

Histology of Ureter

Dr Muhammad Aaqib Riaz

Anatomy Department

Sargodha Medical College

Ureter

- The ureters conduct urine from kidneys to urinary bladder.
- The wall of each ureter is composed of three coats:
 - Mucosa
 - Muscularis
 - Adventitia

Ureter

Mucosa :

- Lined by 5- 6 cell layer of transitional epithelium that rests on lamina propria of loose connective tissue having blood vessels, lymphatics.

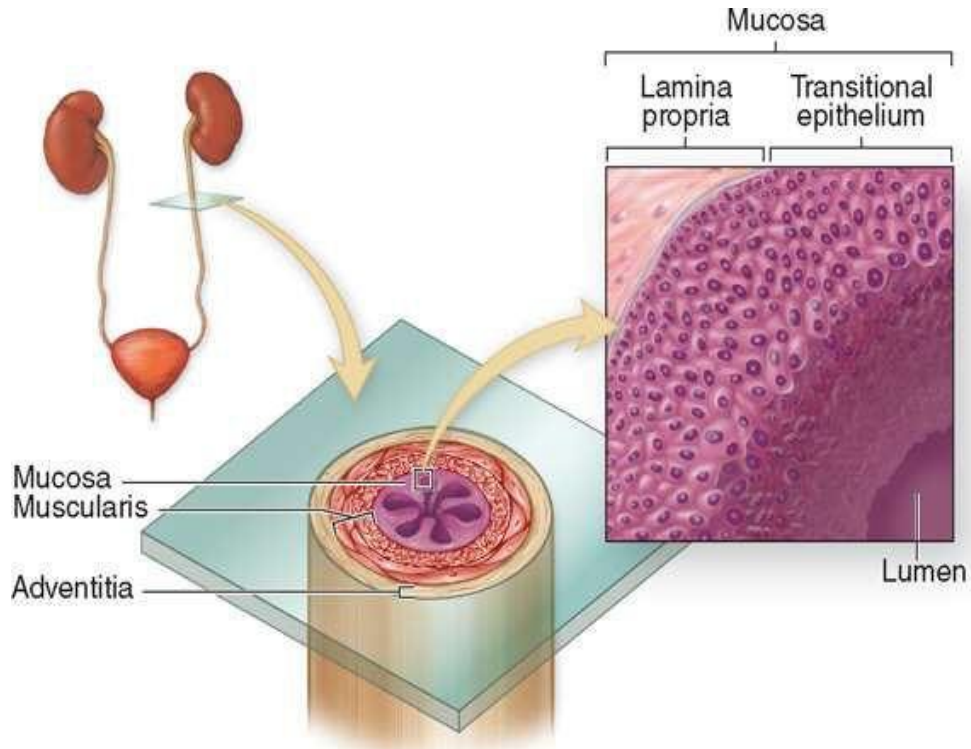
Muscularis:

- Has inner and outer longitudinal and middle circular layer of smooth muscles.

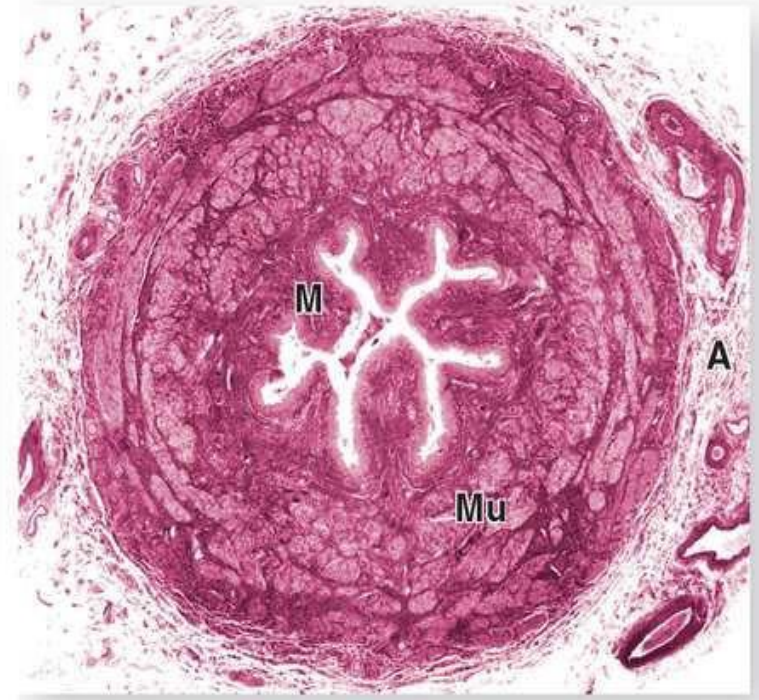
Adventitia:

- Outermost layer of the ureter consist of loose connective tissue containing blood vessels , lymphatics and nerves of ureter.

