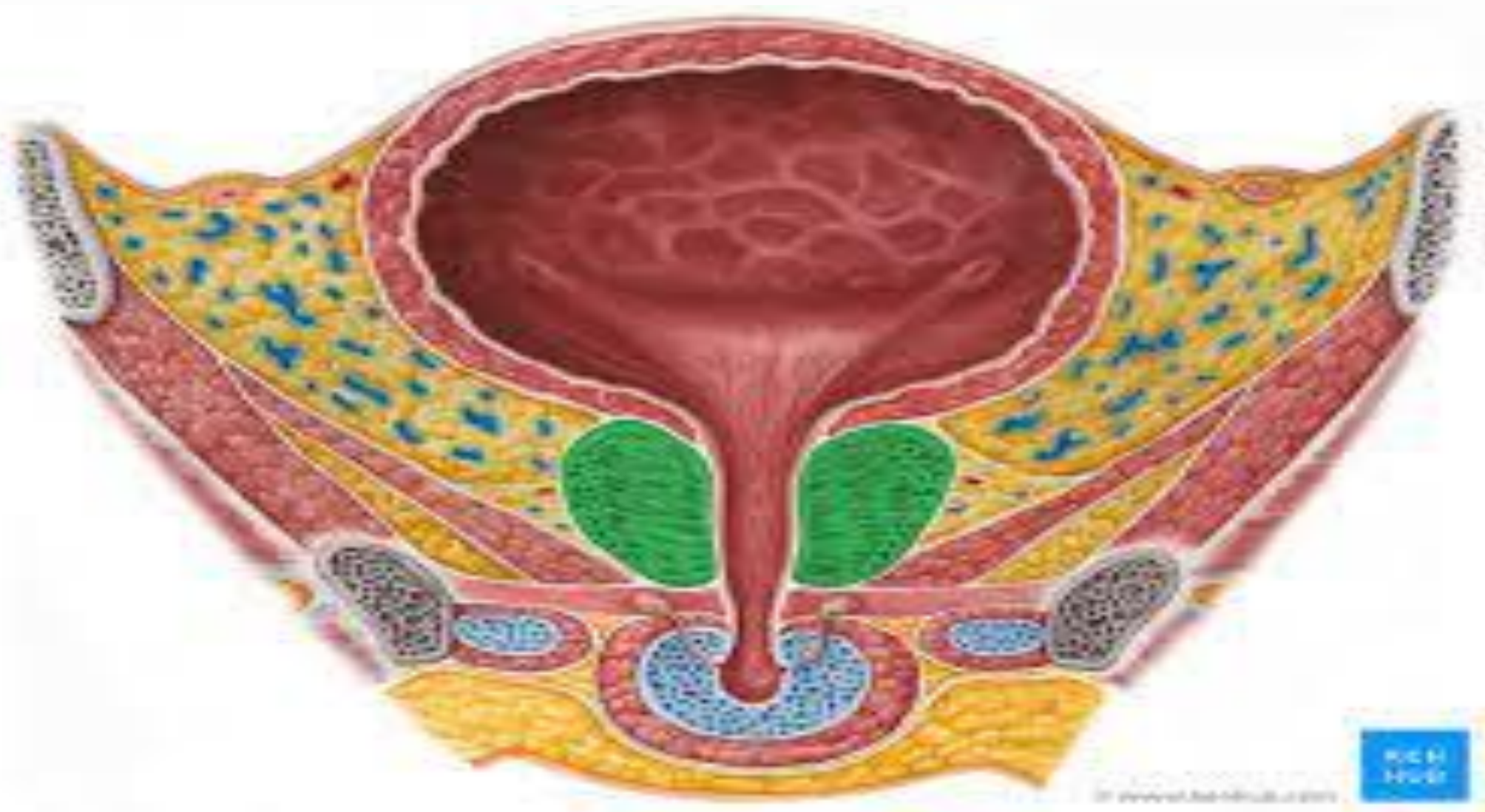
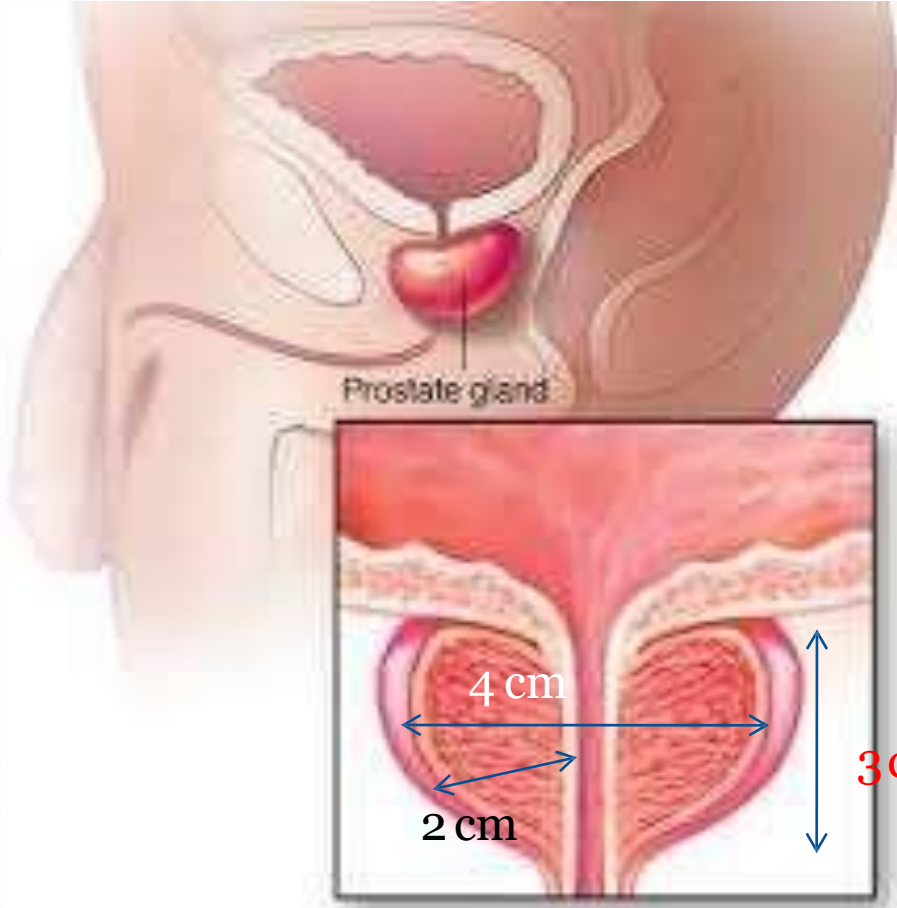


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

GROSS ANATOMY OF PROSTATE

BY DR. MAHVISH JAVED





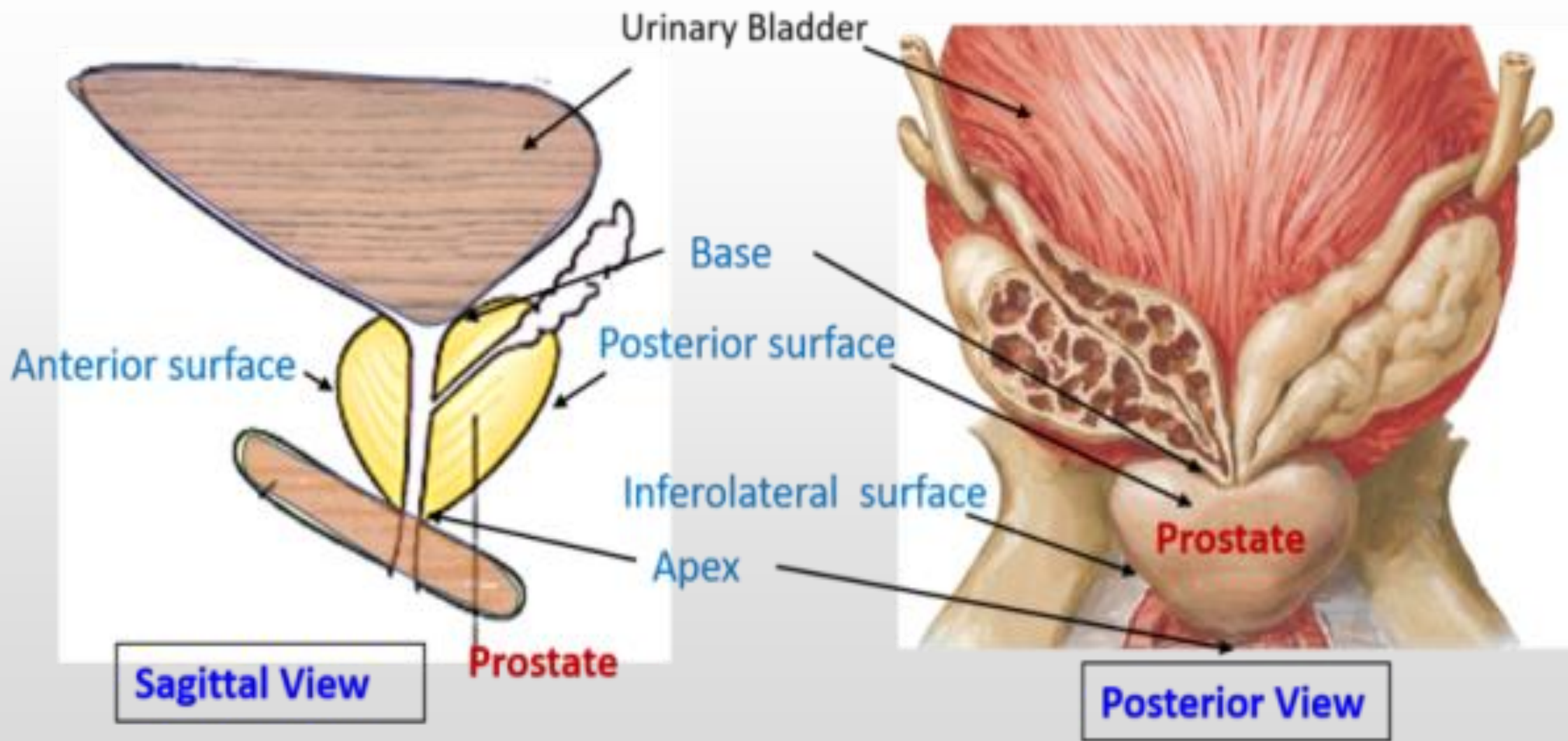
Gross Anatomy

- Ovoid (Almond, walnut) in shape.
- 3 cm in length, 4 cm in width, and 2 cm in depth.
- Weight of 18 to 20 g.
- Homologous to the Skene glands.
- Composed of
 1. Glandular elements (70%)
 2. Fibromuscular stroma (30%)

