Development and maturation of the female gametes

Functions of the Female reproductive system

- Production of ovum,
- Fertilization of male and female gametes,
- Nutrition of the embryo and fetus,
- Secretion of hormones,
- Birth.

Female Genital Organs: Ovaries, oviduct, uterus, cervix, vagina, vulva.

Ovaries are a pair of organs, are found in the right and left abdominal cavity.

OOGENESİS

- Oogenesis is the process of development of female gametes (also called ova or eggs), that takes place in ovaries. The process of oogenesis begins before birth with the formation of diploid germ cells, called oogonia that have the ability to develop into mature ova.

OVARY

-The ovary consists of two parts: Cortex and medulla

-Cortex includes corpus luteum, interstitial cells various development stages of follicles, and connective tissue.

-Ovary produces progesterone and estrogen hormones.

Oogenesis

- **Oogenesis** is the formation and development of ova.
- There are constituted proliferation, growth, and maturation stages.
- When the primitive germ cells come to draft of gonads, they are differentiate into the oogonia.
- The oogonia are increased their number with mitotic divisions.
- Some oogonia grow and turn into primary oocytes.
- They are replicated their DNA. These primary oocytes are arrested in prophase I until sexual maturity is achieved.
- They hug by squamous epithelium and are formed primordial follicles.

Oogenesis

- An ovarian follicle consists of an oocyte surrounded by one or more layers of **follicular** cells.
- The follicles that are formed during fetal life—**primordial follicles**—consist of a primary oocyte enveloped by a single layer of flattened follicular cells.
- These follicles are found in the superficial layer of the cortical region in the ovary.
- The oocyte in the primordial follicle is a spherical cell about 25 µm in diameter. Its nucleus is large and has a large nucleolus.
- These cells are in the first prophase of meiosis.
- The chromosomes have mostly uncoiled and have not stain intensely.

Oogenesis

- Growth stage begins with puberty.
- Primary oocytes of primordial follicles are growing.
- Firstly, oocyte surrounded the single layer of flattened follicular epithelium. After a while this epithelium becomes cubic, then becomes columnar and then becomes multilaminar by mitosis.
- Thus, in this period, with the effect of FSH and LH, from the primordial follicles develop to the primary follicle, antral follicle, and graafian follicle respectively. .

Oogenesis

- Maturation stage means reduction or maturation division (meiosis). It is a special form of cell division.
- A cell division is comprised two steps: **first** and **second maturation divisions**.
- First maturation division is completed just before ovulation.
- The chromosomes are equally divided between the daughter cells.
- But almost all of the cytoplasm remains in one of the two daughter cells, which becomes a secondary oocyte.

Oogenesis

- The other daughter cell has half of the chromosomes, but it has very little cytoplasm is called a polar body.
- The polar body is not a functional oocyte, instead, it degenerates and dies.
- As a result of this division, the secondary oocyte (oocyte II) and the first polar body (polosit I) is formed.

- Second maturation division is completed after ovulation, during the entrance of spermatozoa into the oocyte II in the tuba uterina.
- Results of this division, from the secondary oocyte occur to mature egg cell (ovum) with haploid chromosome and the second polar body (polosit II).
- Thus, at the end of the maturation divisions, from one primary oocytes occurs a matured egg cell (ovum) and two polar bodies.
- In spermatogenesis, the sister cells are fully developed, are of equal size and exhibit the same characteristics.

  For this reason, from one primary spermatocyte form four mature male spermatozoa.

- Polar bodies have less cytoplasm.
- They cannot develop to the ovum.
- They are not suitable for fertilization so they have degenerate later.
- Therefore, during the oogenesis, from one primary oocyte occurs one mature egg cell (ovum) as a result of the meiotic divisions.

- A newborn female has about two million primary oocytes in the ovaries; however, most of them would degenerate during the childhood.
- At puberty, nearly 400,000 primary oocytes are found in ovaries.
- Approximately, 400 primary oocytes would be secondary oocytes and they will undergo ovulation, during the reproductive period.

