Anatomy & Embryology

Male & Female Reproductive systems

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Introduction

The male and female reproductive organs can be grouped by function.

- **The gonads—testes** in males and **ovaries** in females— produce gametes and secrete sex hormones.
- **Various ducts** that store and transport the gametes
- **Accessory sex glands** produce substances that protect the gametes and facilitate their movement.
- **Supporting structures (penis** in males and the **vagina** in females) assist the delivery of gametes, and the **uterus** in females assists in the growth of the embryo and fetus during pregnancy.

MALE REPRODUCTIVE SYSTEM

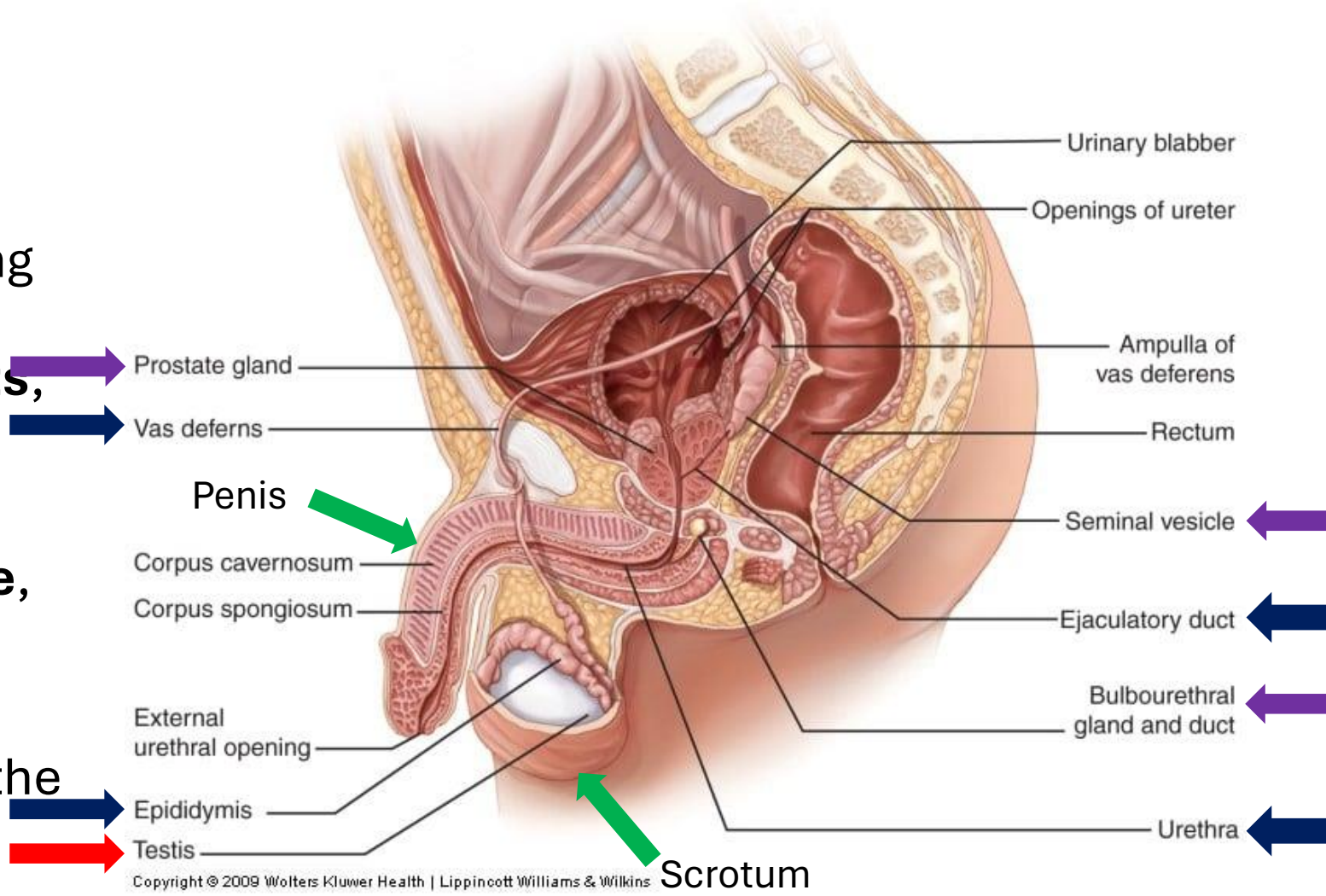
- Includes:

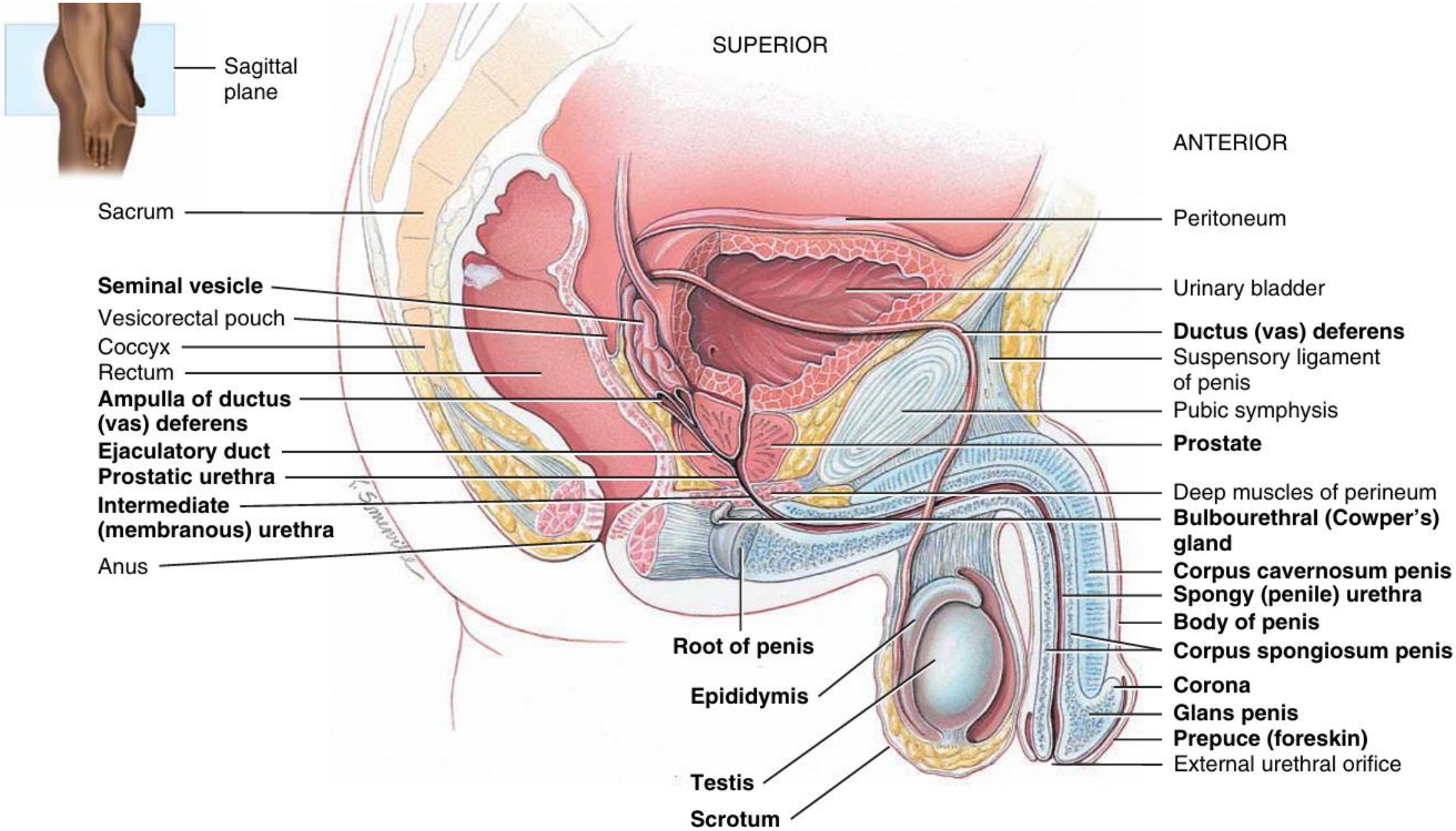
➢ **Testes** (male gonads),

➢ **A system of ducts** (including the **epididymis**, **ductus deferens**, **ejaculatory ducts**, and **urethra**)

➢ **Accessory sex glands** (**seminal vesicles**, **prostate**, and **bulbourethral glands**)

➢ **Supporting structures**: including the **scrotum** and the **penis**





(a) Sagittal section

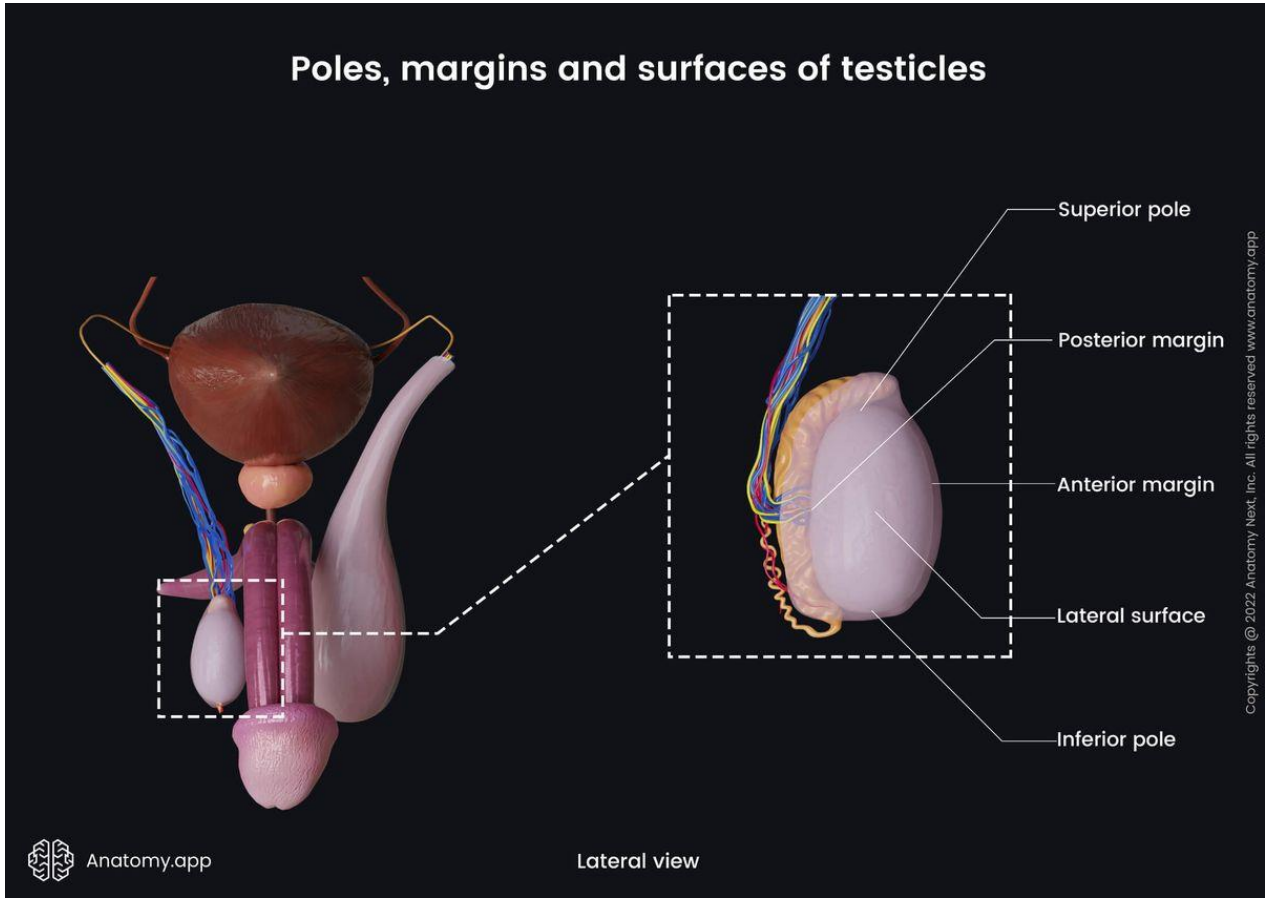
Testis

- Right& Left
- Primary male sex organs.
- Size: 5cm length, 2.5cm thickness and 2.5 cm anteroposterior diameter.

Description : It has

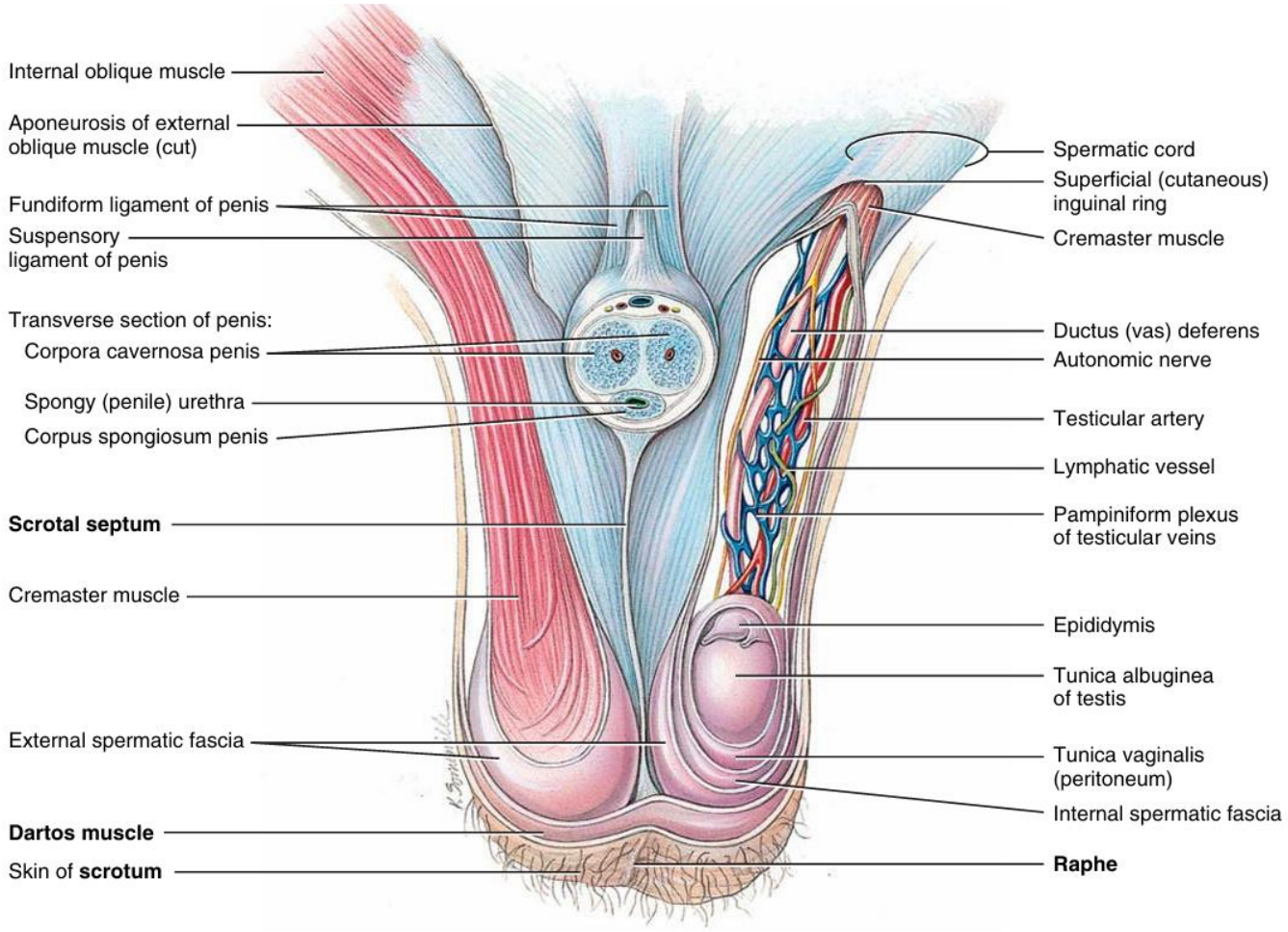
- Two poles (upper and lower).
- Two borders (anterior and posterior).
- Two surfaces (medial and lateral).

