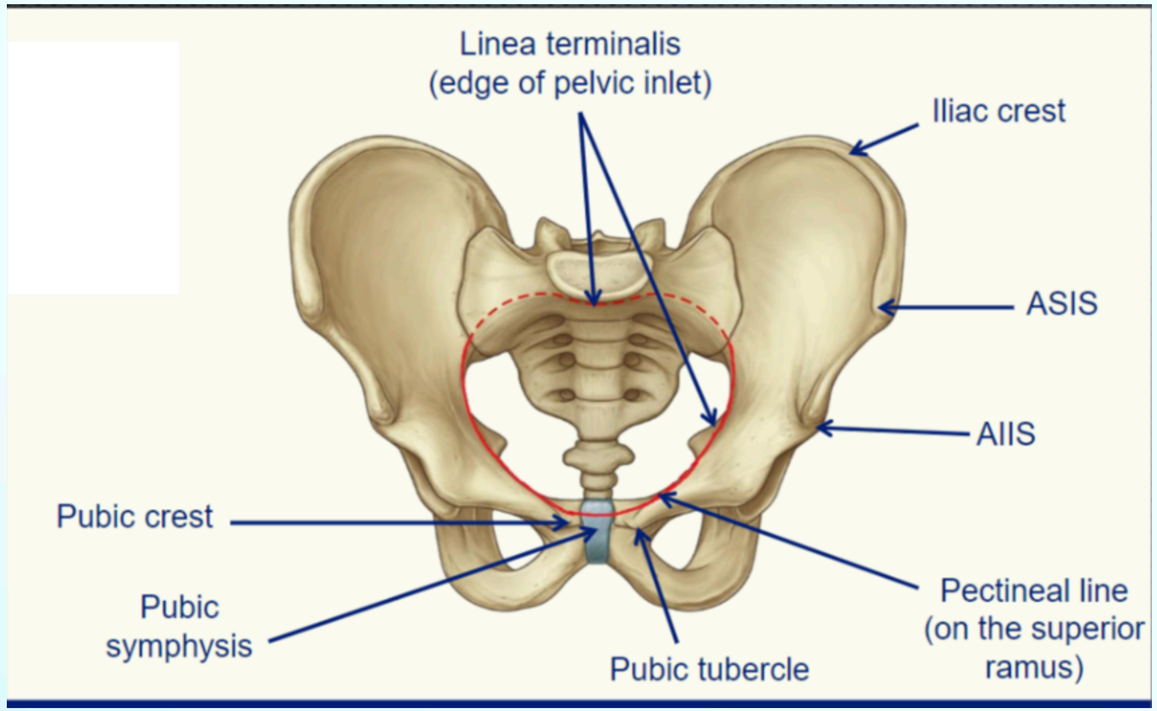
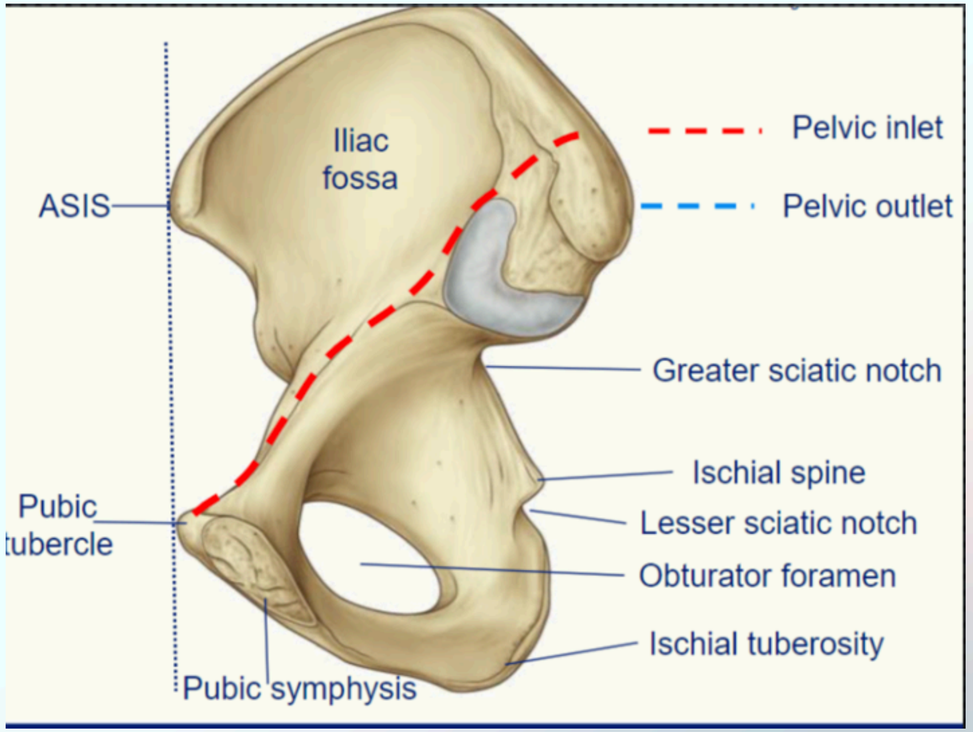
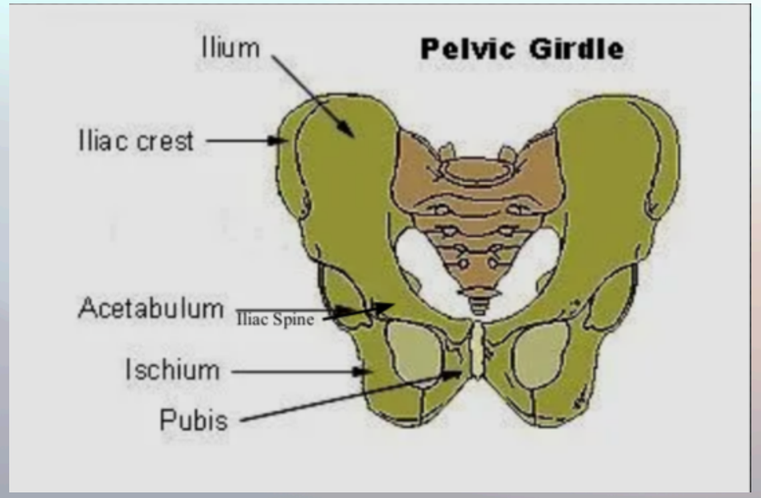
Pelvis and Pelvic Floor Muscles (and a bit of male anatomy)

