Reproductive system, include a group of tissues, glands, and organs involved in producing offspring (children).

The male reproductive system

Anatomy of the male reproductive system

The male reproductive system includes:

I. The testicles, are a pair of ovoid organs (4-5 cm) in size located in the scrotum. The testis divided into a number of lobules. Each lobule consist of tightly coiled seminiferous tubules**.**

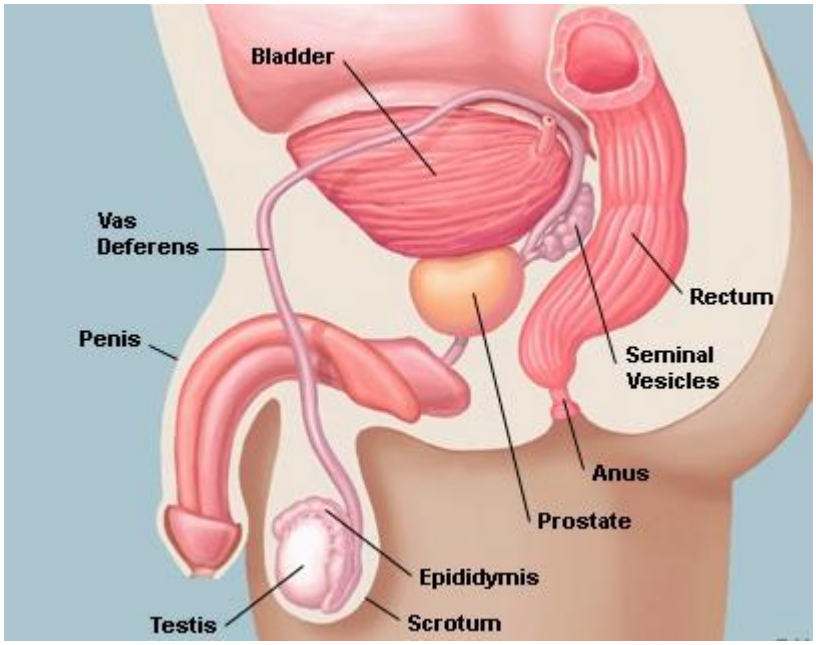


figure: The male reproductive system

Seminiferous tubules

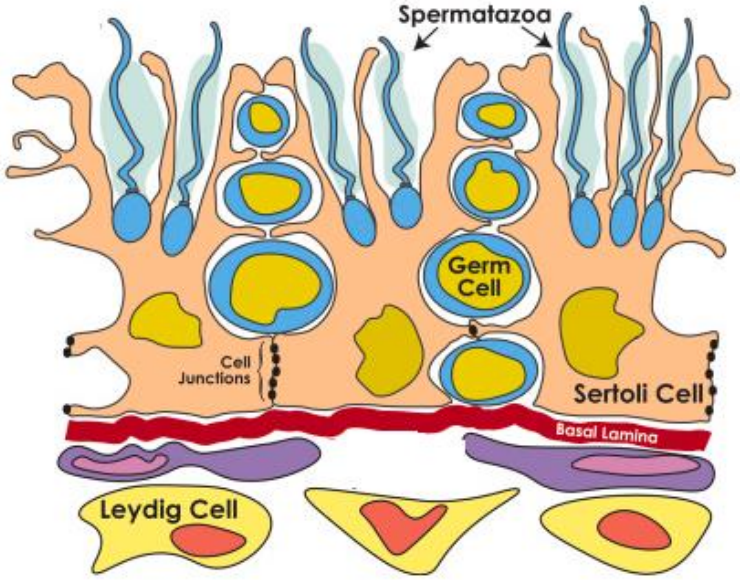
The walls of the seminiferous tubules are lined by

1.primitive germ cells, they mature into sperm cells, and move from the lining to the epididymis.

2.Sertoli cells, its main function is to nurture the developing sperm cells through the stages of spermatogenesis.

