induces contraction of the ovarian walls so that the oocyte can come out of the cumulus oophorus. When it is out of this place, the oocyte floats and moves freely in the ovary then, it is said that ovulation has occurred. The ovarian cycle goes hand in hand with the menstrual cycle. In a normal 28 days menstrual cycle, ovulation occurs on the 14th day

after the end of menstruation.

FEMALE SEXUAL CYCLE



Signs of ovulation are increase in basal body temperature, increase in cervical mucus, increased sexual desire, breast tenderness, e.t.c.



when an oocyte is produced and is not fertilized, the oocyte degenerates in 24 to 48 hours and the corpus luteum turn to corpus luteum of menstruation but if the oocyte is fertilized, it turn to corpus luteum of pregnancy.

CLINICAL SIGNIFICANCE

- The pain felt during ovulation is known as mittelschmerz. When ovulation occurs, it may result into slight bleeding into the peritoneal cavity, hence, causing a pain in the lower abdomen.
- When a woman isn't ovulating, it is called anovulation which is caused by low concentration of gonadotropin. Gonadotropin releasing hormones trigger the production of follicle stimulating hormone and luteinizing hormone and the follicle stimulating hormone produces the ovarian follicle which produces the oocyte. Drugs can be taken to increase the concentration of gonadotropin
- Five days before ovulation is considered the fertile days because the sperm can stay in the body for up to 5 days before it dies but the day before ovulation and the ovulation day are the most fertile days for a woman with no health conditions.

QUESTION 2: DIFFERENTIATE BETWEEN MEIOSIS1 AND MEIOSIS2

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

Synapsis occurs	Synapsis does not occur
Reductive division takes place	Equal division takes place
Meiosis one has a longer duration	Meiosis 2 has a short duration