Pelvis





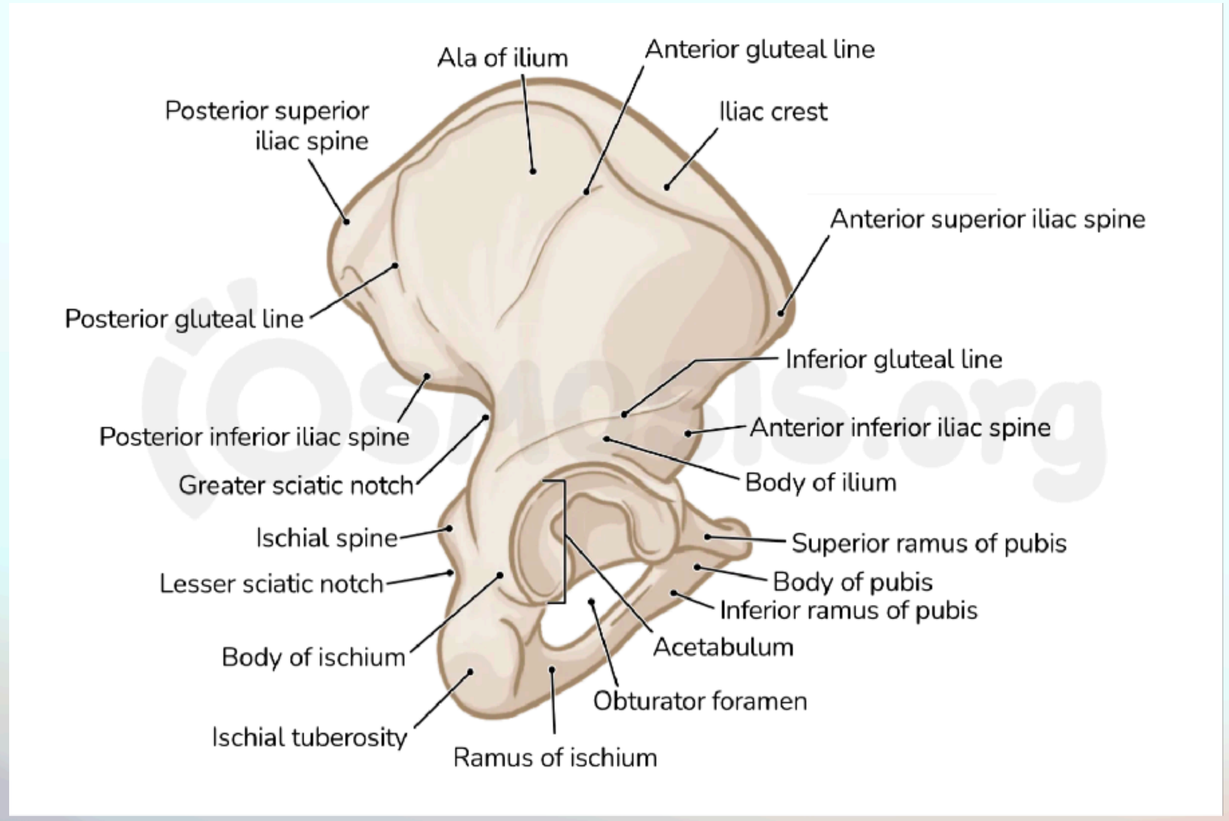


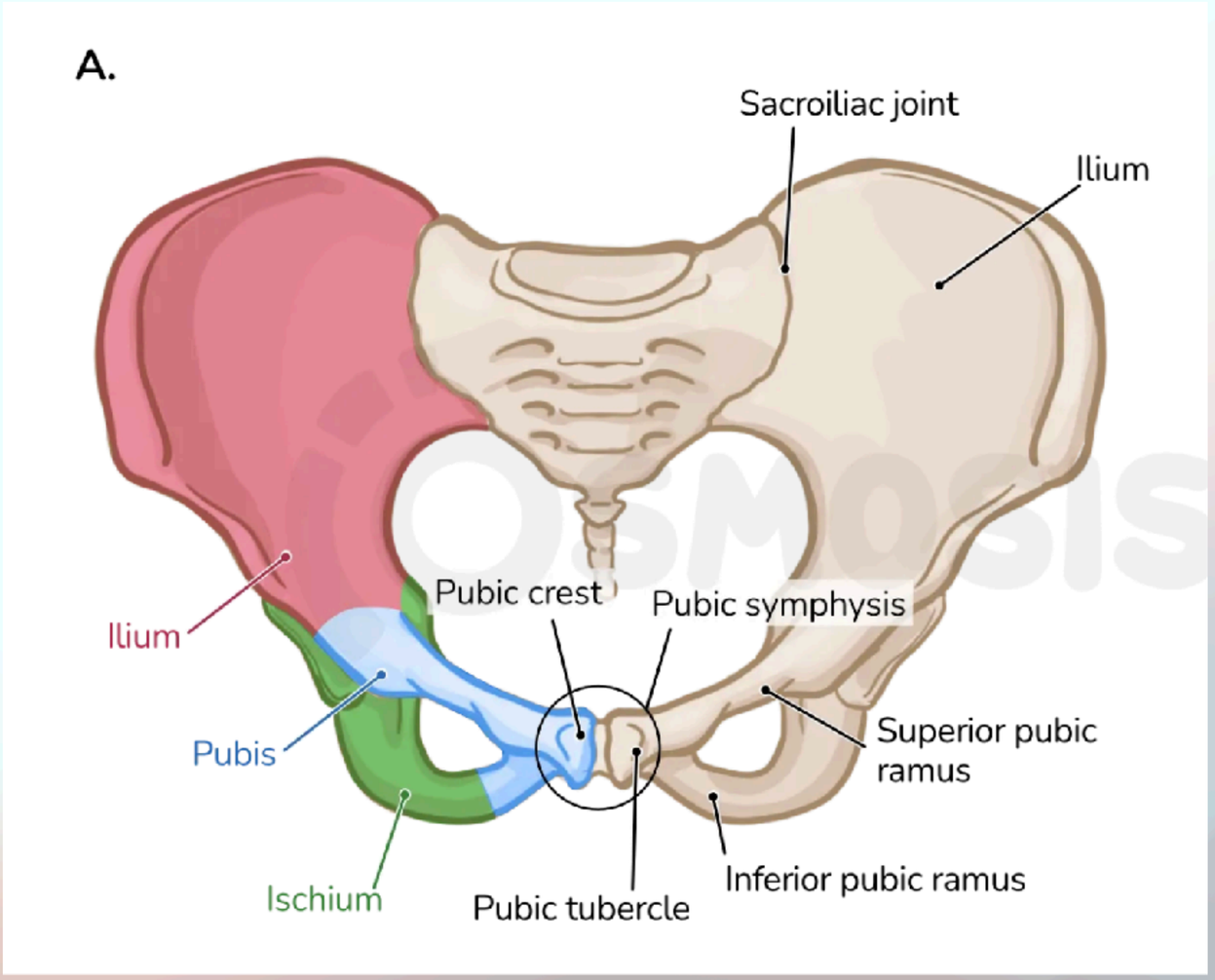
Inlet formed by:

- Proximal Sacrum
- Arcuate line of Sacrum
- Illiopectinal Line
- Posterior surface of Pubic Crest

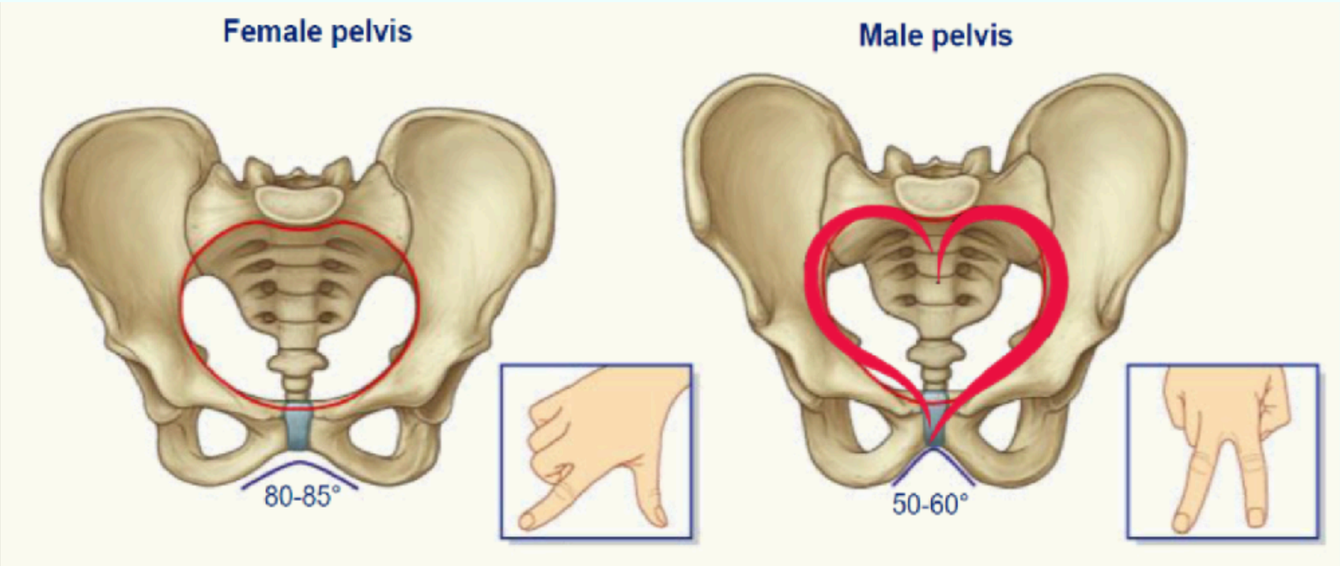
Outlet formed by:

- Ischiopubic rami
- Ischial Tuberosities
- Sacrotuberous Ligaments
- Distal Sacrum (Coccyx)


Ala of ilium
Anterior gluteal line
Posterior superior iliac spine
Iliac crest
Anterior superior iliac spine
Posterior gluteal line
Inferior gluteal line
Posterior inferior iliac spine
Anterior inferior iliac spine
Greater sciatic notch
Body of ilium
Ischial spine
Superior ramus of pubis
Lesser sciatic notch
Body of pubis
Inferior ramus of pubis
Body of ischium
Acetabulum
Obturator foramen
Ischial tuberosity
Ramus of ischium


A.
Sacroiliac joint
Ilium
Ilium
Pubic crest
Pubic symphysis
Pubis
Superior pubic ramus
Ischium
Pubic tubercle
Inferior pubic ramus

Male vs Female Pelvis



There are THREE DIFFERENCES

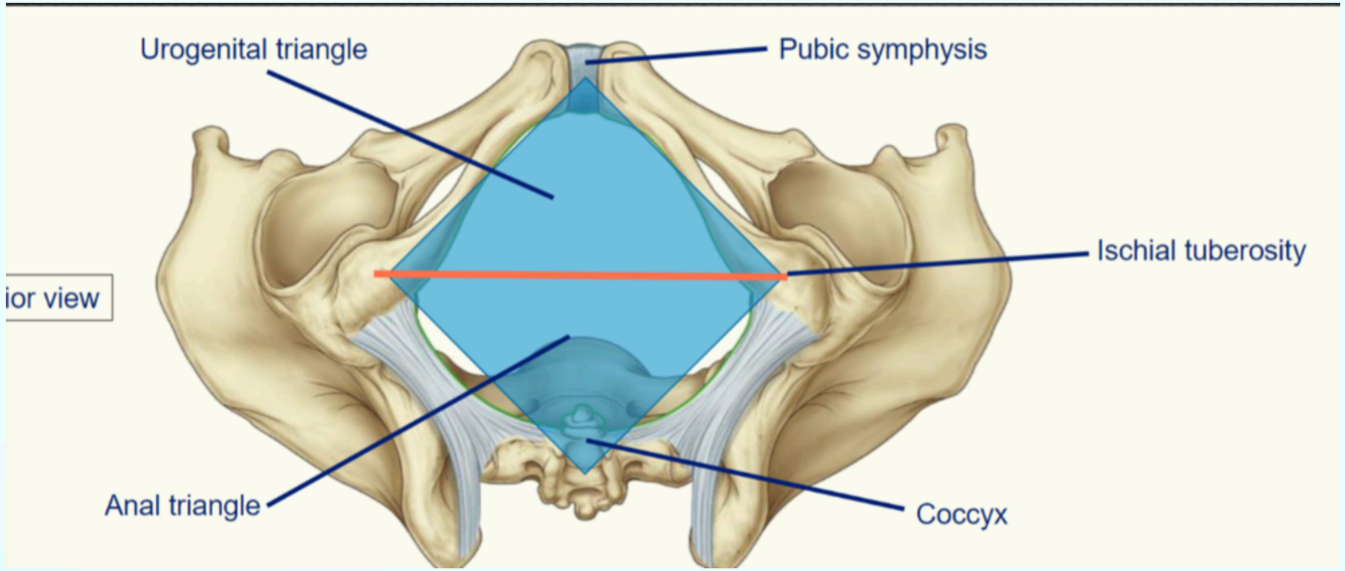
1 - Females Linea Terminalis is OVAL shaped and bigger while in males it is heart shaped and narrow. This is so females can firm giving birth.