Site : In the scrotum

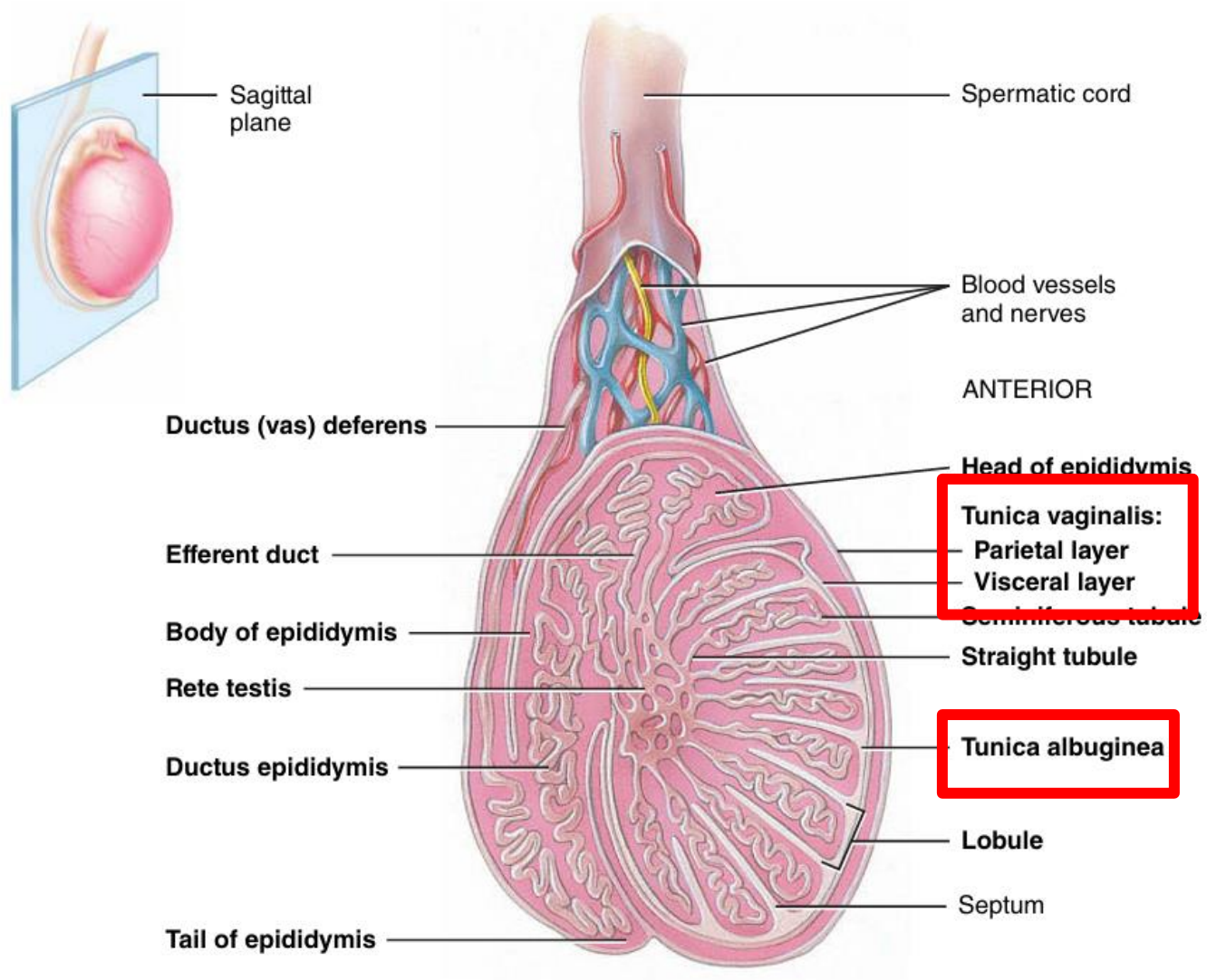


Testis

- Develop high up on the **posterior abdominal wall** and descend, normally before birth, through the **inguinal canals** to reach the **scrotum**, carrying their blood vessels, lymphatics, nerves &process of peritoneum (**tunica vaginalis**).
- **Tunica vaginalis**: It is a closed sac of peritoneum encloses the testis. It has a-Inner visceral layer. b- Outer parietal layer.
- **Tunica albuginea**: thick white fibrous capsule that envelopes testis



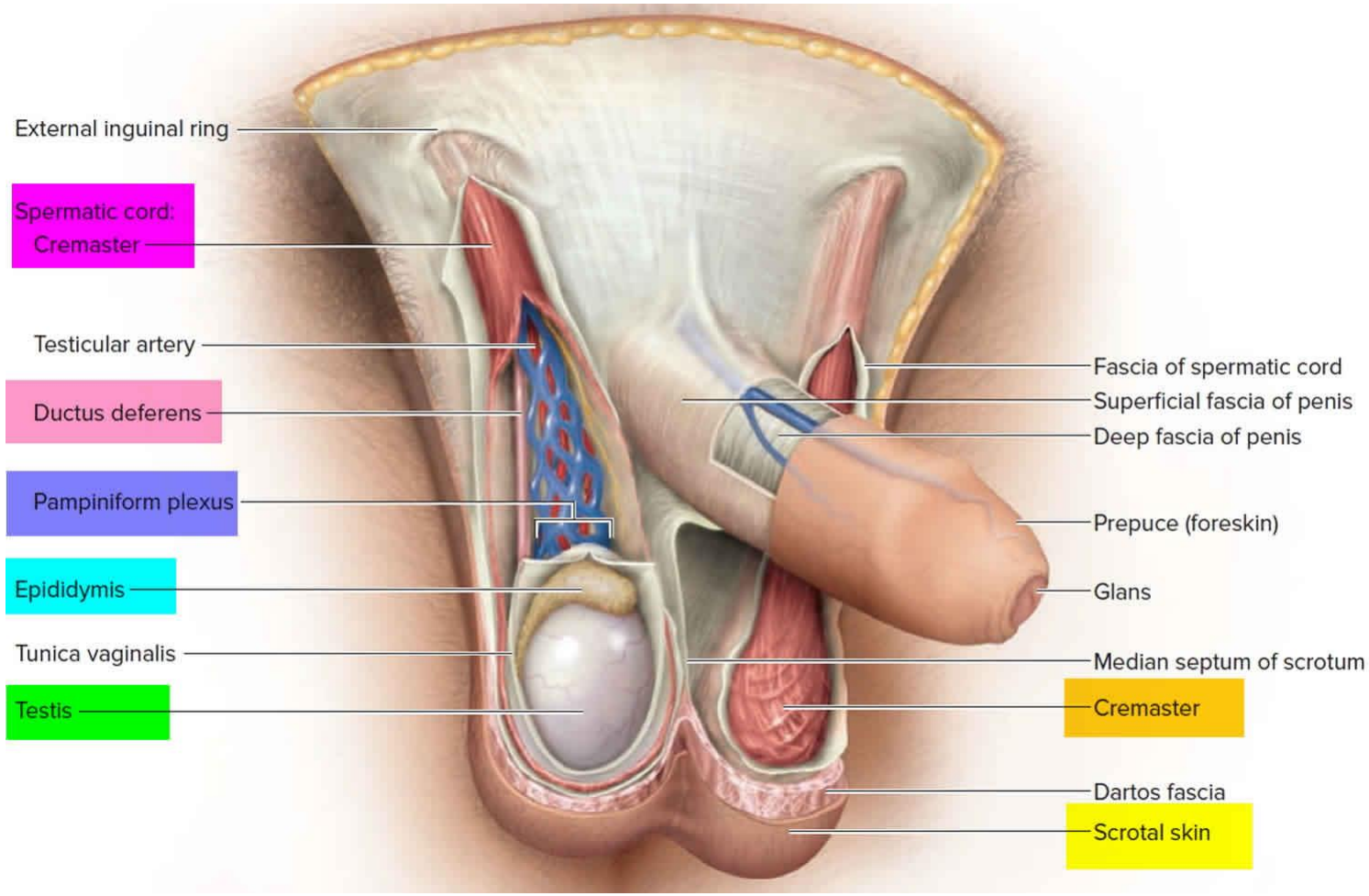
Anterior view of scrotum and testes and transverse section of penis



(a) Sagittal section of a testis showing seminiferous tubules

Scrotum

- Is a cutaneous bag containing the **two testes**, **two epididymis** and the **lower parts of the spermatic cords** of both sides.
- It can be considered as an out pouching of the lower part of the anterior abdominal wall.



Structure of the wall of the scrotum

- The wall of the scrotum consists of the following layers (from superficial to dee

1-Skin: It is thin, wrinkled and pigmented a raised ridge in the midline.

2-Dartos muscle. This muscle helps in regulating the temperature of the scrotal ca This is a factor which is essential for normal spermatogenesis.

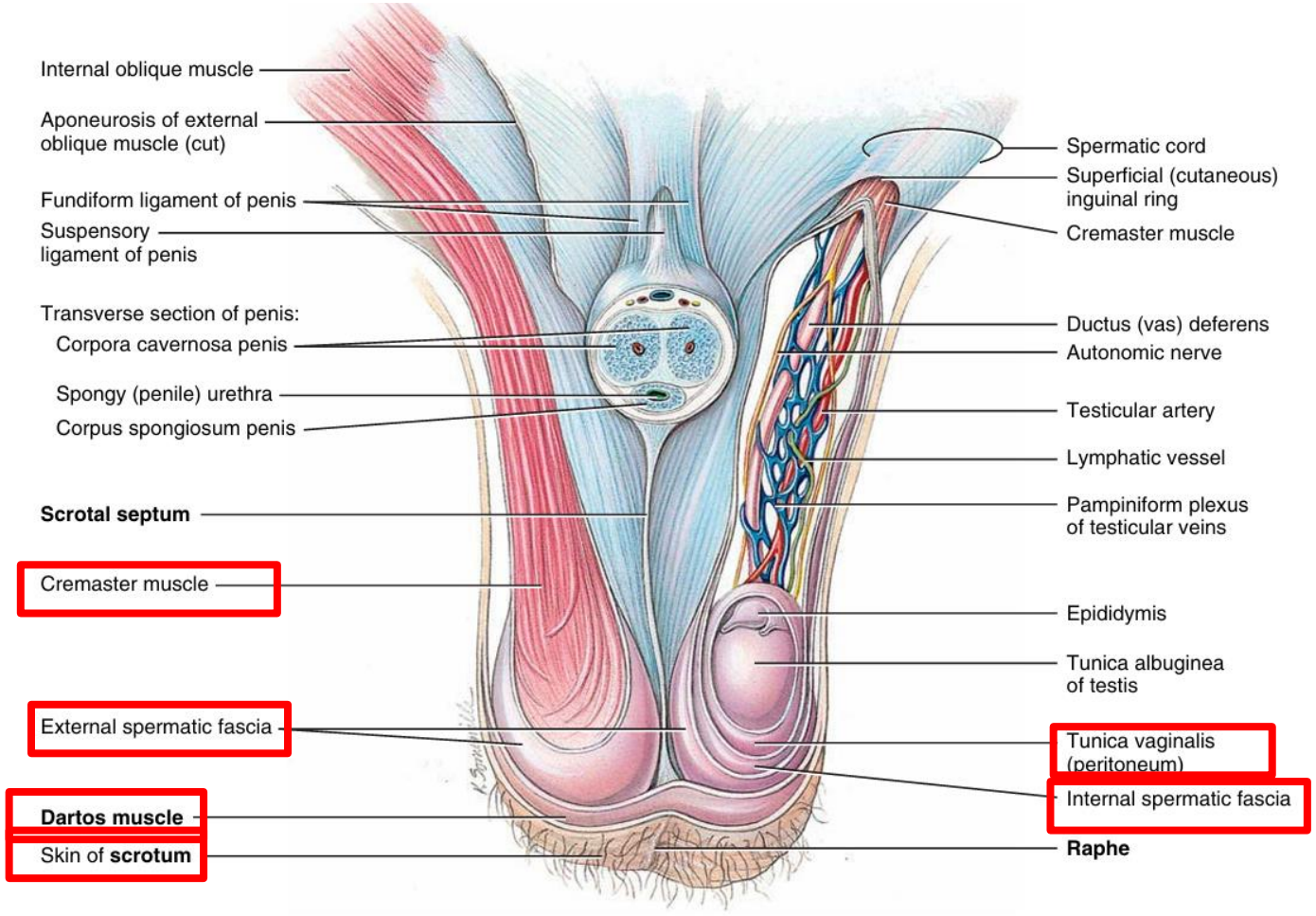
3-Deep membranous layer (Colle's fasci

4-External spermatic fascia.

5-Cremasteric muscle and fascia.

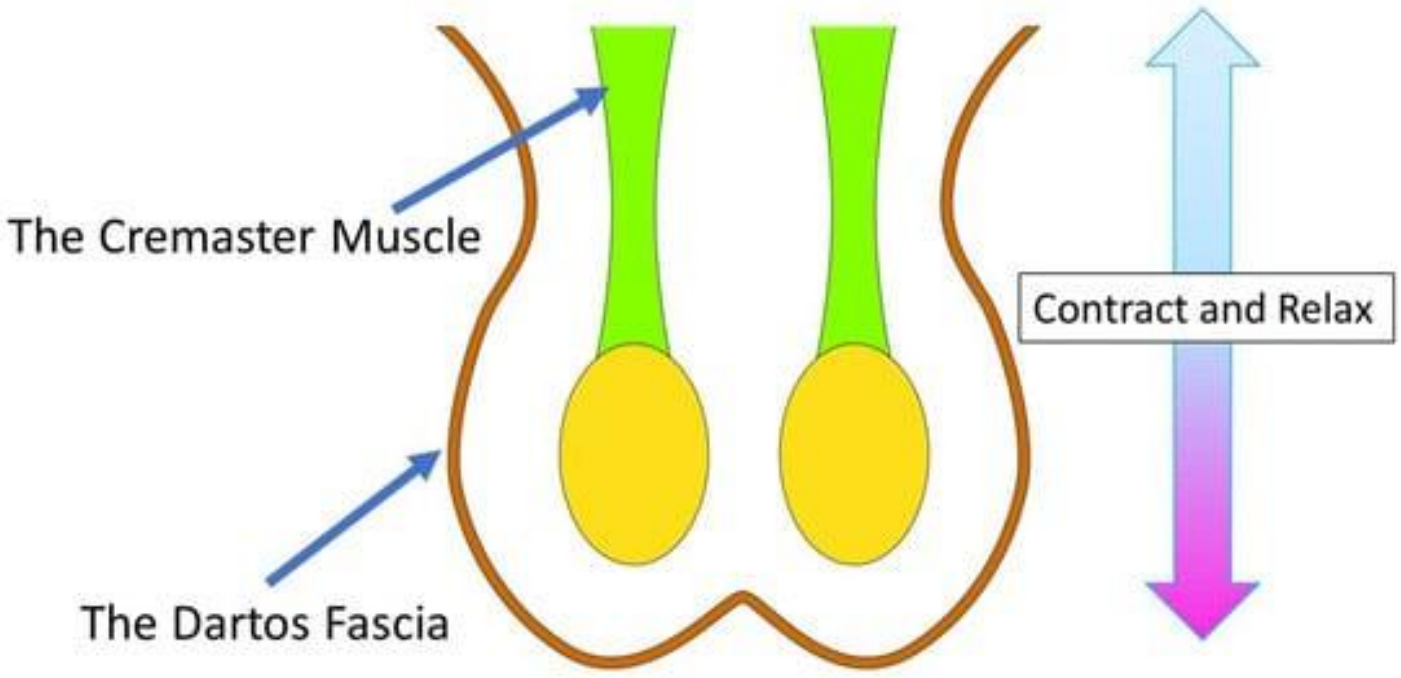
6-Internal spermatic fascia.

