Pathology

Subject : Note (تفريغ)

Lec no : 2

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وقل رب زدني علماً

للوصول الى guidance الباثو و تفاريغ المادة كاملة :

كل اعمال الفريق العلمي تنشر على قناة التيليغرام

تجدون في guidance مادة الباثو على موقع النادي :

كتب المادة

ROBBINS

PATHOMA

شرح المادة

شرح المادة كاملة

يوجد شرح للمادة كاملة من ارشيف دفعة اثر ، مع العلم ان الوحدة الثالثة كانت تعطى من قبل الدكتورة غادة

PATHO ATHAR

شرح لاب الباثو

PATHO LAB

شرح الفريق العلمي

شرح قديم للفريق العلمي

PATHO - SCIENTIFIC TEAM

تفاريغ

يمكن الاستفادة من تفاريغ الدفع السابقة

تفاريغ دفعتي اثر و ورود قويات جدا

ATHAR PATHOLOGY NOTES

VEIN PATHO NOTES

QUIZZES

كويزات للدكاترة

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Hyperplasia :

- Is an increase in the number of cells leading to increase in size of the organ .

Usually achieved by production of new cells by the of stem cells .

Permanent cells can't undergo hyperplasia due to the absence of stem cells.(They only undergo hypertrophy)

Can be :

I- **Physiological:** Can be induced by :

imp

a- **Hormonal stimulation** : as in female uterus during pregnancy hyperplasia is accompanied by hypertrophy or in the female breast during puberty or lactation .

replace / تعويضي

b- **Compensatory physiological hyperplasia** :

that is, hyperplasia which occurs when a portion of the tissue is removed or diseased. ← تعويض الجزء المزال من النسيج

Examples :

In Surgical resection :

- **For example ; when the liver is partially resected** (استئصال), mitotic activity (النشاط الانقسامي) in the remaining cells begins as early as 12 hours later, eventually restoring the liver to its normal weight, within three months . → **Liver cells divide only after resection or disease**

- **The hyperplasia in this setting is due to stimulation by polypeptide growth factors (GF) produced by remnant hepatocytes as well as non-parenchymal cells found in the liver.**

Liver cells are considered stable cells (multiply only when needed)

When a part of the liver is donated, the donor's remaining liver cells will begin dividing until the liver is fully restored.

Q : True / False : Liver cells multiply even when the liver is healthy and not resected

Ans : FALSE !! They only multiply when a disease or resection occur.

Types of cells :

1) Permanent Cells : incapable of regeneration
   - Neurons
   - Cardiac myocytes
   - Skeletal muscle cells

2) Labile Cells : continuously divide
   - Skin
   - GIT
   - RBCs

3) Stable Cells : divide only when needed → Liver

II- Pathological : due to hormonal stimulation as in endometrial hyperplasia due to estrogen hormone stimulation, leading to thickening of uterine endometrium ,clinically presents as a dysfunctional uterine bleeding called menorrhagia . ↑Excess of estrogen = menorrhagia

- Or in benign prostatic hyperplasia in men causing urinary tract obstruction due to enlargement of the prostate تصيب الرجال الكبار وهي تضخم بالبروستات مما يؤدي إلى عدم القدرة على إفراز البول (urine retention) و (dysuria) ألم أثناء التبول ، والتبول غير إرادي (urine dribbling)

- **In wound healing : the GF-stimulated fibroblasts & blood vessels (BV) endothelial cells (EC) hyperplasia to facilitate repair . In this case growth factors are produced by white blood cells (WBCs) that accumulate during tissue injury.**

Endometrium grows in the presence of estrogen and sheds in the presence of progesterone

Menorrhagia : excessive irregular bleeding because of ↑ Estrogen

Q : A 45 year old female suffers from excessive irregular bleeding.What's the cause of this condition?

Ans : Hyperplasia of endometrial tissue. Cells no. increases due to an increase of estrogen.
This condition can be treated by decreasing the estrogen level so the no. of cells can go back to normal ⟶ Reversible injury

Endometrial hyperplasia leads to cancer, whereas benign prostatic hyperplasia doesn't.

Symptoms of benign prostatic hyperplasia (BPH) :
1) **Frequent** (متكررة) **urination**
2) **Urinary retention**
3) **Urine urgency** عدم قدرة تأجيل التبول
4) **Dysuria** الألم أثناء التبول

BPH may lead to prostatism

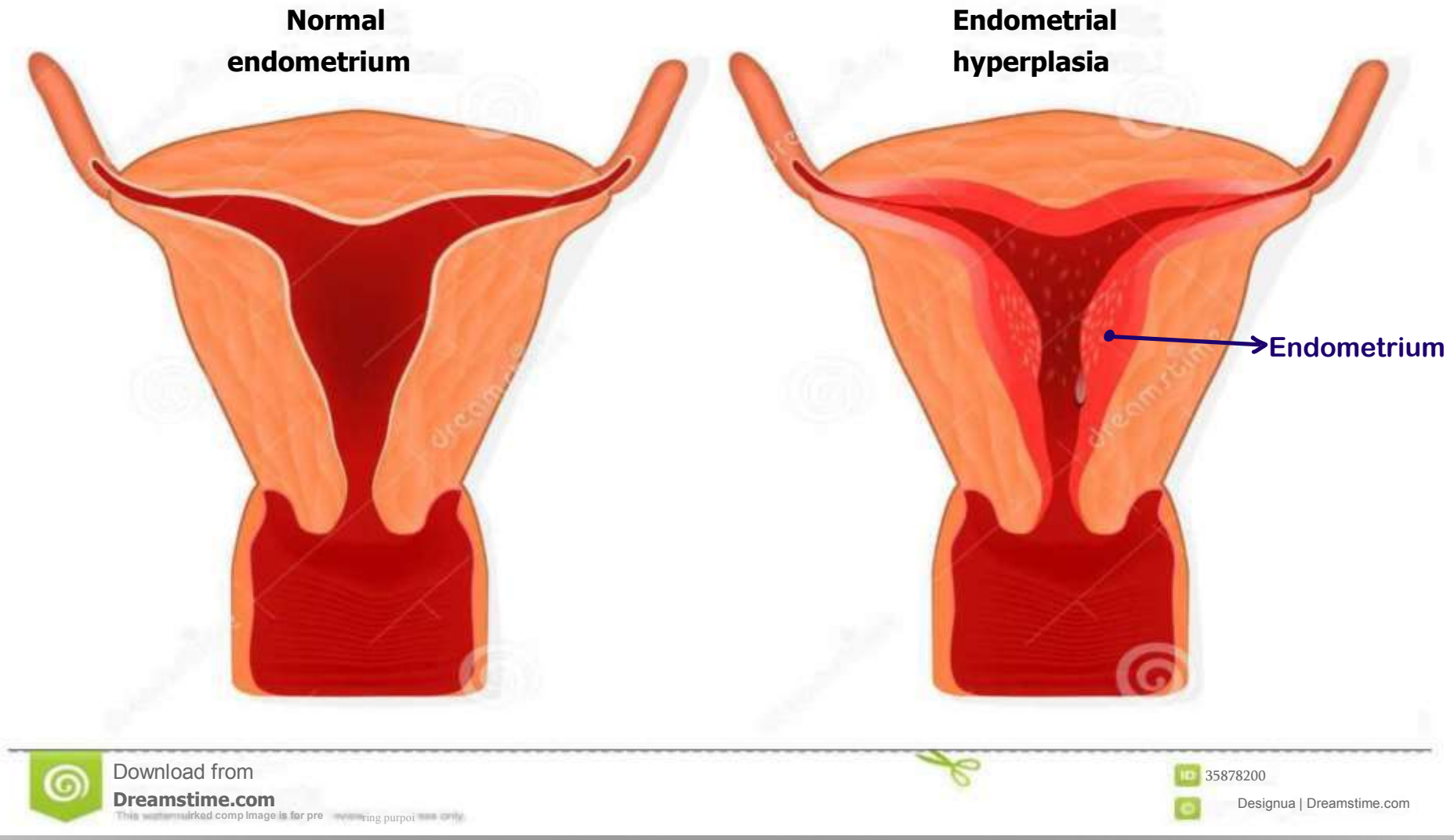


Figure 16 : Diagramatic view of normal uterus (left) showing normal endometrium & endometrial hyperplasia (right)