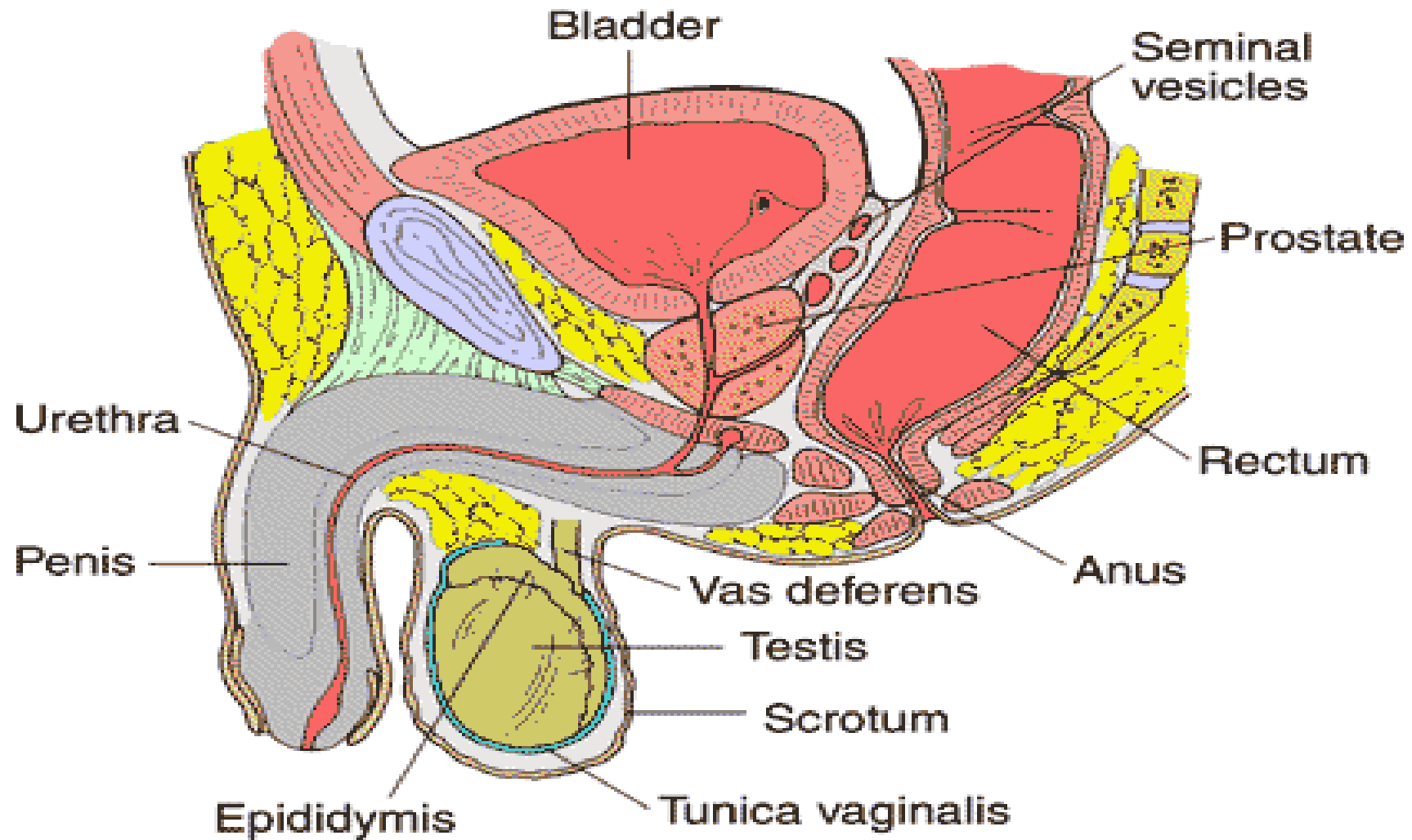
- The **prostate** is the largest accessory gland in the male reproductive system.
- It secretes **proteolytic enzymes** into the semen, which act to break down clotting factors in the ejaculate. This allows the semen to remain in a fluid state, moving throughout the female reproductive tract for potential fertilisation