7-Parietal layer of tunica vaginalis.



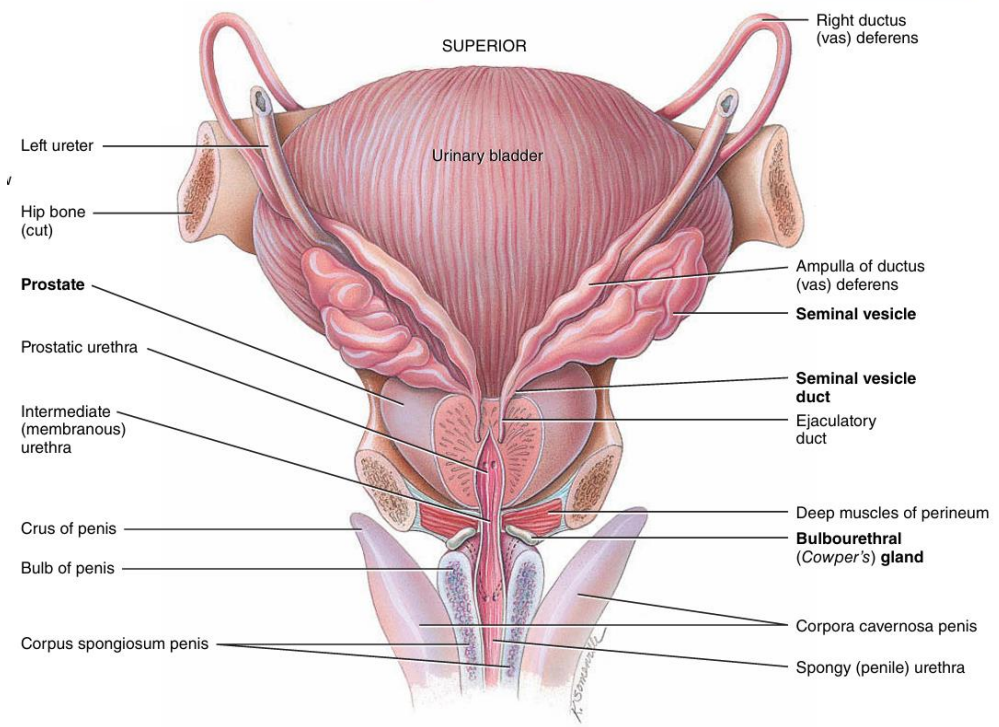
Anterior view of scrotum and testes and transverse section of penis

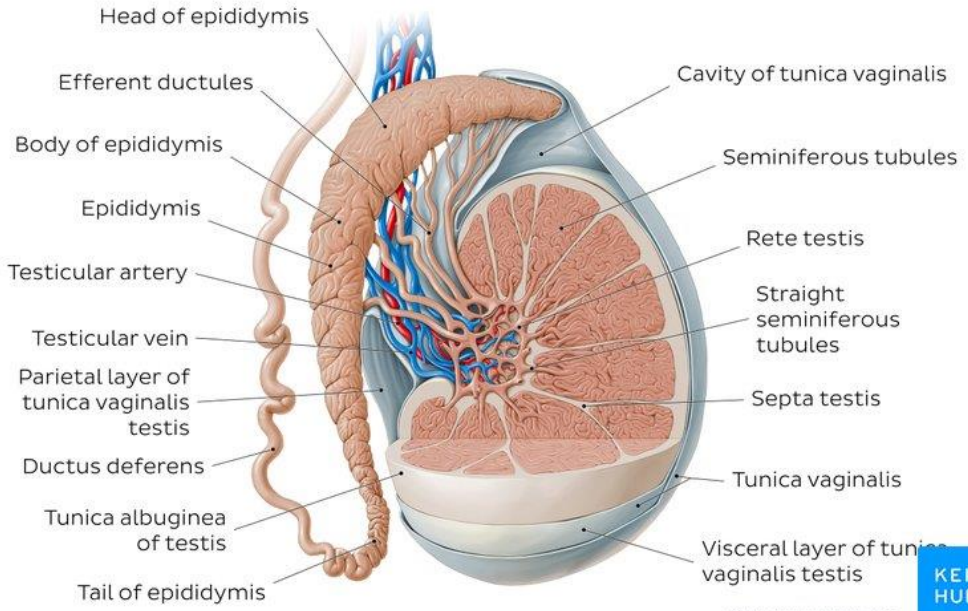
- Normal sperm production requires a temperature about 2–3°C below core body temperature.



System of ducts

1. **Epididymis:** is a long, coiled duct. It is represented in 3 parts: **Head, Body,& tail**
2. **Vas (Ductus) Deferens** :is a long narrow muscular duct that conveys the sperms from the tail of the epididymis to the ejaculatory duct. It measures about 45 cm long.
3. **Ejaculatory Duct:** each duct is formed behind the neck of the bladder by the union of the duct of the seminal vesicle and the terminal part of the ductus deferens.
4. **Urethra:** the shared terminal duct of the reproductive and urinary systems (prostatic, membranous & spongy)





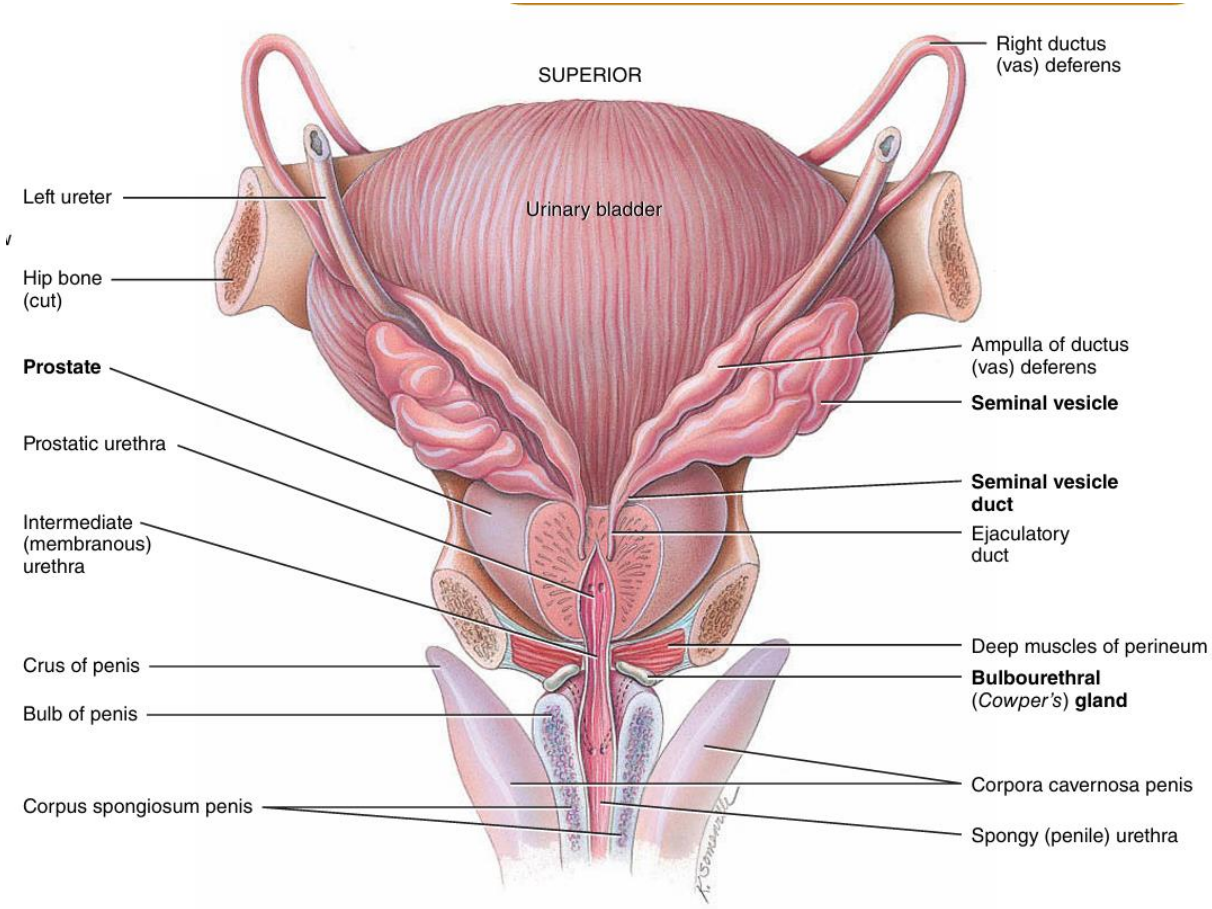
Accessory sex glands in Males

- **Semen** is a mixture of sperm and seminal fluid
- Accessory sex glands **secrete most of the liquid portion of semen**. Include:

1)**seminal vesicles**, 2)**prostate**, and 3)**bulbourethral glands**.

1. **Seminal Vesicles**: paired, convoluted and pouchlike structures, about 5 cm in length, lying posterior to and at the base of the urinary bladder anterior to the rectum

Function: secret about **60%** of the volume of semen. secrete an alkaline, viscous fluid that contains fructose, prostaglandins, and clotting proteins.



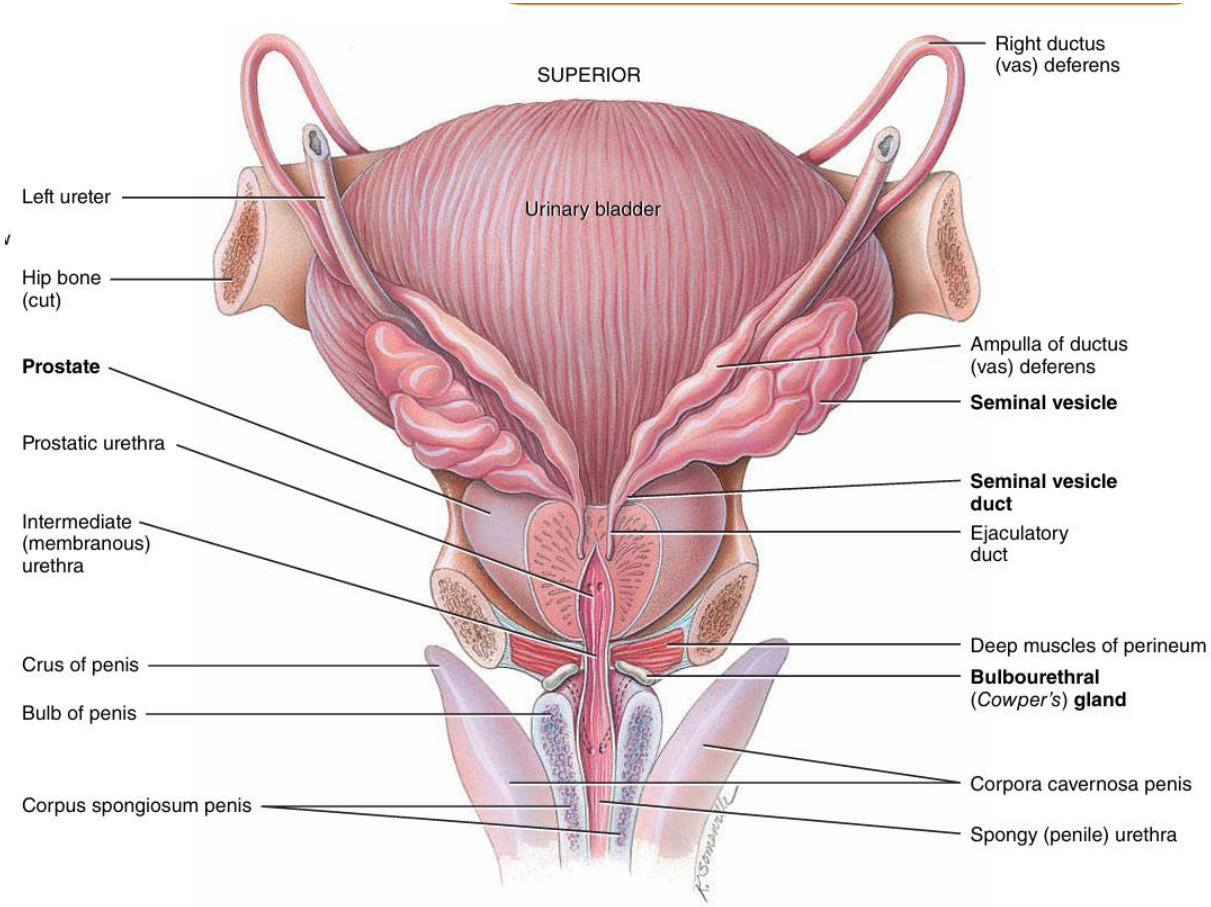
Accessory sex glands in Males

2. Prostate: lies immediately inferior to the bladder, posterior to the symphysis pubis and anterior to the rectum. **Shape** : It has a base (upward), an apex (downward).