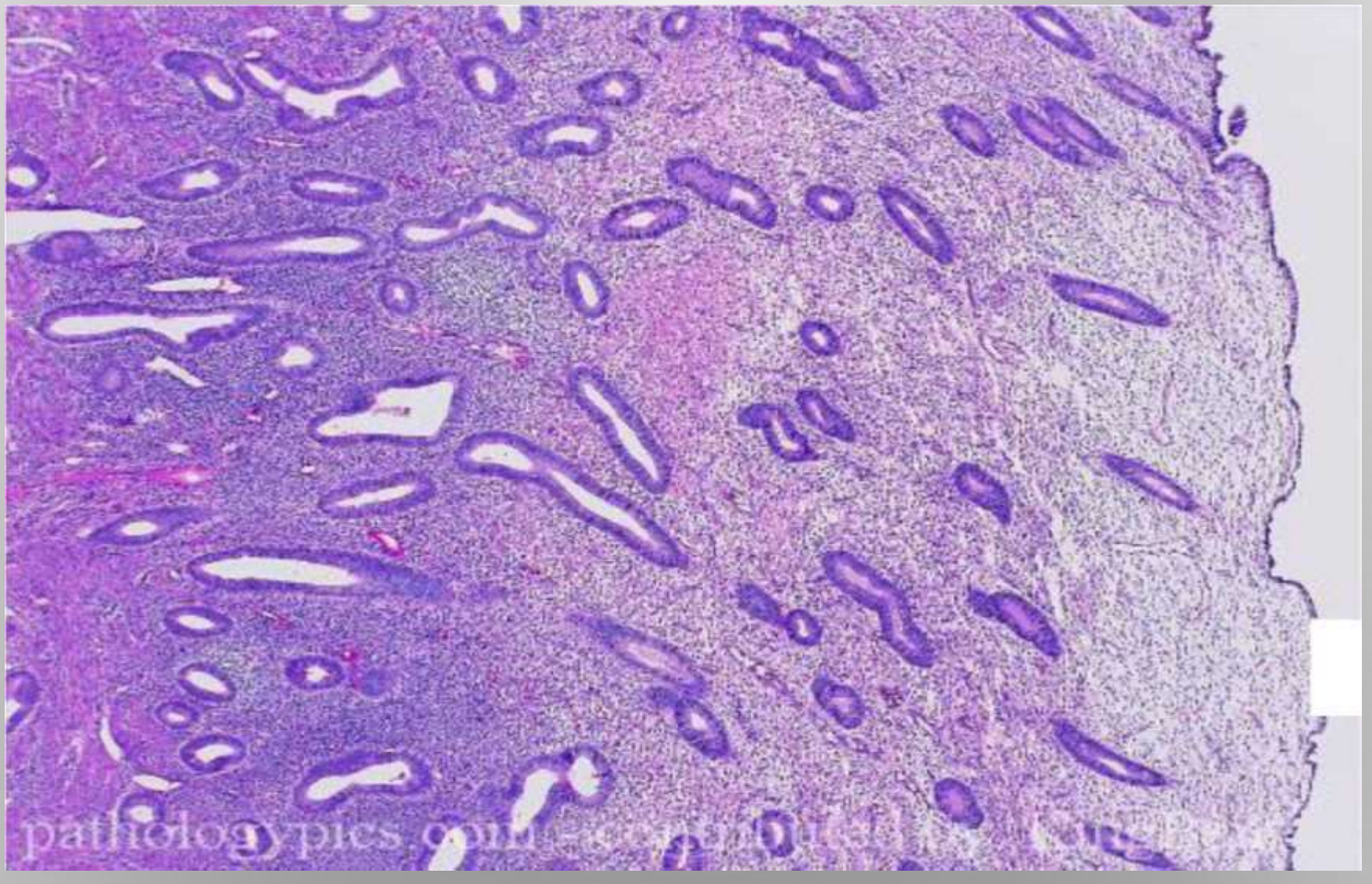


Figure 17 : Microscopic view of normal endometrium.

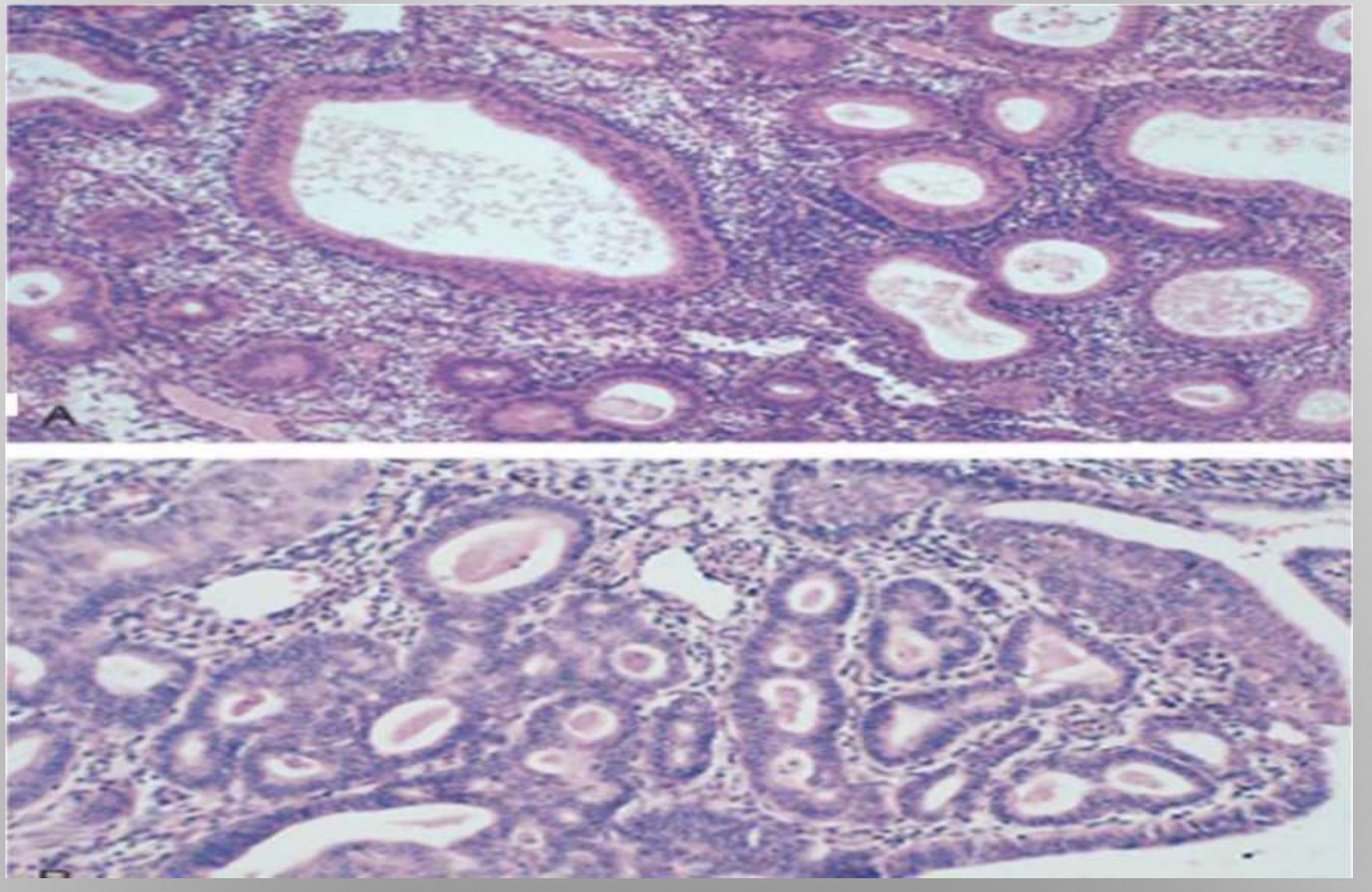
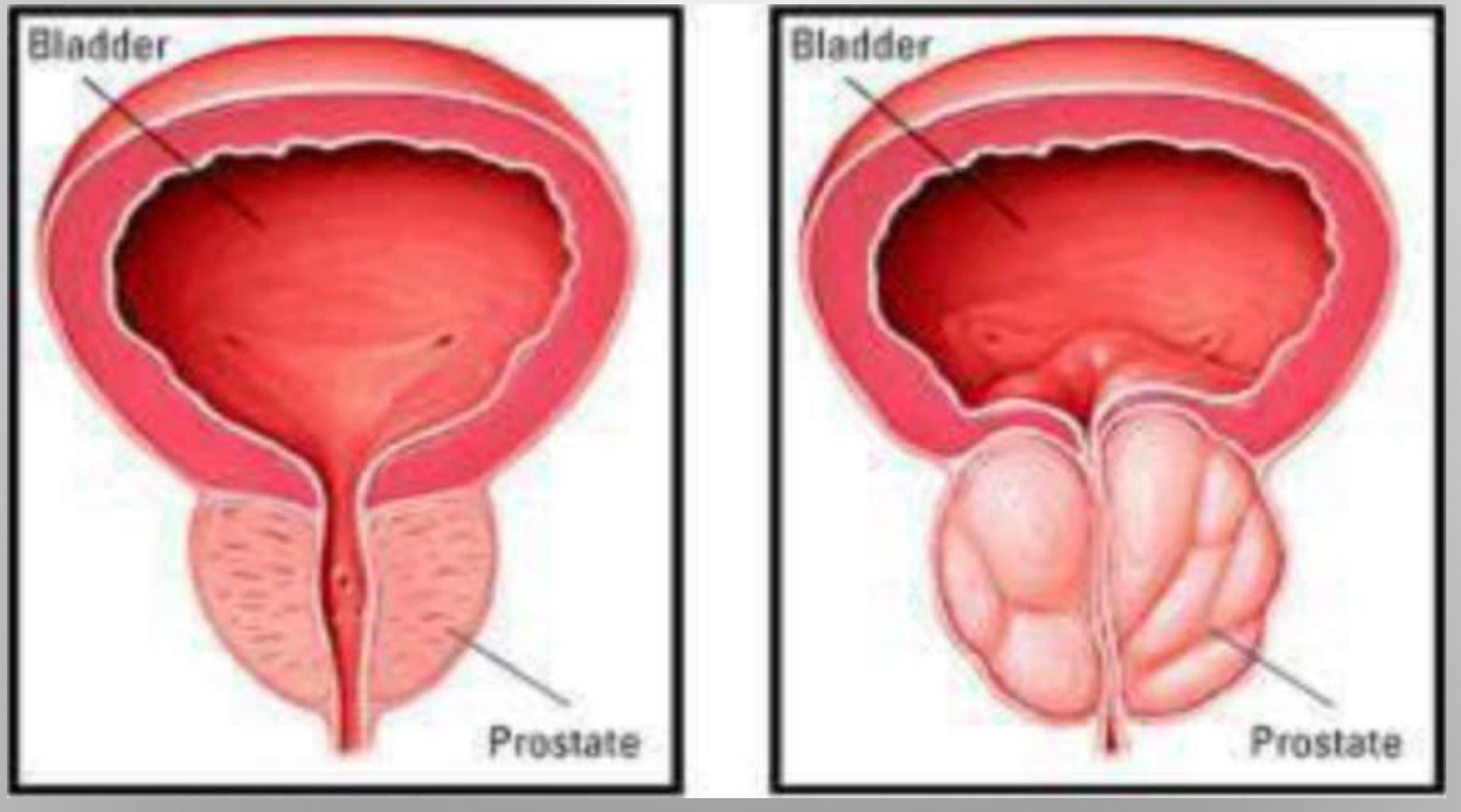