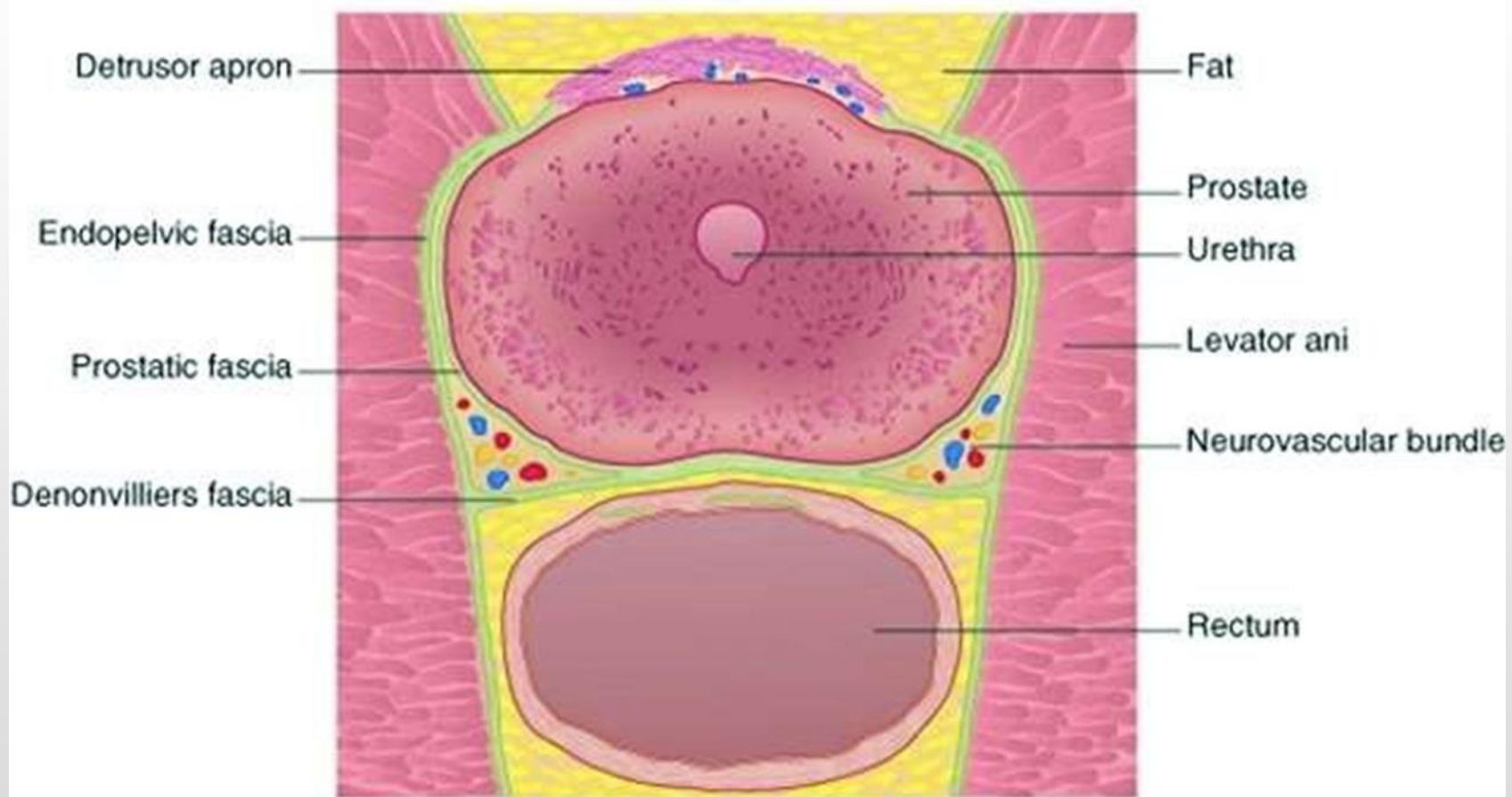
PROSTATIC SECRETIONS

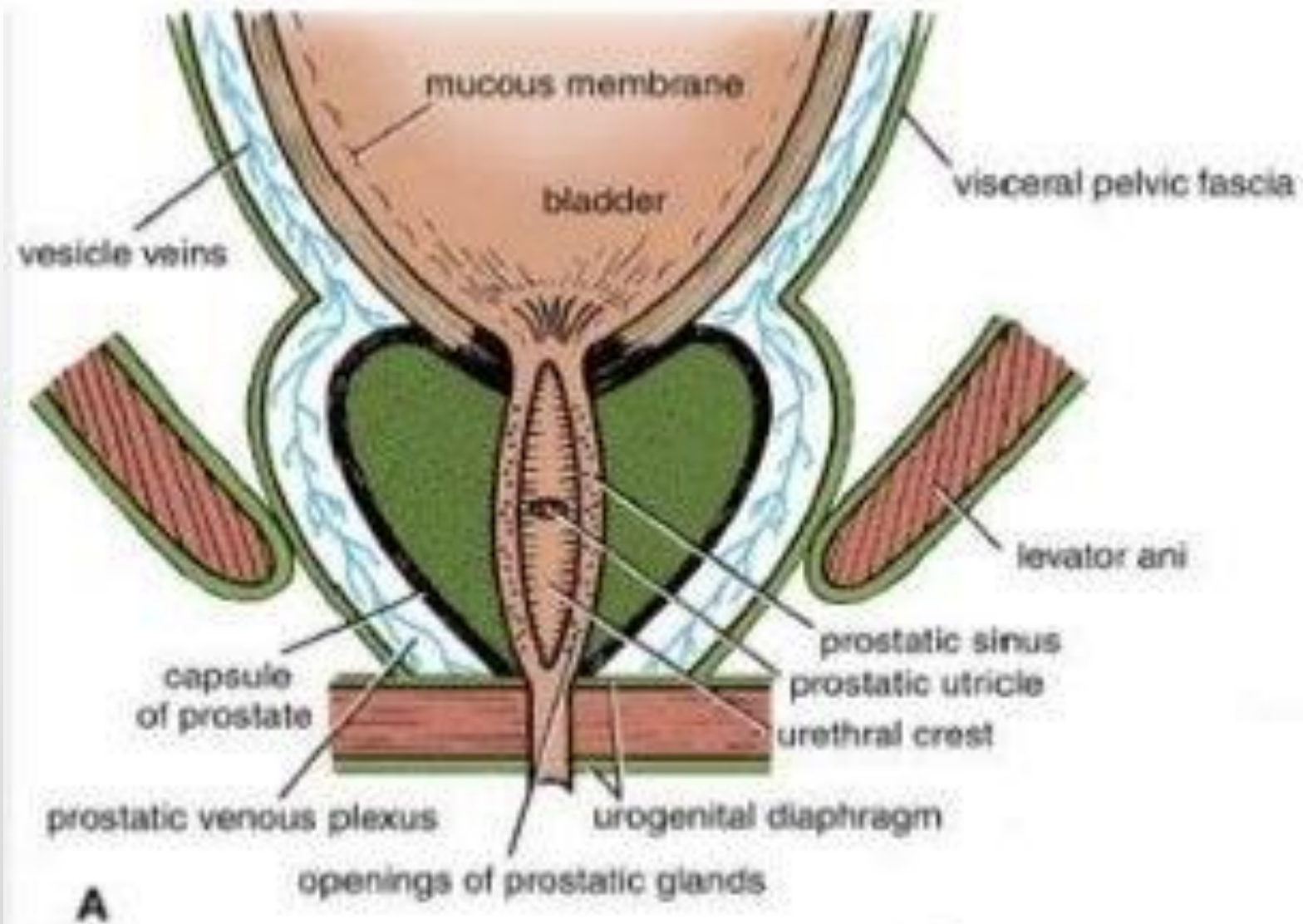
- The proteolytic enzymes leave the prostate via the **prostatic ducts**. These open into the prostatic portion of the urethra, through 10-12 openings at each side of the seminal colliculus (or verumontanum); secreting the enzymes into the semen immediately before ejaculation.



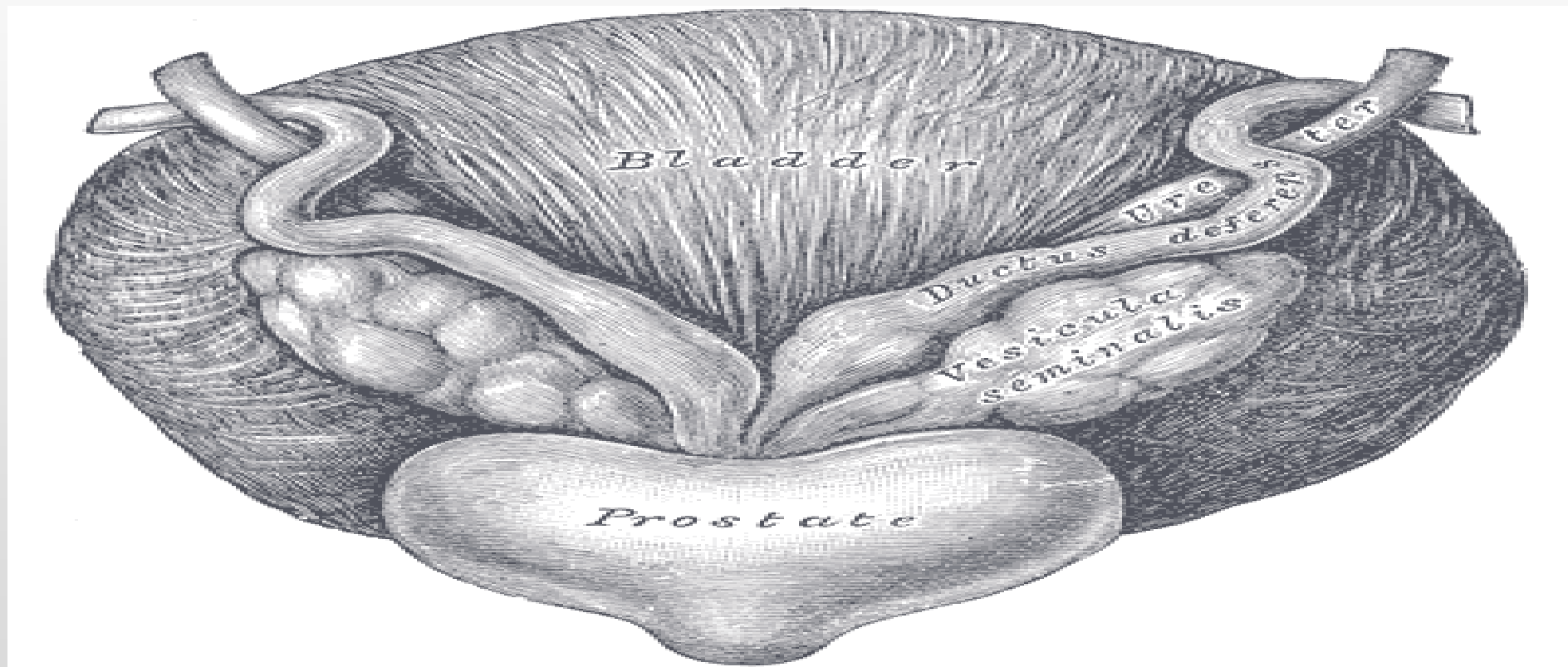
Male Reproductive Tract





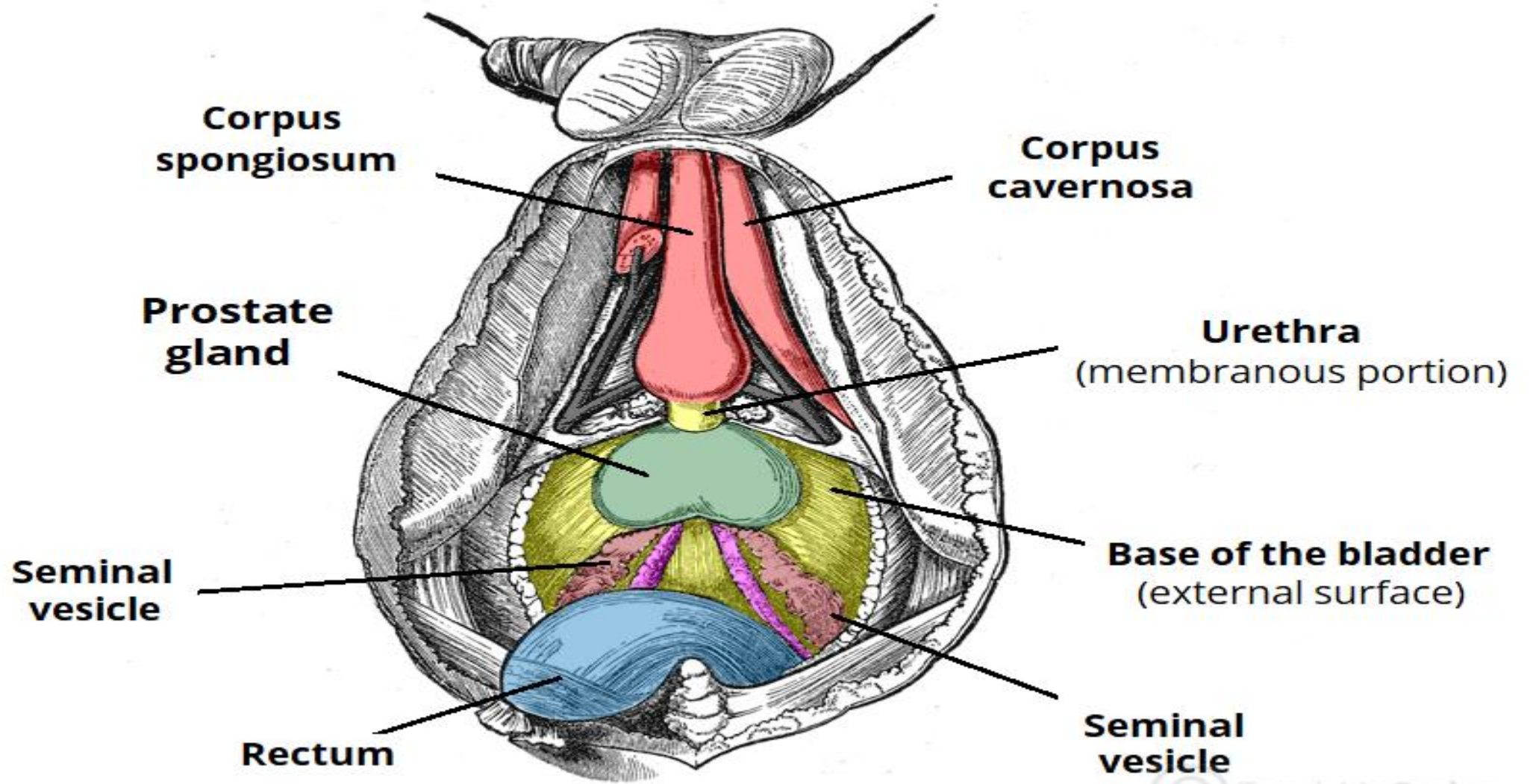


FUNDUS OF THE BLADDER WITH THE VESICULÆ SEMINALES



Anatomical Position

- The prostate is positioned inferiorly to the neck of the bladder and superiorly to the **external urethral sphincter**, with the levator ani muscle lying inferolaterally to the gland.
- Most importantly, posteriorly to the prostate lies the ampulla of the **rectum** – this anatomical arrangement is utilised during Digital Rectal Examinations (DRE), allowing physicians to examine the gland.