3.interstitial cells, or, Cells of Leydig

Located between the seminiferous tubules within the testes, they are responsible for secreting the male sex hormones (testosterone).



Section across seminiferous tubules

II.Epididymus

Each epididymus is a tightly coiled tube lying adjacent to the testicle and leading from the testicle to the vas deferens. It is the site of sperm maturation.

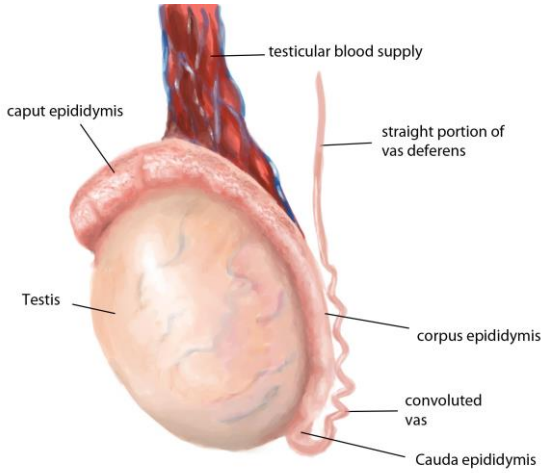


Figure: testicle

III.The vas deference

The vas deferens is a muscular tube 45 centimeters in length leading from the epididymus up into the ejaculatory duct where it combines with seminal vesicle.

IV. Seminal Vesicle

The seminal vesicle is a saclike structure attached to the vas deferens near the base of the urinary bladder. it produce about 60% of semen which contains

- fructose, to nourish sperm.
- prostaglandins to cause muscular contractions in the female tract to help propel sperm
- high pH to help neutralize the acid environment of the urethra and vagina.

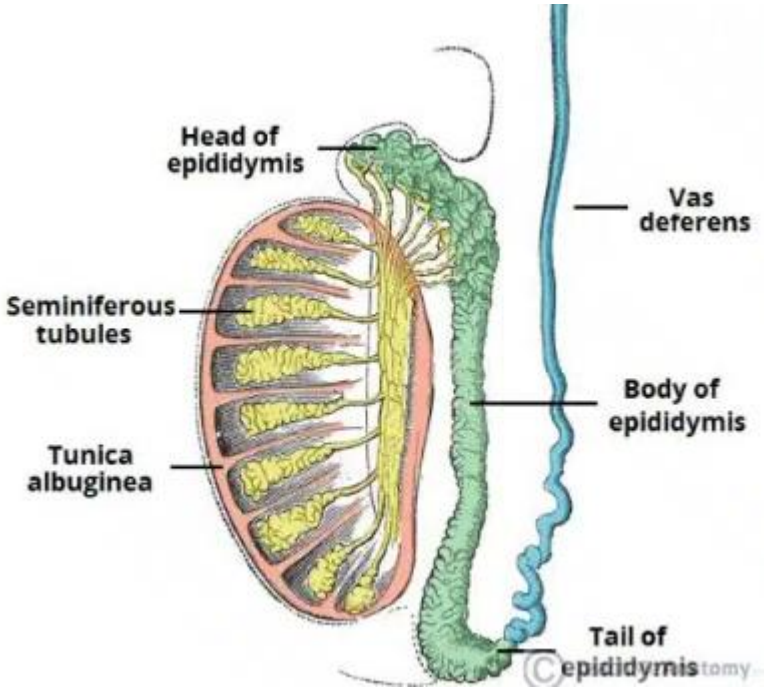


figure: structure of the testis.

V. prostate gland

The prostate gland located anterior to the rectum at the base of the bladder surrounding the prostatic urethra. It Produces about 30% of semen which is a thin, milky secretion, with slightly acidic pH.

VI.Penis

The penis is a cylindrical organ made up of specialized erectile tissue (corpora cavernosa and corpus spongiosum), it also contain part of the urethra and is designed to convey both urine and semen to the outside. The corpus spongiosum enlarges at its distal end to form the glans penis.