Figure 18 : Upper view : Microscopic view of endometrial hyperplasia , showing cystic glands . Lower view : Endometrial hyperplasia showing numerous glands .



Normal Prostate Enlarged Prostate (BPH)

Figure 20 : Diagrammatic view of normal prostate (left) and benign prostatic hyperplasia (right) .

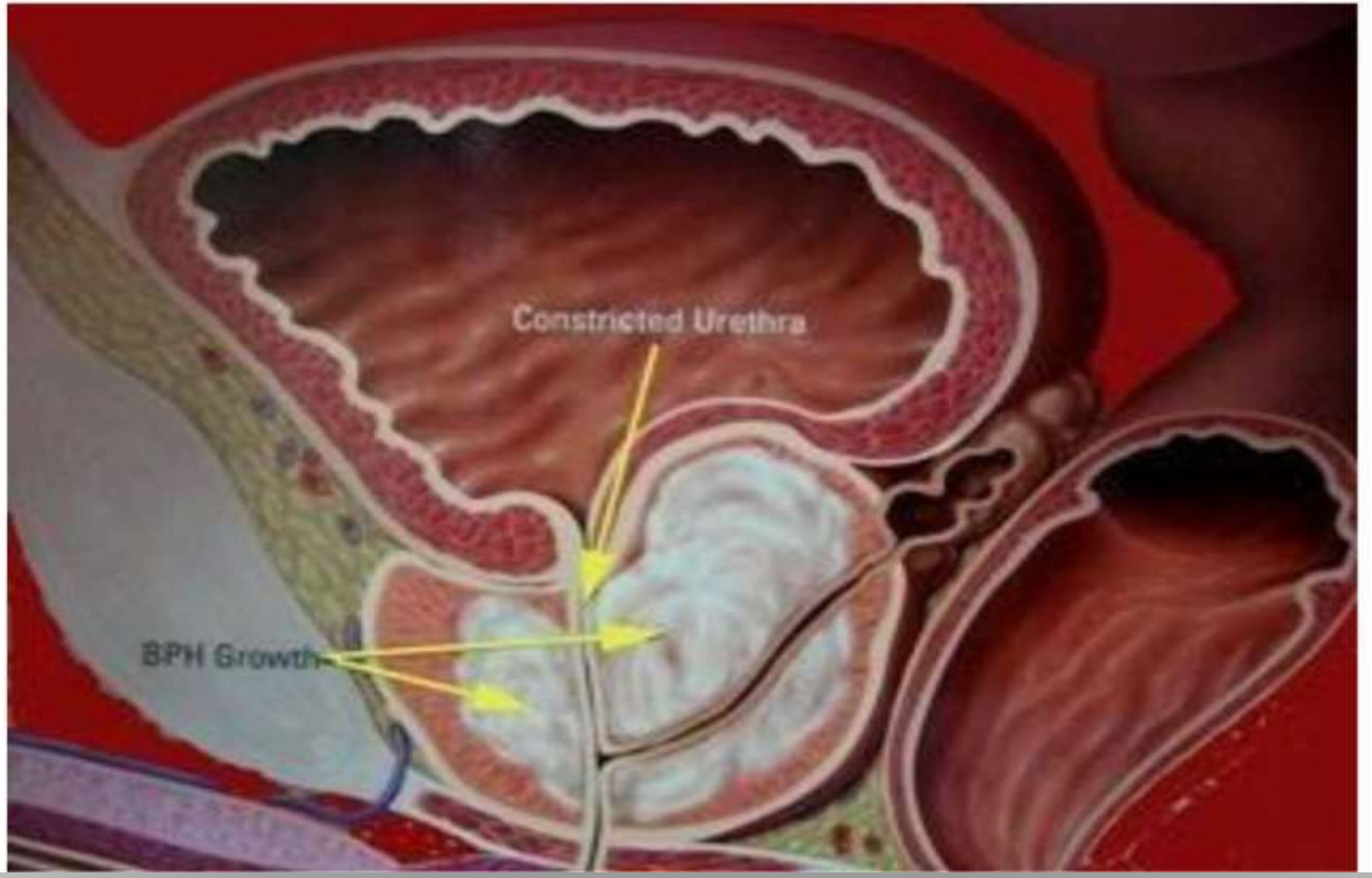


Fig. 21 - Benign Prostatic Hyperplasia (BPH)