2 - In the Female Pelvis the sub-pubic arch is 80-85 degrees while the male is 50-60 degrees

3 - Ilia project more LATERALLY in females and is WIDER (again for baby to fit)

Basically the women have the better pelvis lads 😔

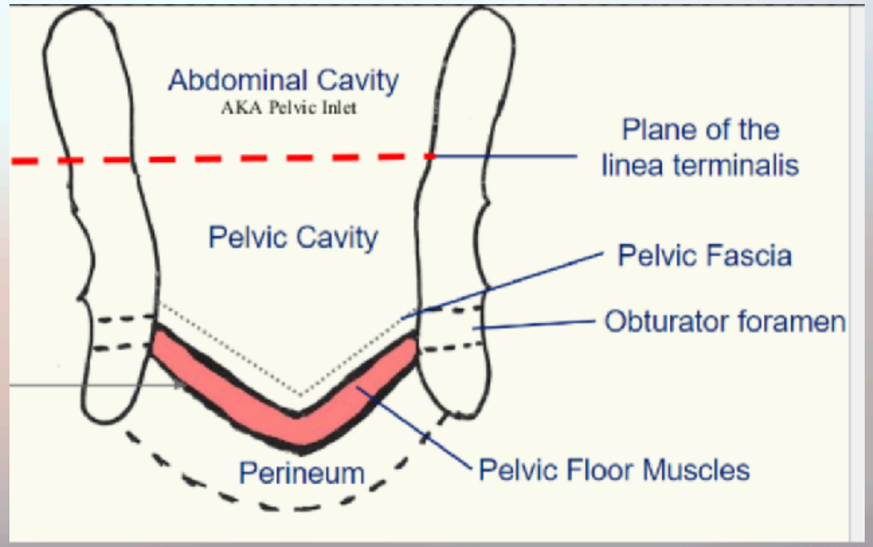
Pelvic Floor Muscles



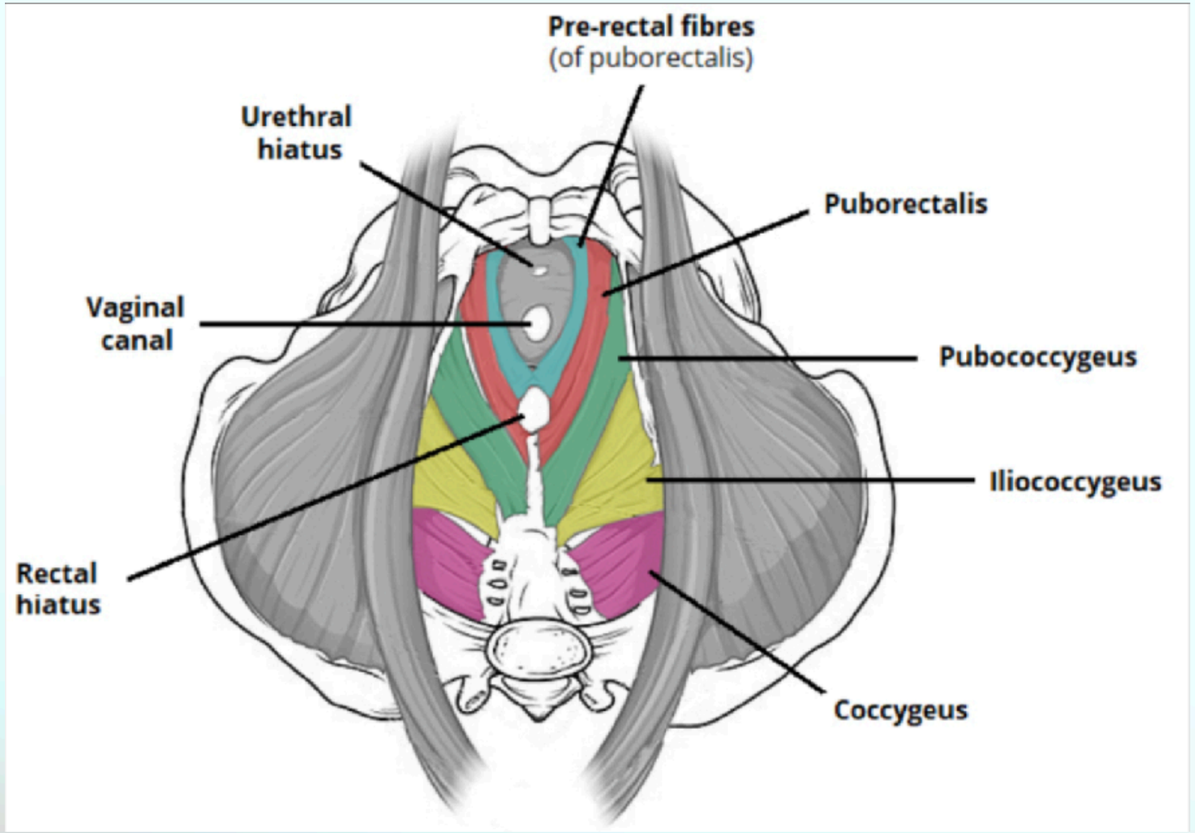
Two triangles

- Urogenital Triangle: Allows passage of urethra and vagina in females
- Anal Triangle: As the name states

BASICALLY the pelvic floor separates the perineum from the pelvis



Pelvic Floor Muscles



2 MAIN MUSCLES MAKE UP THE PELVIC FLOOR

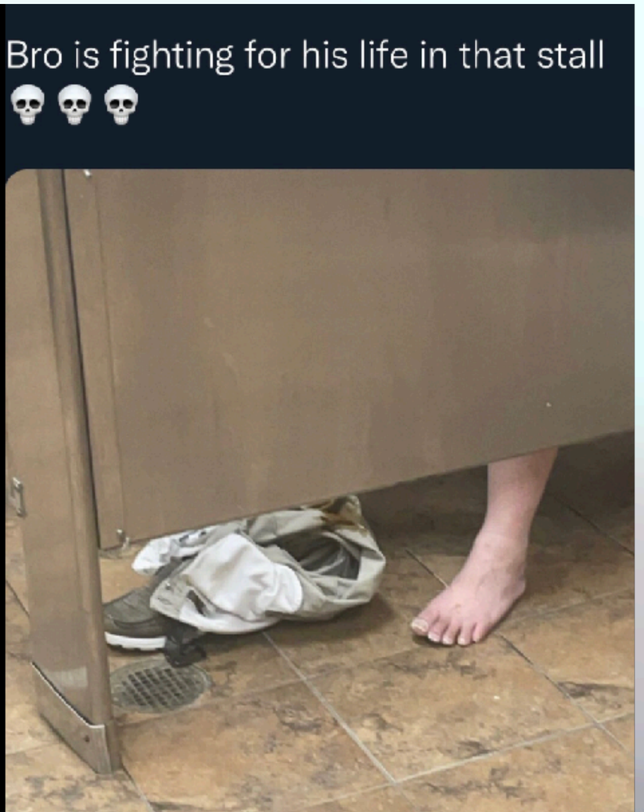
1) Levator Ani

- Pubococcygeus, Iliococcygeus and Puborectalis

2) Coccygeus

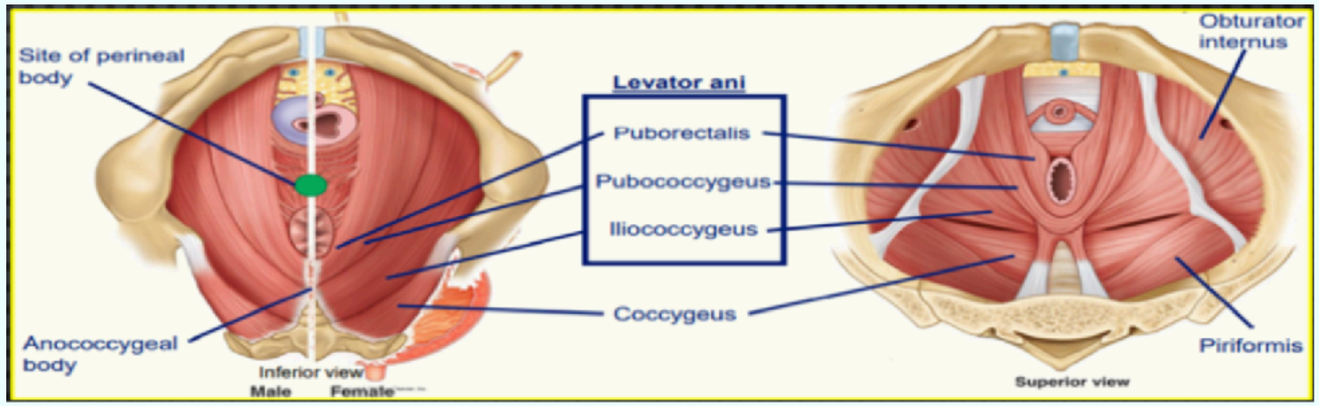
Which nerve innervates the levator ani muscles?

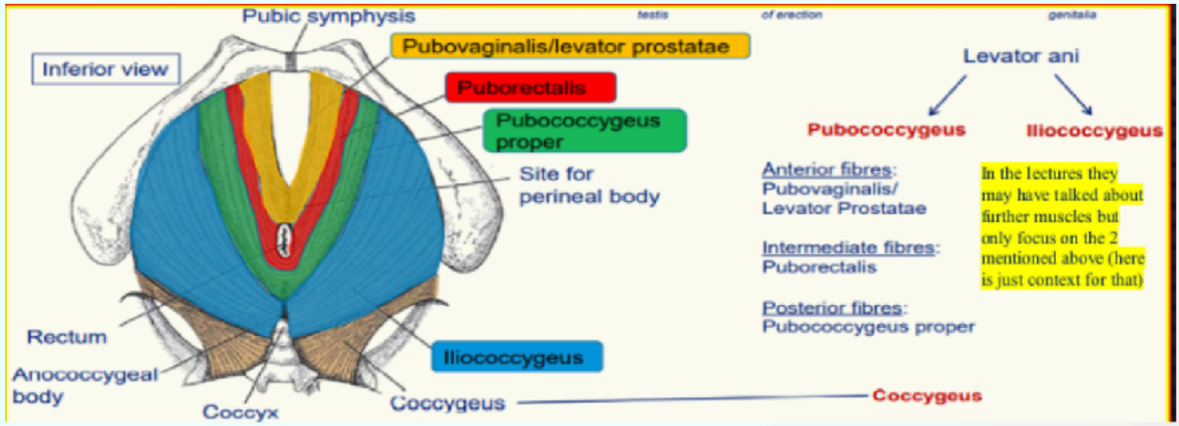
Which nerve innervates the levator ani muscles?