Functions of the Testes

The testis have a dual function:

I. Secretion of testosterone.

testosterone secreted by Leydig cell, it synthesized from cholesterol, its action:

1. It is essential for normal development of sexual organ and secondary sex characteristics in male (penis , scrotum , pattern of male hair growth ,pitch of the voice, and muscle strength).

2.Testosterone increases protein formation.

3.Testosterone increases basal Metabolism.

4. Testosterone increases the number of red blood cells .

II. Spermatogenesis, the process of formation of sperms from primitive germ cell. spermatogenesis beginning at an average age of 13 years and continuing throughout most of the remainder of life but decreasing markedly in old age. The entire period

of spermatogenesis, takes about 74 days. Each spermatozoa receive one of the sex chromosome (Y or X).

Hormonal control in the male

At the start of puberty, the hypothalamus increase its production of gonadotropin-releasing hormone (GnRH), which stimulates the anterior pituitary to produce

- FSH (follicle-stimulating hormone) which promotes spermatogenesis
- LH (luteinizing hormone) which promotes testosterone

The Female Reproductive System

The major organs of female reproductive system are:

1. the external genitalia.
2. the ovaries (gonads).
3. the uterus.
4. the oviduct.
5. the vagina.
6. the breast.

The function of the female reproductive system

The organs of the female reproductive system are specialized to

- produce and maintain the eggs cells.
- to transport these cells to the site of fertilization.
- to provide a favorable environment for a developing fetus.
- to give birth.
- to produce female sex hormones.

External Female Genitals

The external female reproductive structures are referred to collectively as the vulva:

- the mons pubis is a pad of fat that is located at the anterior, over the pubic bone. After puberty, it becomes covered in pubic hair.
- The labia majora are folds of hair-covered skin that begin just posterior to the mons pubis. The thinner and more pigmented labia minora extend medial to the labia majora.
- the clitoris.
- The hymen is a thin membrane that sometimes partially covers the entrance to the vagina. The vaginal opening is located between the opening of the urethra

and the anus. It is flanked by outlets to the Bartholin’ s glands (or greater vestibular glands).