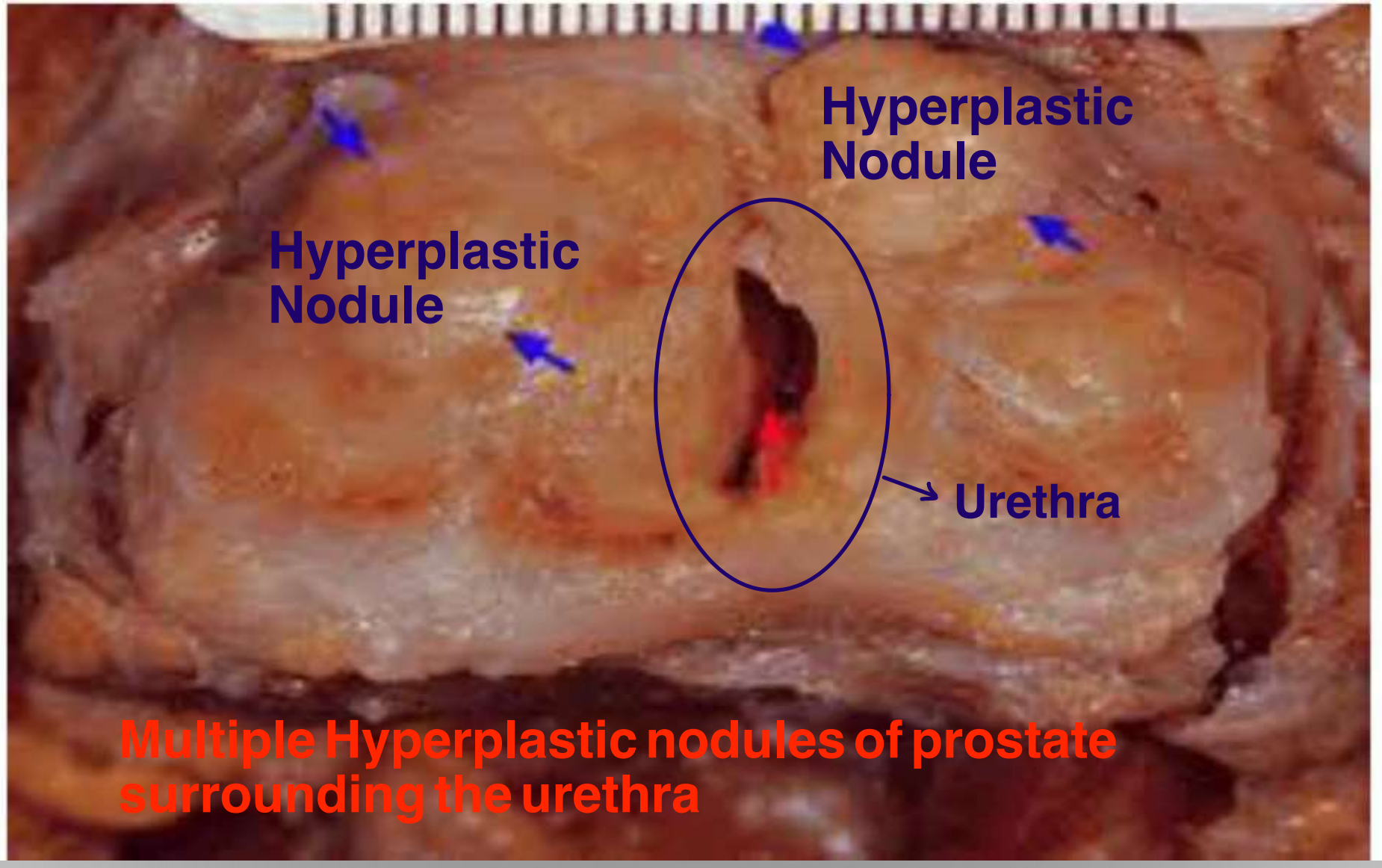
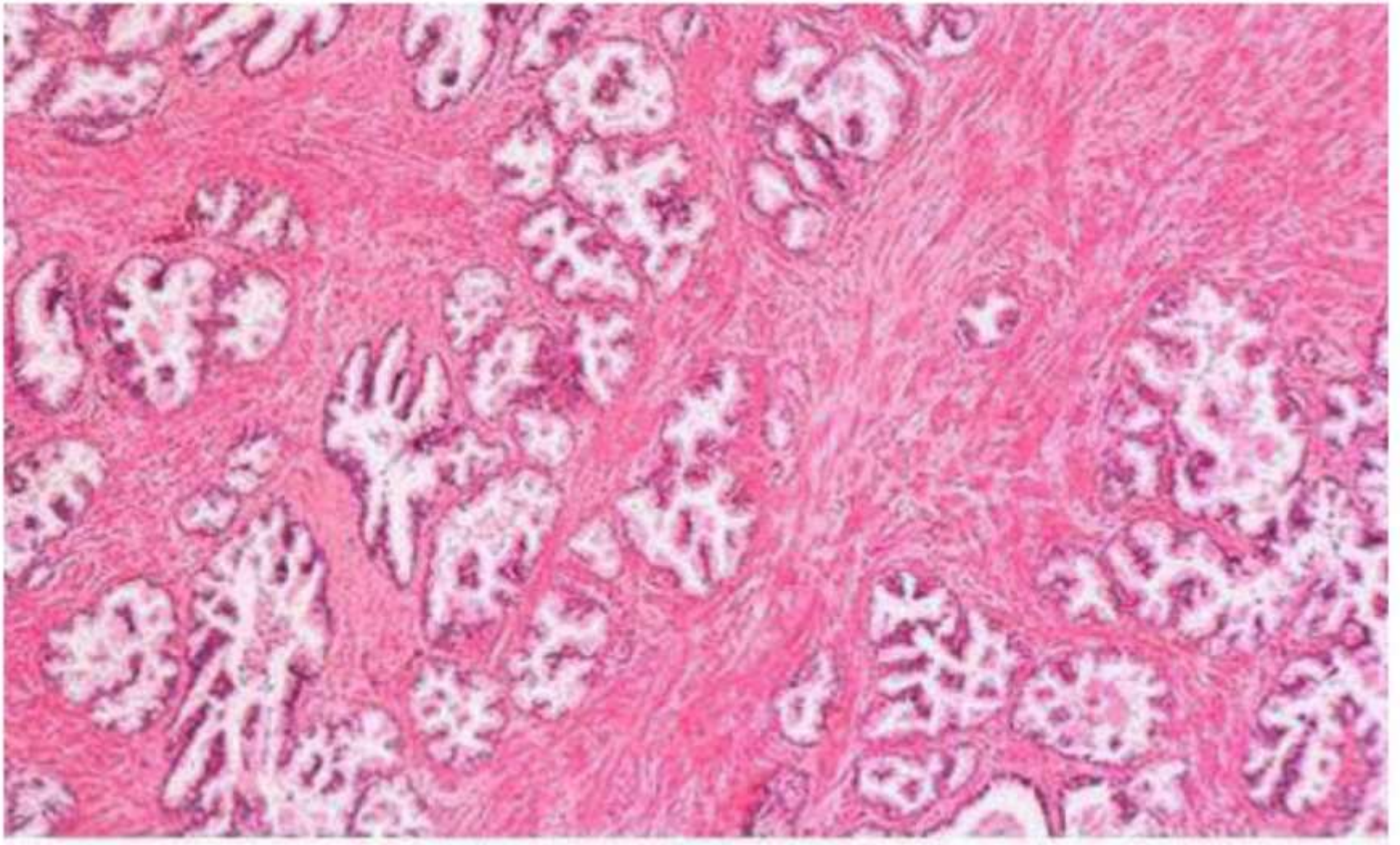


Fig. 22 - Gross appearance of prostate gland showing benign prostatic glandular hyperplasia .



Prostate 40x

Figure 23 : Microscopic view of normal prostate .