PUDENDAL NERVE (S2-S4)

(lets u take a dump)





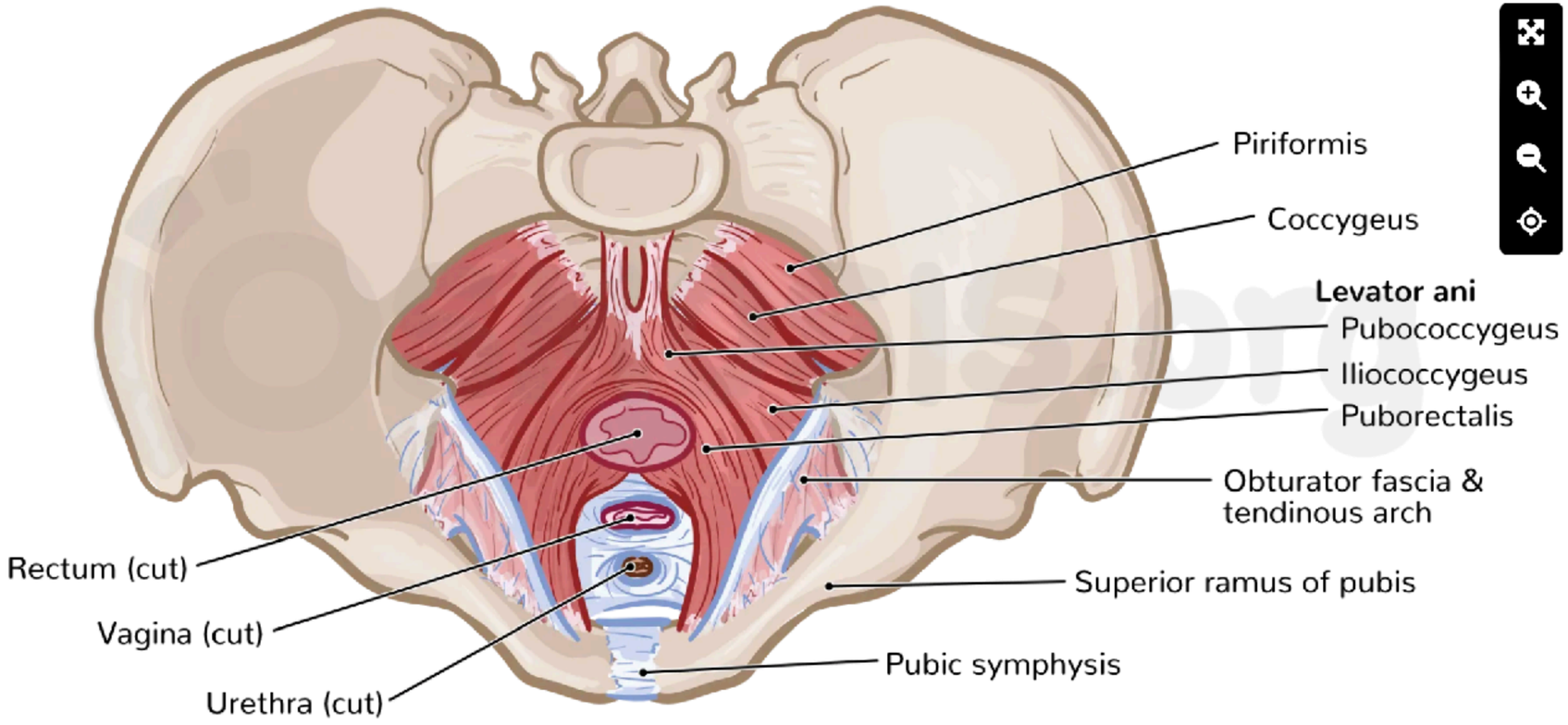


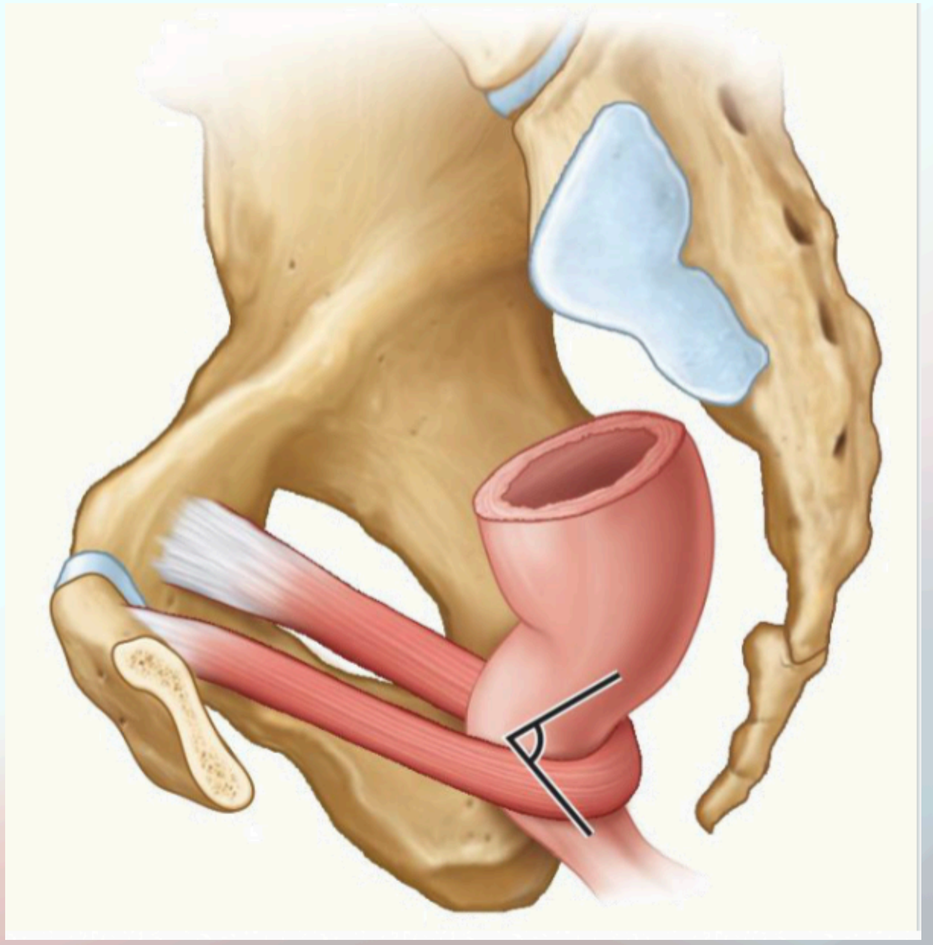
Figure 3: Muscles of the female pelvic floor.

Puborectalis (Sphincter Control)

Acts as a sling between the rectum and anus and creates an 80 degree angle -> To prevent and control defecation.

Puborectalis Fibres form a sling around the junction between the rectum and anus (perineal flexure).

Relaxation will increase the angle and allow for defecation once the Internal and External anal sphincters also relax.

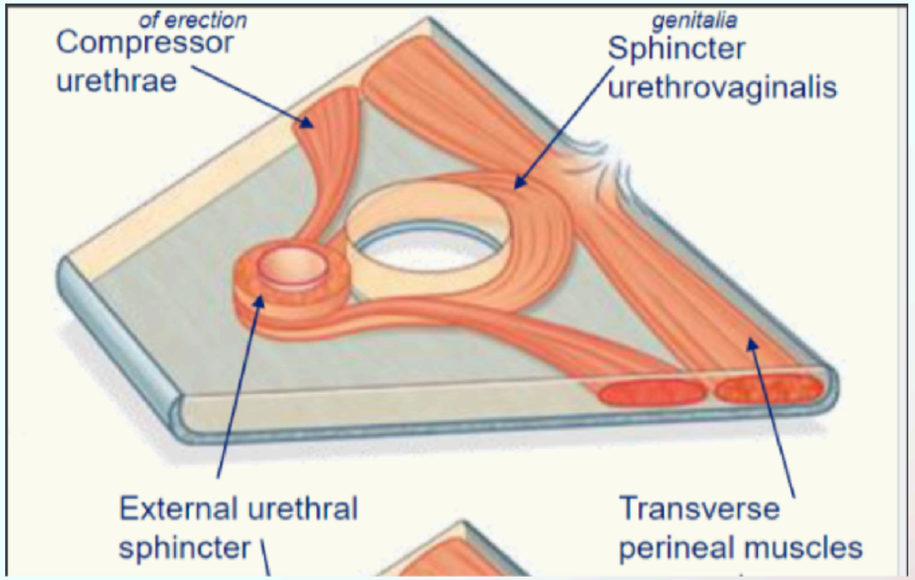


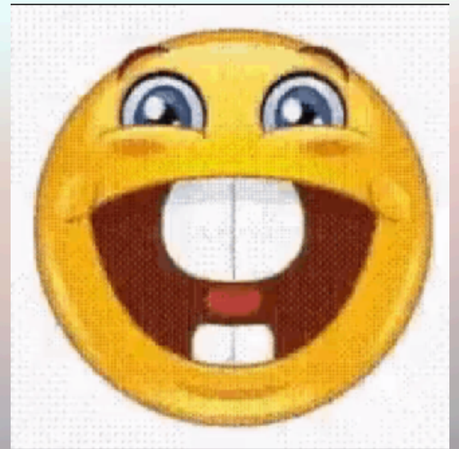
Female Urethral Sphincters

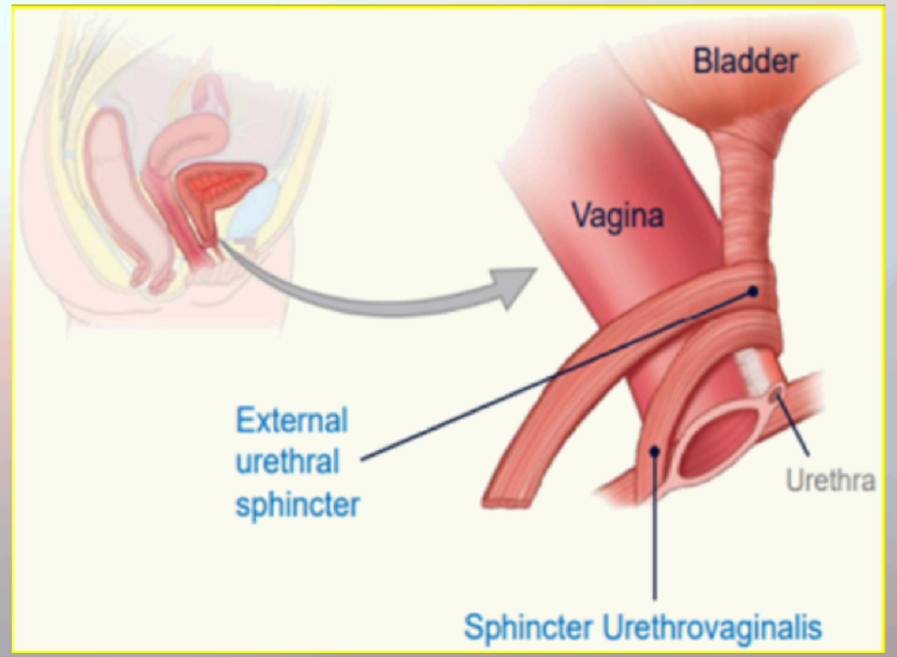
Difference between male and female:

- Male: internal (autonomic) and external urethral sphincter (somatic – voluntary)