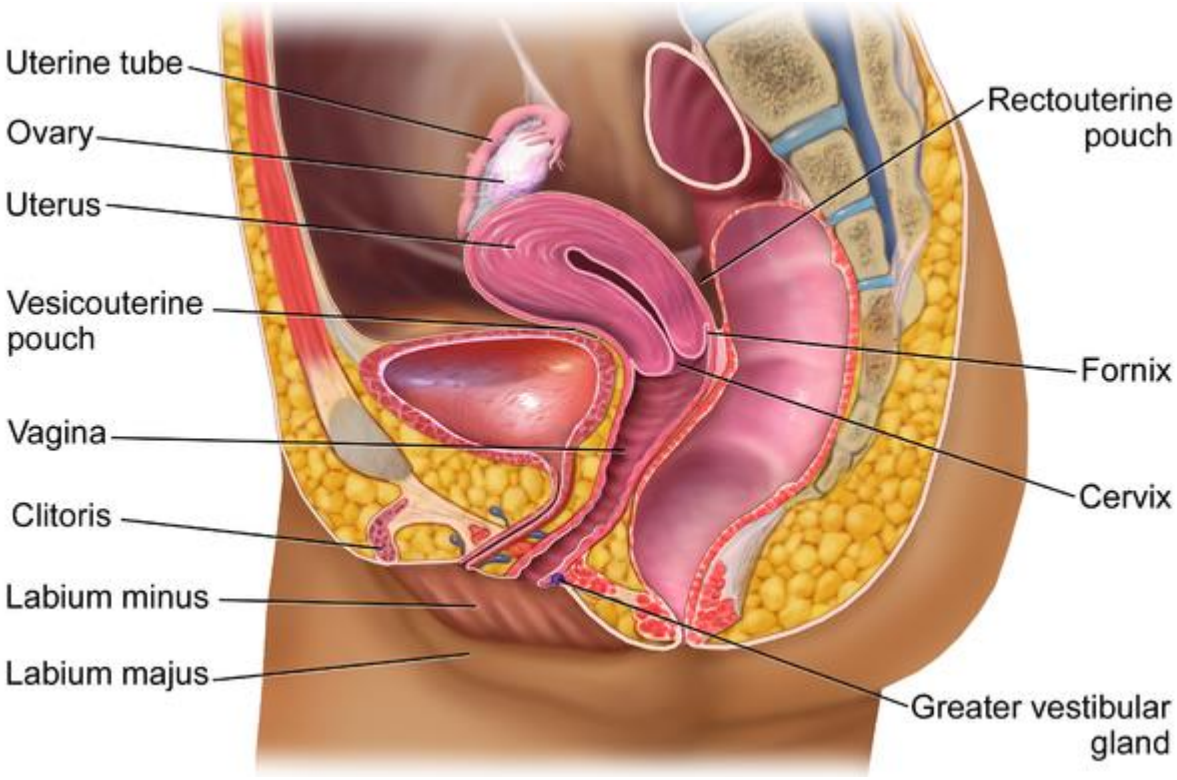


Figure: female reproductive system.

Ovaries

Each ovary has an estimated length of 4 cm and width of 2 cm and is 1.5 cm thick. It appears to be shaped like an almond. they are located proximal to both sides of the uterus at the lower abdomen. Histologically the ovaries divided into

- The medulla is made up of connective tissue, blood vessels, lymphatic vessels, and nerves.
- The cortex contains millions primordial follicles, each follicle consists of oocyte surrounded by supporting cell .

Function

1.production and periodical release of egg cells, the female gametes. When the oocyte finishes its maturation in the ovary, a surge of luteinizing hormone secreted by the pituitary gland stimulates the release of the oocyte through the rupture of the follicle, a process called ovulation.

2.Ovaries secrete estrogen, and progesterone. Estrogen is responsible for the appearance of secondary sex characteristics for females at puberty and for the maturation and maintenance of the reproductive organs in their mature functional state. Progesterone prepares the uterus for pregnancy, and the mammary glands for lactation. Progesterone functions with estrogen by promoting menstrual cycle changes in the endometrium.