Ureter



(a) Ureter cross section

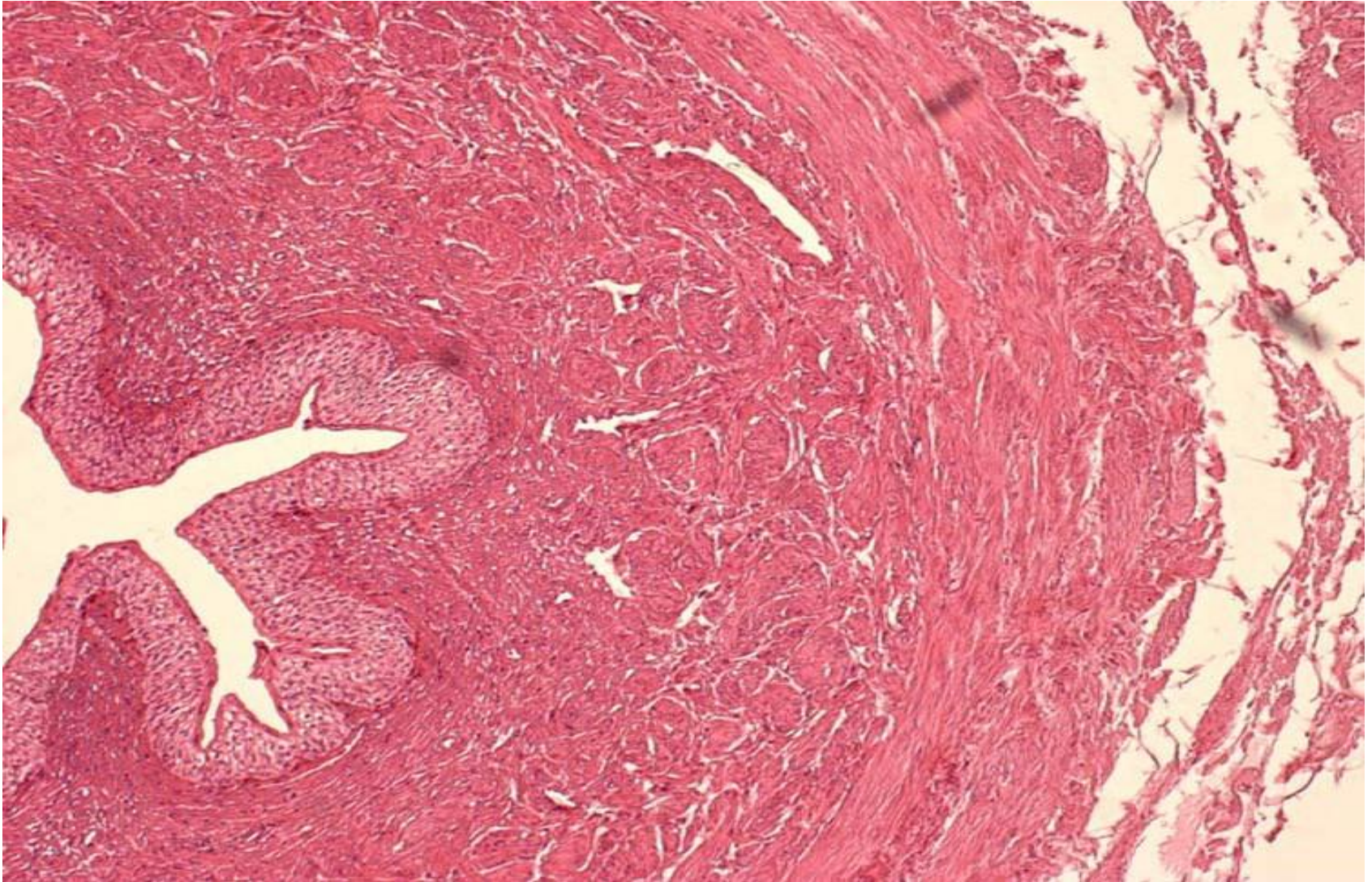


(b)