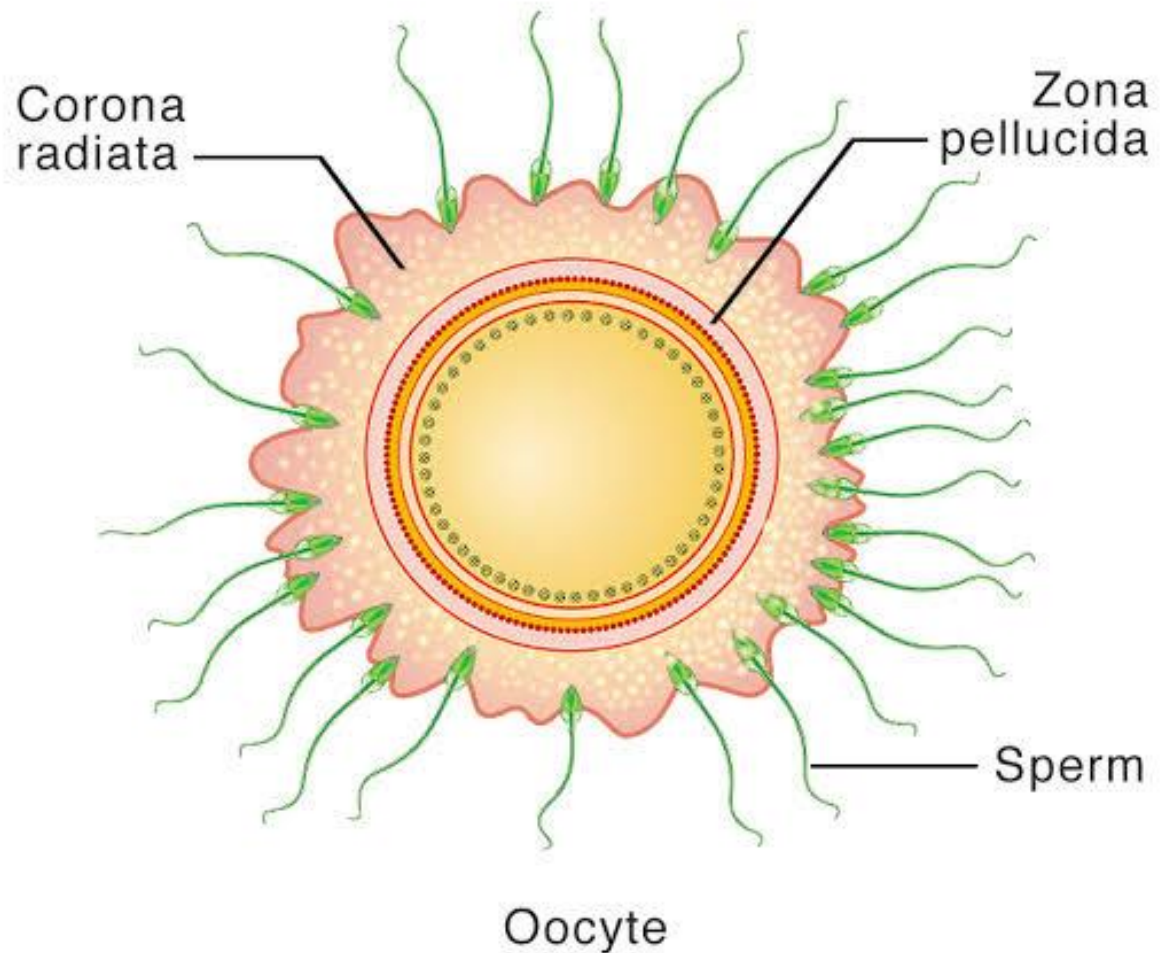
QUESTION3: DISCUSS THE STAGES INVOLVED IN FERTILIZATION

Fertilization occurs when a mature sperm cell unites with a mature oocyte. Fertilization takes place at the ampulla of the uterine tube and it happens at approximately 24 hours after the unity of the sperm and egg. There are 5 stages involved in fertilization:

- Passage of sperm through the corona radiata
 - Penetration of the zona pellucida
 - Fusion of plasma membrane of the oocyte and the sperm cell
 - Completion of second meiotic division and formation of the female pro nucleus
 - Formation of male pro nucleus
 - Fusion of the male and female pronucleus to form an ootid
1. Passage of sperm through the corona radiata: only capacitated sperms are allowed to pass freely through the corona radiata. The

ovum secretes factors that attract capacitated sperm.