Function: secretes milky, slightly acidic fluid (pH about 6.5)that make up about **25%** of the volume of semen and contribute to sperm motility and viability

3. bulbourethral glands: paired glands (Cowper's glands) each about the size of a pea, lie inferior to the prostate on either side of the membranous urethra

Function: 1)secrete an alkaline substance that protects the passing sperm by neutralizing acids from urine in the urethra. 2) secrete mucus that lubricates the end of the penis

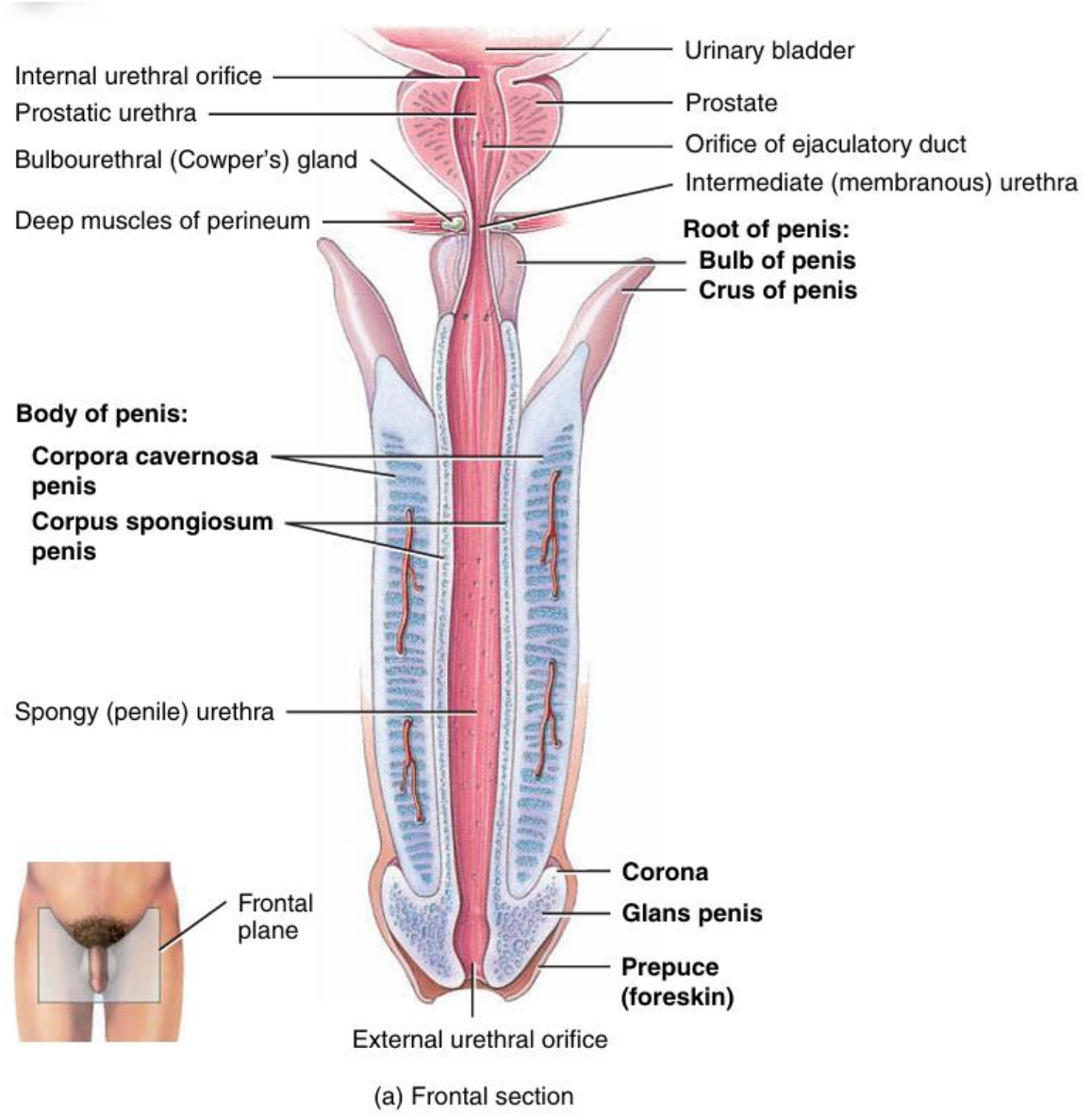


Penis

- A supporting structure of the male reproductive system that contains the urethra
- **A passageway for the ejaculation of semen and the excretion of urine**
- It is cylindrical in shape and consists of a **root, body**, and **glans penis**

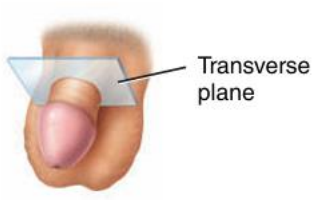
- **The root: attached and proximal portion consists of the:**
  - Bulb of the penis
  - Crura of the penis

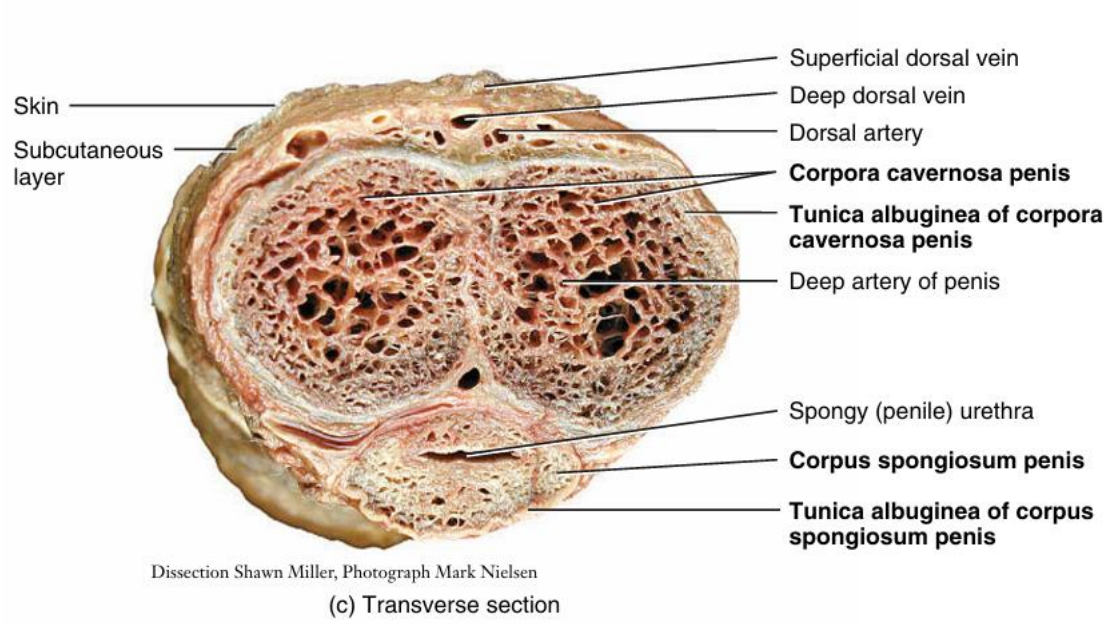
- **The body** of the penis is the free movable part that is composed of three cylindrical masses of erectile tissue, each surrounded by fibrous tissue called the **tunica albuginea**.
- **Glans penis**: covered with prepuce (foreskin) which is removed during circumcision

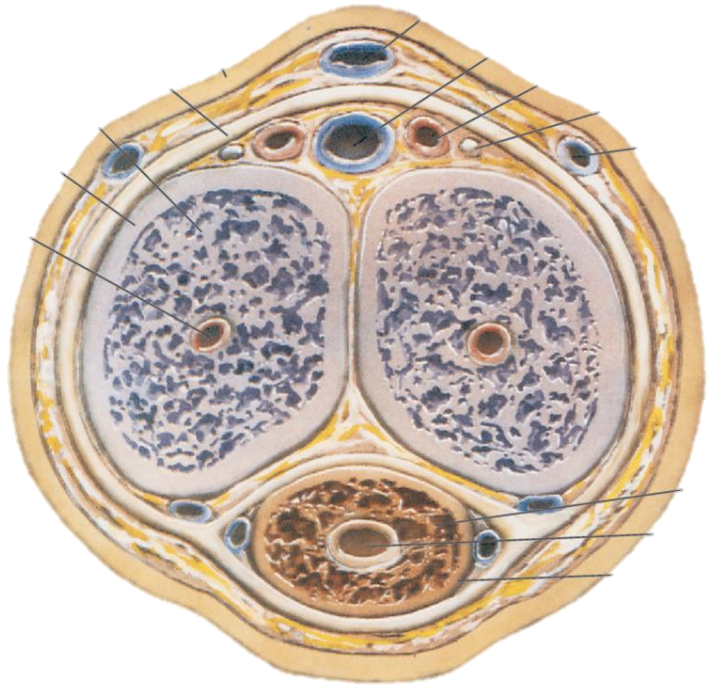


(a) Frontal section

- The two dorsolateral masses of the body of the penis are called the **corpora cavernosa penis.** The smaller midventral mass, the corpus spongiosum penis, contains the spongy urethra and keeps it open during ejaculation.

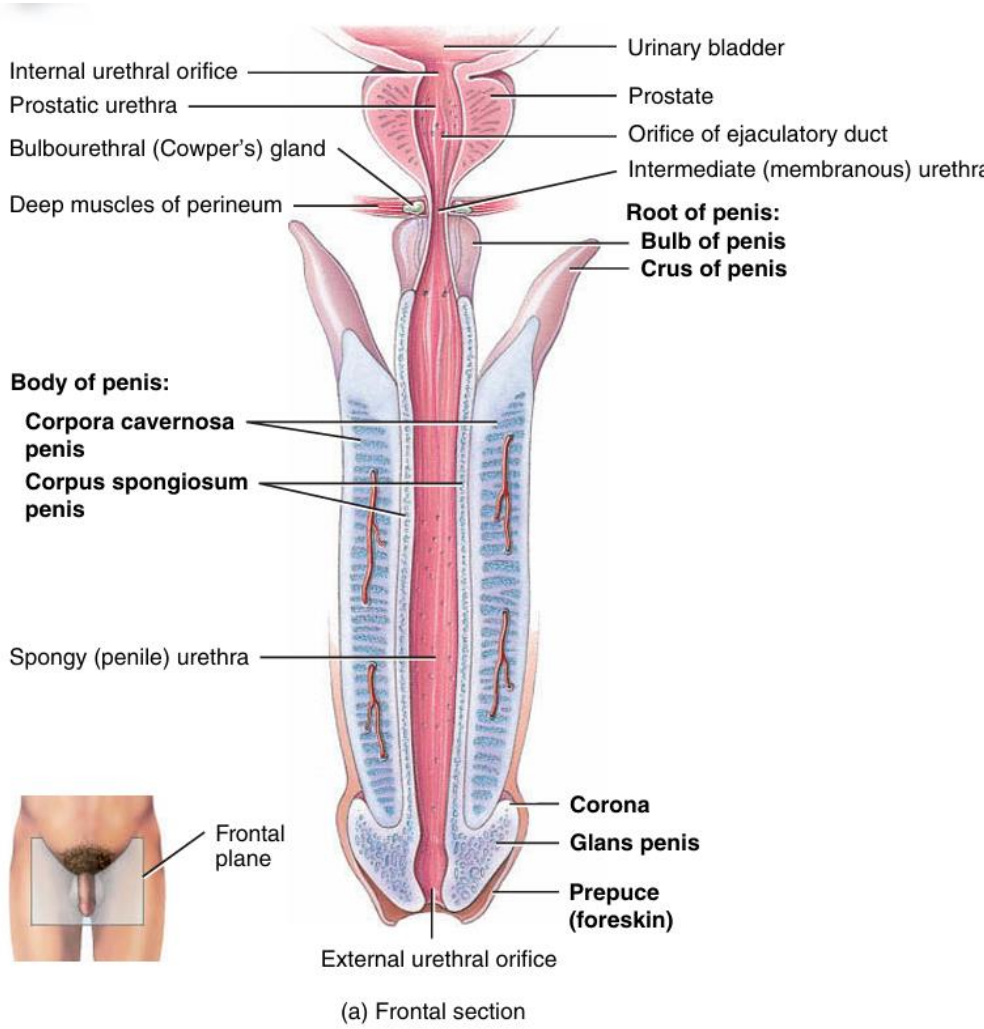






Penis

- The distal end of the corpus spongiosum penis is slightly enlarged to form the glans penis. The distal part of urethra enlarges within the glans penis and forms a terminal opening called **external urethral orifice**.
- Covering the glans in an uncircumcised penis is the loosely fitting prepuce (PRE ¯-poos), or foreskin.



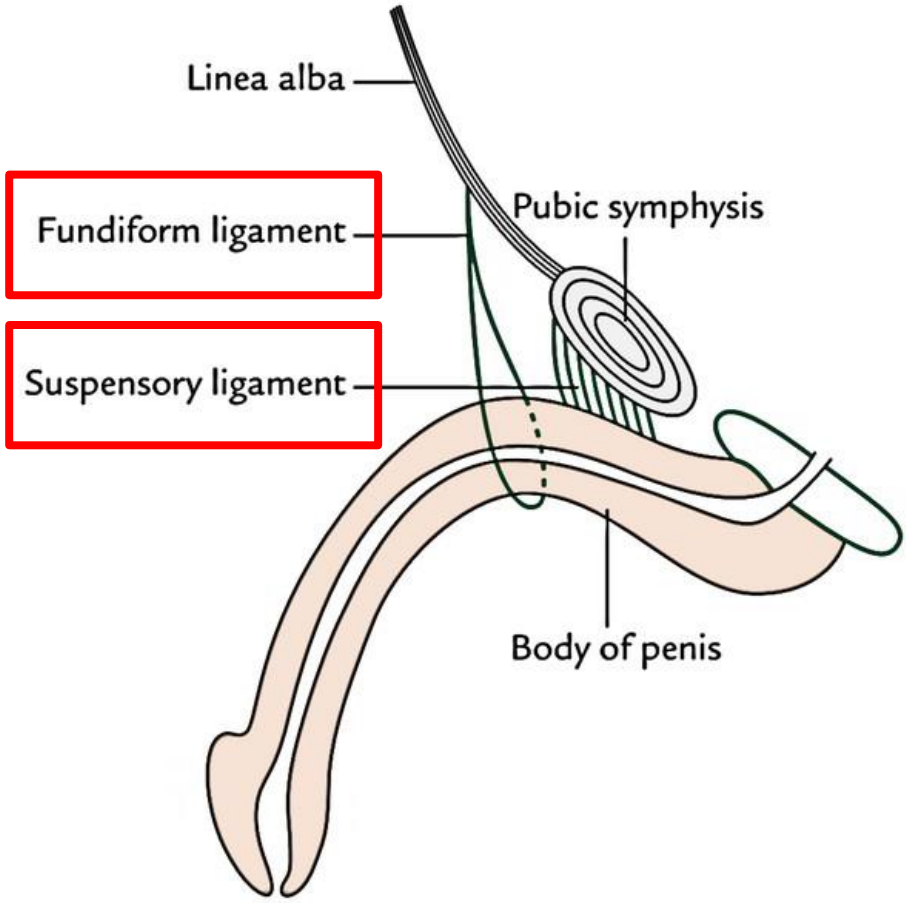
(a) Frontal section

Supporting ligaments of the penis

- The weight of the penis is supported by two ligaments that are continuous with the fascia of the penis:

(1) **The fundiform ligament** arises from the inferior part of the linea alba

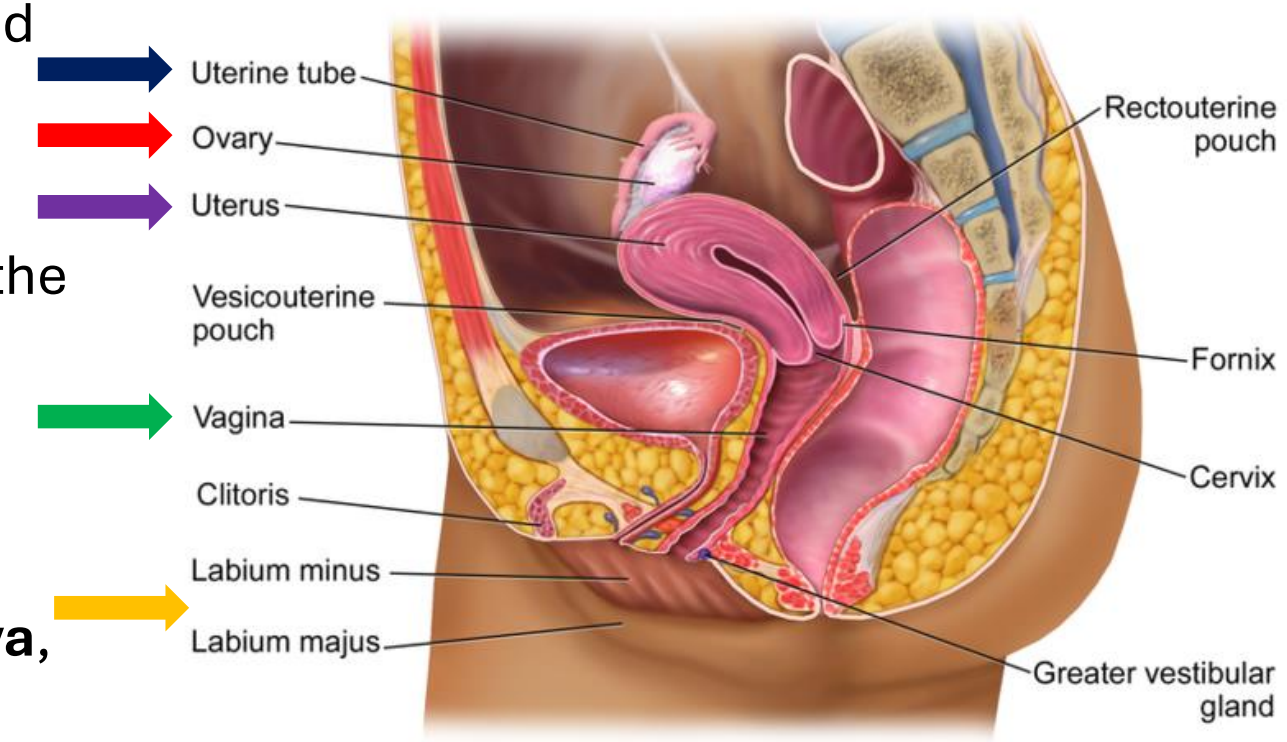
(2) **the suspensory ligament** of the penis arises from the pubic symphysis.