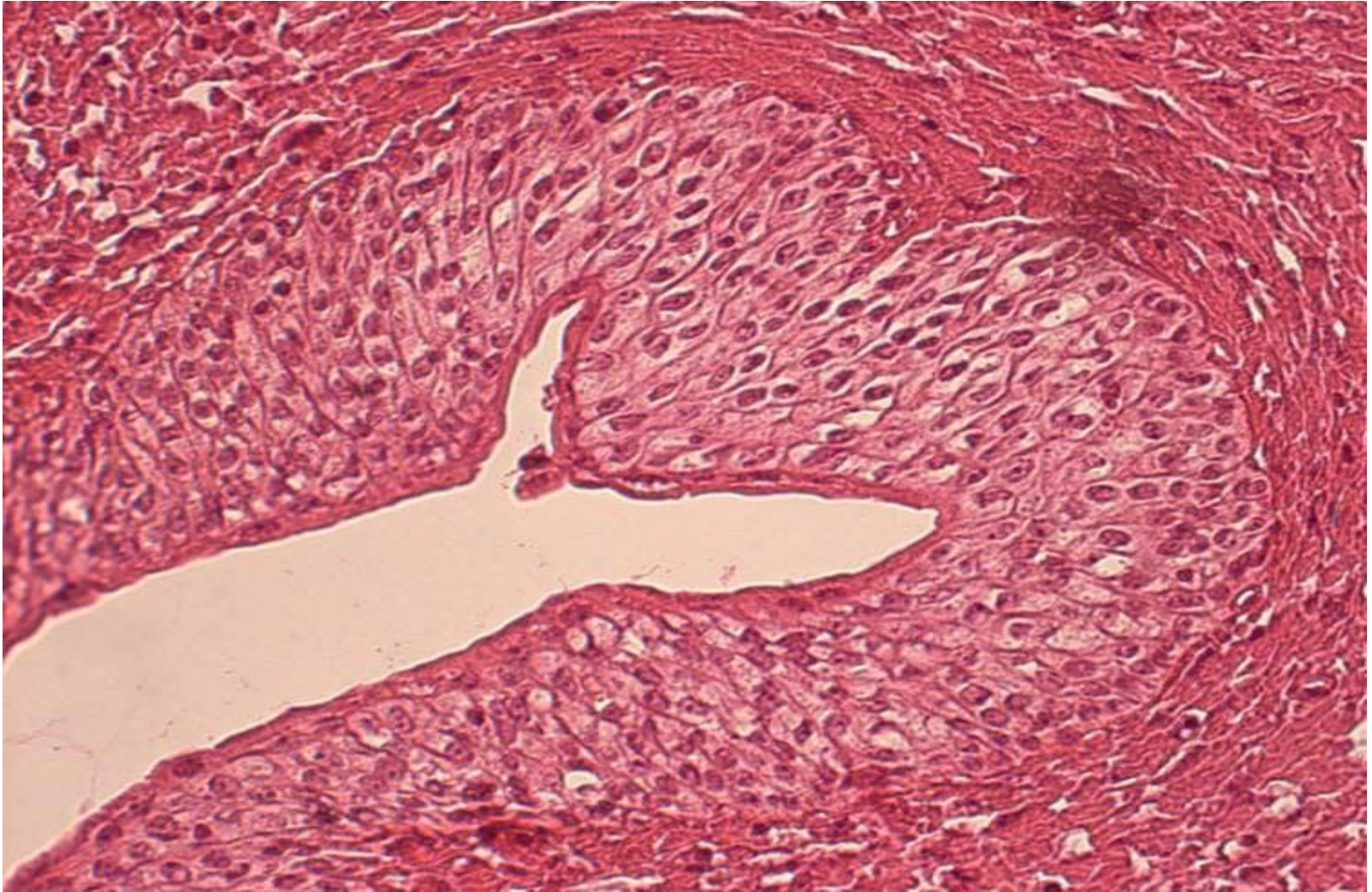
Ureter



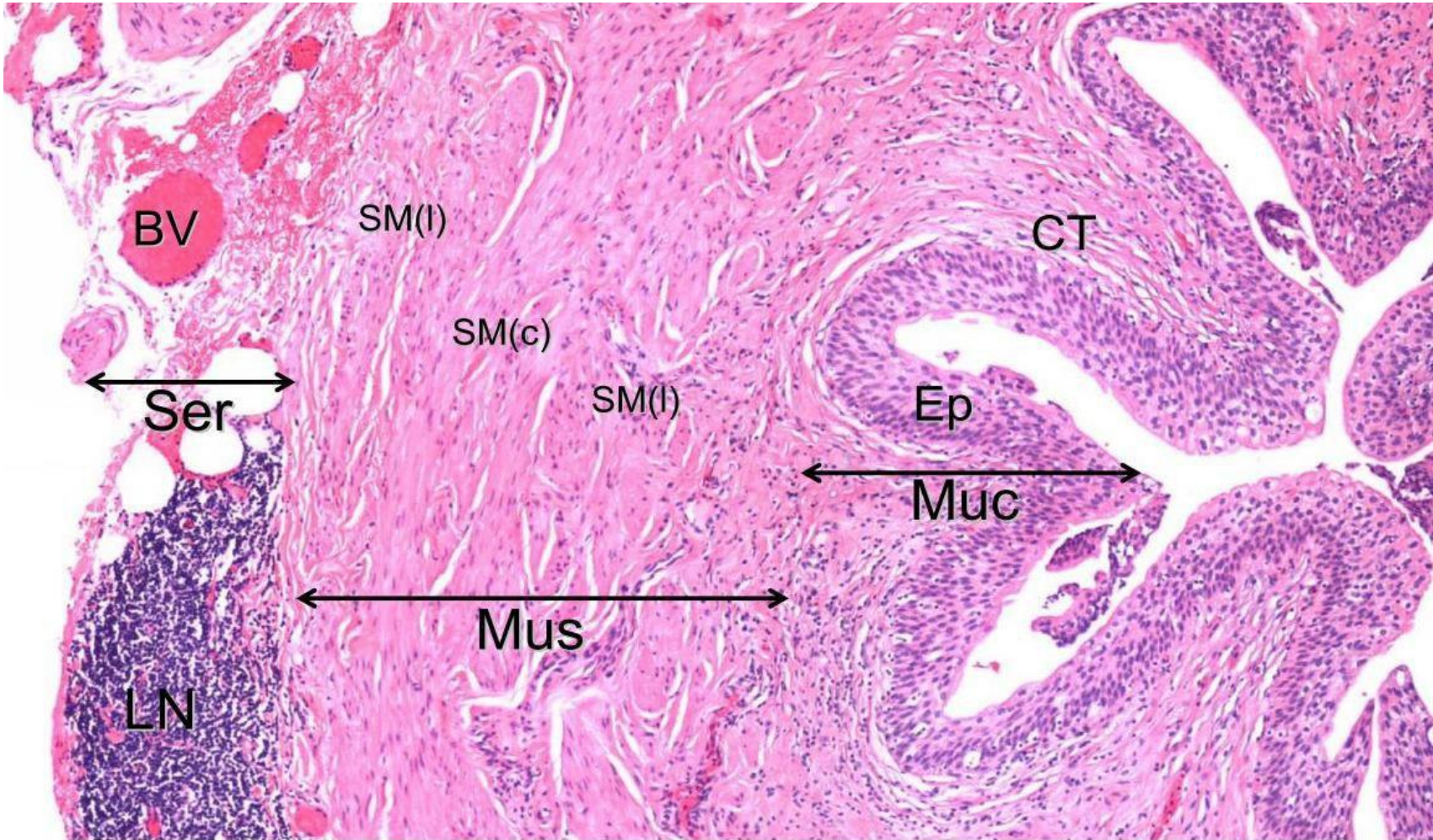
Ureter



Ureter



Ureter



Urinary Bladder

- The urinary bladder is reservoir that stores the urine.
- The wall of urinary bladder consists of three coats.
 - 1) Mucosa
 - 2) Muscularis
 - 3) Adventitia/ Serosa

Urinary Bladder

Mucosa:

- The mucosa of empty bladder shows folds that disappear when bladder becomes distended.
- The mucosa is lined by transitional epithelium appears 6 to 8 layers in empty bladder.
- The basal layer is of cuboidal cells, over which are several layers of polygonal cells.
- The most superficial layer consist of dome shaped cells.

Urinary Bladder

- The lining epithelium of distended urinary bladder consists of a basal layer of cuboidal cells and covered by one or two layers of squamous cells.
- The transitional epithelium of urinary bladder forms an impermeable barrier that prevents the content of urine from passing into the underlying tissue.
 - 1) The luminal plasmalemma of superficial cells is impermeable to salts and water.
 - 2) The surface cells are firmly bound to each other by desmosomes and tight junction.

Urinary Bladder

❖ Plasma membrane of the superficial cells form an osmotic barrier between the toxic urine and the tissue fluids.

Dome shaped superficial cells. Some may be binucleated.