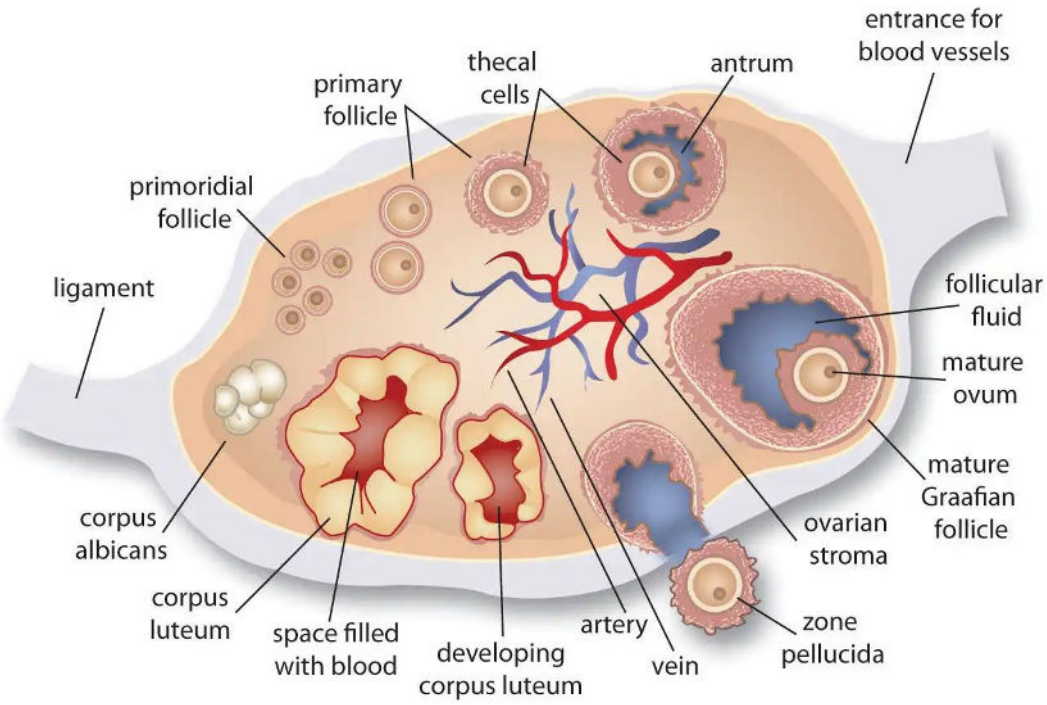


Figure: the ovary

The uterus

The uterus is located in the pelvis, it is a hollow, muscular organ that functions to receive, the fertilized ovum (البيضة الملقحة) and support the embryo (الجنين). The major portion of the uterus is the fundus, the body and the cervix. The os, is the opening in the cervix that runs between the uterus and vagina. The wall of uterus composed of 3 layers:

Perimetrium: Outer serous membrane

Myometrium: Middle layer of smooth muscle .

Endometrium: Mucous membrane

The oviducts

The oviducts, also called uterine or fallopian tubes, extend from the uterus toward the ovaries. it consists of

- The isthmus attached to the uterine body,
- Ampulla, where fertilization occurs
- Infundibulum, is the part that open to peritoneal cavity and contain long thin processes called the fimbriae.

Vagina

The vagina is a fibromuscular about 8 to 10 cm long tube that extends from the uterus to the outside, lying between the bladder anteriorly and the rectum posteriorly. The reaction of the vagina is acidic, the pH is 4.5that protects the vagina against infection.

The Uterine Cycle

With each ovarian cycle 15-20 follicle start to grow. However, only one follicle continue to grow and maturate and form a secondary oocyte with half number of chromosome (32) while other follicle atrophy. The Uterine Cycle also called menstrual cycle**,** it include a series of events that occurs in the uterus in order to prepare the endometrial layer for implantation and fetal development. The duration of each cycle is about 28 days. it includes the following phases:

1. menstruation phase, from days 1 to 6 , in this phase the top portion of endometrial is shed. The stratum tissue , mucus , blood , are discarded as "menses".

2. **proliferative phase**, from days 7 to 13 , in this phase the increasing levels of estrogens from mature follicles causes the lining of uterus (the endometrium) to grow and thicken .

3. **the secretory phase,** from days 15 to 28, in this phase the level of progesterone from corpus luteum causes the endometrium to continue thickening and vascularizing to become ready to receive the fertilized ova and start pregnancy.

ovulation

At about the middle of ovarian cycle the follicle eject its oocyte in a process called ovulation. The remnants of an ovulated follicle develop into a corpus luteum. If fertilization take place the corpus luteum continue growing forming what is called corpus graviditasis. If fertilization not take place the corpus luteum degenerate to form what is called as corpus albicans which form a white scar tissue in the ovary. The corpus luteum produces:

Progesterone – completes the preparation of uterine lining

Estrogens – work with progesterone

Relaxin – relaxes uterine muscles and pubic symphysis

Inhibin – decreases secretion of FSH and LH.