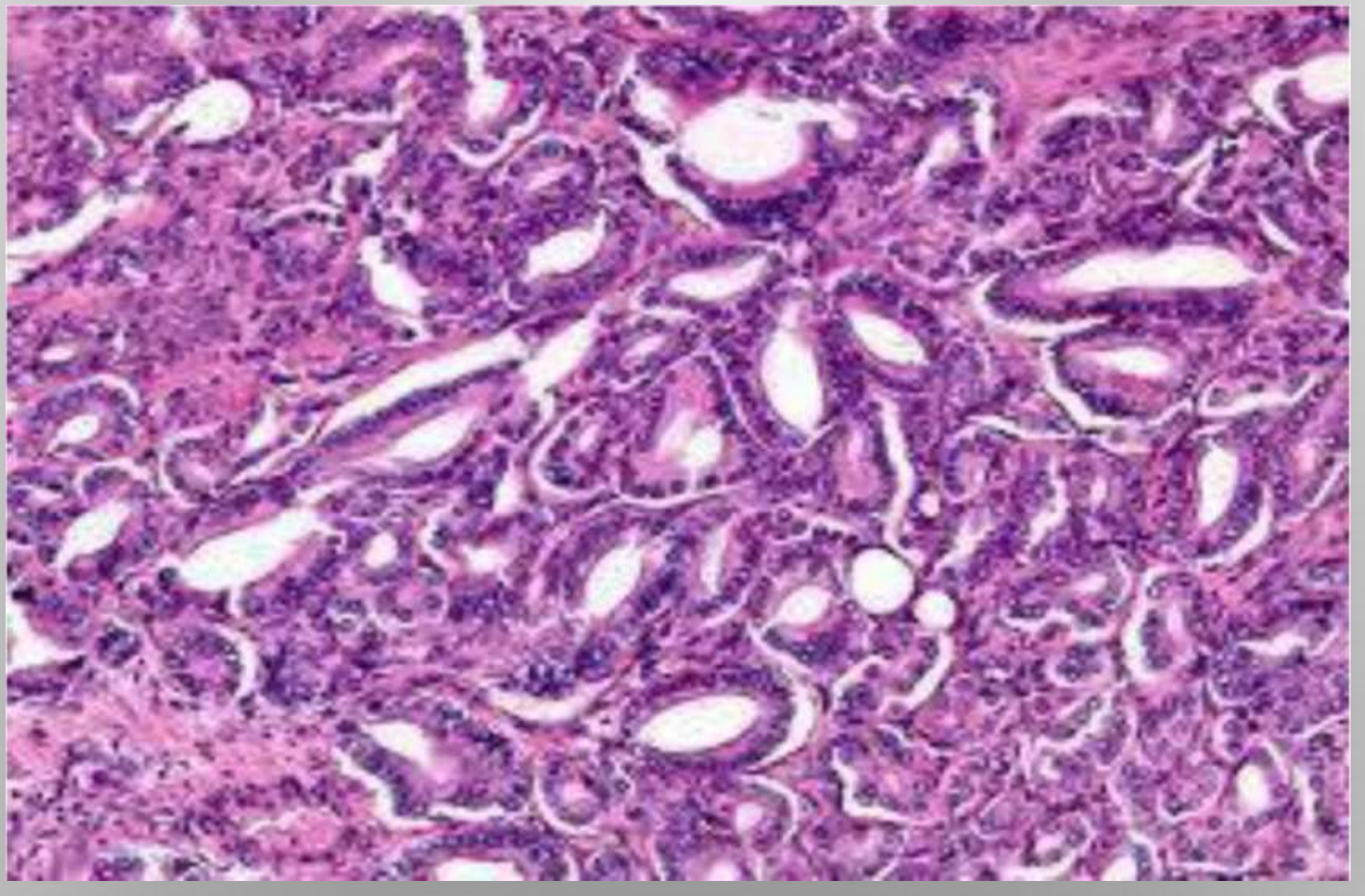
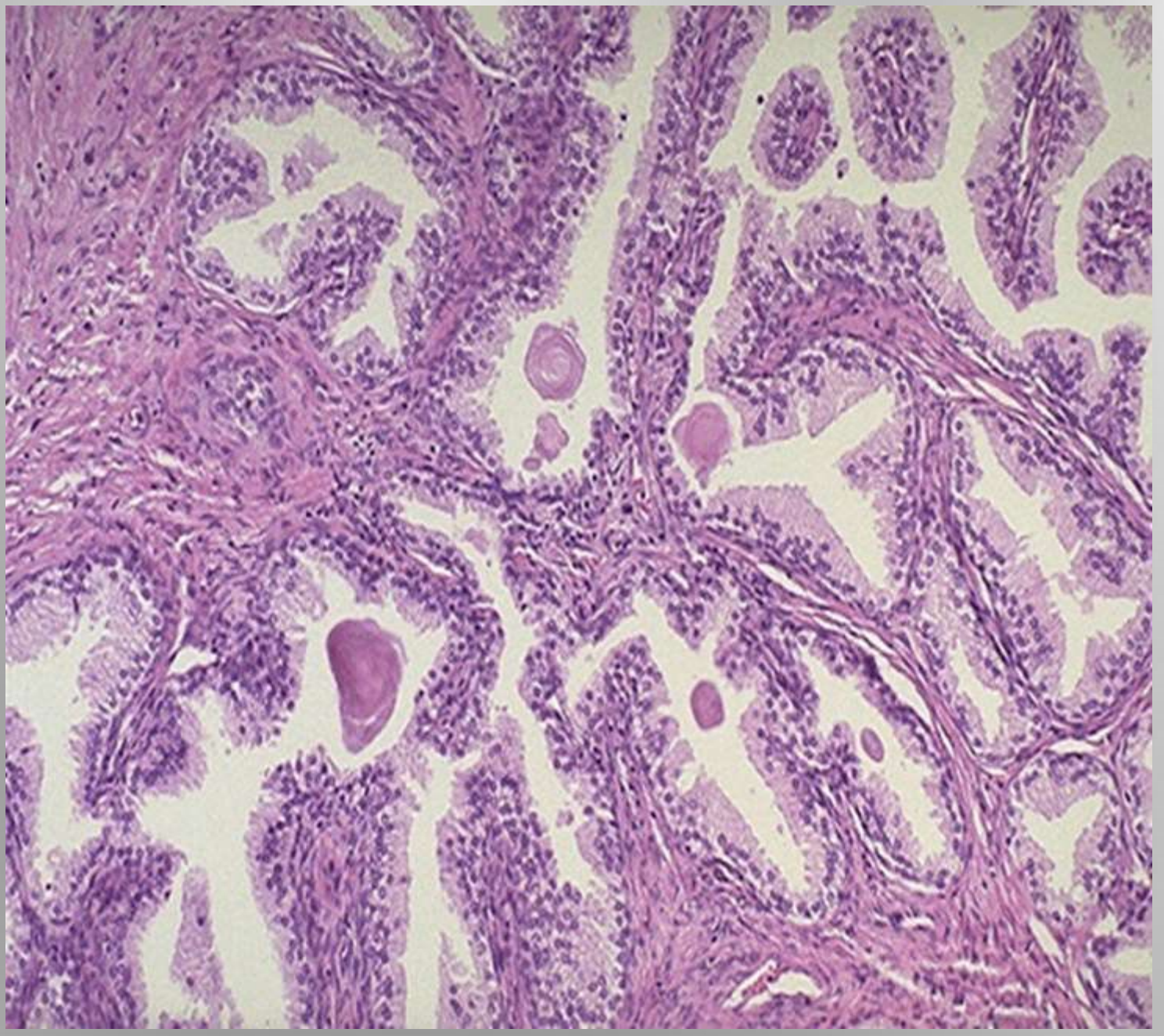


Figure 24 : Microscopic view of benign prostatic hyperplasia , showing increased number of glands.

Here is one of the nodules of hyperplastic prostate, with many glands along with some intervening stroma. The cells making up the glands are normal in appearance, but there are just too many of them



Imp

- It is important to note that:

1. In both above examples of pathologic hyperplasia, the hyperplastic process "remains controlled" i.e., if hormonal or GF stimulation ends , the hyperplasia disappears. يختفي hyperplasia ال , (BPH + Menorrhagia) عند علاج مسبب المرضين
2. This differentiates these hyperplastic processes from neoplastic process (neoplasm or tumors) , whether benign حميد or malignant خبيث in which cells continue to grow despite the absence of hormonal stimuli. على الرغم
3. Nevertheless, pathologic hyperplasia constitutes a fertile soil in which cancerous proliferation may eventually arise. endometrial hyperplasia ال تتحول إلى سرطان إذا لم يتم معالجتها

كثير مهم نعرف النقطة الأولى عشان نفرق بين ال hyperplasia & neoplasia

Hyperplasia vs. Neoplasia

Hyperplasia : when the cause is removed, it disappears

Neoplasia : When the cause is removed, it doesn't disappear

Atrophy

- Decrease in number of cells ,or shrinkage (decrease) in the size of the cell by the loss of the cell substance._↓ **Stress**
- When a large number of cells are affected, the entire tissue or organ diminishes in size, i.e., becoming atrophic.

Causes of atrophy include:

(1) Decreased workload (e.g., immobilized muscles in a paralyised limb) **Like paralyzed or broken limbs**

(2) Decreased or Inadequate nutrition .

(3) Decreased blood supply as in atherosclerosis . تصلب الشرايين

Because of the increase in cholesterol levels that are accumulated on the blood vessels walls

(4) Aging .

(5) Loss of endocrine stimulation . مثل فقدان الهرمون

(6) Loss of nerve supply (Denervation). قطع إحدى الأعصاب التي تعمل على تغذية إحدى العضلات

Loss of cells may occur in : The 3 pathways occur to achieve homeostasis

1- Apoptosis : a special type of cell death also decrease the number of cells of a tissue or organ . Apoptosis is a natural/programmed cell death which is a part of the homeostasis

2- via Ubiquitin& proteasome pathway :

- Nutrient deficiency and disuse may activate ubiquitin ligases enzyme which enhances attachment of multiple copies of small peptide ubiquitin molecules to cellular proteins as the cellular intermediate filaments of cytoskeleton and target them to degradation by proteasomes . The mechanism by which the cytoskeleton is broken down is the ubiquitin-proteosome degradation pathway

3- Also the cells may undergo autophagocytosis i.e phagocytosis of cellular components which involves generation of autophagic vacuoles that fuse with lysosomes whose hydrolytic enzymes breakdown cellular components .