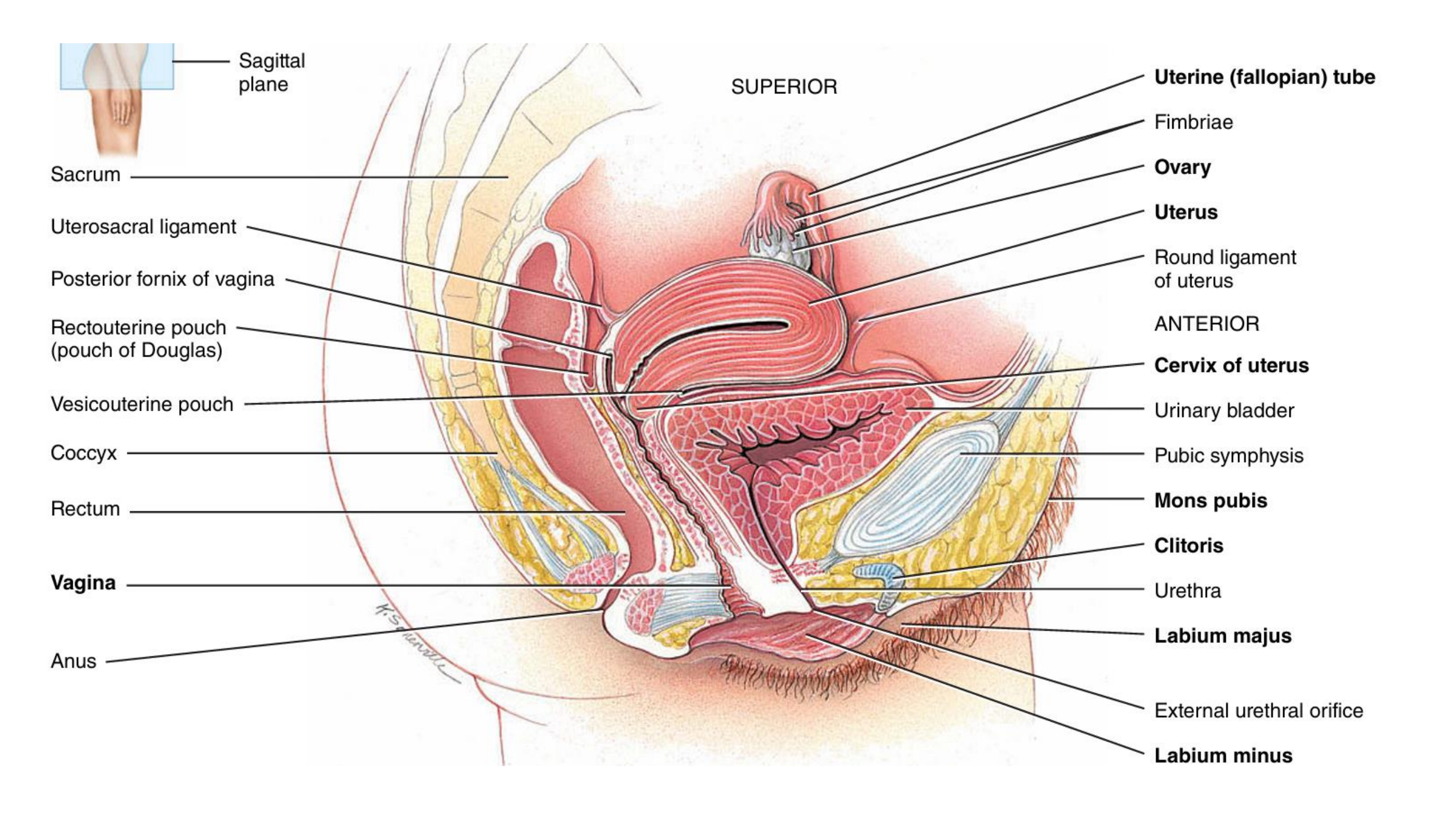


FEMALE REPRODUCTIVE SYSTEM

- **Consists of:**

1. **Ovaries**: produce secondary oocytes and hormones such as progesterone and estrogens, inhibin, and relaxin
2. **Uterine tubes**, or oviducts: transport secondary oocytes and fertilized ova to the uterus
3. **Uterus**: site of embryonic and fetal development occur
4. **Vagina**
5. **External organs** that constitute the **vulva**, or pudendum.
6. **Mammary glands** also are considered part of the female reproductive system.

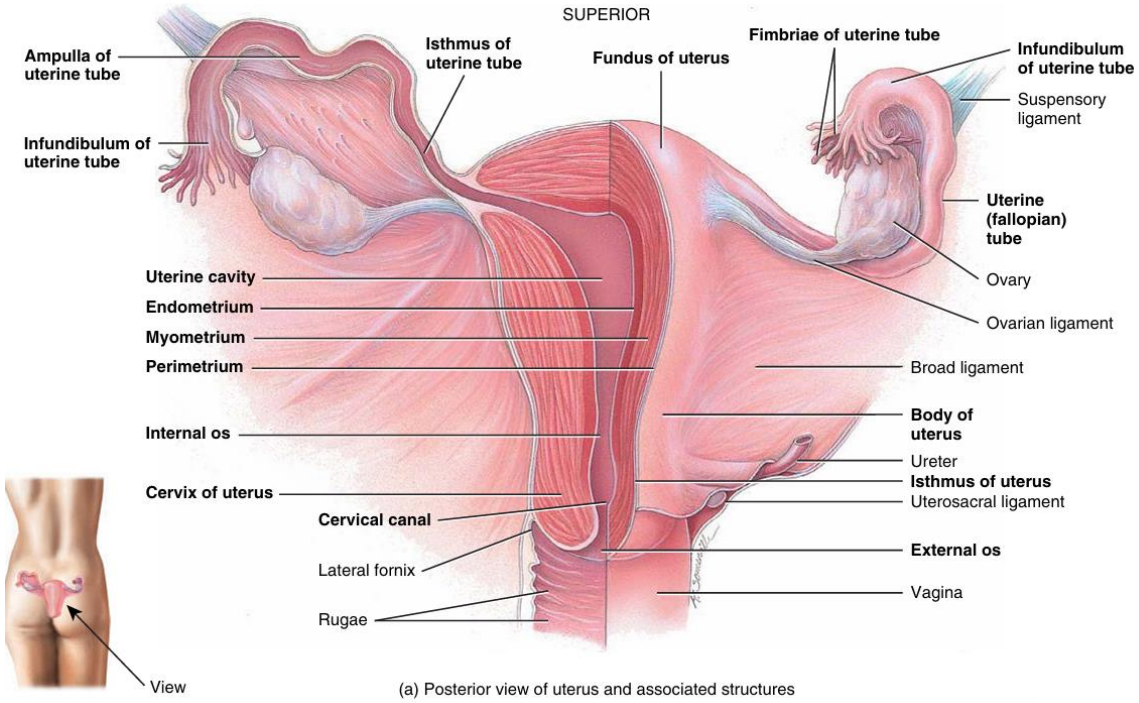



Sagittal plane
SUPERIOR
Uterine (fallopian) tube
Fimbriae
Ovary
Uterus
Round ligament of uterus
ANTERIOR
Cervix of uterus
Urinary bladder
Pubic symphysis
Mons pubis
Clitoris
Urethra
Labium majus
External urethral orifice
Labium minus
Sacrum
Uterosacral ligament
Posterior fornix of vagina
Rectouterine pouch (pouch of Douglas)
Vesicouterine pouch
Coccyx
Rectum
Vagina
Anus

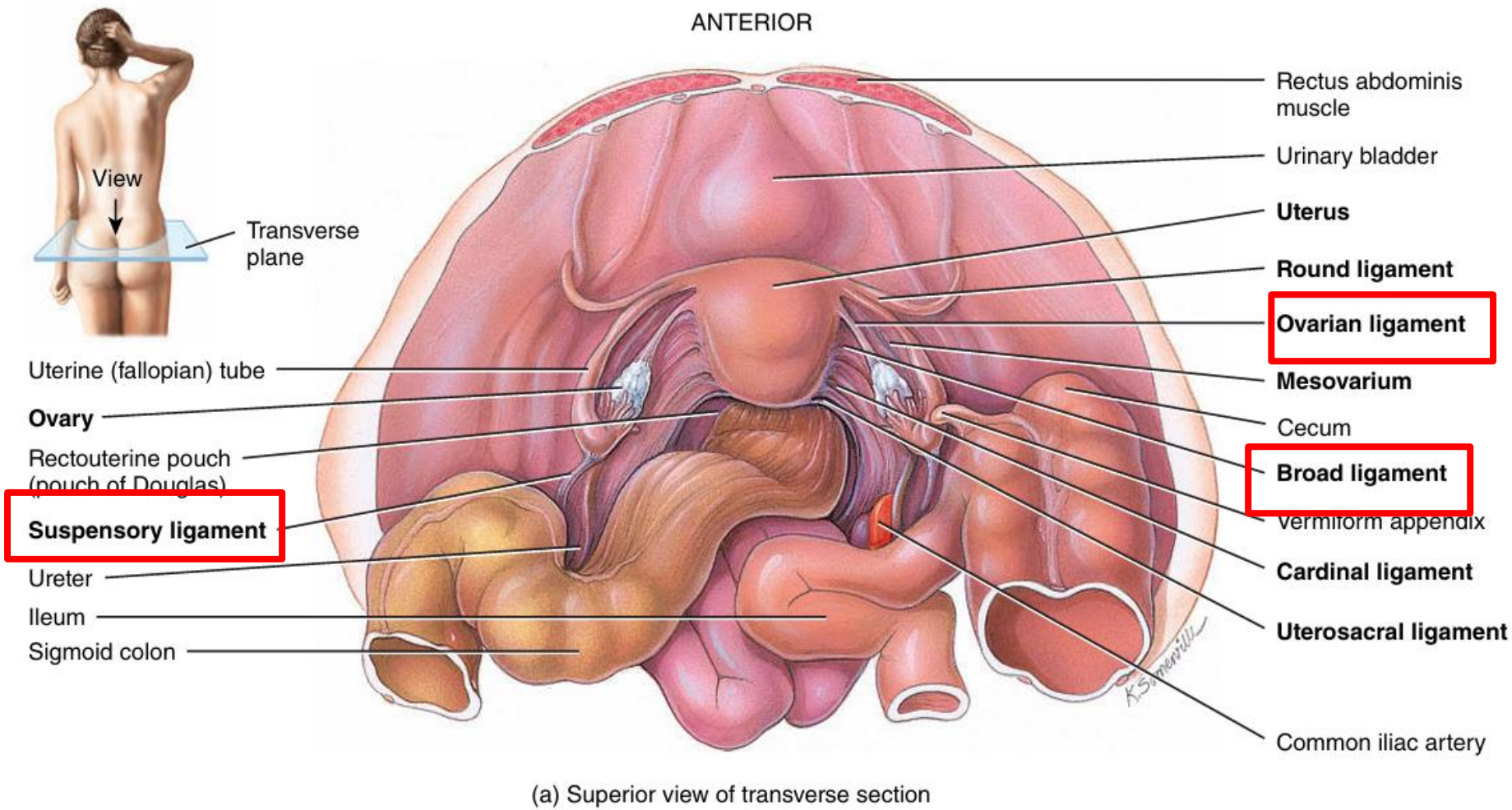
Ovaries

- Its dimensions; 3×2×1 cm
- Paired glands that resemble unshelled almonds in size and shape; **they are the female gonads**
- Homologous to the testes.
- A series of ligaments holds them in position:

1. **The broad ligament of the uterus**: a fold of the peritoneum, attaches to the ovaries by a subset of this peritoneal fold (**mesovarium**)
2. **The ovarian ligament** attaches the ovaries to the uterus
3. **Suspensory ligament** attaches ovaries to the pelvic wall