Urinary Bladder

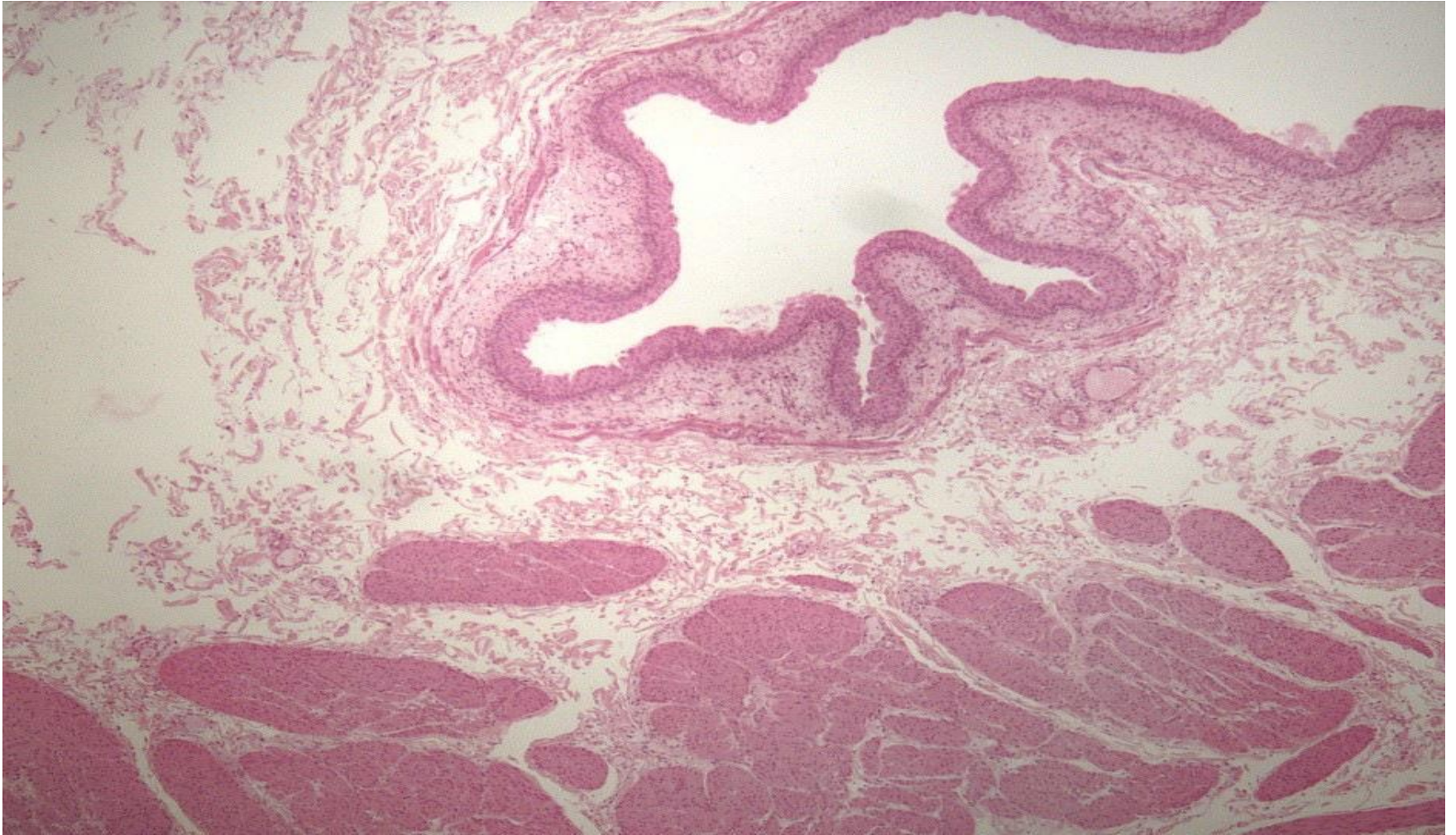
Muscularis:

- It consist of interlacing bundles of smooth muscle fibers and distinction into different layers is not possible.
- Has inner and outer longitudinal and middle layer of smooth muscles.

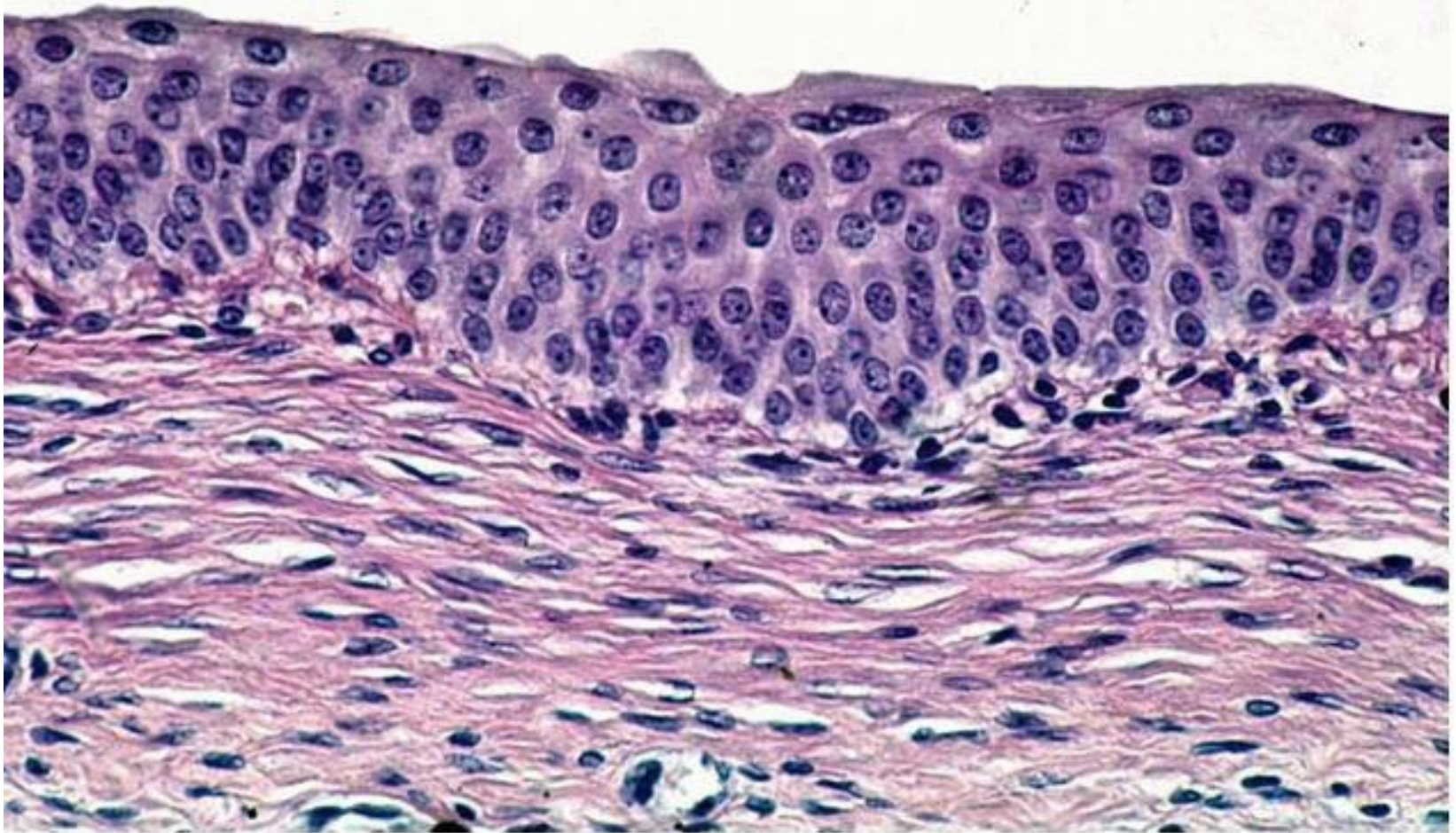
Adventitia:

- Most of bladder is covered by adventitia except superior surface is covered by serosa.