Cells consume their own proteins and organelles to recycle them

Ubiquitin-proteome pathway:

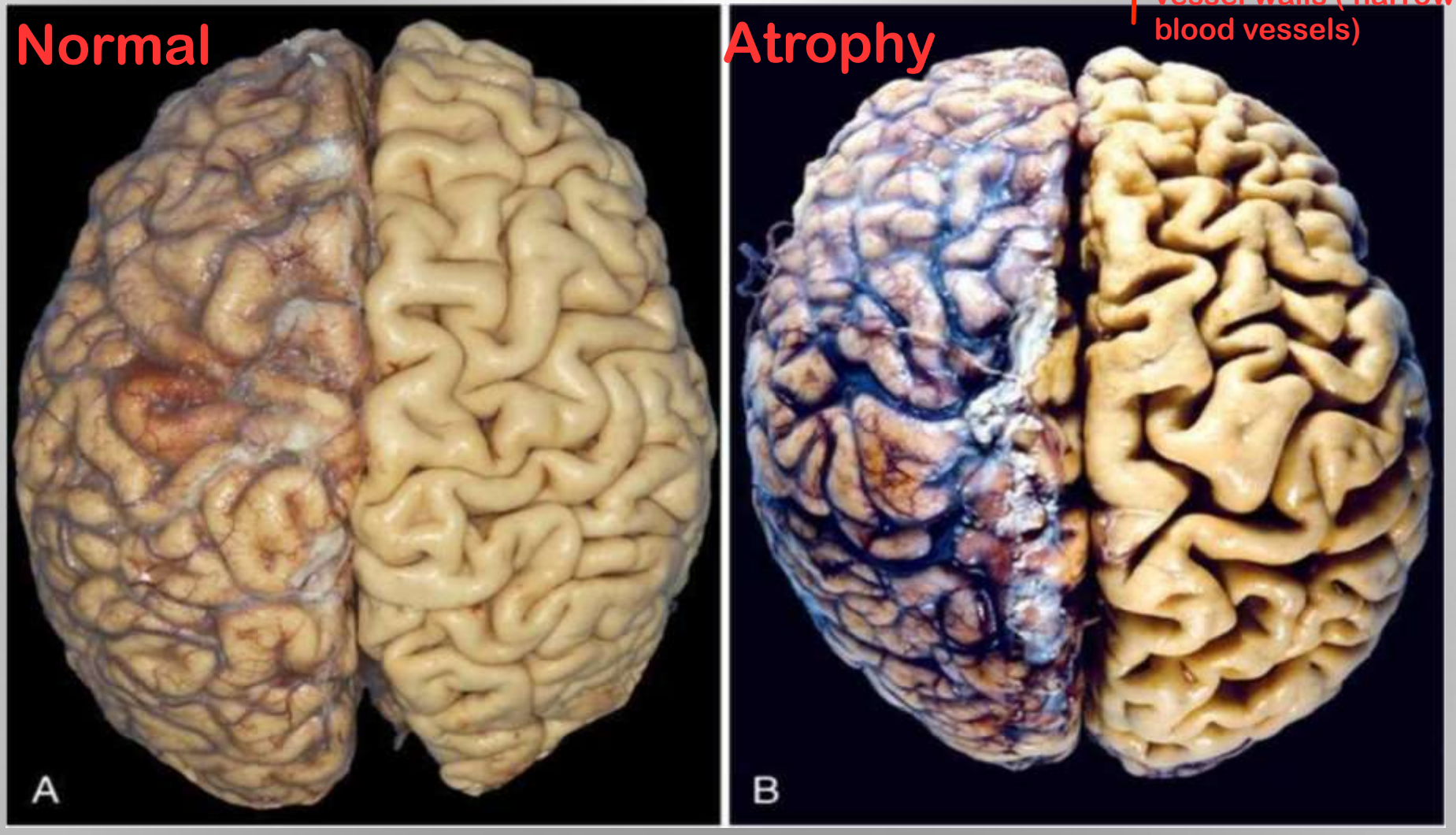
👇🏻 كلام الدكتورة

This happens when the protein's (ubiquitin) role is done & the proteosomes destroy it

👇🏻 **Pathoma** من

Ubiquitin is a protein that gets posted onto the intermediate filaments of the cytoskeleton, whereas the proteosome is an organelle present within the cell that recognizes ubiquitin tagged proteins & destroys them.

F 25 : A, left: Normal young adult brain., B, right: Atrophy of the brain in an 82 years-old male with atherosclerotic disease. Note that loss of the brain substance (due to aging & reduced blood supply) narrows the gyri & widens the sulci.



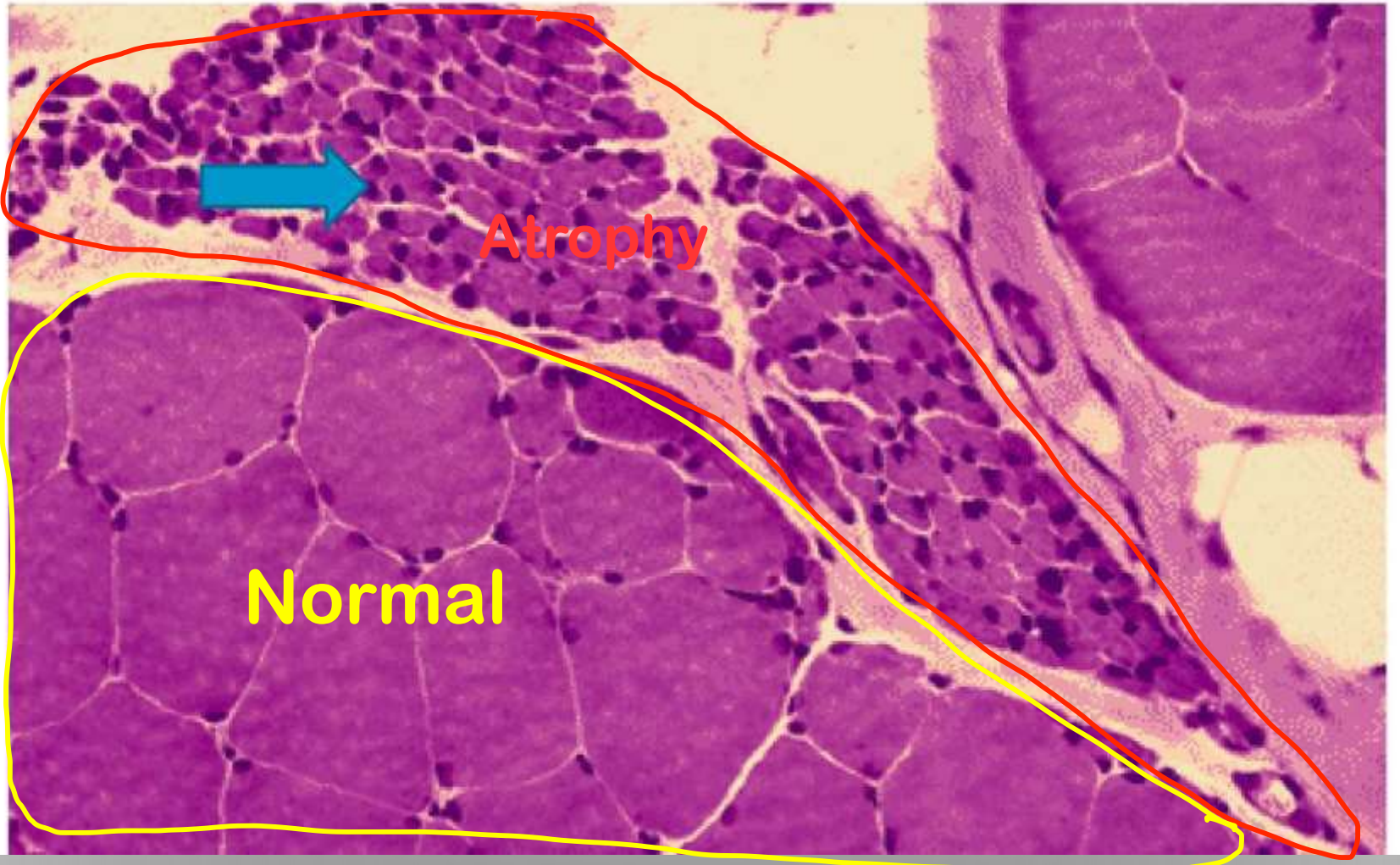
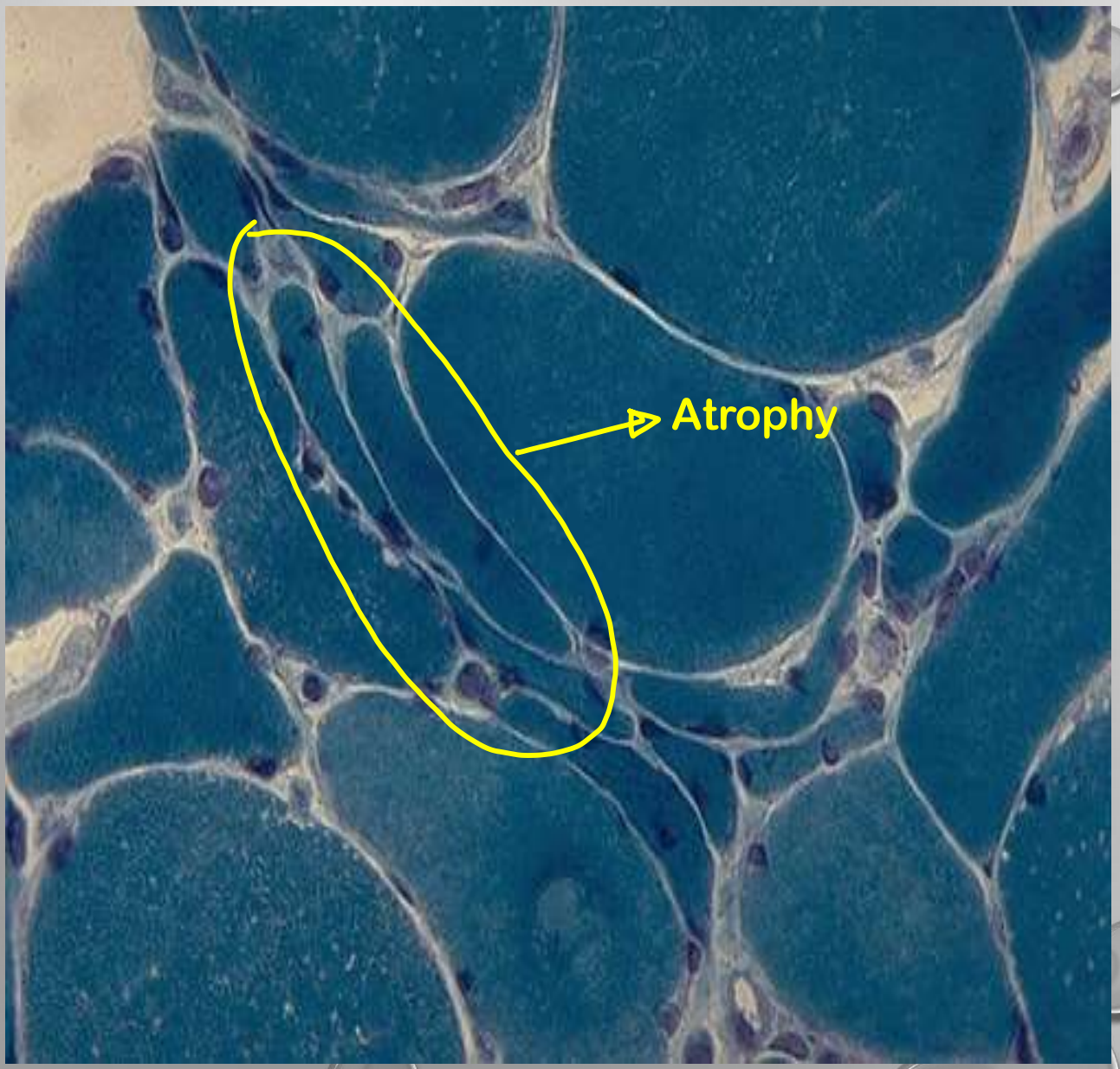