Supporting ligaments of the ovaries



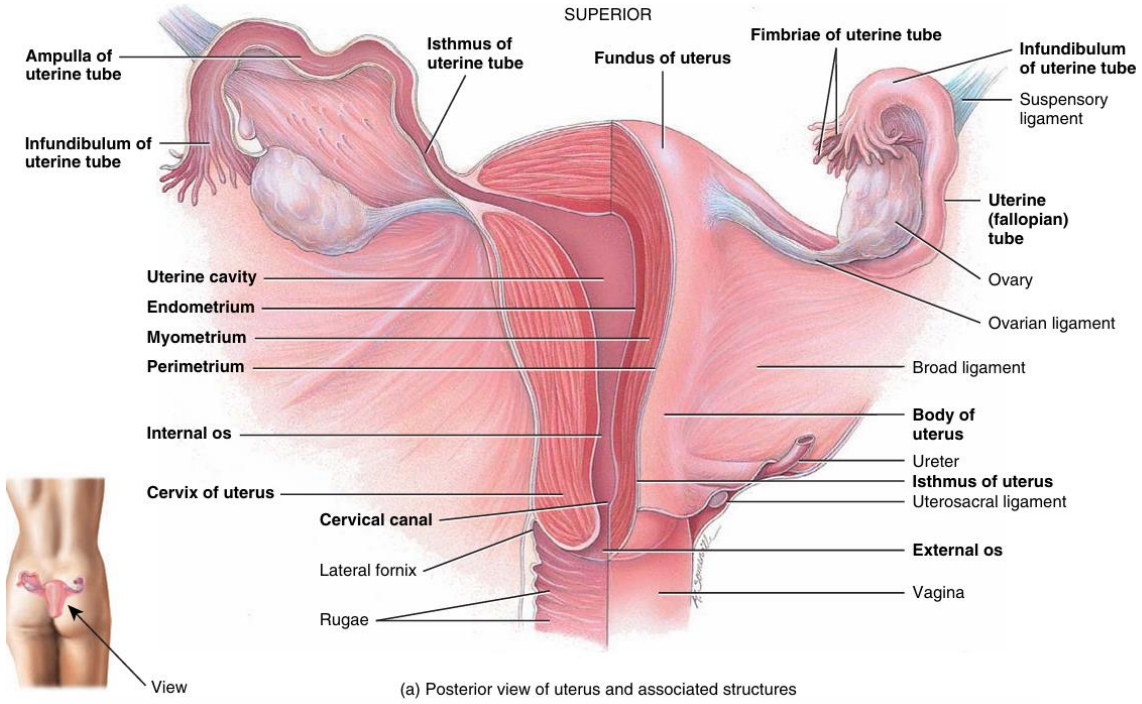
(a) Superior view of transverse section

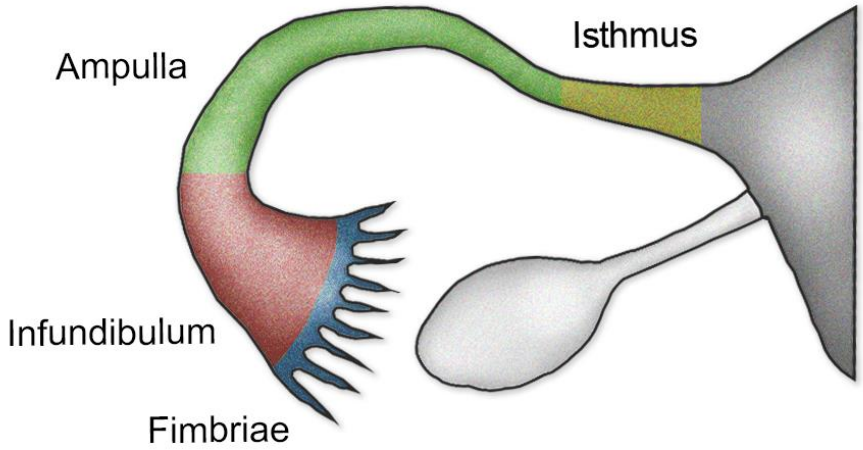
Uterine Tubes

- Fallopian tubes or oviducts
- Extend laterally from the uterus.
- Measure about 10 cm long and lie within the folds of the broad ligaments of the uterus
- **Function**: transport secondary oocytes and fertilized ova to the uterus.
- Consists of:

1. **Infundibulum:** funnel-shaped portion that ends in a fringe of finger-like projections called **fimbriae**
2. **Ampulla:** the widest, longest portion, making up about the lateral two thirds of its length
3. **Isthmus** is the more medial, short, narrow, thick-walled portion that joins the uterus.

the uterine tube extends **medially and inferiorly** and attaches to the superior lateral angle of the uterus.





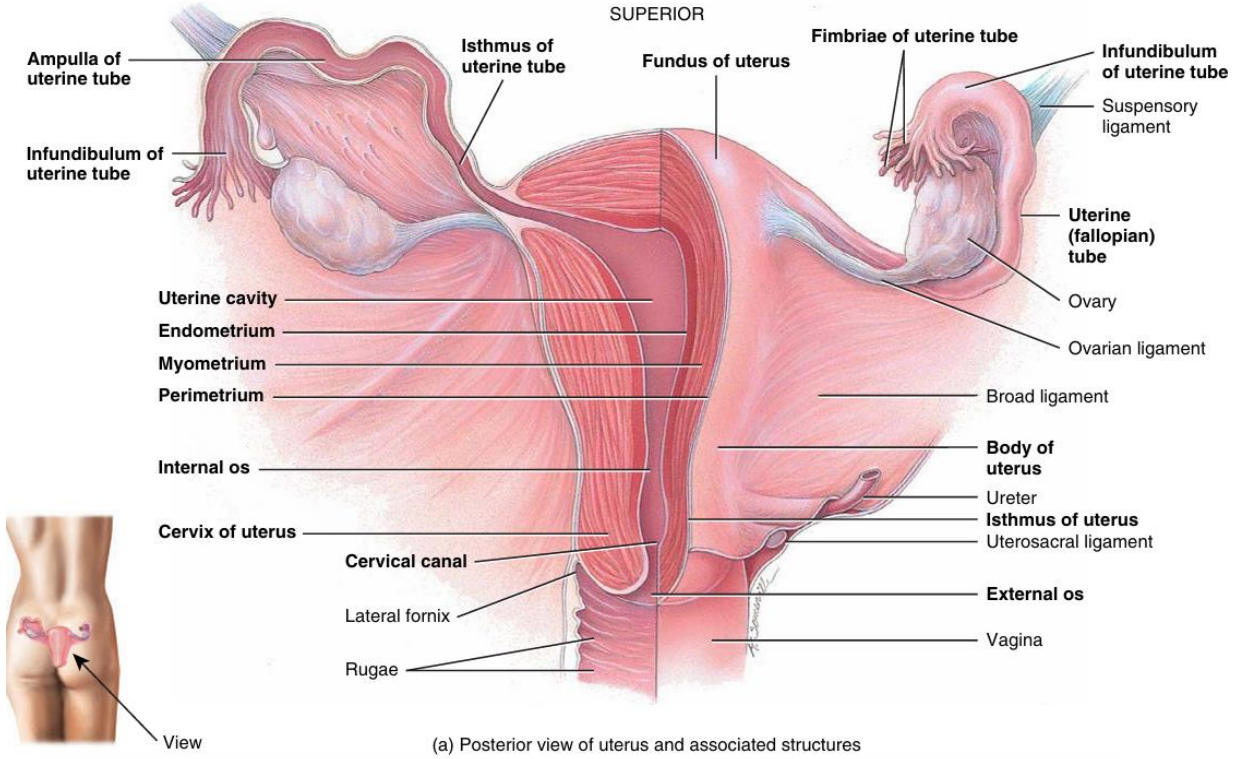
The uterus (womb)

- Resembles the size and shape of an inverted pear.
- Situated between the **urinary bladder and the rectum**
- **Functions**:

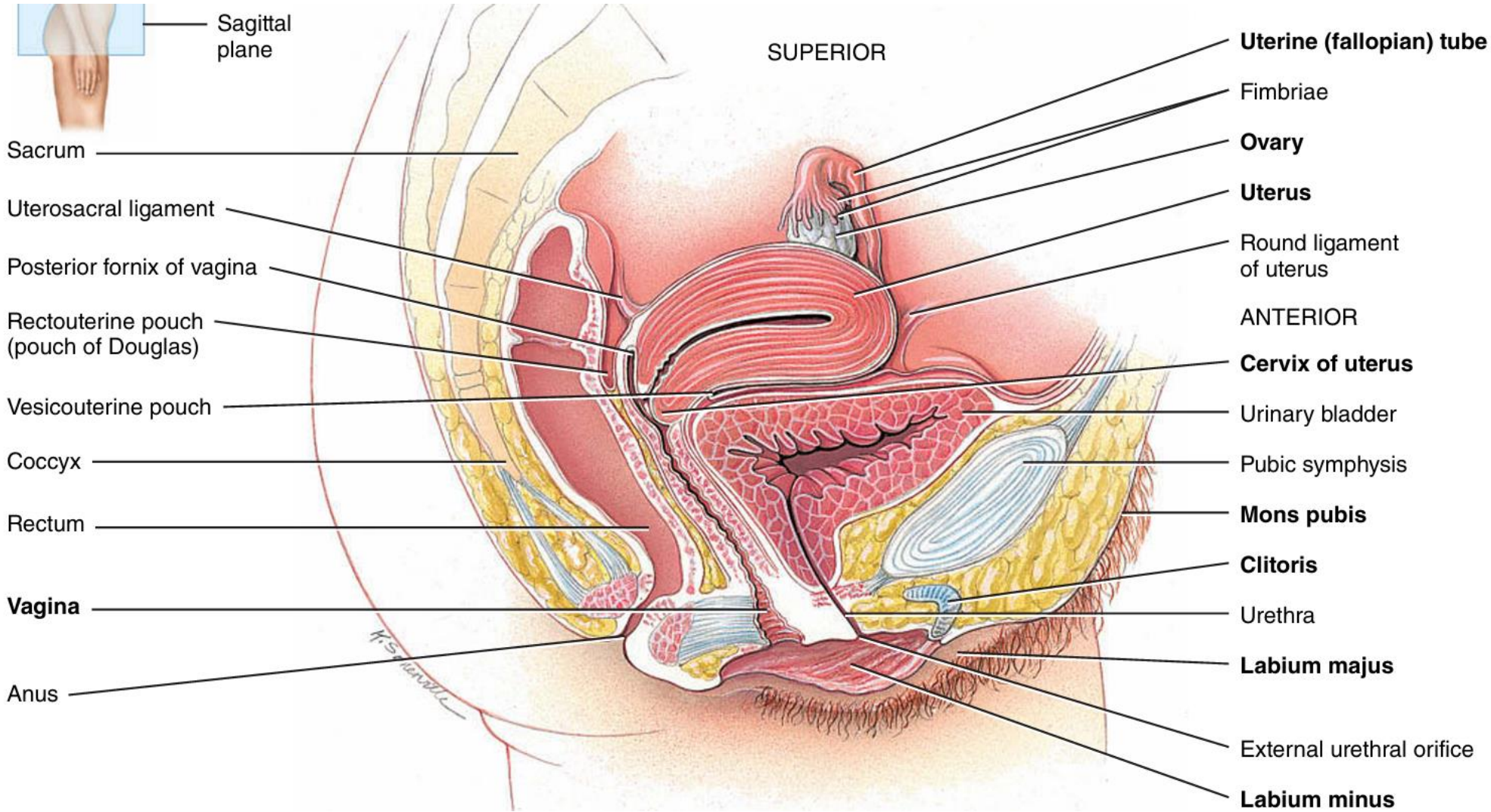
➢ Part of the pathway for sperm deposited in the vagina to reach the uterine tubes

➢ The site of implantation of a blastocyst, development of the fetus during pregnancy, and labor.

➢ During reproductive cycles when implantation does not occur, the uterus is the source of menstrual flow.



In females who have never been pregnant, it is about 7.5 cm (3 in.) long, 5 cm (2 in.) wide, and 2.5 cm (1 in.) thick. The uterus is larger in females who have recently been pregnant, and smaller (atrophied) when sex hormone levels are low


Sagittal plane
SUPERIOR
Sacrum
Uterosacral ligament
Posterior fornix of vagina
Rectouterine pouch (pouch of Douglas)
Vesicouterine pouch
Coccyx
Rectum
Vagina
Anus
Uterine (fallopian) tube
Fimbriae
Ovary
Uterus
Round ligament of uterus
ANTERIOR
Cervix of uterus
Urinary bladder
Pubic symphysis
Mons pubis
Clitoris
Urethra
Labium majus
External urethral orifice
Labium minus

The uterus (womb)

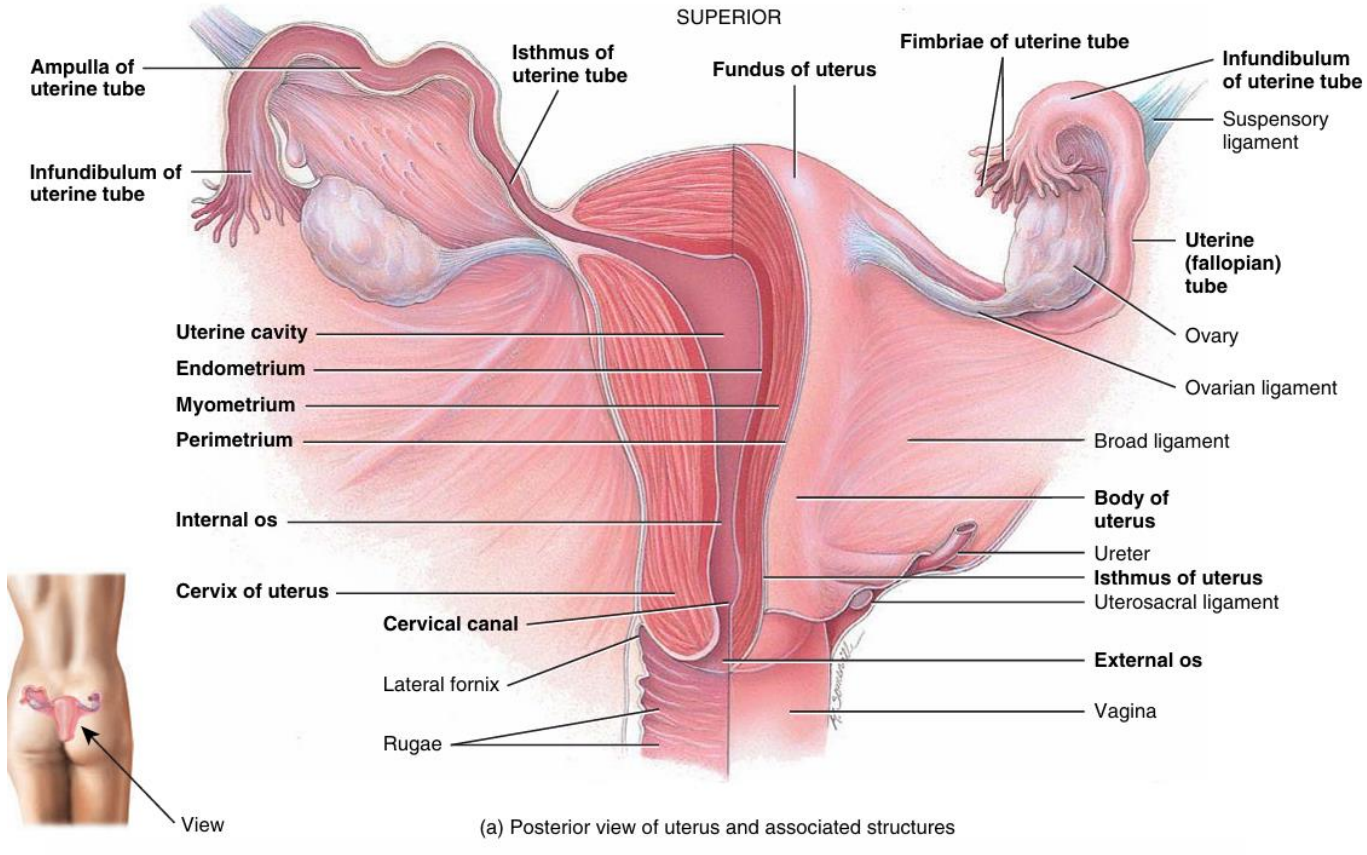
- **Anatomical subdivisions of the uterus:**