- Traditionally, the prostate is divided into anatomical lobes (inferoposterior, inferolateral, superomedial, and anteromedial) by the urethra and the ejaculatory ducts as they pass through the organ.
- However, more important clinically is the histological division of the prostate into **three zones**

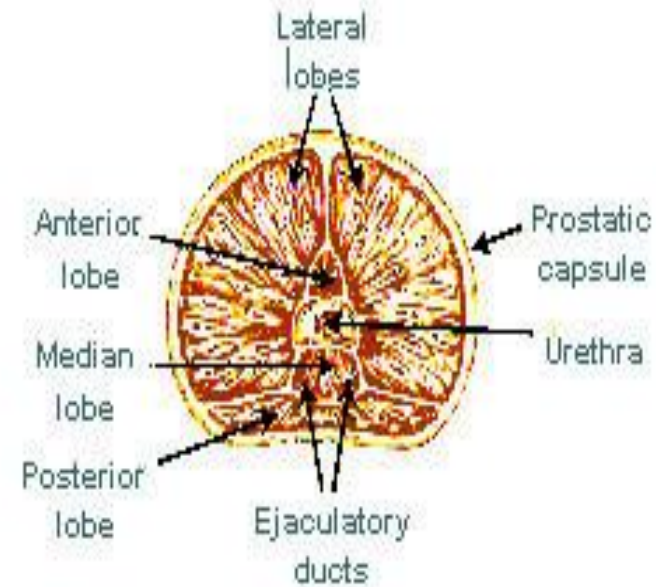
Lobes

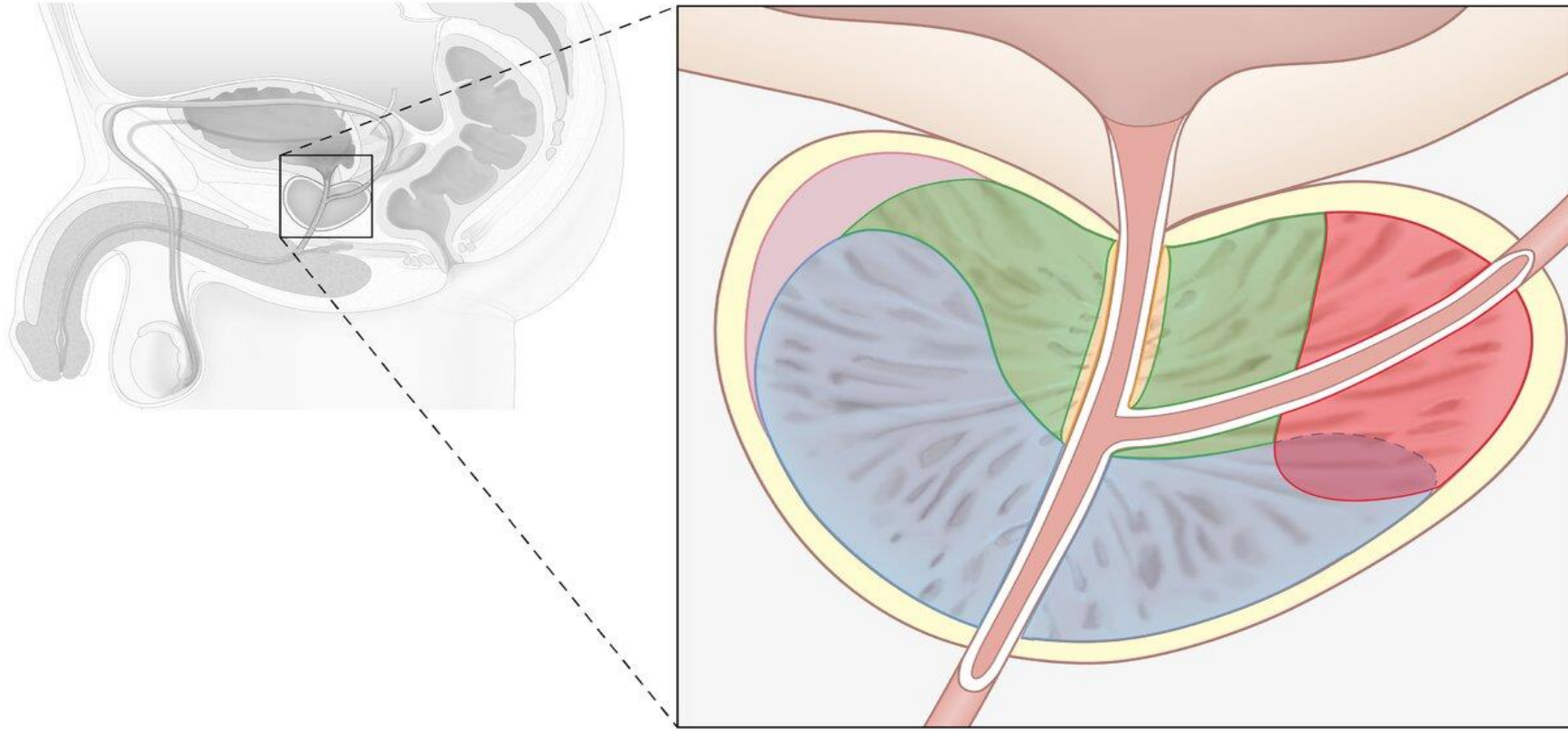
- The "lobe" classification is more often used in anatomy. The prostate is incompletely divided into five lobes:

Anterior lobe (or isthmus)	roughly corresponds to part of transitional zone
Posterior lobe	roughly corresponds to peripheral zone
Right & left Lateral lobes	span all zones
Median lobe (or middle lobe)	roughly corresponds to part of central zone