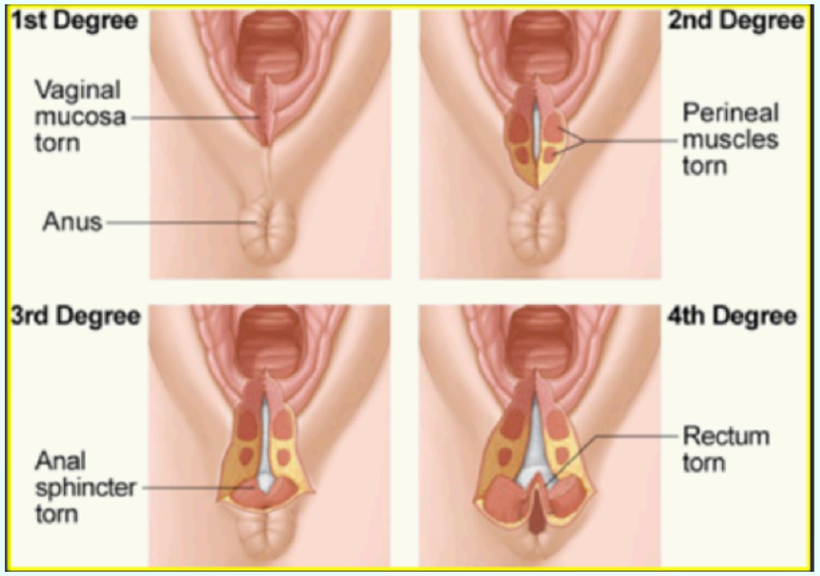
- Women: 3 sphincters: compressor urethrae (compresses the urethra), sphincter urethrovaginalis, external urethral sphincter







Perineal Tears during labour



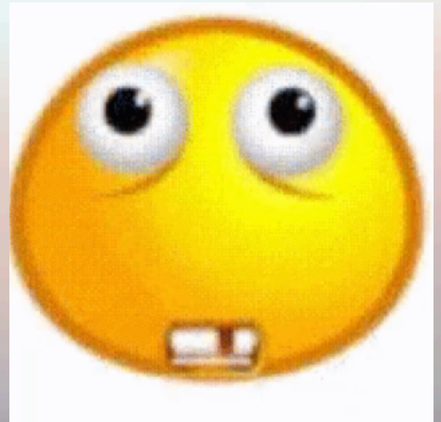
First degree tear: Superficial perineal skin or vaginal mucosa

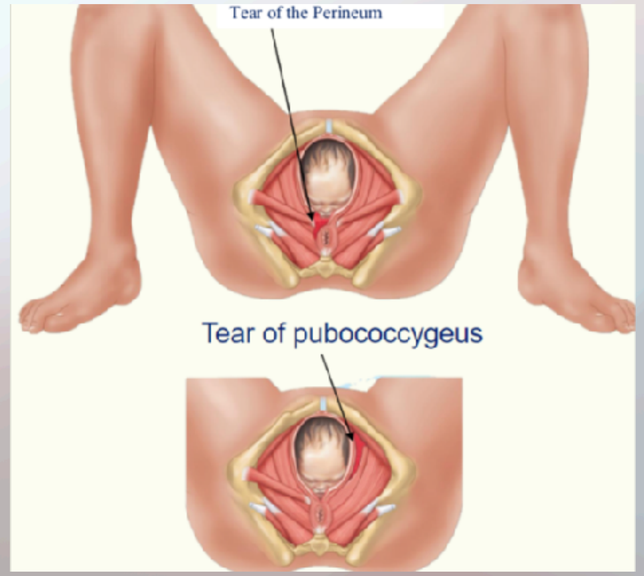
Second degree tear: Perineal skin, mucosa, muscles, fascia but NOT the anal sphincter

Third degree tear: Perineal Skin, mucosa, muscles, fascia and anal sphincter

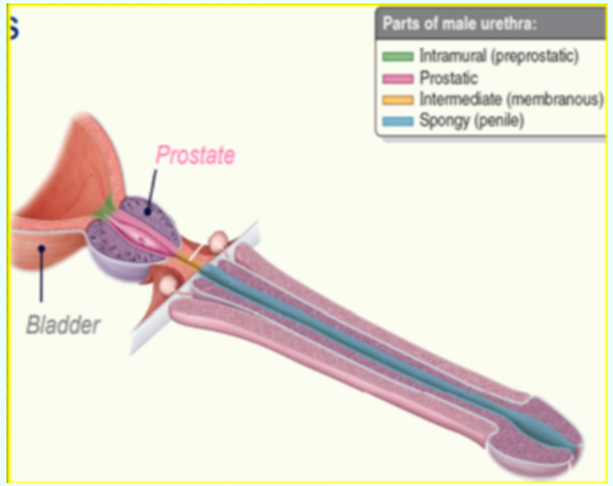
Fourth degree tear: Perineal skin, mucosa, muscles, fascia, anal sphincter