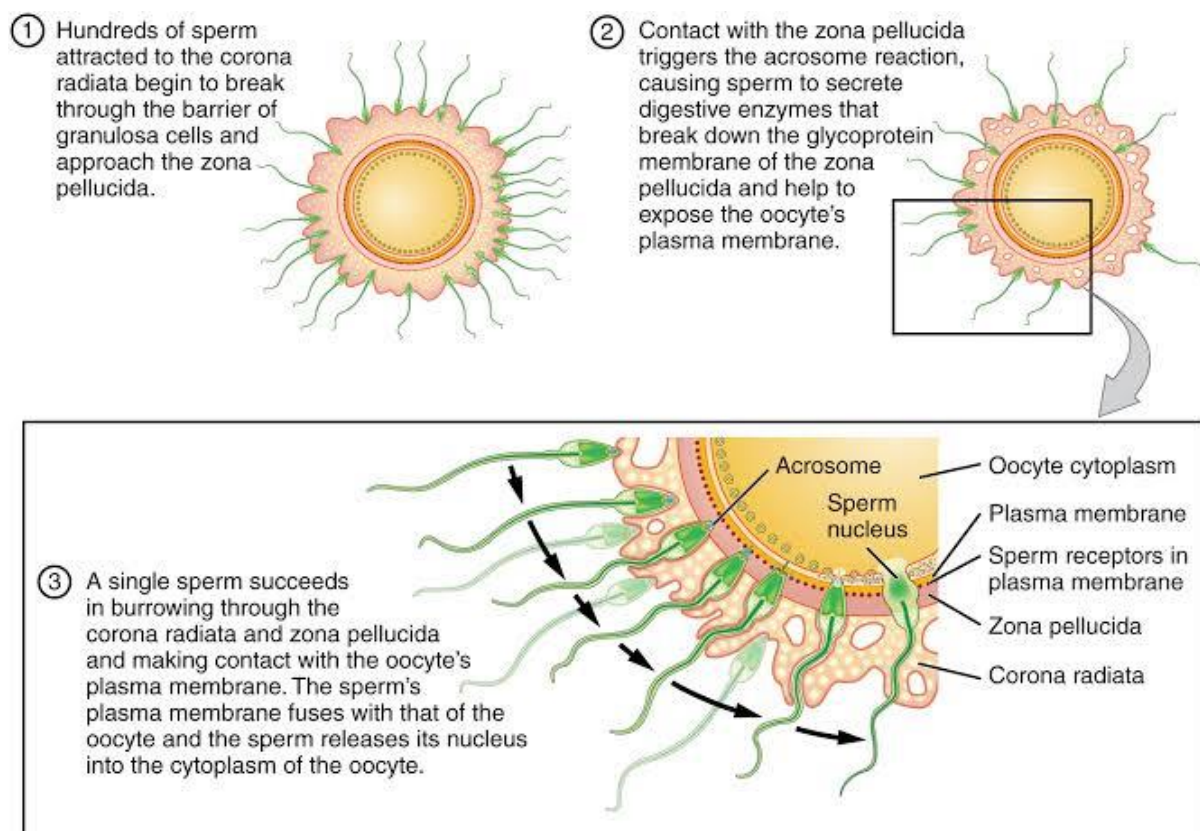
Fertilization



Capacitated sperm penetrate the corona radiata and zona pellucida of the oocyte.

2. Penetration of zona pellucida: this is a relatively thick extracellular glycoprotein coat that surrounds a mature ovum and it is responsible for maintaining sperm binding and also inducing acrosomal reaction. The zona pellucida has a ZP3 glycoprotein. Receptors on the sperm plasma membrane attach to ZP3 and this attachment allows the sperm to adhere to the zona pellucida and this is a very important step for fertilization. When an acrosomal

enzyme called acrosin is released, the sperm is allowed to penetrate the zona pellucida and then it can come in contact with the plasma membrane of the oocyte. Once the head of the sperm comes in contact with the oocyte, it changes the permeability of the zona pellucida. When the sperm comes in contact with the oocyte, a lysosomal enzyme is released from the cortical granules lining the plasma membrane of the oocyte. These enzymes then change the properties of the zona pellucida to prevent sperm penetration and inactivate the binding sites for spermatozoa on the zona pellucida surface and also allow only one sperm to penetrate the oocyte.



3. Fusion of the plasma membranes of the oocyte and sperm: the plasma membrane of the sperm and the plasma membrane of the oocyte fuse and break down at the area of fusion. The head and tail of the plasma membrane enter into the cytoplasm of the cell but the plasma membrane is left behind because it is not needed at this stage.
4. Completion of the second meiotic division of the oocyte and formation of the female pronucleus: when the sperm penetrates the oocyte, it triggers the completion of the second meiotic division

and thereby forming a secondary oocyte and a second polar body. The nucleus of the secondary oocyte is now the female pronucleus.

5. Formation of the male pronucleus: when the sperm penetrates the oocyte, the tail of the sperm degenerates and the nucleus of the sperm enlarge to become the male pronucleus.
6. Fusion of the male and female pronucleus to form an ootid: when the two pronuclei are formed, each of them would have a haploid number of chromosomes which is called an ootid. The haploid chromosomes then fuse into a diploid aggregation of chromosomes which then becomes a zygote.

CLINICAL SIGNIFICANCE:

- Surrogate mothers: this is a case whereby a woman can produce mature oocyte but she can't become pregnant or carry a baby due to maybe hysterectomy. The mature oocyte is then fertilized in vitro and then it is placed in the uterus of another woman to carry the pregnancy.

QUESTION 4: DIFFERENTIATE BETWEEN MONOZYGOTIC TWINS AND DIZYGOTIC TWINS

MONOZYGOTIC TWINS	DIZYGOTIC TWINS
They develop from one egg which was fertilized by one sperm cell	They are developed from two different eggs and two different sperm cell
They may or may not share the same placenta or amniotic sac	They have two different placentas and amniotic sacs
They have exactly identical DNA	They do not have identical DNA
They are also called identical twins	They are also called fraternal twins
They are always the same gender	They can be different genders
They always have the same blood type	They may have different blood types
They have a higher risk of twin-to-twin transfusion syndrome	They have a low risk of twin-to twin transfusion syndrome