Lobes of the Prostate

- Anterior lobe
- Median lobe
- Lateral lobe
- Posterior lobe





1 Prostate capsule

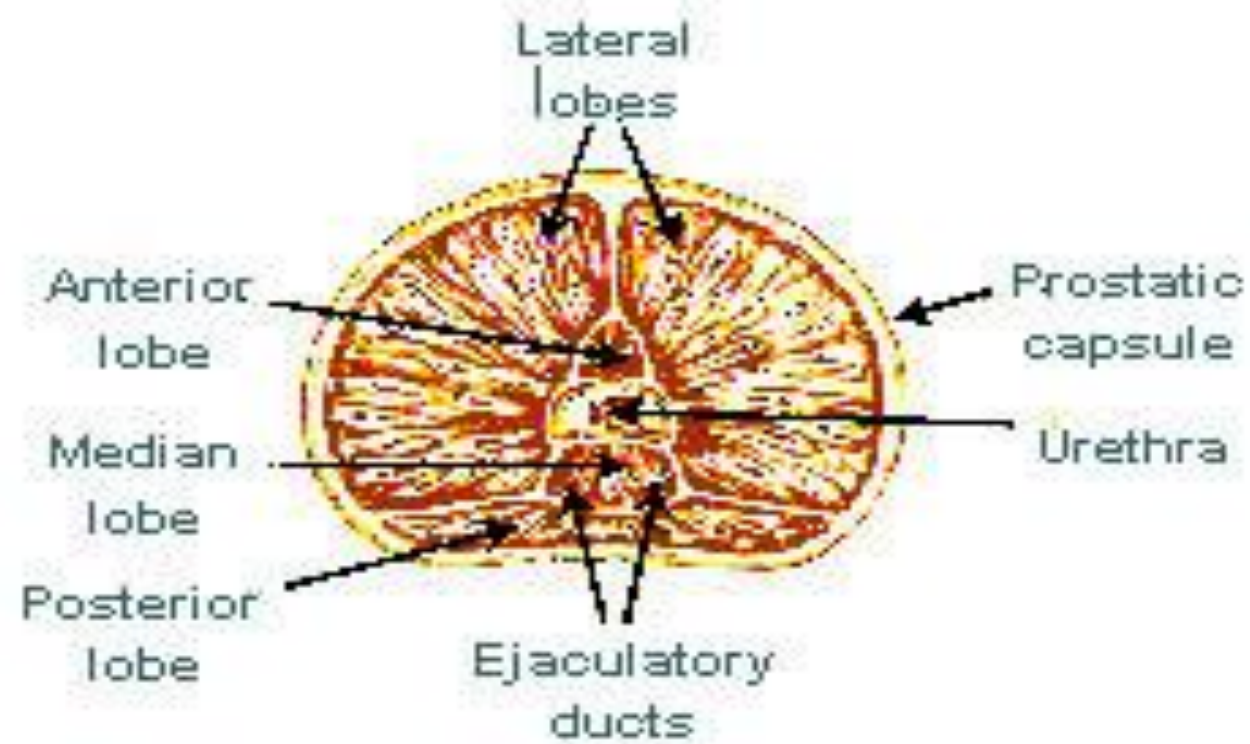
2 Anterior zone

3 Transition zone

4 Periurethral zone

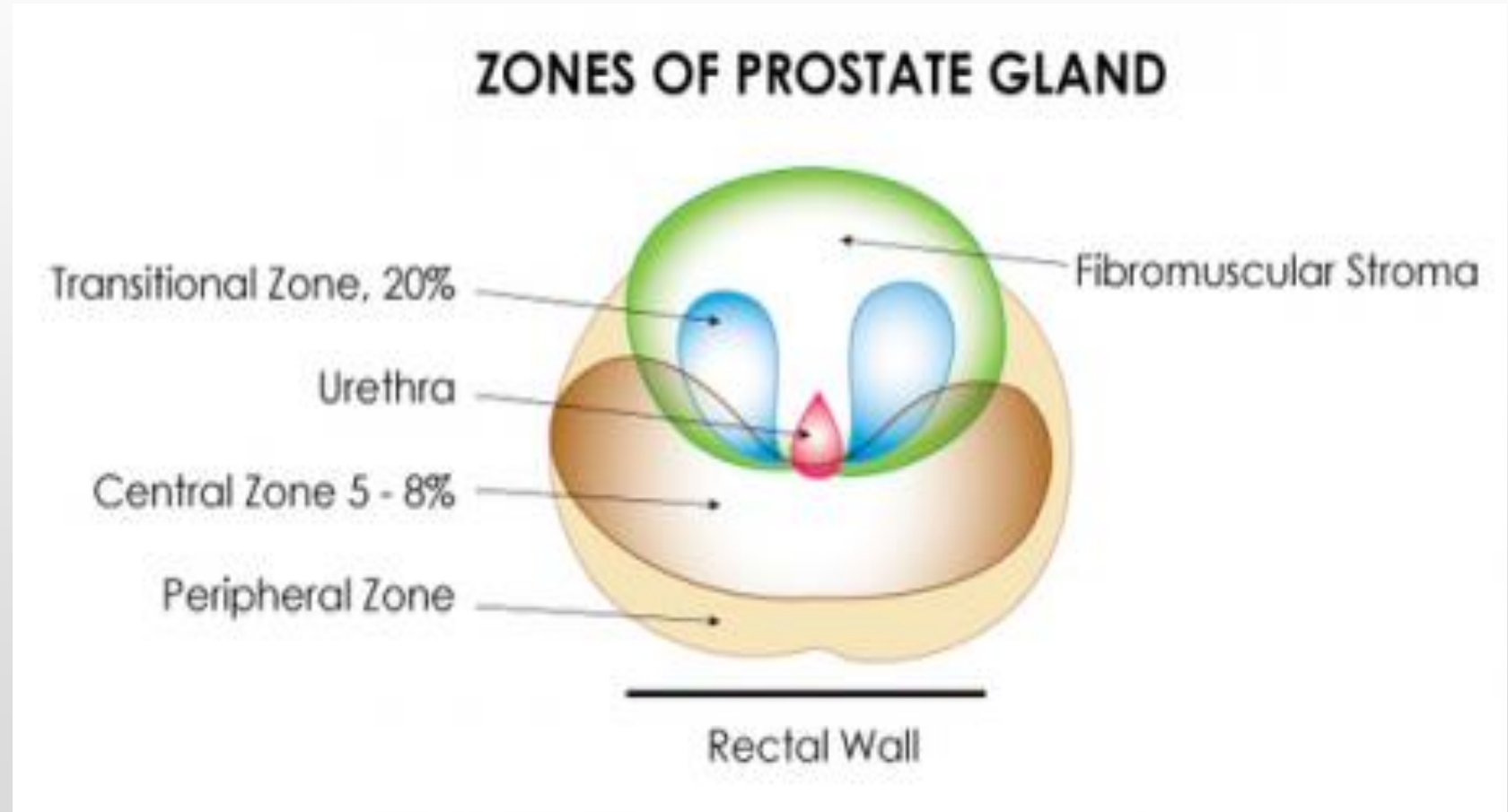
5 Central zone

6 Peripheral zone



Zones of the Prostate

- Peripheral
- Central
- Transitional



- **Central zone** – surrounds the ejaculatory ducts, comprising approximately 25% of normal prostate volume.
 - The ducts of the glands from the central zone are obliquely emptying in the prostatic urethra.

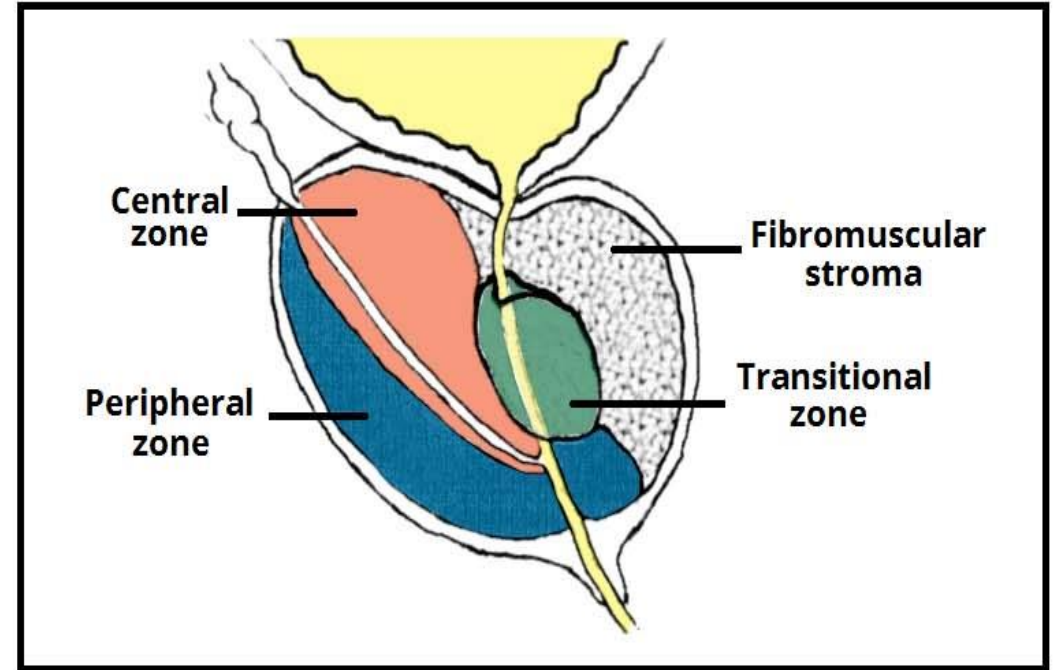
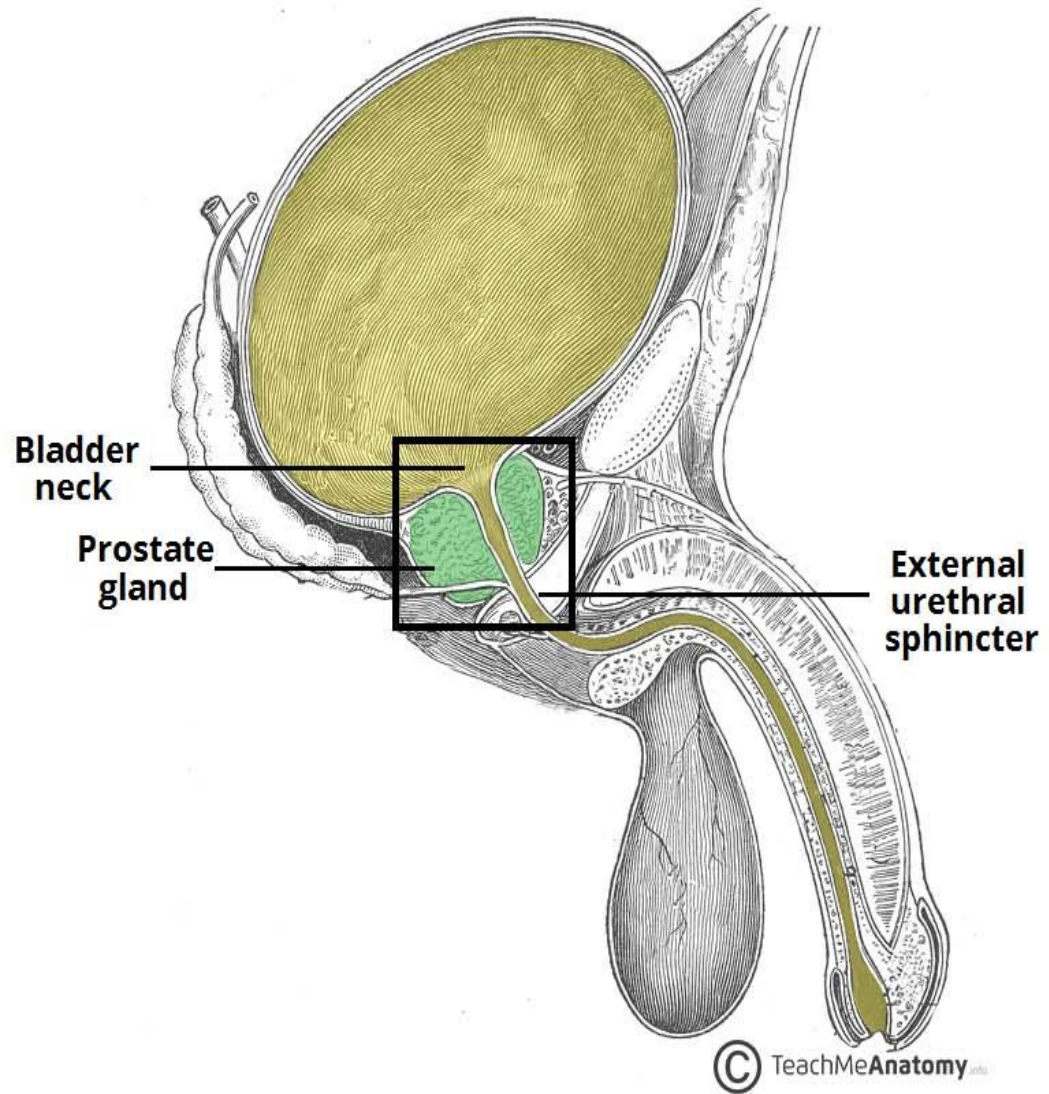
- **Transitional zone** – located centrally and surrounds the urethra, comprising approximately 5-10% of normal prostate volume.
 - The glands of the transitional zone are those that typically undergo benign hyperplasia (BPH)