Figure 27 -Atrophy of skeletal muscle fibers due to denervation (center) compared to normal skeletal muscle fibers seen at both sides of section.

- some of these skeletal muscle fibers here show atrophy, compared to normal fibers. The number of cells is the same as before the atrophy occurred, but the size of some fibers is reduced. This is a response to injury by "downsizing" to conserve the cell. In this case, innervation to the small, atrophic fibers was lost.
- **(This is a trichrome stain.)**
- The most common cause is disuse عدم استعمال عضلة
- In healthy people **lack of exercise**
- **In bedridden people they have considerable atrophy** عندهم atrophy بشكل كبير

طريح الفراش



Metaplasia :

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- Is a reversible change in which one adult cell type (epithelial or mesenchymal) is replaced by another adult cell type. When the stressor is removed (the cause of metaplasia) , metaplasia disappears
- Cells sensitive to a particular stress are replaced by other cell types better able to withstand the adverse environment; this arises by the genetic "reprogramming" of the epithelial reserve (Stem) cell .

Examples:

I- **Squamous metaplasia that may occurs in the respiratory epithelium** in habitual cigarette smokers , in which normal ciliated columnar epithelial cells of the trachea & bronchi are focally or widely replaced by stratified squamous epithelial cells.

Ex : Keratomalacia

Vitamin A deficiency may also induce identical change .

- In the respiratory tracts this **metaplastic change seen among smokers is beneficial as presumably**, the more resistant, stratified squamous epithelium is able to survive under such circumstances more than the more fragile specialized ciliated columnar epithelium which would not tolerate such irritation .
- Although the adaptive metaplastic epithelium probably has survival advantages , while the important protective mechanisms, such as mucus secretion & ciliary clearance of particulate matter , are lost therefore, epithelial metaplasia is considered as a double-edged sword
- Moreover, the influences that induce metaplastic transformation, if persistent, **may induce** cancer transformation in the metaplastic epithelium.

If metaplasia remained persistent, the metaplastic will become dysplastic (dysphasia) which is cancerous

مفهوم ال metaplasia

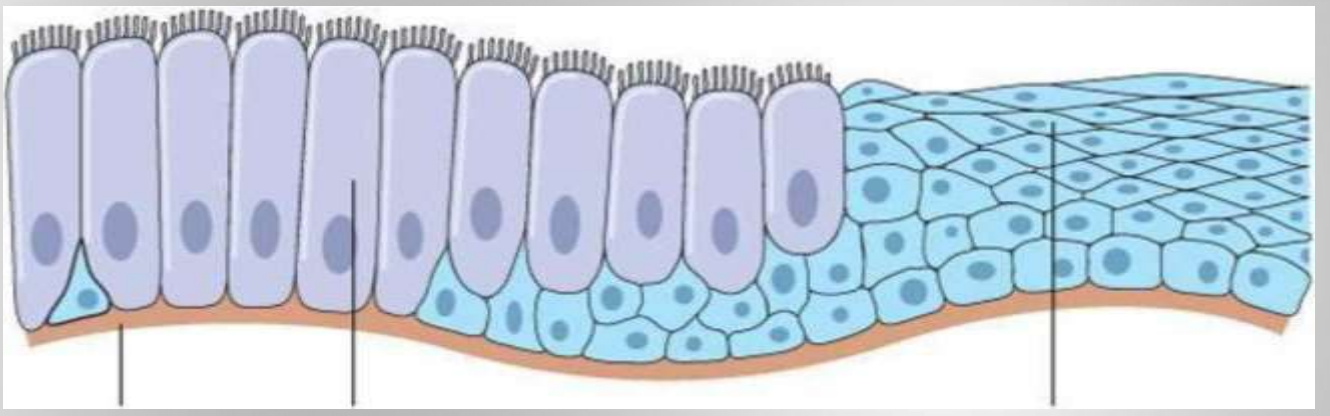
الخلايا معتاده على محيط معين لكن عند تغير هاد المحيط الى محيط آخر صعب على الخلية ، يتم تغير هذا النوع من الخلية الى آخر قادر على تحمل المحيط الجديد