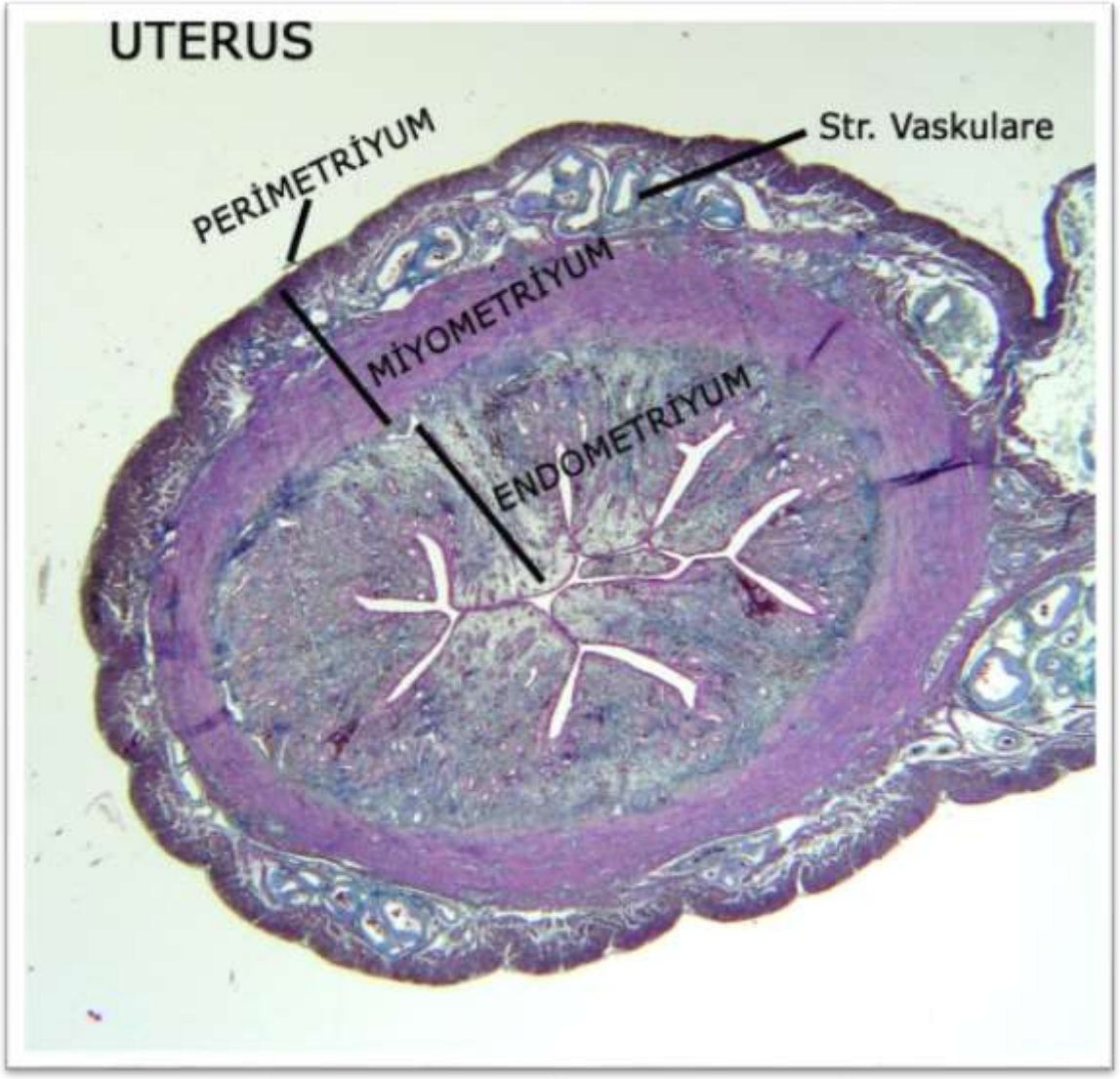
Mature female germ cell (ovum)

- During the ovulation, oocyte II is discarded from the ovary.
- The female germ cell is approximately 150-200 micron in diameter, very rich in nutrients.
- It is a large cell.
- The oocyte does not move actively. However, with the help of the cilial epithelium and secretion of secretory epithelium of the tuba uterina, they have passive motion.
- The cytoplasm of the oocyte is rich in all the nutrients necessary for the zygote.
- Cytoplasm contains proteins, carbohydrates, lipids, minerals, vitamins and lipochromes pigment. A portion of cytoplasm containing nutrient is called vitellus (lecithus).

- The plasma membrane of the oocyte II has microvilli. But microvilli disappear at ovum.
- Oocyte II is surrounded by a thick membrane (zona pellucida) which is containing homogeneous glycoprotein.
- Outside of this membrane has columnar epithelial cells, called the corona radiata.
- The zona pellucida is made of by corona radiata cells and oocytes.

- Corona radiata cells are sent microvilli to the oocyte. And they establish close relationships with cytoplasmic extensions from oocytes.
- During fertilization, corona radiata is destroyed and sperm enters the egg cell.
- The life of oocytes II is about 24-48 hours.
- If no fertilization, ovocyte II will degenerate and die.

- In the female reproductive system, oviduct is the nearest organ to the ovarium.
- The oviduct epithelium consists of single layer of columnar cells. These cells are two types: Ciliated cells and secretory cells.
- Depending on the amount of circulating estrogen, cilia formation is increased.
- Secretory cells increase depending on the effects of progesterone.
- Secretory cells provide nutrition of ovum and spermatozoon capacitation.
- Oocyte II, moves through the oviduct to the uterus.
- Ovum nucleus is round.
- The nucleus is painted in light colors because it has an euchromatic structure.
- The nucleolus is located in the nucleus.



- The uterine wall consists of endometrium myometrium and perimetrium layers.
- Endometrium, which is synchronized with the estrus cycle, exhibits structural changes.

KAYNAKLAR

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