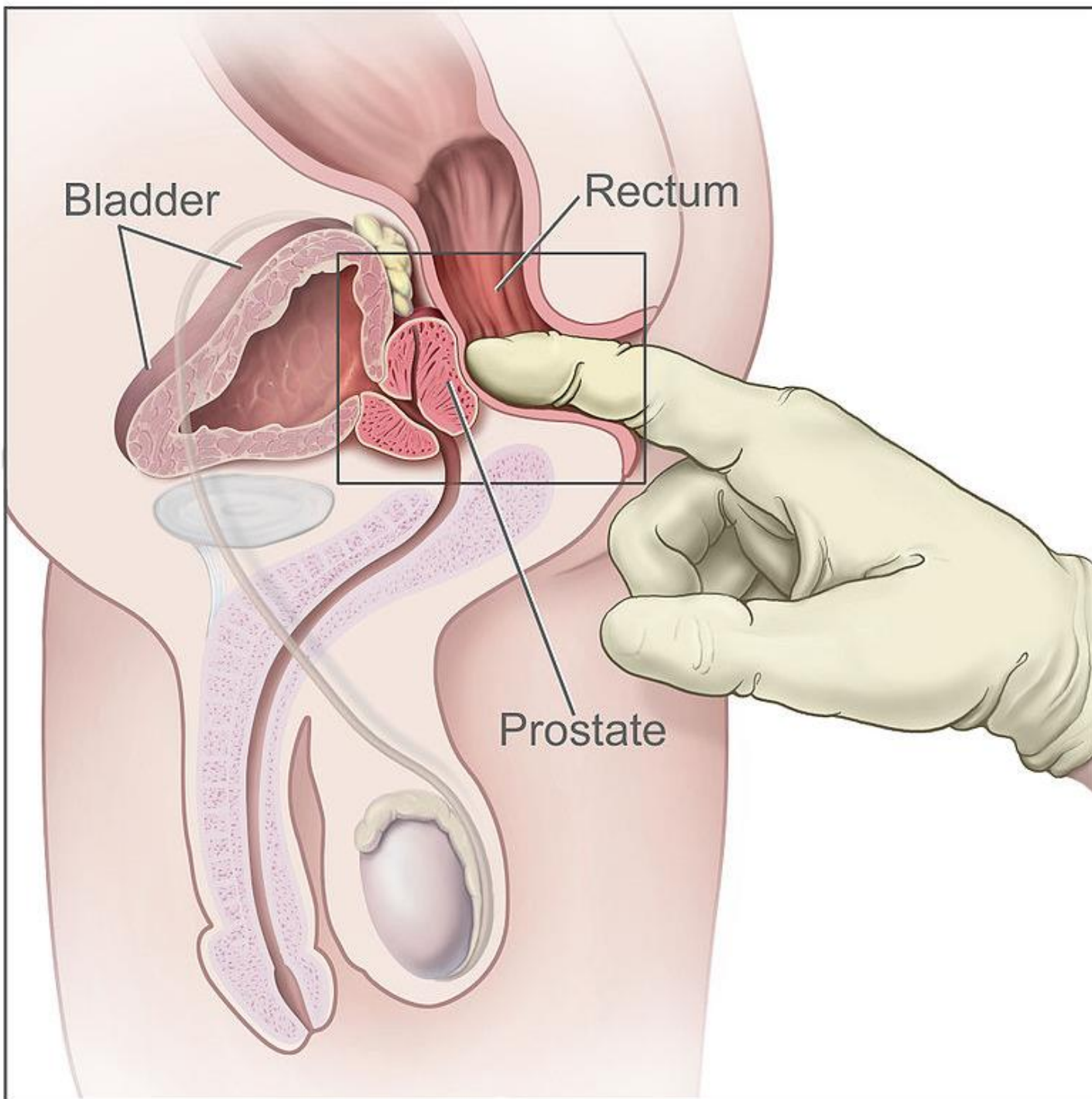
- **Peripheral zone** – makes up the main body of the gland (approximately 65%) and is located posteriorly. The ducts of the glands from the peripheral zone are vertically emptying in the prostatic urethra; that may explain the tendency of these glands to permit urine reflux.
- That also explains the high incidence of acute and chronic inflammation found in these compartments, a fact that may be linked to the high incidence of prostate carcinoma at the peripheral zone.
- The peripheral zone is mainly the area felt against the rectum on DRE, which is of irreplaceable value

- The **fibromuscular stroma** (or fourth zone for some) is situated anteriorly in the gland. It merges with the tissue of the urogenital diaphragm. This part of the gland is actually the result of interaction of the prostate gland budding around the urethra during prostate embryogenesis and the common horseshoe-like muscle precursor of the smooth and striated muscle that will eventually form the internal and external urethra sphincter.

ZONES

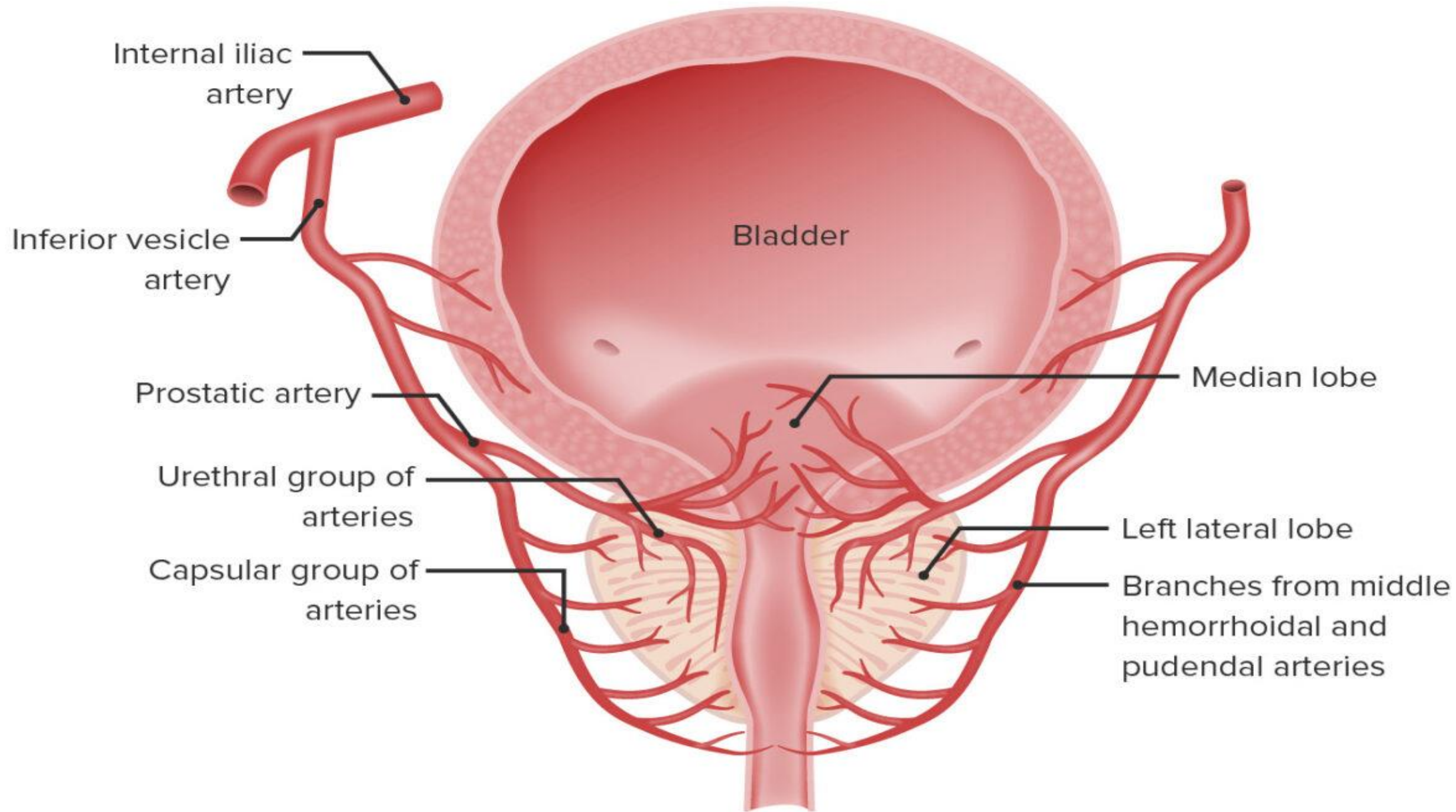
Name	Fraction of gland	Description
Peripheral zone (PZ)	Up to 70% in young men	The sub-capsular portion of the posterior aspect of the prostate gland that surrounds the distal urethra . From this portion of the gland ~70–80% of prostatic cancers originate. ^{[13][14]}
Central zone (CZ)	Approximately 25% normally	This zone surrounds the ejaculatory ducts . The central zone accounts for roughly 2.5% of prostate cancers; these cancers tend to be more aggressive and more likely to invade the seminal vesicles. ^[15]
Transition zone (TZ)	5% at puberty	~10–20% of prostate cancers originate in this zone. The transition zone surrounds the proximal urethra and is the region of the prostate gland that grows throughout life and causes the disease of benign prostatic enlargement . (2) ^{[13][14]}
Anterior fibro-muscular zone (or stroma)	Approximately 5%	This zone is usually devoid of glandular components, and composed only, as its name suggests, of muscle and fibrous tissue .