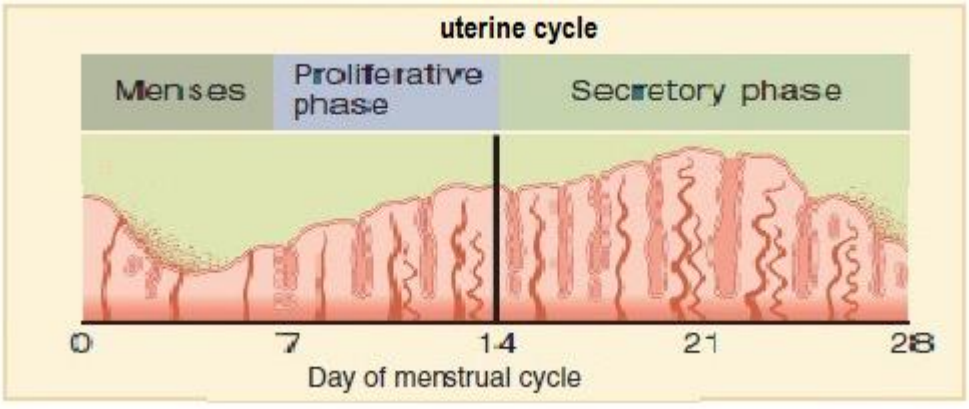


Figure: uterine cycle

Oogenesis

Oogenesis is the process of development of female gametes (also called ova or eggs), that takes place in ovaries. Oogenesis begins prenatally when primordial germ cells

divide mitotically to produce a large number of oogonia. Oogonia then undergo several mitosis to form primary oocytes. Primary oocytes then enter meiosis, but are arrested at prophase I. Upon puberty, meiosis resumes and the primary oocyte divides to create a secondary oocyte and the first polar body. The secondary oocyte is ovulated into the fallopian tube close to the time of fertilization. At puberty age the ovaries contain, about 40,000 follicle , but only 400 go on to mature and ovulate during a woman's reproductive lifetime. The others degenerate.

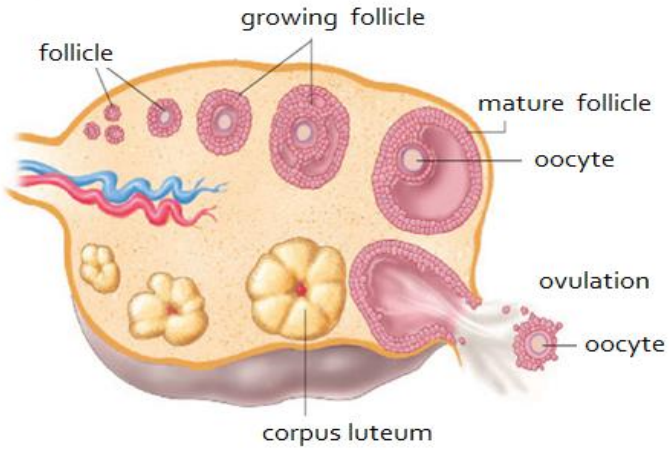


figure: ovarian cycle.

Parturition

Parturition is the process of delivering the baby after the completion of pregnancy or a fully grown developed fetus and placenta from the uterus to the vagina to the outside world. This process occurs in three stages, which includes:

1. Stage 1: Preparatory Stage- 2 to 12 hours.
2. Stage 2: Birthing Process –30 to 180 minutes.
3. Stage 3: Placenta Expulsion –1 to 12 hours.

Infertility

Infertility is a disease characterized by the failure to establish a clinical pregnancy after 12 months of regular and unprotected sexual intercourse. It is estimated to affect between 8 and 12% of reproductive-aged couples worldwide.

In vitro fertilization (IVF)

In vitro fertilization (IVF) is a process of fertilization where an egg is combined with sperm outside the body, in vitro ("in glass"). The process involves removing an ovum or ova from the woman's ovaries and letting sperm fertilize them in a liquid in a laboratory. After the fertilized egg (zygote) undergoes embryo culture for 2–6 days, it is implanted in the same or another woman's uterus, with the intention of establishing a successful pregnancy.

Benign prostatic hypertrophy (BPH) – swelling of the prostate gland which surrounds the base of the male bladder and urethra causing difficulty urinating, dribbling, and nocturia