(1) **fundus:** a dome-shaped portion superior to the uterine tubes

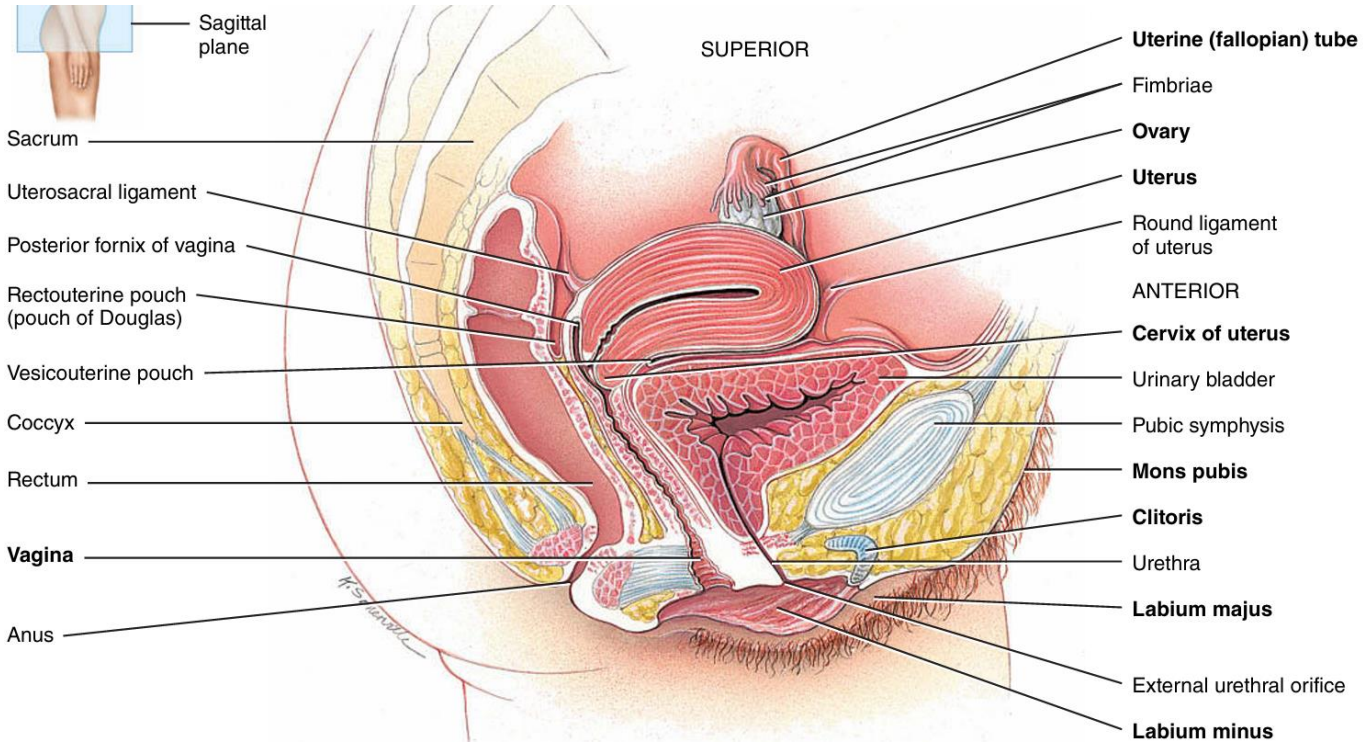
(2) **body:** a tapering central portion

(3) **cervix:** an inferior narrow portion that opens into the vagina.

- Between the body of the uterus and the cervix is the **isthmus**, a constricted region about 1 cm (0.5 in.) long.
- The interior of the body of the uterus is called the **uterine cavity**, and the interior of the narrow cervix is called the **cervical canal**. The cervical canal opens into the uterine cavity at the internal os and into the vagina at the external os.

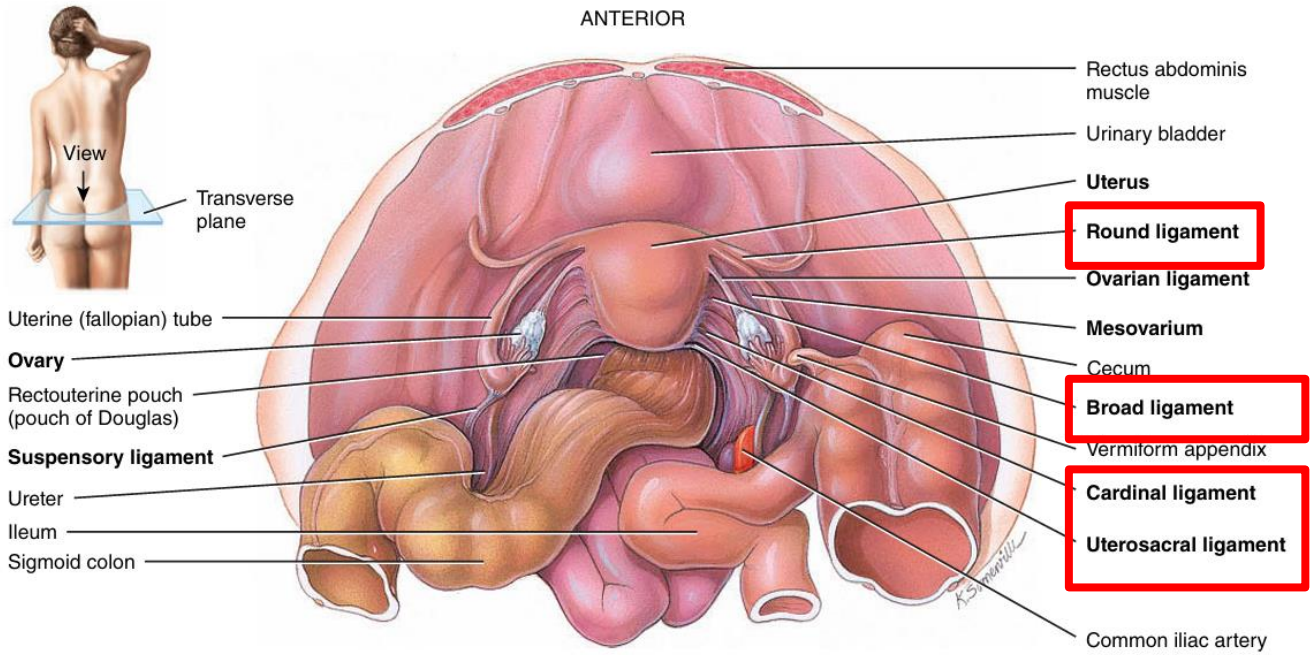


- Normally, the body of the uterus projects **anteriorly and superiorly** over the urinary bladder in a position called **anteflexion**.
- The cervix projects **inferiorly and posteriorly** and enters the anterior wall of the vagina at nearly a right angle

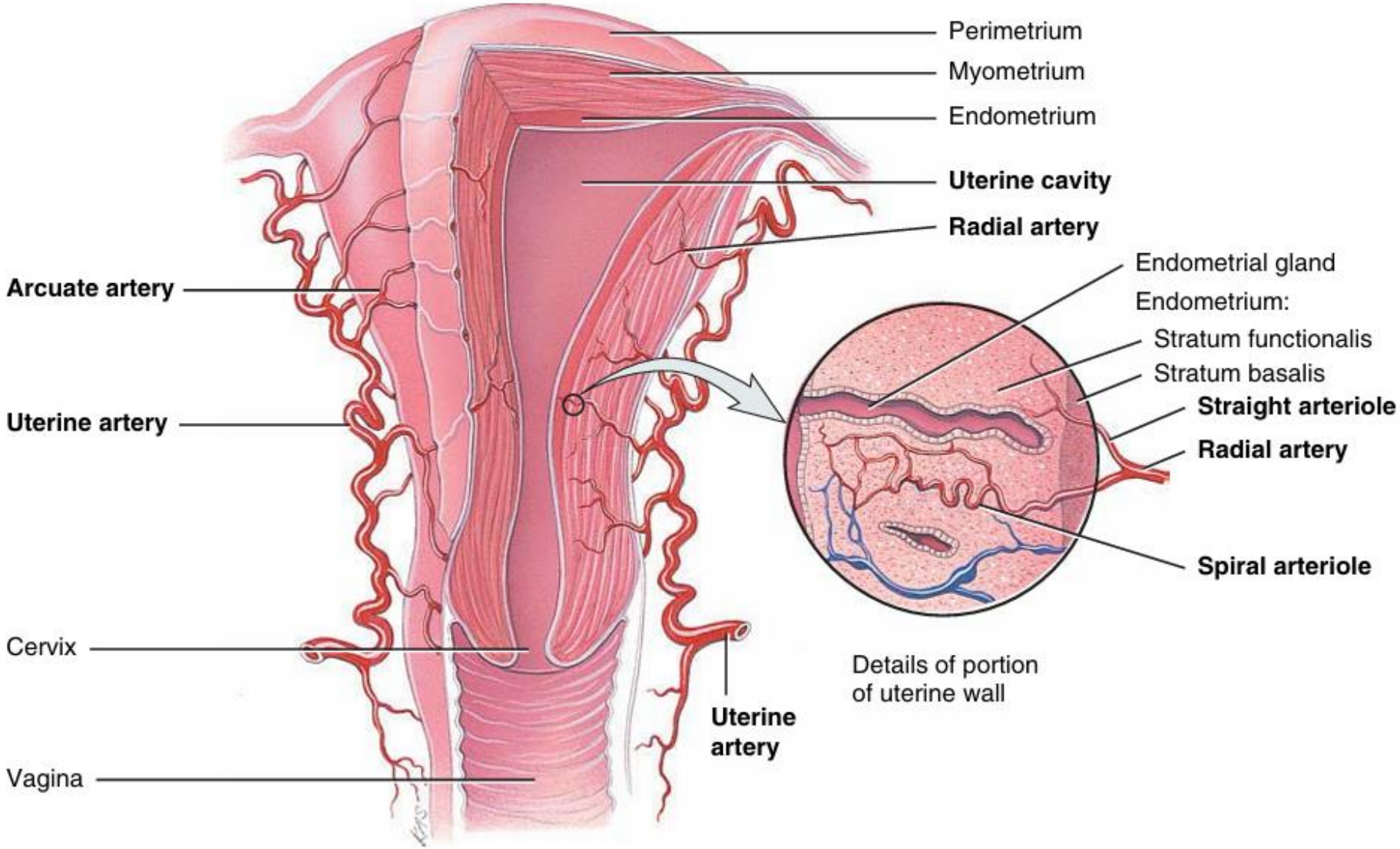


Supporting ligaments of the uterus

- **Broad ligaments** are double folds of peritoneum attaching the uterus to either side of the pelvic cavity.
- **Uterosacral ligaments** also peritoneal extensions, lie on either side of the rectum and connect the uterus to the sacrum.
- **Cardinal ligaments:** inf. to broad ligament from the pelvic wall to the cervix and vagina.
- **Round ligaments** are bands of fibrous connective tissue between the layers of the broad ligament; they extend from a point on the uterus just inferior to the uterine tubes to a portion of the labia majora of the external genitalia.



(a) Superior view of transverse section



Anterior view with left side of uterus partially sectioned

Vagina

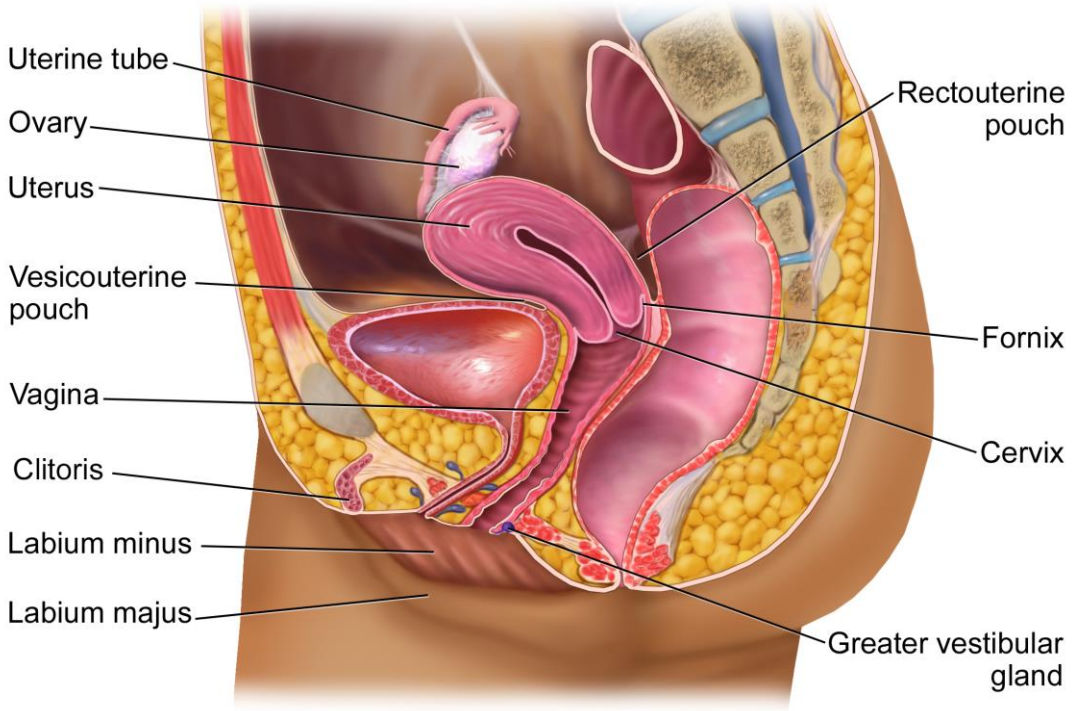
- A tubular, fibromuscular canal lined with mucous membrane that extends from the exterior of the body to the uterine cervix.
- It is about 10 cm (4 in.) long

Functions:

- ➢ Receptacle for the penis during sexual intercourse
- ➢ Outlet for menstrual flow
- ➢ Passageway for childbirth.