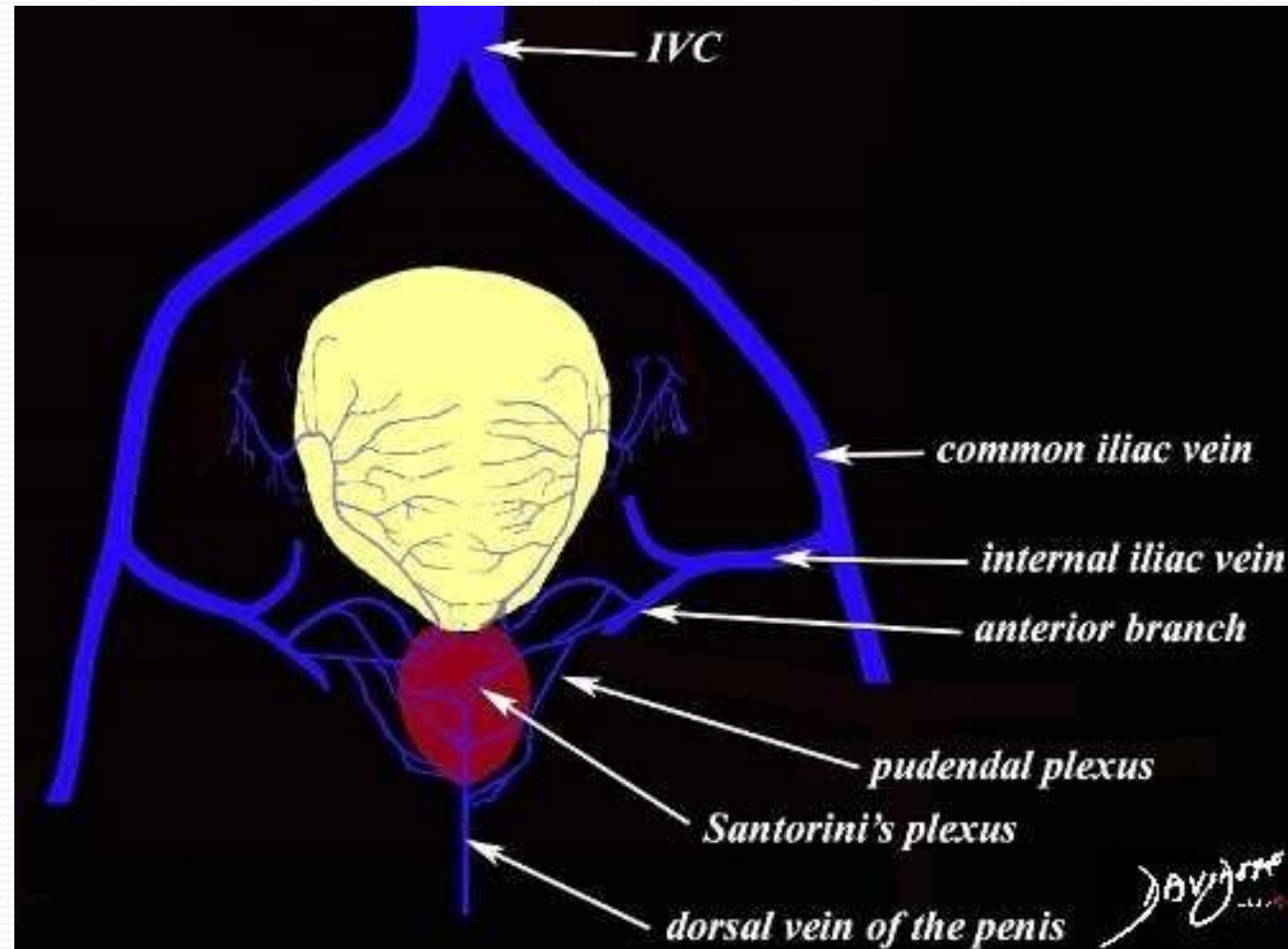




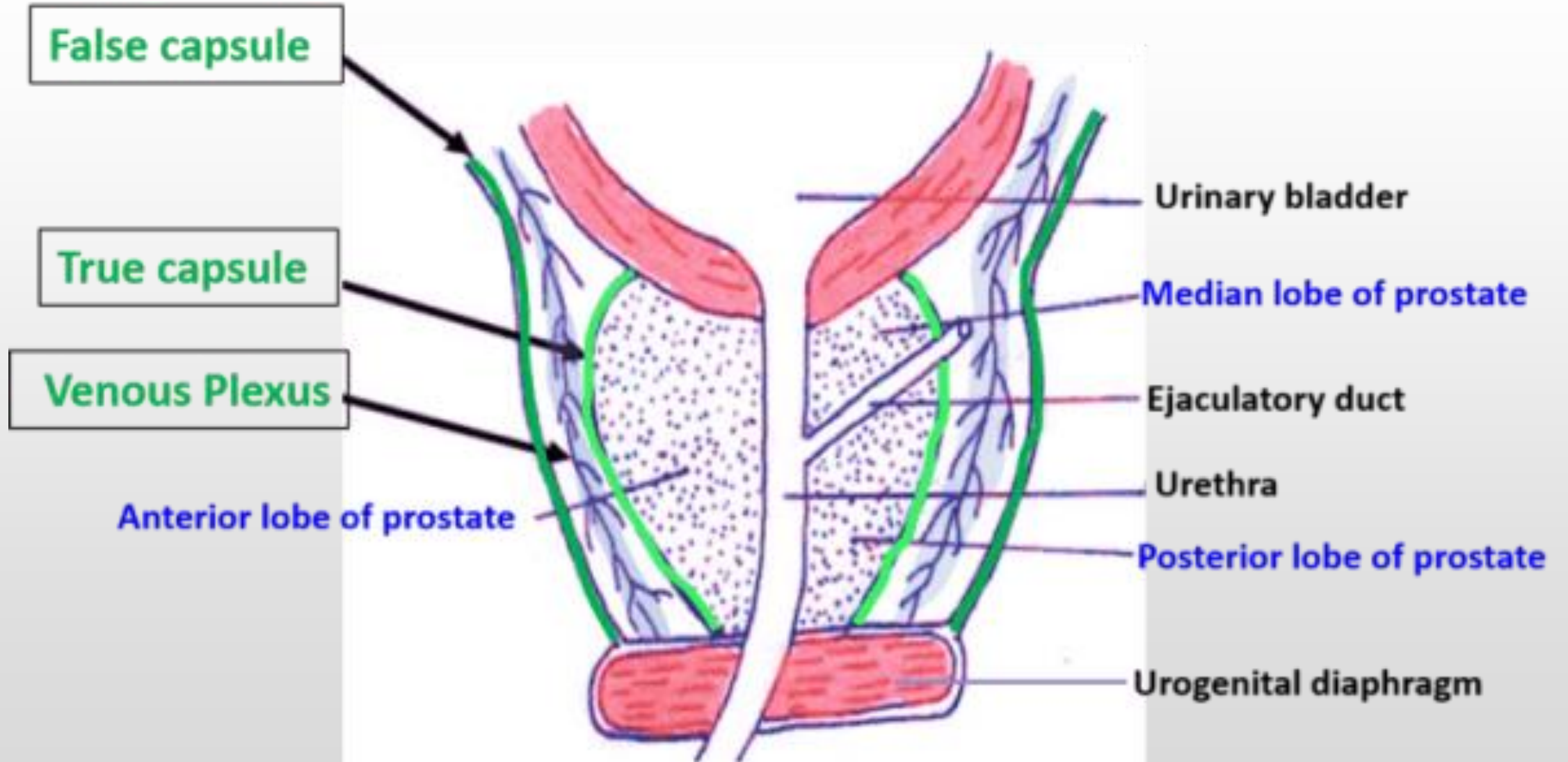
The prostate can be felt anteriorly during a digital rectal examination. The peripheral zone is mainly palpated.

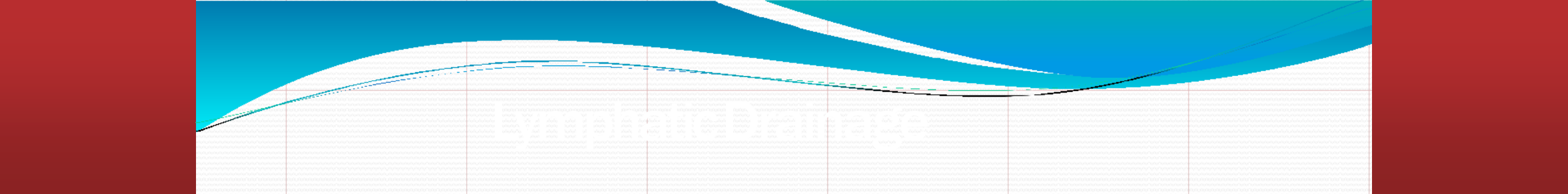
- The arterial supply to the prostate comes from the **prostatic arteries**, which are mainly derived from the internal iliac arteries. Some branches may also arise from the internal pudendal and middle rectal arteries.