and rectal mucosa





Male reproductive anatomy

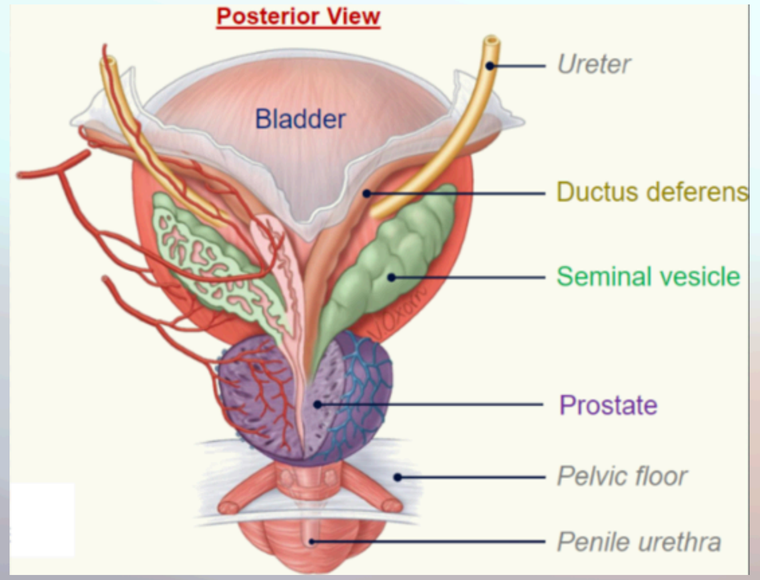


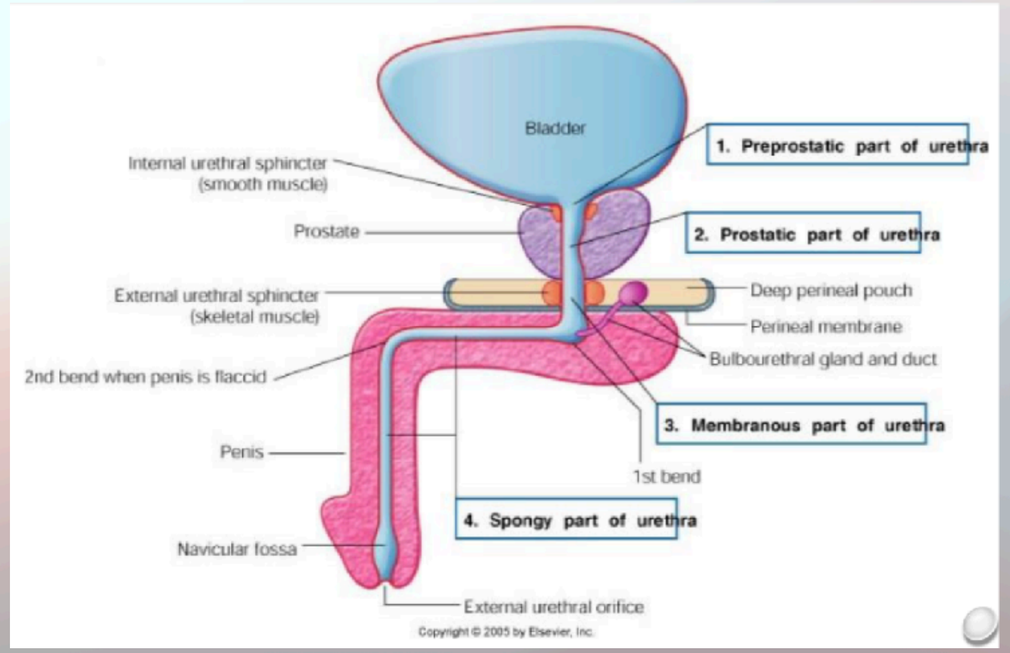
1: PREPROSTATIC – BLADDER TO PROSTATE

2: PROSTATIC – PASSES THROUGH PROSTATE

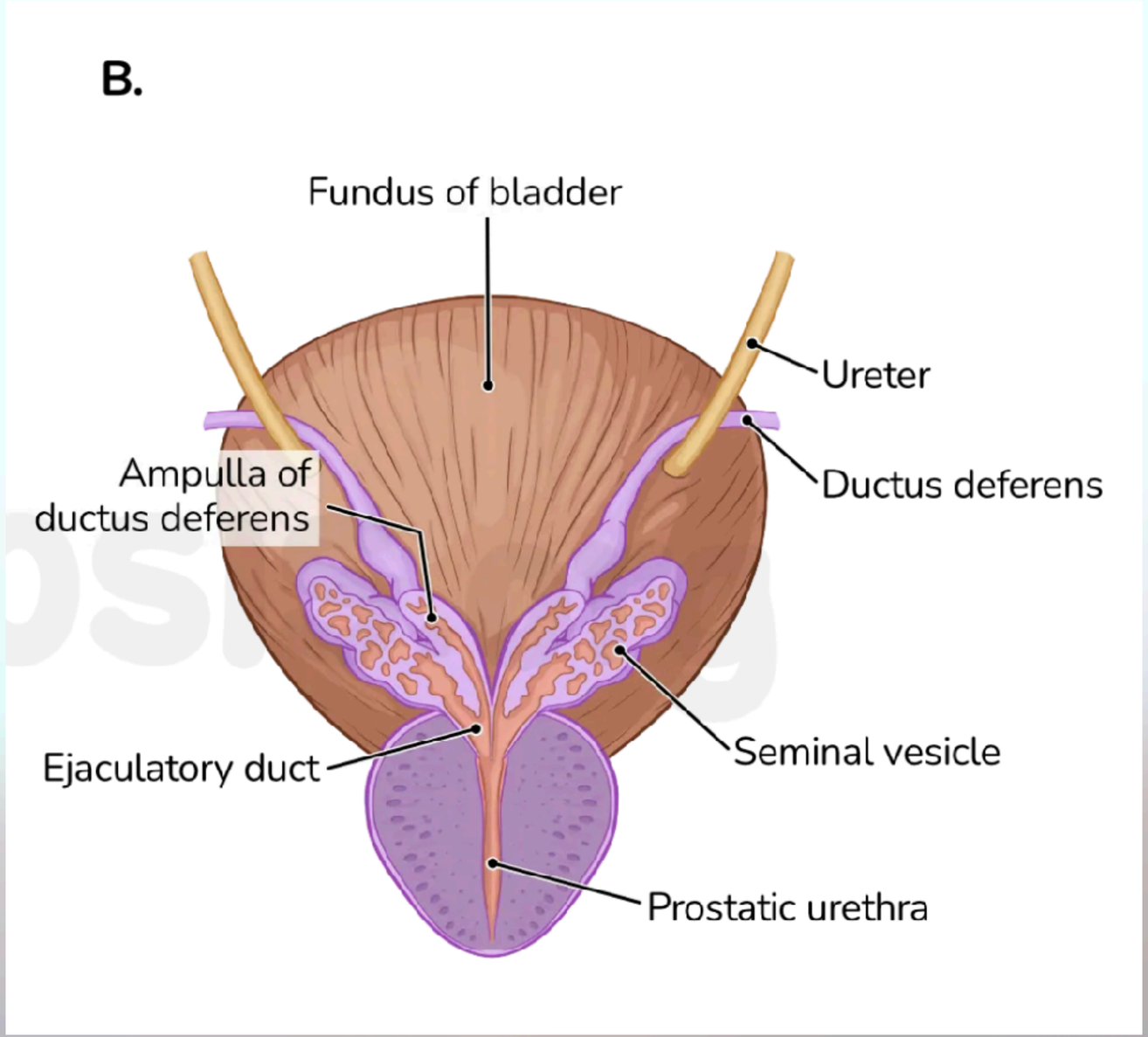
3: MEMBRANOUS – PASSES THROUGH DEEP PERINEAL POUCH AND PERINEAL MEMBRANE

4: SPONGY – SURROUNDED BY CORPUS SPONGIOSUM AND BULBOSPONGIOSUS MUSCLE





IMPORTANT


B.
Fundus of bladder
Ureter
Ductus deferens
Ampulla of
ductus deferens
Seminal vesicle
Ejaculatory duct
Prostatic urethra

Penis

There are 3 tubes

1 - (x2) Corpora Cavernosa

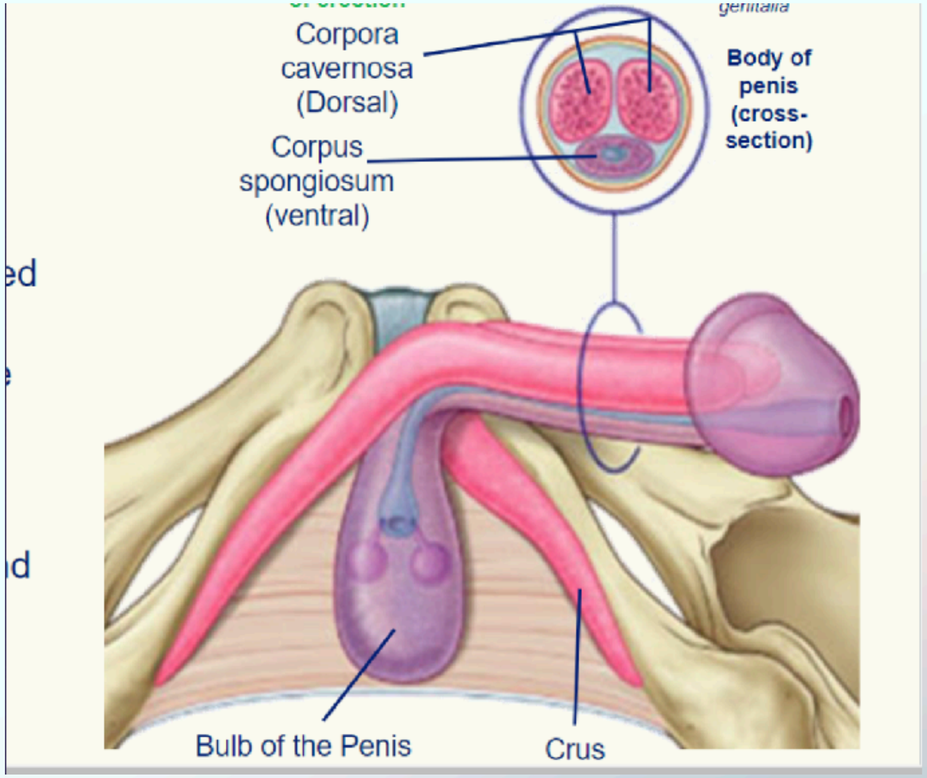
2 - (x1) Corpus Spongiosum

The Corpora Canvernoa engorges in blood for erections

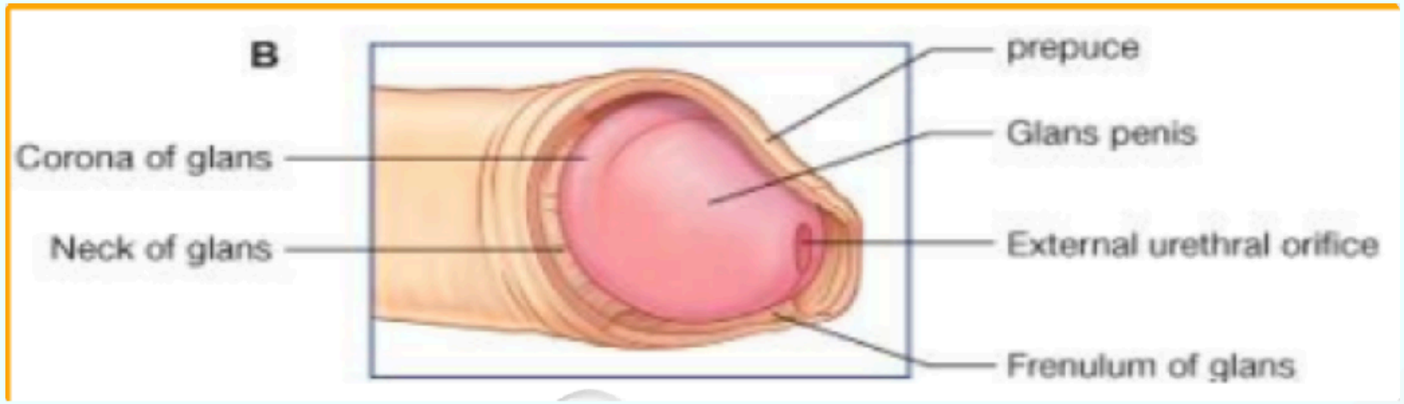
The Corpus Spongiosum transports the URETHRA

There is also a ROOT, BULB and BODY

- Root - Contains x2 crura which are the proximal parts of the Corpora Cavernosa
- Bulb - Proximal part of Corpus Spongiousum
- Body - Tethers free parts of Corpora Cavernosa and Corpus Spongiosum



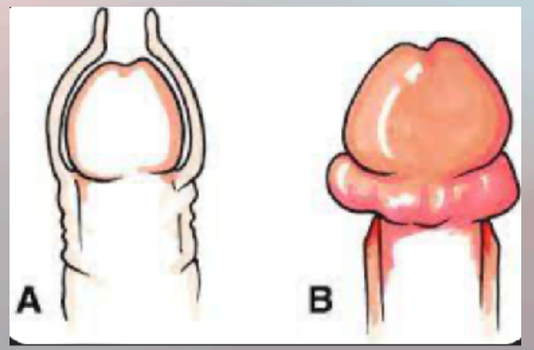
More 🅿enis



✓ The body of the penis is covered by skin and the tip is the GLANS PENIS which is covered by the PREPUCE. This can be removed through circumcision.

✓ The External urethral orifice of the penis is a sagittal slit at the tip of the glans

✓The Prepuce can have many pathologies involved with it such as crusting (🤢), fungal infections and it *strangling your own penis*



QUICK CHECK (to see if u lot have been listening)

How many parts are there to the Urethra?

(And list them)

Four

Pre-Prostatic

Prostatic

Membranous

Spongy

Which structure carries sperm into the urethra?

a) Epididymis

b) Seminal Vesicle

c) Ductus / Vas Deferens

d) Ejaculatory Duct

e) Ureter

Which structure carries sperm into the urethra?

a) Epididymis

b) Seminal Vesicle

c) Ductus / Vas Deferens

d) Ejaculatory Duct

e) Ureter

Erection

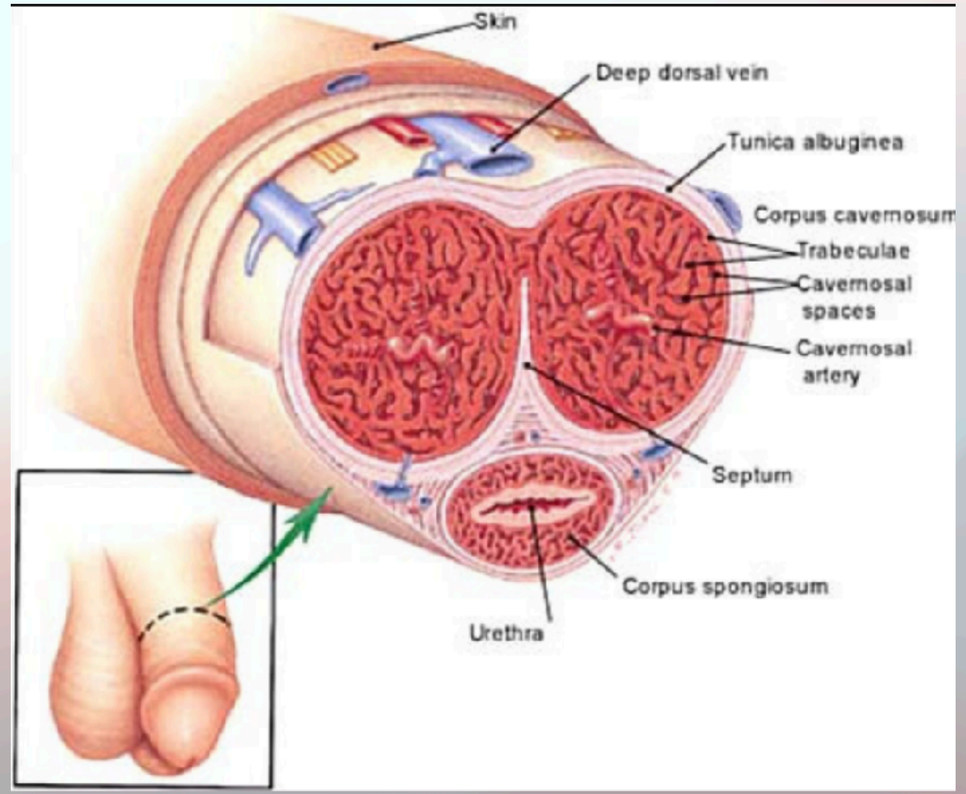
Corpora cavernosa become engorged with venous blood, due to psychological stimuli such as sexual arousal or stimulation (🙈)

Largely under autonomic control - Parasympathetic branches from the sacral plexus into the arteries supplying the erectile tissue.