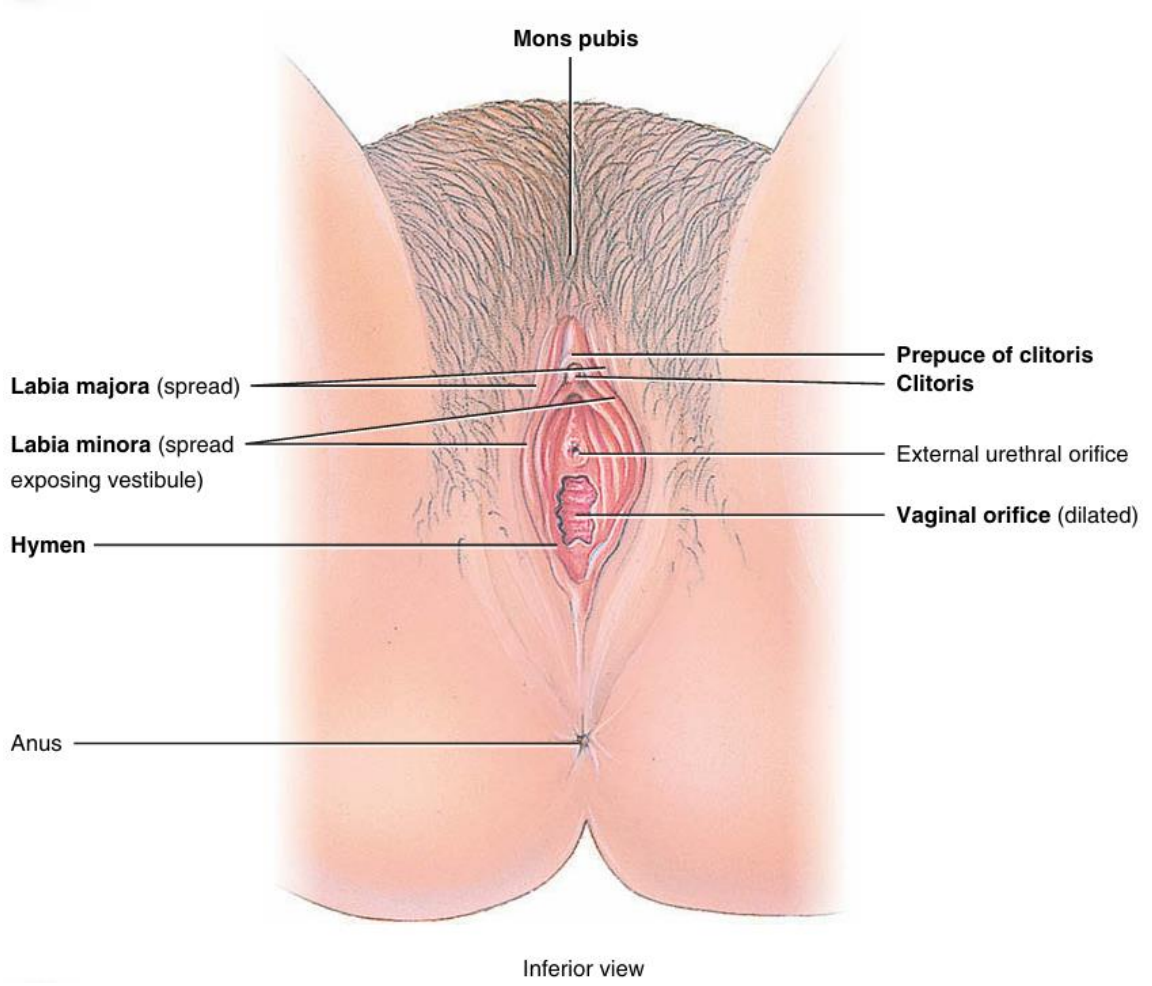
Situated **posterior to the urinary bladder** and urethra and **anterior to the rectum**, the vagina is **directed superiorly and posteriorly**, to attach to the cervix of the uterus.

A recess called the fornix surrounds the vaginal attachment to the cervix.



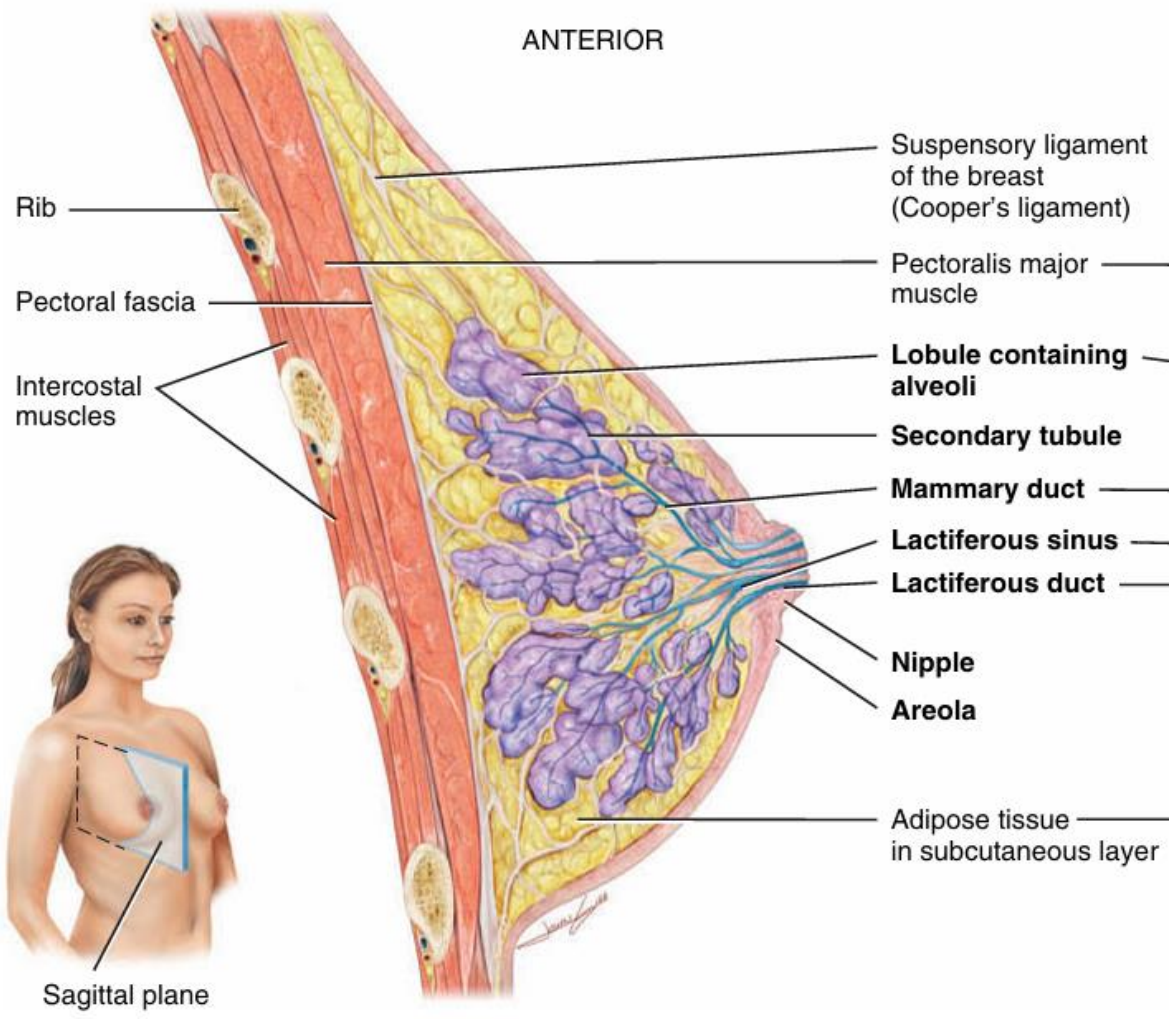
Female External Genital Organs (vulva)

- **Mons pubis**
- **The labia majora**: two broad skin folds, lateral to the labia minora. covered by pubic hair. They are homologous to the scrotum.
- **The labia minora**: They are two thin skin folds devoid of pubic hair. The region between the labia minora is the vestibule. Within the vestibule are the **vaginal orifice**, the **external urethral orifice**, and the openings of the ducts of glands
- **Clitoris**: is a small cylindrical mass of erectile issue and nerves located at the anterior junction of the labia minora.



Mammary Glands

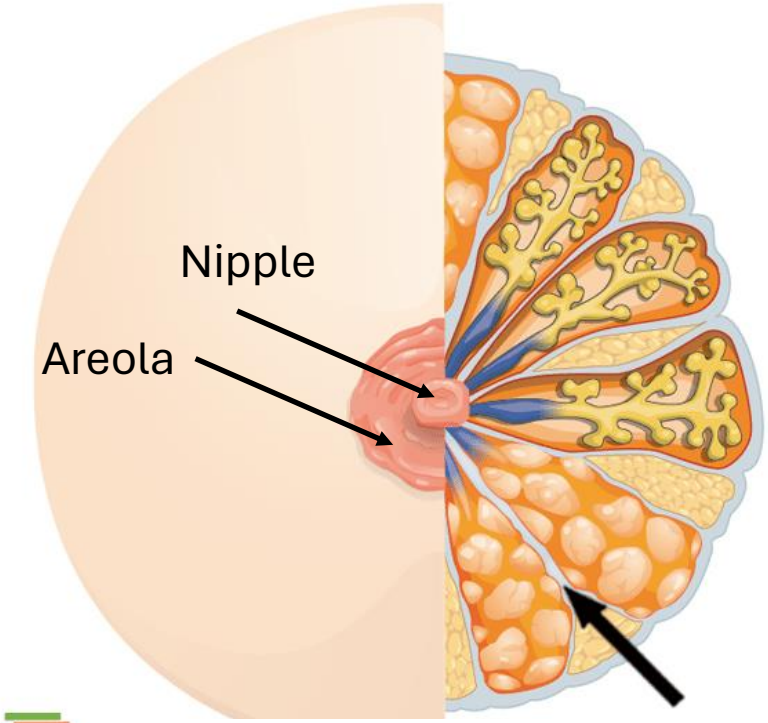
- Each breast is a hemispheric projection of variable size anterior to the **pectoralis major** and **serratus anterior muscles**.
- Within each breast is a mammary gland, a modified (sweat) gland that produces milk .
- Consists of 15 to 20 **lobes**, or compartments, separated by a variable amount of adipose tissue. In each lobe are several smaller compartments called **lobules**, composed of grapelike clusters of milk-secreting glands termed **alveoli**



(a) Sagittal section

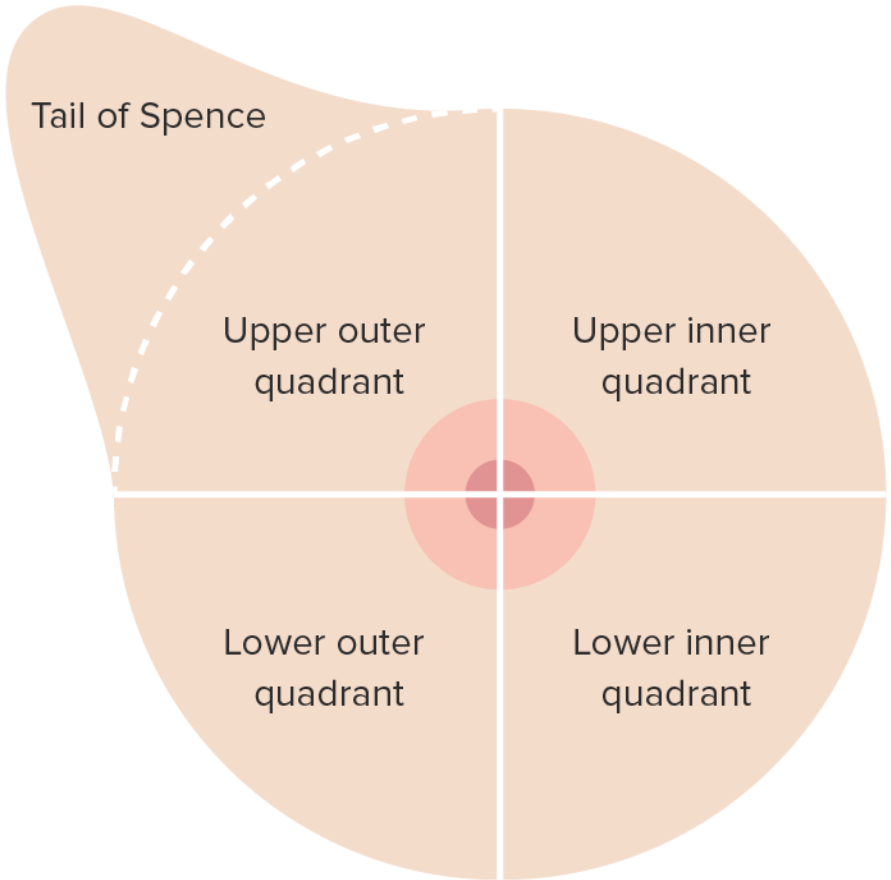
Mammary Glands

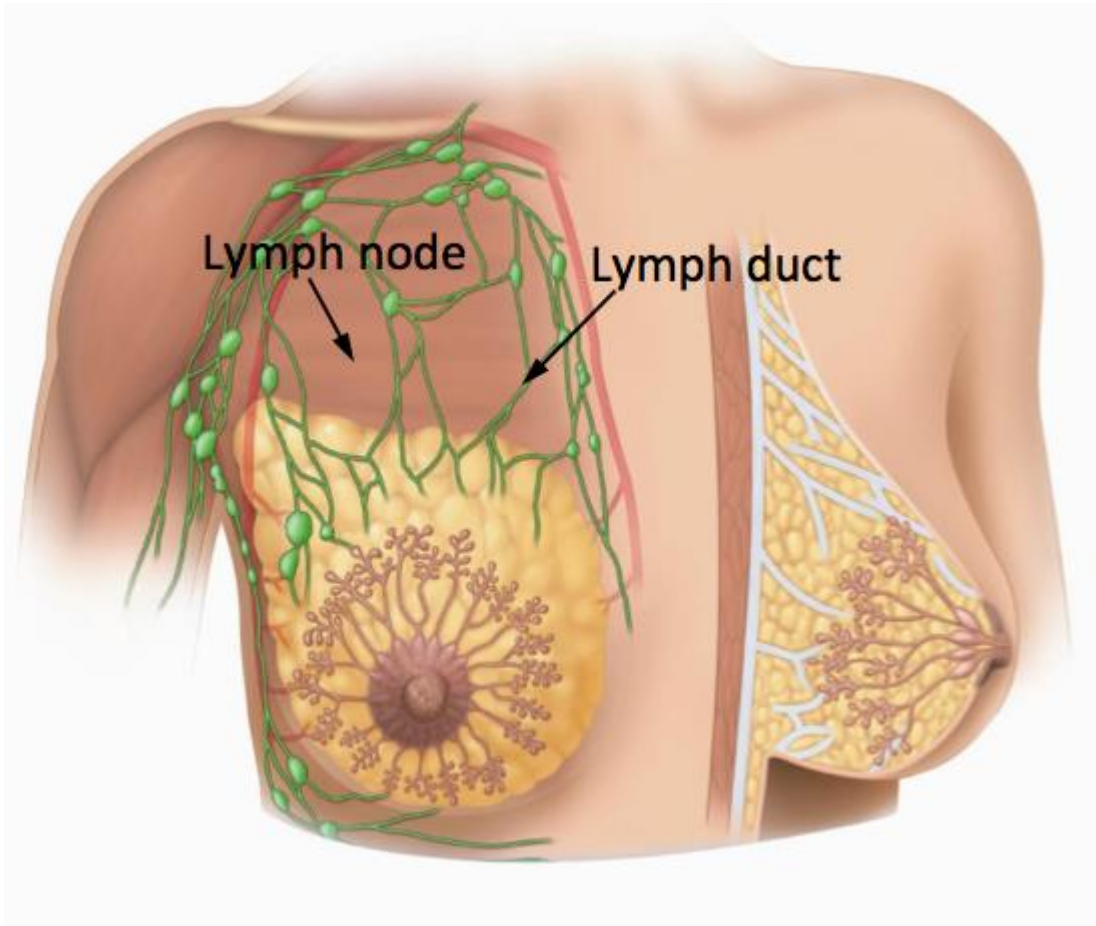
- Each breast has one pigmented projection, **the nipple**, which has a series of closely spaced openings of ducts called **lactiferous ducts**, where milk emerges. The circular pigmented area of skin surrounding the nipple is called **the areola**
- Strands of connective tissue called **the suspensory ligaments of the breast** (Cooper's ligaments) run between the skin and fascia and support the breast.
- **Functions**: synthesis, secretion, and ejection of milk; these functions, called lactation, are associated with pregnancy and childbirth.



openstax COLLEGE

suspensory ligaments of the breast


Tail of Spence
Upper outer quadrant
Upper inner quadrant
Lower outer quadrant
Lower inner quadrant


Lymph node
Lymph duct

- Thank you and best wishes!