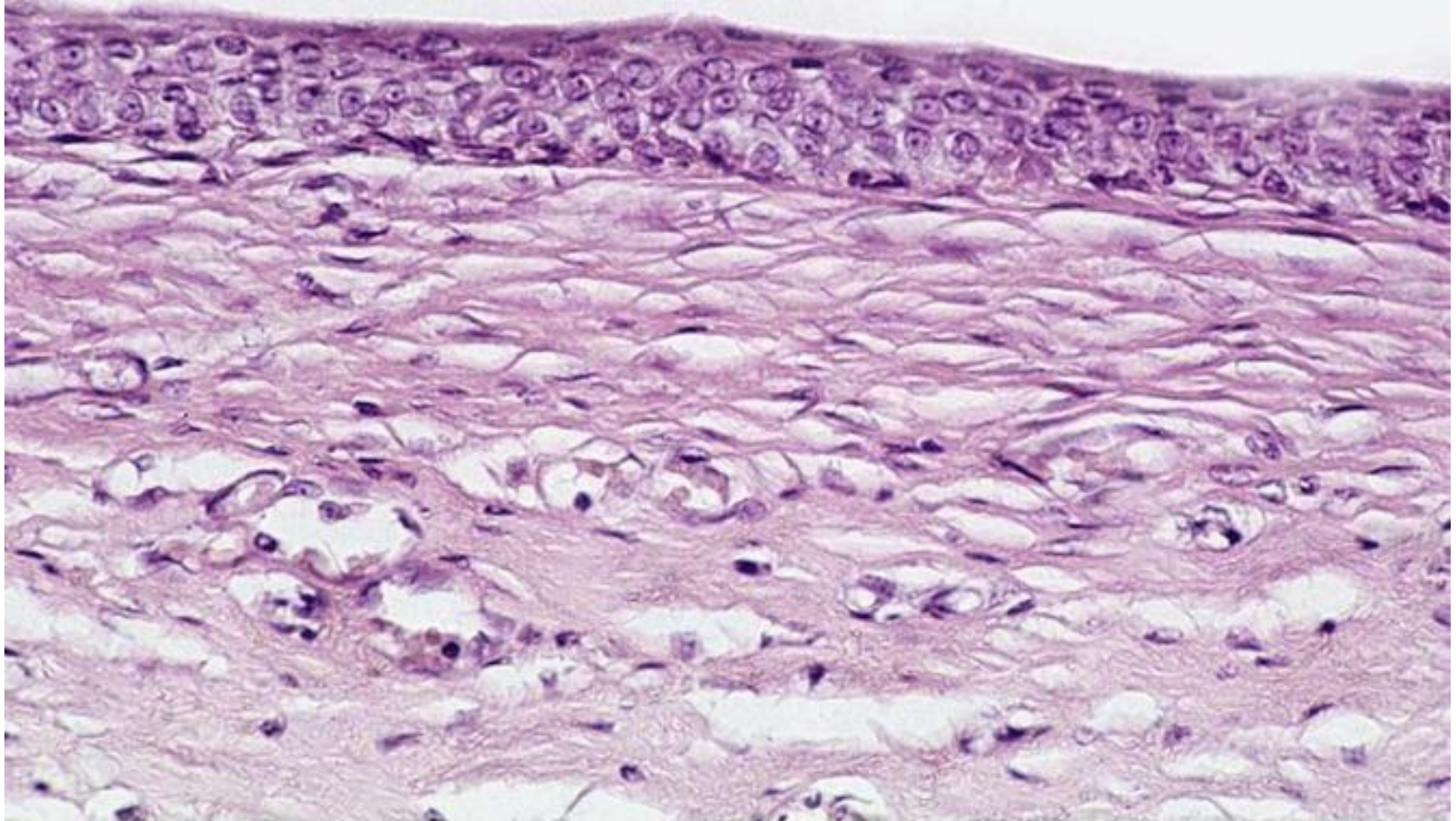
Urinary bladder



Urinary Bladder - Relaxed



Urinary Bladder- Stretched



Histology Of Thyroid Gland

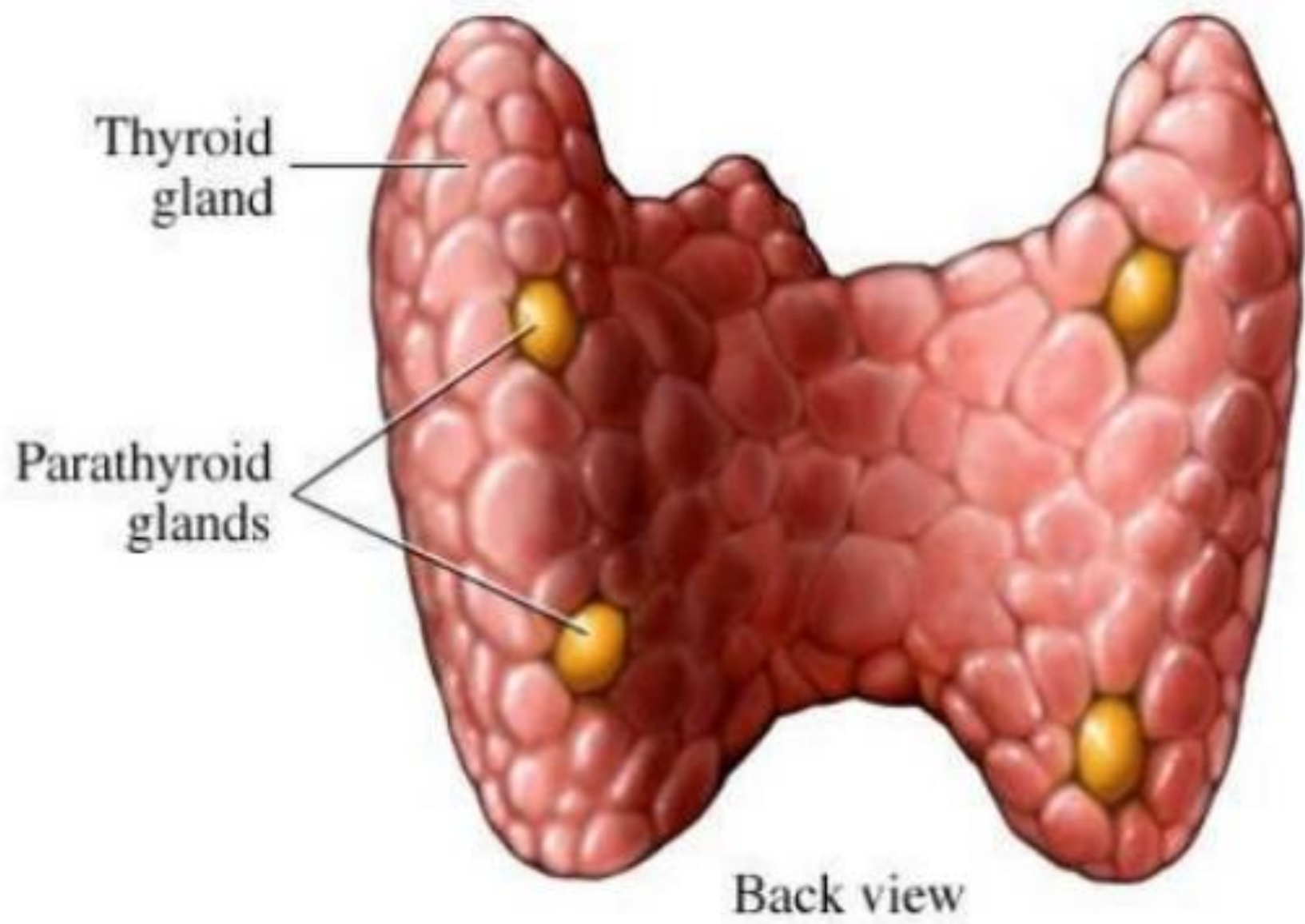
Dr Muhammad Aaqib Riaz

Anatomy Department

Sargodha Medical College

Thyroid Gland

- Thyroid is a bilobed organ which is located in anterior aspect of neck
- Two lobes of thyroid are connected with each other by the isthmus in front of trachea.



Microscopic Features of Thyroid Gland

Capsule:

- It is covered by a thin connective tissue **capsule**.
- Many septa arise from capsule which convey blood vessels, nerves and lymphatics into the gland.

Parenchyma:

- The parenchyma consist of hollow, spheroidal structures called **thyroid follicles** and **parafollicular cells**.

Thyroid Follicles

- Consist of single layer of cells called **follicular cells**.
These cells rest on basement membrane
- The CT between thyroid follicles contains
 - ❖ **Capillaries**
 - ❖ **Nerves**
 - ❖ **Lymphatics**

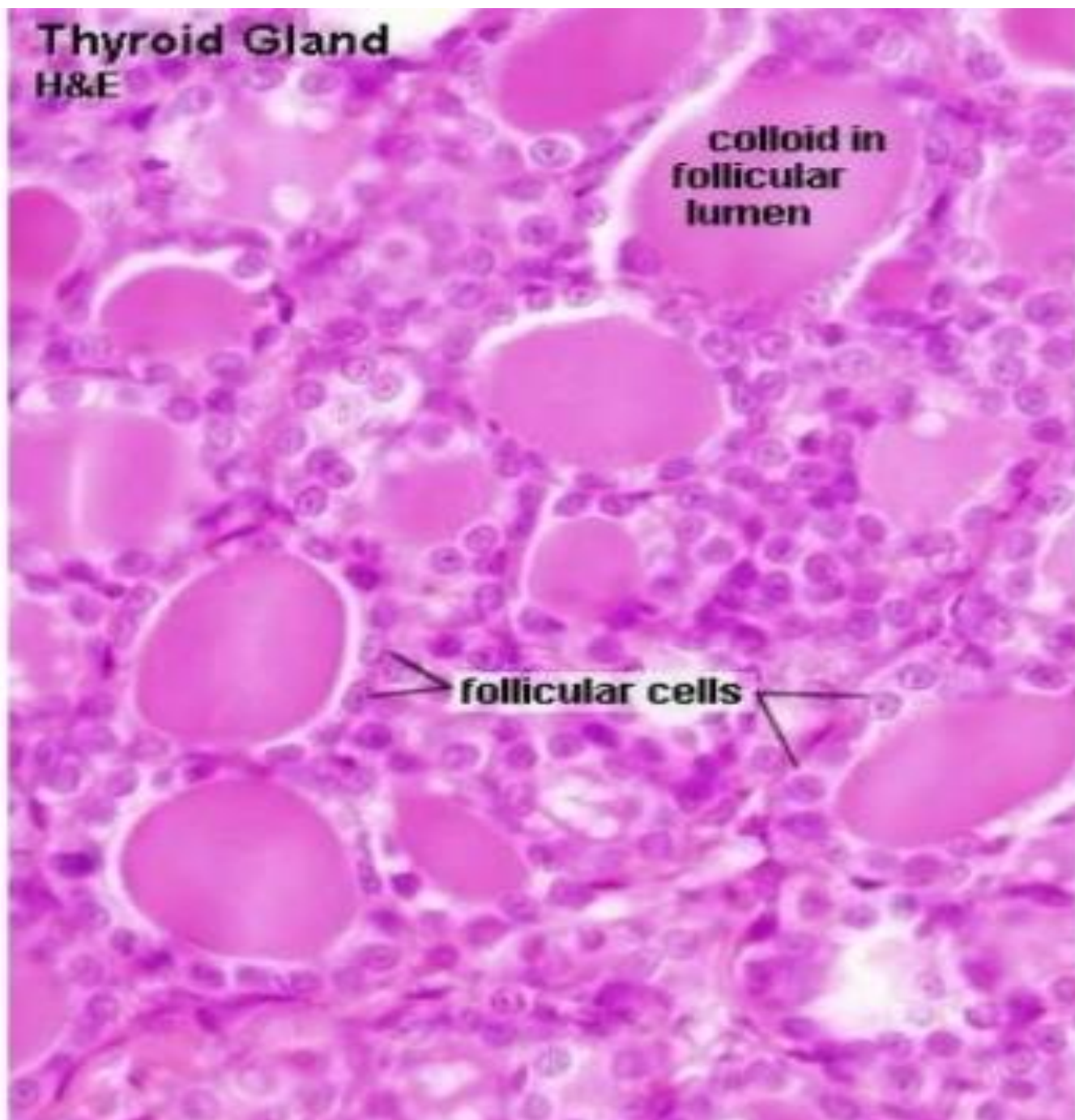
Thyroid Follicles

- Lumen of follicles is filled with colloid material
- In resting state, follicular cells are cuboidal
- In actively secreting state, follicular cells are tall and amount of colloid decreases
- In less active state, amount of colloid is more and follicular cells become flat