Upon stimulation, these nerve branches release acetylcholine, which releases nitric oxide from endothelial cells in the trabecular arteries.

Nitric oxide diffuses to the smooth muscle of the arteries (called trabecular smooth muscle), acting as a vasodilating agent. The arteries dilate, filling the corpus spongiosum and corpora cavernosa with blood.

Simultaneously muscles also compress the veins of the corpora cavernosa, limiting the venous drainage of blood.



Houston we have a problem 😳

Erectile Dysfunction - INABILITY to maintain an erection. Common condition which can result from a number of causes such as hypertension, smoking, diabetes or even stress, anxiety and depression.

Priapism - Serious condition where erection persists beyond or without sexual stimulation. It is almost always painful and results from blood becoming trapped in the erectile bodies with no arterial flow.

If the penis does not become flaccid within 4 hours, this is an EMERGENCY.

Testis

Pair of sex glands in the scrotum which are separated by a median raphe into two compartments. They are responsible for testosterone and sperm production

They hang a little lower than the body as they need to be 3 degrees cooler (so all them sperm homies can chill and not die)

Has 2 very important cell types: 1) Sertoli Cells 2) Leydig Cells

1) Sertoli cells

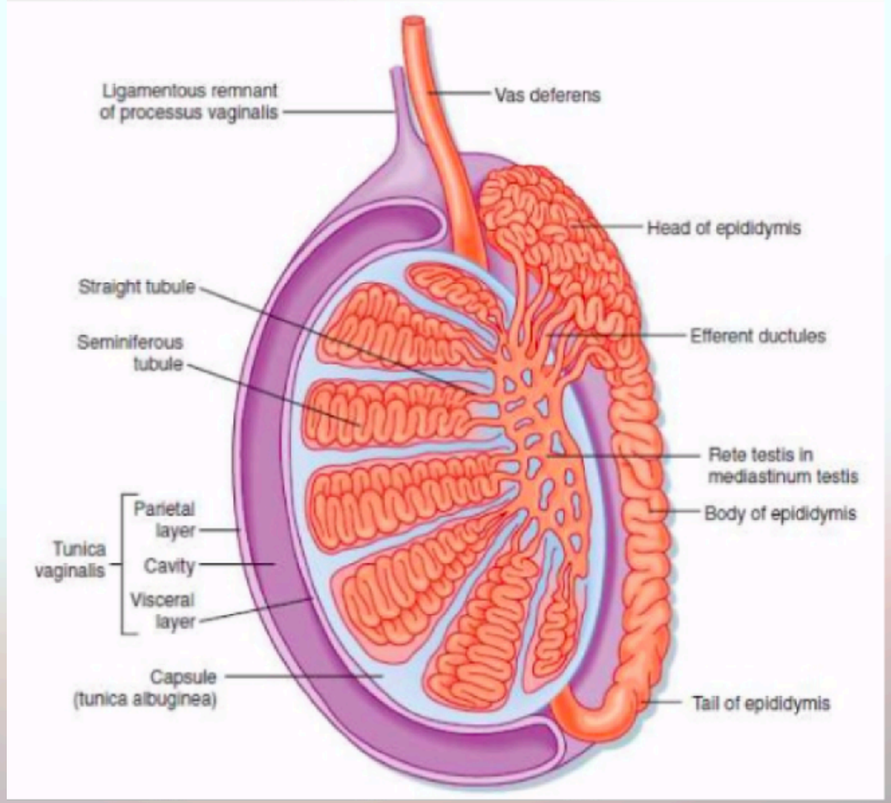
- EPITHELIAL SUPPORTING CELLS OF THE SEMINIFEROUS TUBULES – WHICH ARE SIMPLE COLUMNAR CELLS
- MAINTAIN THE ENVIRONMENT NECESSARY FOR DEVELOPMENT AND MATURATION OF GAMETE, VIA THE BLOOD-TESTIS BARRIER
- SECRETE SUBSTANCES INITIATING MEIOSIS
- SECRETE SUPPORTING TESTICULAR FLUID
- **SECRETE ANDROGEN-BINDING PROTEIN (ABP), WHICH CONCENTRATES TESTOSTERONE IN CLOSE PROXIMITY TO THE DEVELOPING GAMETES**
- **SECRETE INHIBIN AND ACTIVIN – WHICH INHIBIT AND ACTIVATE FSH SECRETION BY THE PITUITARY GLAND RESPECTIVELY**
- PHAGOCYTOSE RESIDUAL CYTOPLASM LEFT OVER FROM SPERMIOGENESIS
- **SECRETE ANTI-MÜLLERIAN HORMONE CAUSES DETERIORATION OF THE MÜLLERIAN DUCT**
- PROTECT SPERMATIDS FROM THE IMMUNE SYSTEM OF THE MALE, VIA THE BLOOD-TESTIS BARRIER

2) Leydig Cells

- INTERSTITIAL CELLS OR LEYDIG CELLS LIE BETWEEN SEMINIFEROUS TUBULES IN INTERSTITIUM AND CONTAIN MANY CHOLESTEROL LIPID DROPLETS
- THEY MAKE AND SECRETE TESTOSTERONE IN RESPONSE TO LH FROM THE PITUITARY USING CHOLESTEROL STORED IN THE CELL
- TESTOSTERONE FUNCTION
  - PROMOTES PRODUCTION OF SPERMATOZOA, SECRETION FROM ACCESSORY GLANDS AS WELL AS LOTS OF OTHER FUNCTIONS – BEGINS AT PUBERTY WHEN LH IS PRODUCED
  - STIMULATES DEVELOPMENT OF MALE CHARACTERISTICS
  - INCREASES MUSCLE GROWTH, BONE GROWTH AND THICKNESS OF SKIN
  - STIMULATES NEW BLOOD CELL PRODUCTION

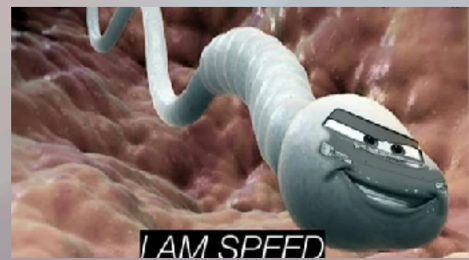
Pathway of sperm 🏊

Spermatogenesis occurs in seminiferous tubules -> Straight Tubules -> Rete Testes -> Efferent Ducts -> Stored in Head of Epididymis -> Vas Deferens -> Ejaculatory Duct -> Urethra

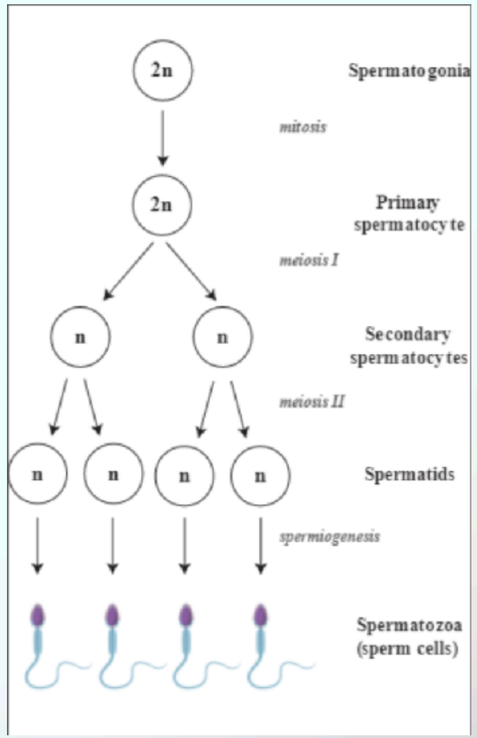


Extra important info

- Right testis drains into IVC and Left drains into Left renal vein (this is important, esp for Y2 UG pathologies)



Production of Sperm (Spermatogenesis)

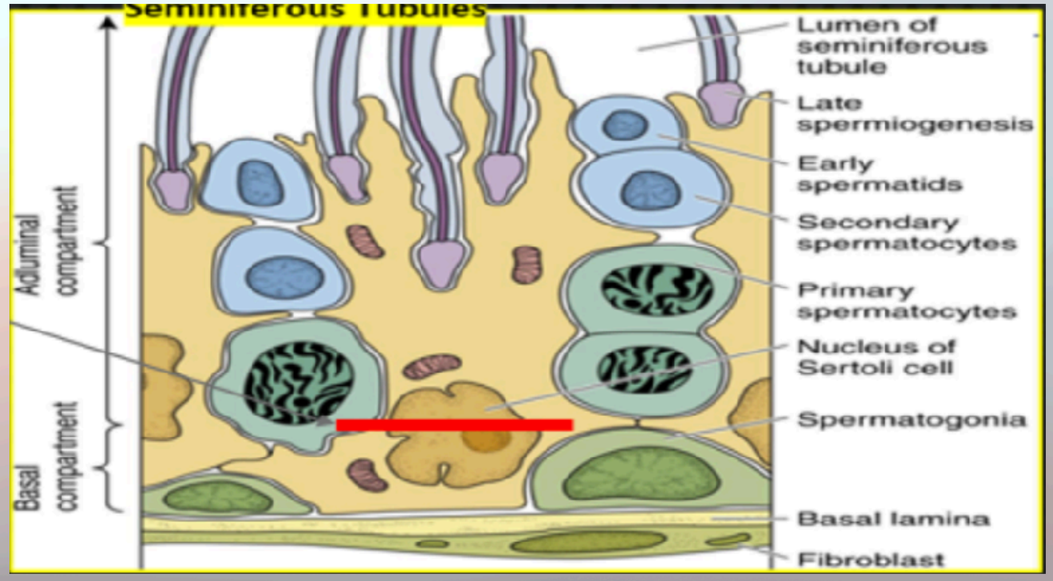


Primordial germ cells migrate into the testes and become immature germ cells called SPERMATOGONIA

These migrate from the basement membrane, between sertoli cells, through the tight junctions of the blood-testis barrier. (Here they differentiate into diploid primary spermatocytes)

They divide now to form x2 HAPLOID secondary spermatocytes. These form x4 spermatids.

