NAME: AJOGI MARY FAITH

MATRIC NO :18/MHS01/048

OVULATION

In humans, ovulation occurs about midway through the menstrual cycle, after the follicular phase. The few days surrounding ovulation (from approximately days 10 to 18 of a 28-day cycle), constitute the most fertile phase. The time from the beginning of the last menstrual period until ovulation is, on average, 7 days. The process of ovulation is controlled by the hypothalamus of the brain and through the release of hormones secreted in the anterior lobe of the pituitary gland, luteinizing hormone (LH) and follicle-stimulating hormone (FSH). Ovulation is triggered by a spike in the amount of FSH and LH released from the pituitary gland, the follicular phase (or proliferative phase) is the phase of the menstrual cycle during which the ovarian follicles mature. The follicular phase lasts from the beginning of menstruation to the start of ovulation.

Ovulation: Estrogen levels peak towards the end of the follicular phase. This, by positive feedback, causes a surge in levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH). This lasts from 24 to 36 hours, and results in the rupture of the ovarian follicles, causing the oocyte to be released from the ovary. Through a signal transduction cascade initiated by LH, proteolytic enzymes are secreted by the follicle that degrade the follicular tissue at the site of the blister, forming a hole called the stigma. The secondary oocyte leaves the ruptured follicle and moves out into the peritoneal cavity through the stigma, where it is caught by the fimbriae at the end of the fallopian tube. After entering the fallopian tube, the oocyte is pushed along by cilia, beginning its journey toward the uterus.

By this time, the oocyte has completed meiosis I, yielding two cells: the larger secondary oocyte that contains all of the cytoplasmic material and a smaller, inactive first polar body. Meiosis II follows at once but will be arrested in the metaphase and will so remain until fertilization. The spindle apparatus of the second meiotic division appears at the time of ovulation. If no fertilization occurs, the oocyte will degenerate between 12 and 24 hours after ovulation. Approximately 1-2% of ovulations release more than one oocyte. This tendency increases with maternal age.

Clinical correlations

Females near ovulation experience changes in the cervical mucus, and in their basal body temperature. Furthermore, many females experience secondary fertility signs including Mittelschmerz (pain associated with ovulation).

2) differences between meiosis 1 and meiosis 2

MEIOSIS 1	MEIOSIS 2
homologous chromosomes pair separate	sister chromatids separate
produces 2 diploid daughter cells.	produces 4 haploid daughter cells
Genetic recombination (crossing over)	No crossing over
Prophase split into 5 sub-phases	Prophase does not have sub-phases
Longer duration	Short duration
Sister chromatids in prophase have convergent arms	Sister chromatids in prophase have divergent arms

3) Stages of fertilization

Ampulla: Fertilization occurs in the ampulla, the section of the oviduct that curves around the ovary. Capacitated sperm are attracted to progesterone, which is secreted from the cumulus cells surrounding the oocyte. Progesterone binds to the receptor on the sperm membrane and increases intracellular calcium levels, causing hyperactive motility. The sperm will continue to swim towards higher concentrations of progesterone, effectively guiding it to the oocyte.

Corona radiata: The sperm binds through the corona radiata, a layer of follicle cells on the outside of the secondary oocyte. Fertilization occurs when the nucleus of both a sperm and an egg fuse to form a diploid cell, known as zygote. The successful fusion of gametes forms a new organism.

Cone of attraction and perivitelline membrane: Where the spermatozoan is about to pierce, the yolk is drawn out into a conical elevation, termed the cone of attraction or reception cone. Once the spermatozoon has entered, the peripheral portion of the yolk changes into a membrane, the perivitelline membrane, which prevents the passage of additional spermatozoa.

Sperm preparation: At the beginning of the process, the sperm undergoes a series of changes, as freshly ejaculated sperm is unable or poorly able to fertilize. The sperm must undergo capacitation in the female's reproductive tract over several hours, which increases its motility and destabilizes its membrane, preparing it for the acrosome reaction, the enzymatic penetration of the egg's tough membrane, the zona pellucida, which surrounds the oocyte.

Zona pellucida: After binding to the corona radiata the sperm reaches the zona pellucida, which is an extra-cellular matrix of glycoproteins. A special complementary molecule on the surface of the sperm head binds to a glycoprotein in the zona pellucida. This binding triggers the acrosome to burst, releasing enzymes that help the sperm get through the zona pellucida.

Some sperm cells consume their acrosome prematurely on the surface of the egg cell, facilitating the penetration by other sperm cells. As a population, sperm cells have on average 50% genome similarity so the premature acrosomal reactions aid fertilization by a member of the same cohort

4)differences between Monozygotic Twins and Dizygotic Twins

Monozygotic Twins	Dizygotic Twins
May have the same physical and mental characteristics	May look alike or different; may behave similarly or differently
Developed from a single egg which was fertilized by a single sperm cell	Developed from two eggs fertilized by two different sperm cells
Have almost identical genetic profile	Completely different genetic profile
Two foetuses grow in the same placenta	Two foetuses grow in two different membranes
Always of the same sex	May be of the same or opposite sex
Also called “identical twins”	Also called “fraternal twins”