Thyroid Follicles

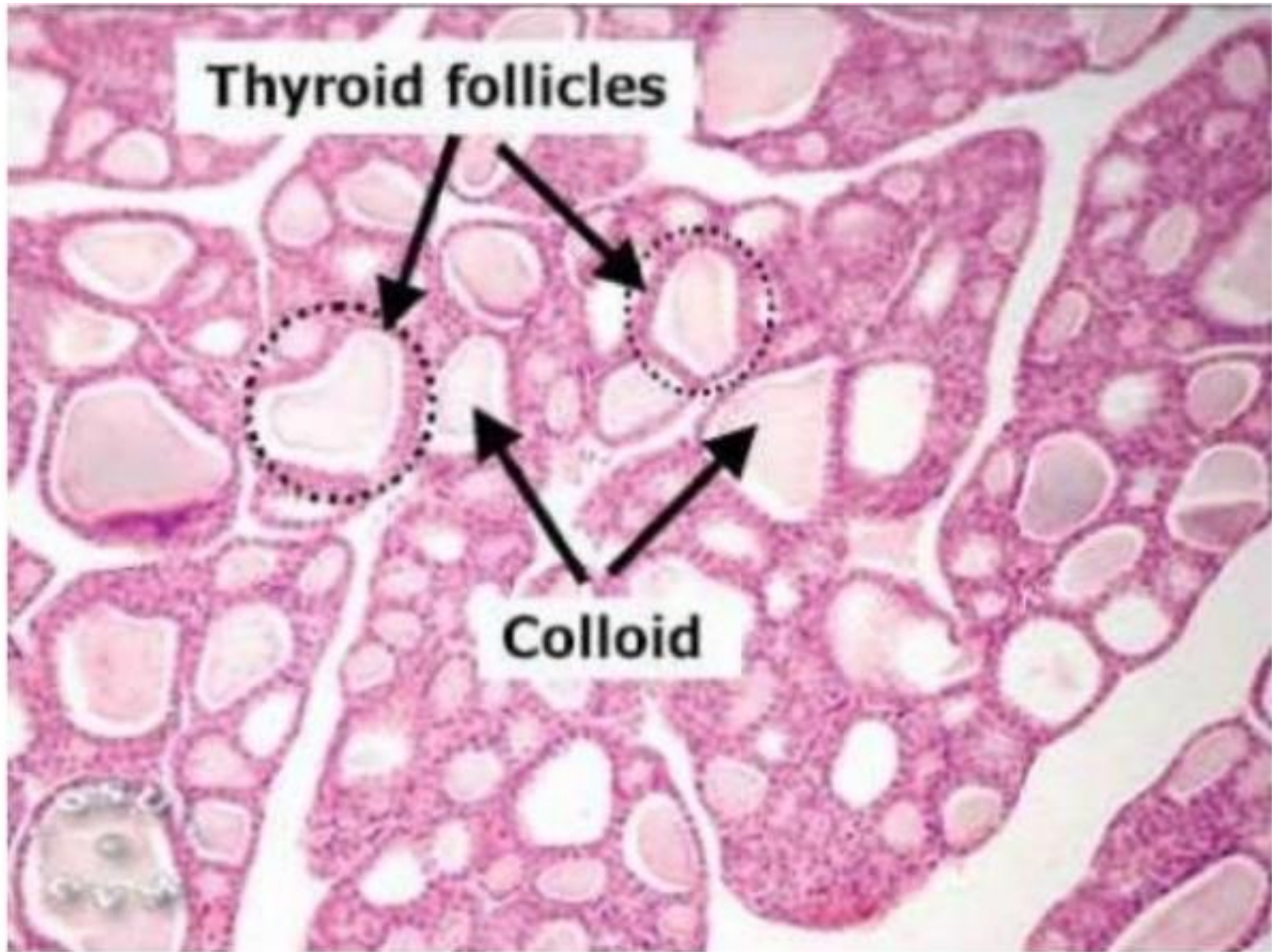
- Colloid is formed by follicular cells
- Main component of colloid is thyroglobulin which is inactive form of thyroid hormone

Thyroid Gland
H&E



Thyroid follicles

Colloid



Thyroid Follicles

- Follicular cells have spherical nucleus containing one or two nucleoli
- Luminal surface of follicular cells have microvilli
- Basal cytoplasm have numerous RER, SER, Golgi complex and colloid resorption droplets

Parafollicular cells

- **Parafollicular cells** are also called C cells
- These are present in cluster of connective tissue in between the follicles
- These are also present as single cell within the follicle
- Within the follicle they are located away from the colloid adjacent to the basement membrane
- These cells secrete calcitonin hormone which reduces the blood calcium level by reducing bone resorption by osteoclasts

Hormones Of Thyroid Gland

Thyroid hormone

- Increases the basal metabolic rate
- Essential for body growth
- Essential for development of CNS

Calcitonin

- is secreted by parafollicular cells
- Antagonises the action of parathyroid hormone
- Reduced the blood calcium level, thus helps to maintain blood calcium level

SYNTHESIS & STORAGE OF THYROID HORMONE

- Thyroglobulin is synthesized by RER and then carried to Golgi complex
- Where it is packed into vesicles
- These vesicles are then transported to apical surface of follicular cells
- Where thyroglobulin is discharged into lumen of follicles by exocytosis

Iodide uptake

under the influence of TSH

- Follicular cells take iodide from blood
- Iodide is oxidized to iodine by enzyme thyroid peroxidase