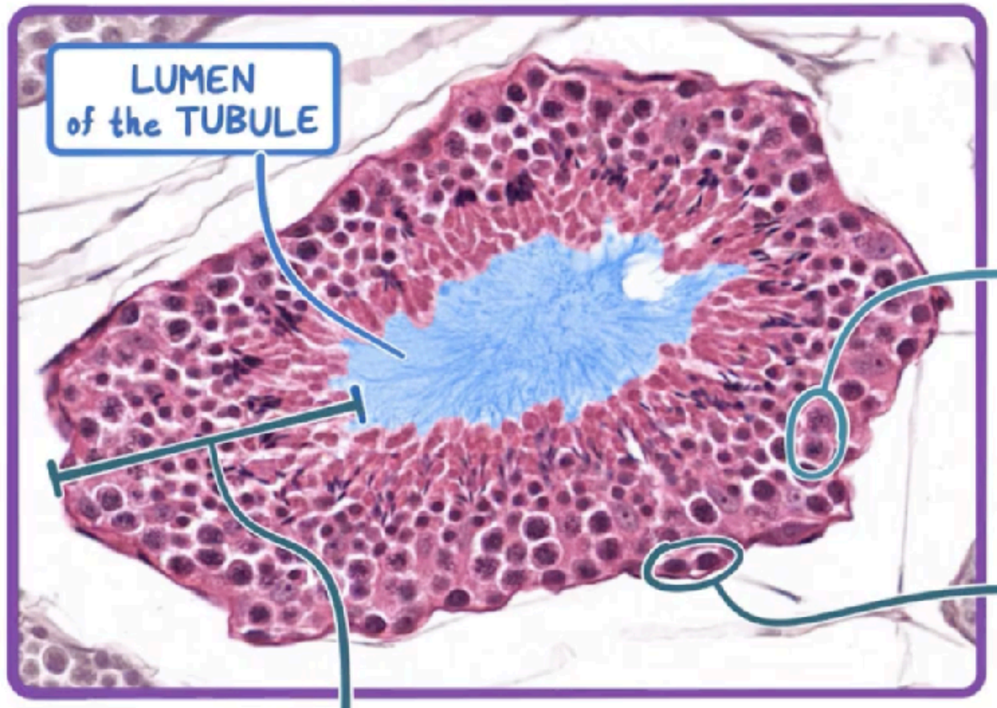
Spermatids mature to form Spermatozoa



Terminology:

- **Spermatogenesis:** the production of mature spermatozoa
- **Spermiogenesis:** conversion of spermatids into spermatozoa.
- **Spermiation:** release of spermatozoa into the lumen.
- **Capacitation:** final maturation of the spermatozoon(spermatozoon is a motile sperm cell, or moving form of the haploid cell that is the male gamete) in the female genital tract.

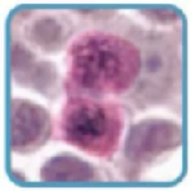
SEMINIFEROUS TUBULE



SECONDARY SPERMATOCYTE

~ RARELY SEEN in IMAGES
~ QUICKLY DIVIDE into TWO HAPLOID SPERMATIDS

PRIMARY SPERMATOCYTE



~ FOUND at VARIOUS LEVELS
~ BIGGER CYTOPLASM
~ **LARGE NUCLEI** that have **CLUMPS** of CHROMATIN

SPERMATOGONIA

~ **UNDIFFERENTIATED** GERM CELLS
~ AGAINST the **BASEMENT MEMBRANE**
~ **CELLS are ROUND**
~ **LARGE ROUND NUCLEI**
~ **PALE CYTOPLASM**

Accessory Sex Organs

There are THREE. They will be ordered from largest contribution to seminal fluid to least.

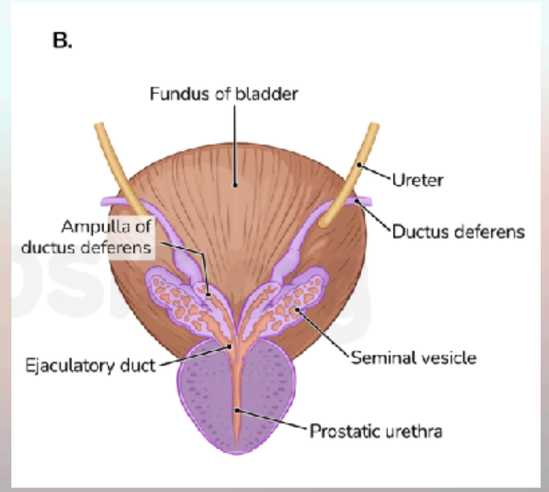
I - Seminal Vesicles

70% of Seminal Fluid

Contains fructose, citric acid and other nutrient substances as well as large quantities of prostaglandins and fibrinogen

Seminal Vesicles joins up with the vas deferens forming the EJACULATORY DUCT.

They lie posterior to the bladder.

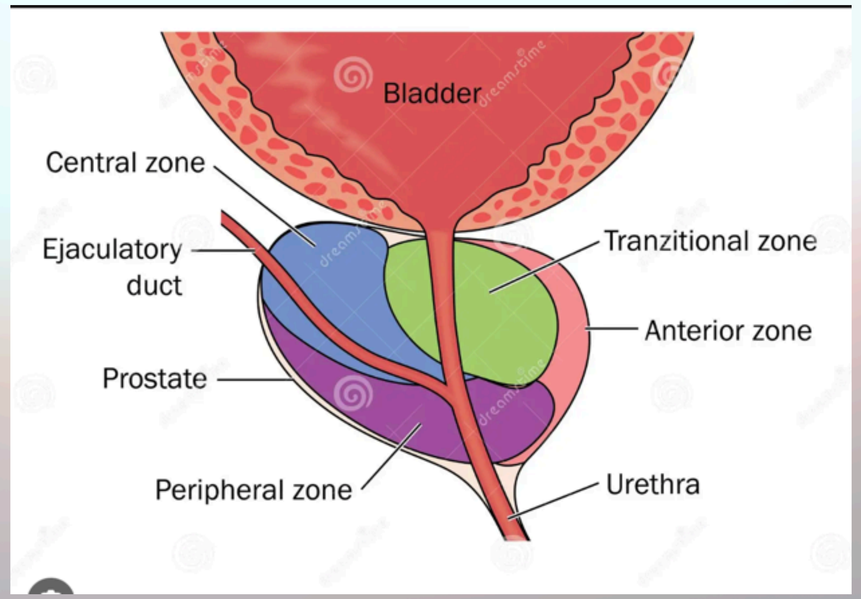


2 - Prostate Gland

25% of seminal fluid

Has 5 lobes - Anterior/Posterior/Medial/x2 Lateral

Has zinc rich fluid to stabilise the DNA, fructose for nutrition for sperm and alkaline to neutralise vaginal pH

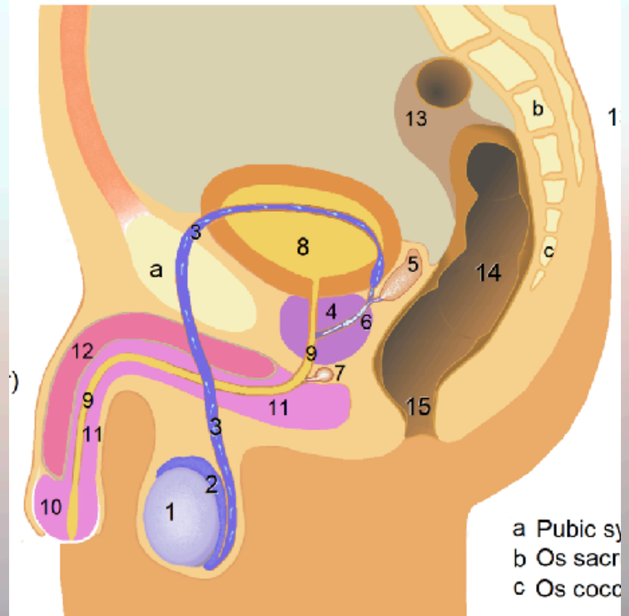


3 - Bulbourethral gland / Bartholin's Gland

The remaining bit of seminal fluid supplied here.

Alkaline fluid to protect sperm during arousal and secretes mucus that lubricates the end of the penis

(pre-ejaculate)



Ejaculation

- OCCURS IN TWO PHASES:
  - EMISSION STAGE – SPERM ARE MOVED FROM TESTES AND EPIDIDYMUS (STORED) TO THE BEGINNING OF THE URETHRA
  - EJACULATION PROPER – SEMEN IS MOVED THROUGH URETHRA AND EXPELLED FROM THE BODY

- EMISSION PHASE - MUSCLES AROUND THE EPIDIDYMIS AND DUCTUS DEFERENS CONTRACT TO PUSH THE SPERM INTO THE PROSTATE AND URETHRA

- EJACULATION PROPER - THE SEMEN IS EXPELLED BY STRONG SPASMODIC CONTRACTIONS OF THE BULBOCAVERNOSUS MUSCLE, WHICH ENCIRCLES THE CORPUS SPONGIOSUM

- ONCE EJACULATION IS STARTED IT BECOMES A REFLEX REACTION THAT CANNOT BE VOLUNTARILY INTERRUPTED

Which Nerve fibres stimulate an erection?

a) Sympathetic

b) Parasympathetic

c) Autonomic

d) Sacral

e) Brachial

Which Nerve fibres stimulate an erection?

a) Sympathetic

b) Parasympathetic

c) Autonomic

d) Sacral

e) Brachial

Which of these are secreted by Sertoli cells?

a) PYT hormone

b) BPH-2

c) Inhibin

d) FSH

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Which structure produces the majority of the seminal fluid in human males?
a. Testes
b. Prostate gland
c. Epididymis
d. Vas deferens

The erectile tissue responsible for maintaining an erection during sexual arousal is called:
a. Corpus luteum
b. Corpus callosum
c. Corpus cavernosum
d. Corpus albicans

Spermatogenesis primarily occurs in which part of the male reproductive system?
a. Seminiferous tubules
b. Epididymis
c. Vas deferens
d. Prostate gland

What is the function of the epididymis in the male reproductive system?
a. Sperm production
b. Storage and maturation of sperm
c. Seminal fluid production
d. Hormone secretion

Which hormone is responsible for the development of male secondary sexual characteristics during puberty?
a. Testosterone
b. Estrogen
c. Progesterone
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Cryptorchidism refers to:
a. Enlarged prostate
b. Undescended testicles
c. Blocked vas deferens
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