- Venous drainage of the prostate is via the **prostatic venous plexus**, draining into the internal iliac veins. However, the prostatic venous plexus also connects posteriorly by networks of veins, to the internal vertebral venous plexus.



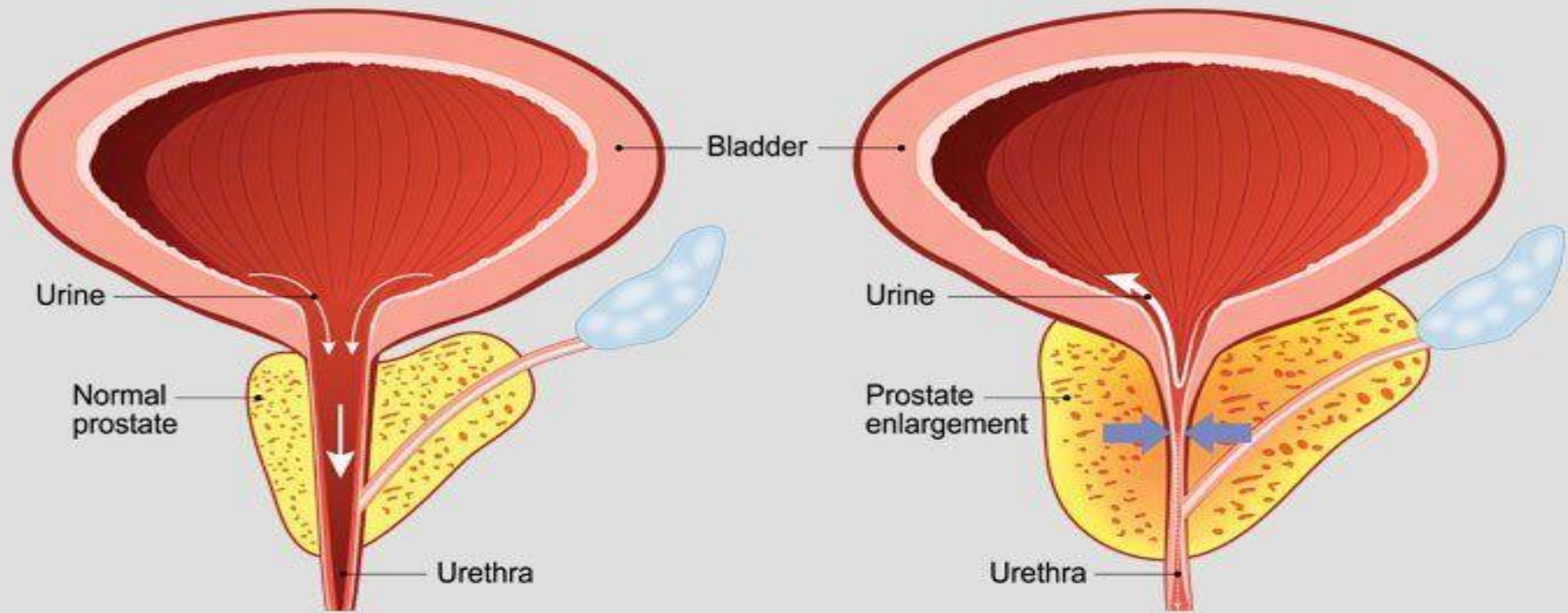
- 
- The obturator and internal iliac nodes are the primary sites of lymphatic drainage from the prostate.**
- The presacral group or, infrequently, the external iliac nodes may receive a small portion of the initial lymphatic drainage.

Clinical Relevance - Benign Prostatic Hyperplasia (BPH)

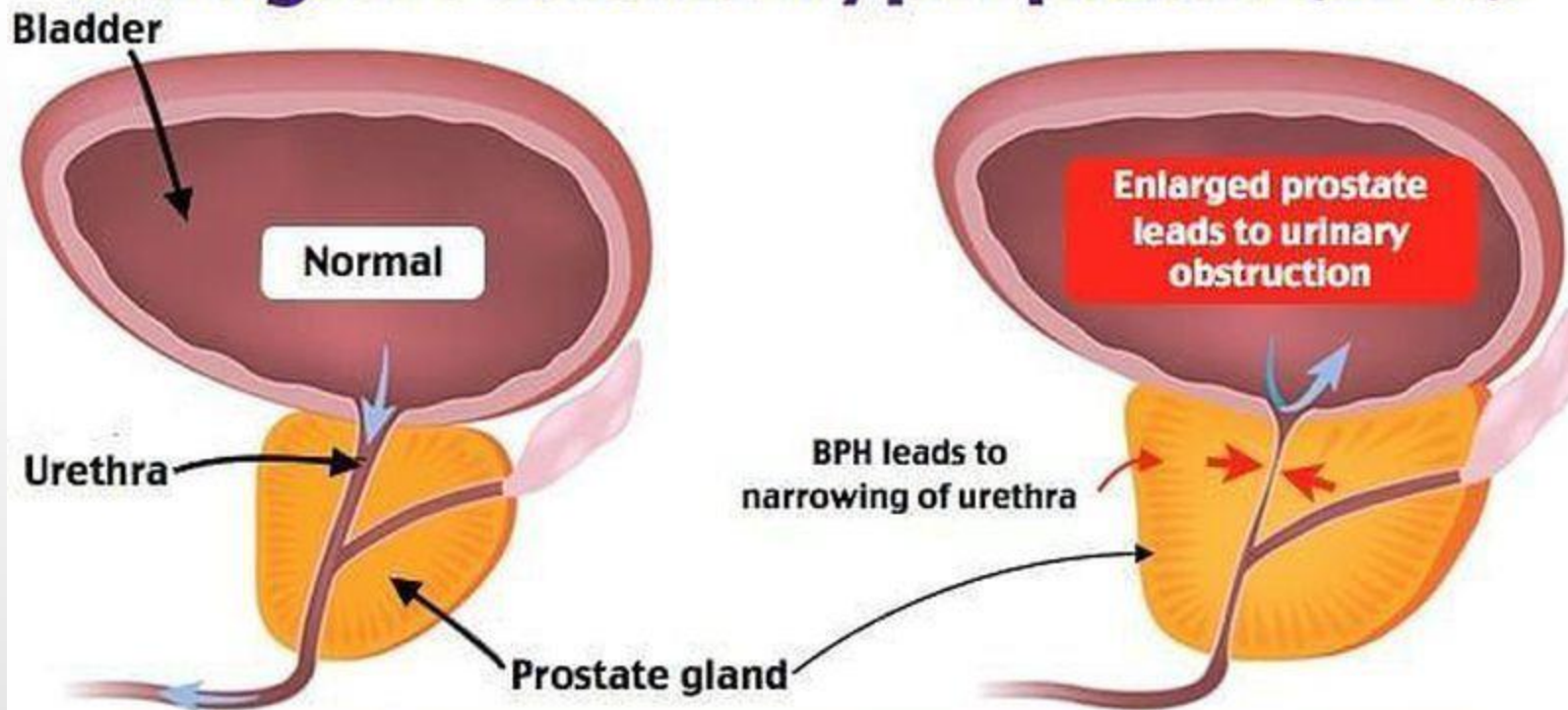
Benign prostatic hyperplasia is the increase in size of the prostate, without the presence of malignancy. It is much more common with advancing age, although initial histological evidence of hyperplasia may be evident from much earlier ages (<40 yrs old).

The enlarged prostate may compress the urethra, resulting in symptoms that refer to impaired storage of urine (urinary frequency, urinary urgency, nocturia) and symptoms that refer to impaired voiding (difficulty in initiating micturition, poor stream, intermittent urine stream and terminal dribbling of urine).

BPH is usually caused by hyperplasia of the glands from the transitional zone of the prostate.



Benign Prostatic Hyperplasia (BPH)



Symptoms of Benign Prostatic Hyperplasia "HI FUN"

Hesitancy

Intermittence, **I**ncontinence

Frequency, **F**ullness

Urgency

Nocturia

Prostate Specific Antigen

The **Prostate Specific Antigen** (PSA) is an enzyme (serine protease) secreted by the prostatic epithelium that aids the liquification of the ejacul

Prostate Specific Antigen

The **Prostate Specific Antigen** (PSA) is an enzyme (serine protease) secreted by the prostatic epithelium that aids the liquification of the ejaculate by lysing seminal vesicle proteins. **However the main clinical use of PSA is as a tumor marker specific for prostate carcinoma.**

Increased levels of serum PSA may suggest the presence of prostate cancer. Nonetheless other conditions that may “irritate” the prostate (such as inflammation, severe constipation, extended sexual intercourse or catheterisation) may also increase the PSA levels in the serum

innervation

- The prostate receives sympathetic, parasympathetic and sensory innervation from the **inferior hypogastric plexus**. The smooth muscle of the prostate gland is innervated by sympathetic fibres, which activate during ejaculation.

DETAILS

<u>Precursor</u>	<u>Endodermic evaginations of the urethra</u>
<u>Artery</u>	<u>Internal pudendal artery, inferior vesical artery, and middle rectal artery</u>
<u>Vein</u>	<u>Prostatic venous plexus, pudendal plexus, vesical plexus, internal iliac vein</u>
<u>Nerve</u>	<u>Inferior hypogastric plexus</u>
<u>Lymph</u>	<u>internal iliac lymph nodes</u>