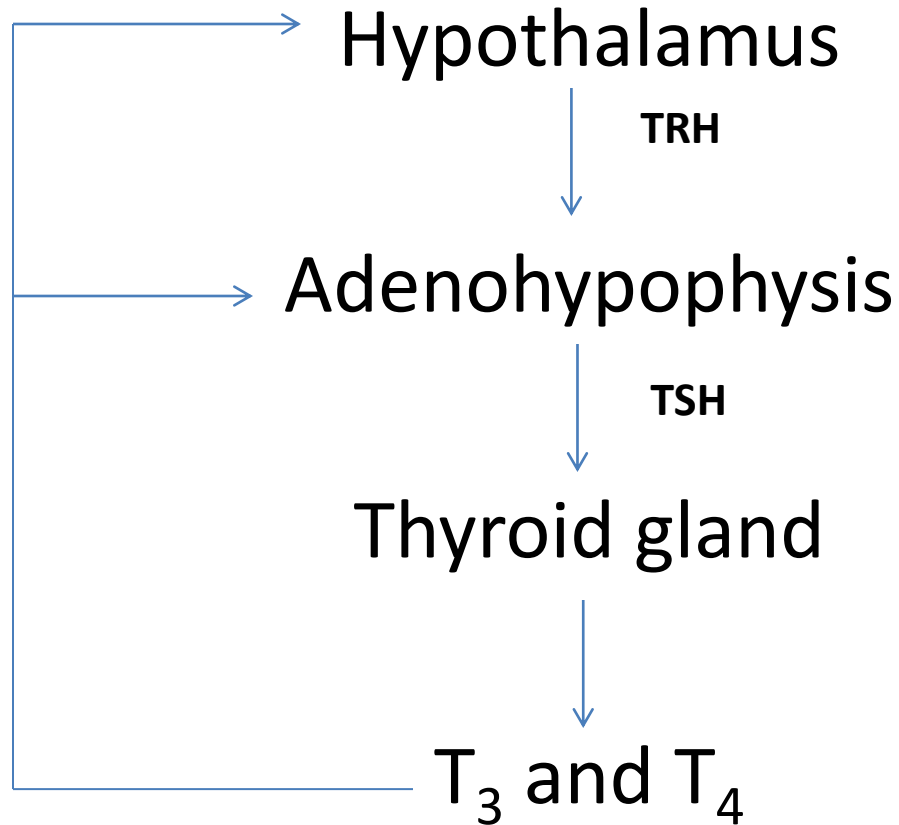
Iodination of thyroglobulin

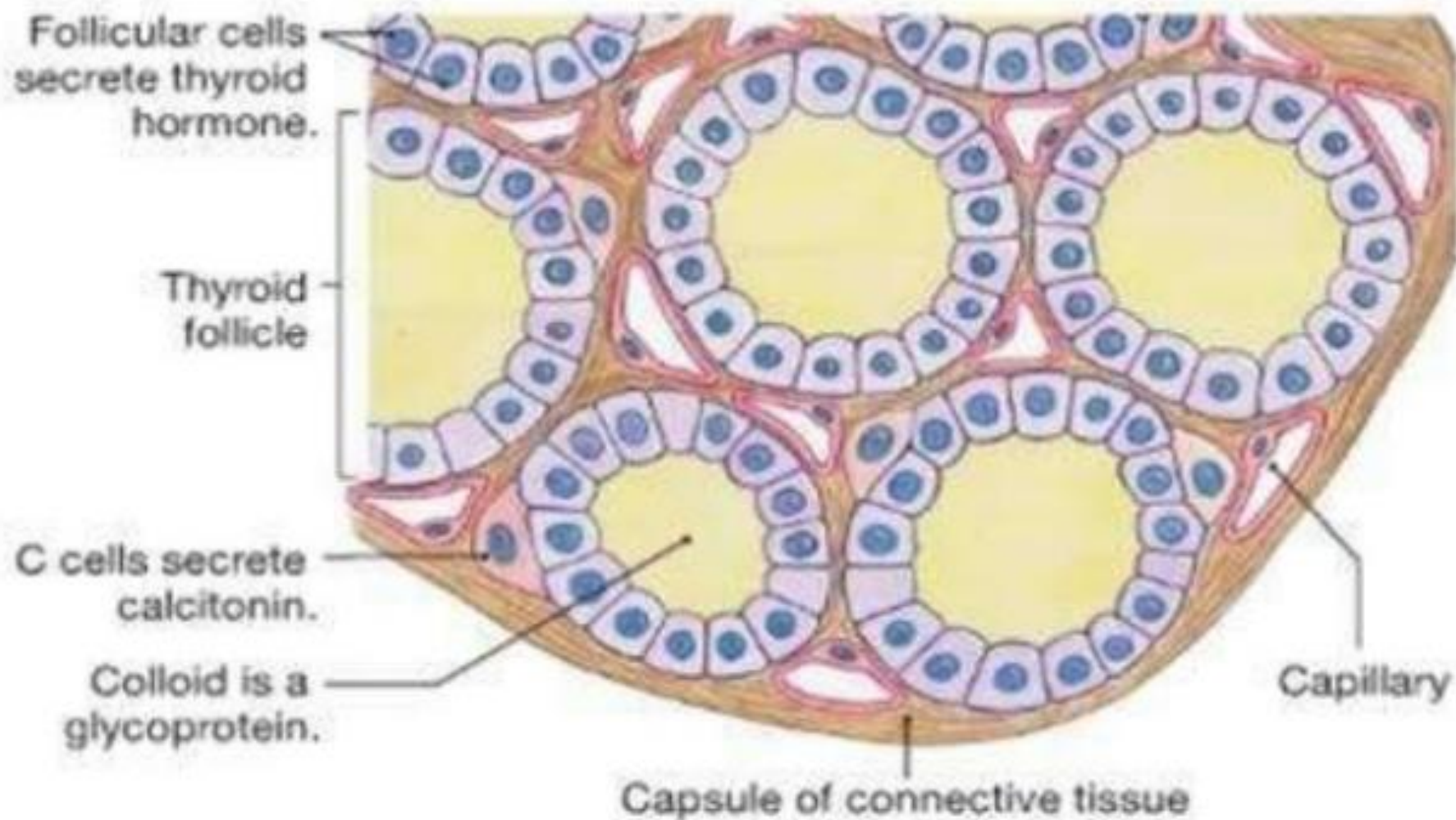
- occurs at luminal surface of follicular cells which forms Triiodothyronine (T_3) and Tetraiodothyronine (T_4).
- Also known as Thyroxine

RELEASE OF THYROID HORMONE

- Occurs due to stimulation of follicular cells by TSH which results in release of T_3 and T_4

CONTROL OF THYROID HORMONE





Parathyroid Gland

- Two pairs of parathyroid glands
- Embedded in capsule of thyroid on its posterior aspect

Microscopic Features

Parathyroid contains two types of cells

➤ **Principal or Chief cells**

➤ **Oxyphil cells**

Chief cells

- Secrete parathyroid hormone
- Most numerous cells
- Polygonal in shape
- Arranged in clumps or cords
- Cytoplasm of cells shows numerous secretory granules

- Each cell has centrally located spherical nucleus
- Large capillaries are present in between the cords and clumps of cells

Oxyphil Cells

- Large in size but fewer in number than chief cells
- Arranged in clumps
- Function is not clear

PARATHYROID HORMONE (PTH)

- Secreted by chief cells
- Raises blood calcium level
- Acts on three different sites to increase blood calcium level i.e., bone, kidney and intestine
- **In bone**, PTH acts on osteoclasts and increases the bone resorption

- **In kidney**, PTH decreases the phosphate resorption in proximal tubules and increases calcium resorption in distal tubules
- **In small intestine**, PTH increases absorption of calcium

CONTROL OF PARATHYROID SECRETION

- Secretion of parathyroid is regulated by blood calcium level by negative feedback mechanism
- The low blood calcium level stimulates gland to produce and secrete PTH
- Increase in blood calcium level inhibits parathyroid gland