مثال : **squamous metaplasia in respiratory tracts**

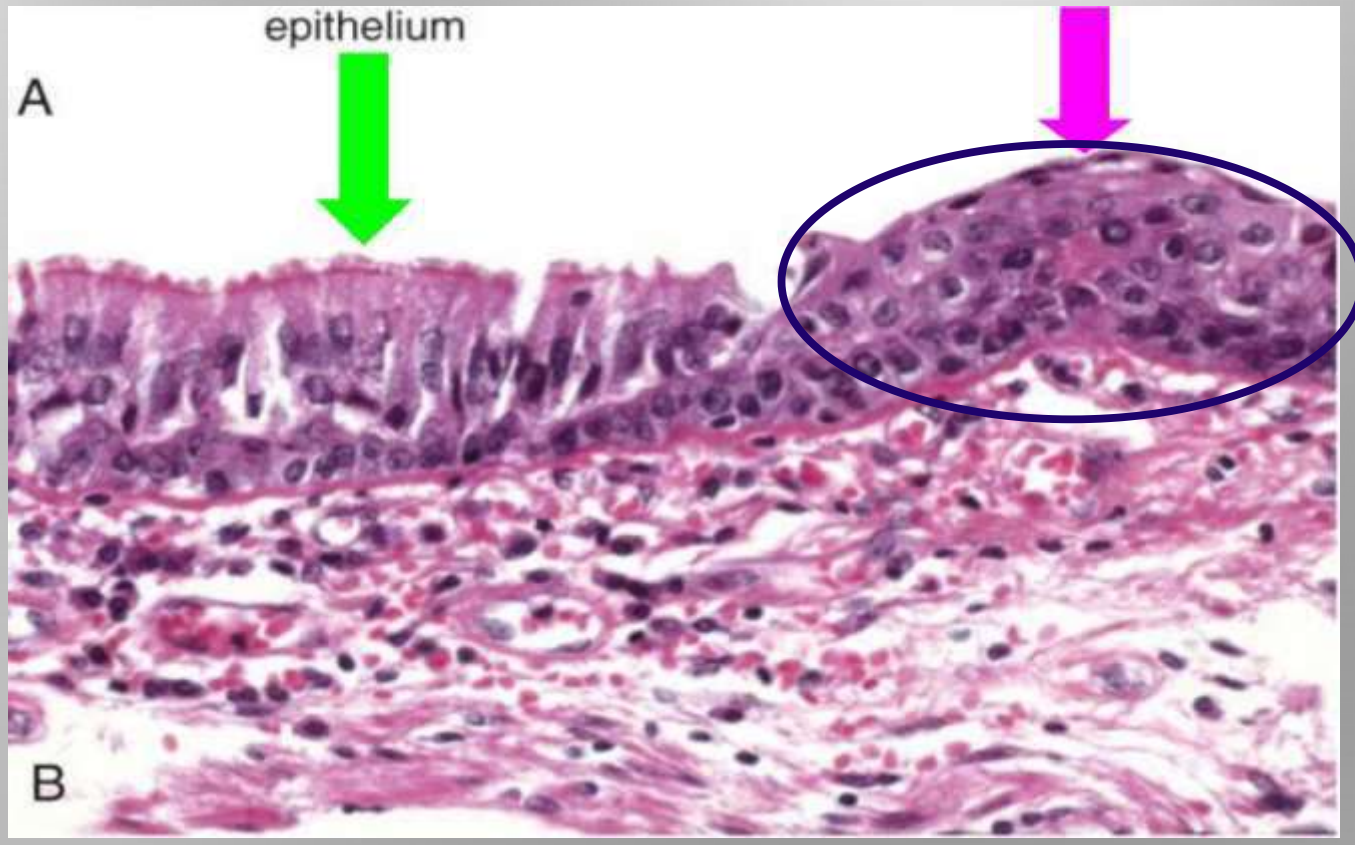
التحول من **normal ciliated columnar epithelial** الى **stratified squamous epithelial cells**

لدى المدخنين ومن يعانون من نقص فيتامين **A**

مع إنه هذا التحول لديه إيجابيات النجاة ، لكن خاصيات الحماية المهمة كإفراز المخاط **mucus** وال **cilia** الخاصة بالتخلص من الجسيمات التي كانت موجودة في البداية تفقد



Basement membrane Normal columnar Squamous metaplasia



F 28 : Metaplasia of normal columnar (left) to squamous epithelium (right) in a bronchus,

Metaplastic changes
Stratified squamous epithelium

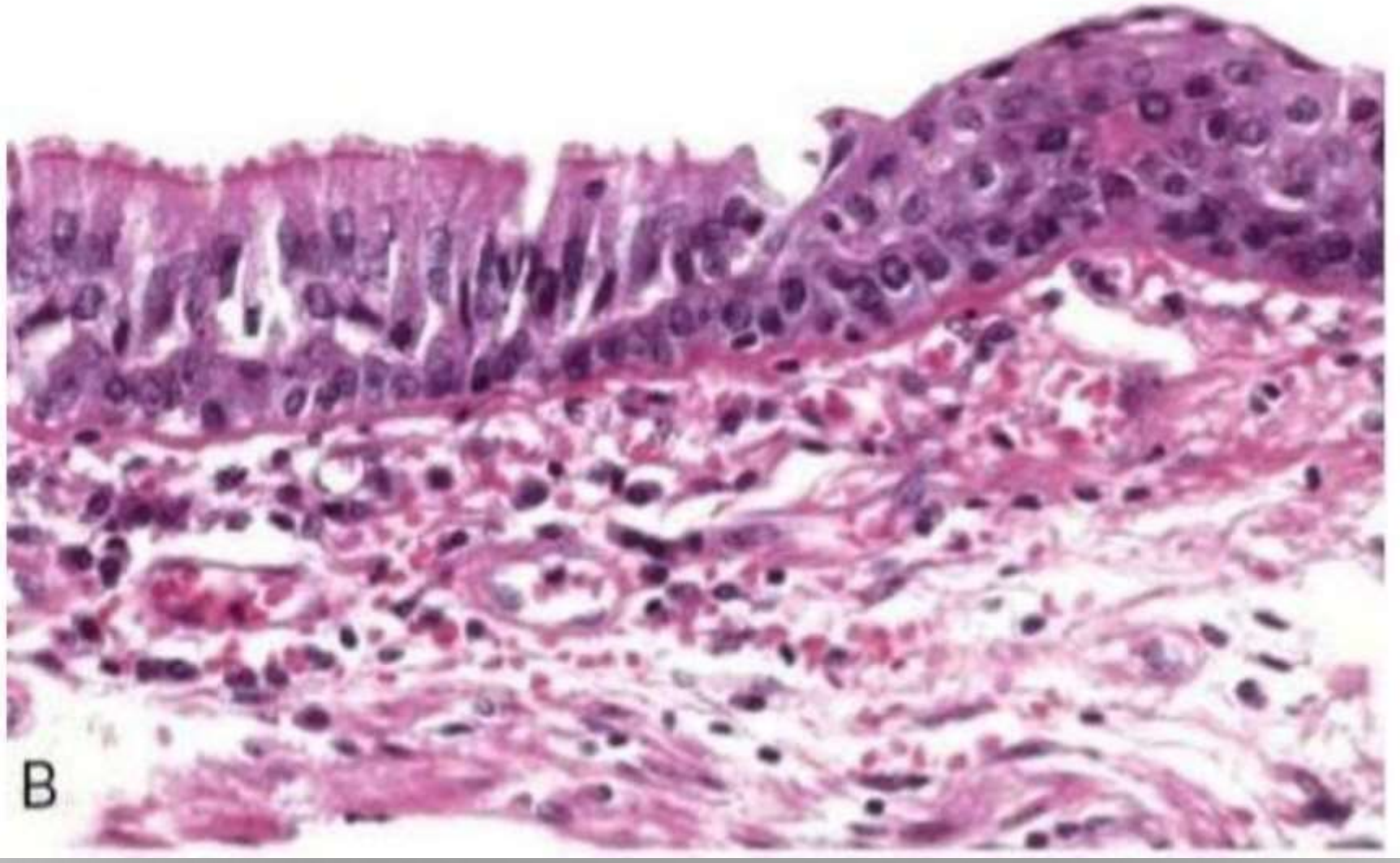


Figure 29 : Microscopic view of bronchial epithelium showing squamous metaplasia of respiratory columnar epithelium

Urothelial tissue transforms into squamous epithelial tissue
If it persisted for a long time, squamous cell carcinoma will take place

(II) **Chronic irritation** caused by the presence of stones Or **bilharizial ova** may cause squamous metaplasia in the renal pelvis, urinary bladder & gall bladder.

imp (III) In chronic gastric reflux : **During regurgitation of the acidic gastric contents to the esophagus the** normal stratified squamous epithelium of the lower esophagus may undergo metaplastic transformation to gastric or intestinal -type columnar epithelium , called mucous metaplasia , also refered to as "Barrett esophagus" which may predispose to peptic ulcer or even adenocarcinoma of the esophagus.

Vomiting

Stratified squamous epithelium can't withstand frequent acidic vomiting, so it undergoes metaplastic transformation to columnar epithelium or " Barrett esophagus "

If " Barrette esophagus " persisted for a long time, it will transform into a peptic ulcer or adrenocarcinoma

تابع للنقطة الأولى من السلايد السابق

The most common cancer type of urinary bladder is Urothelial Cancer

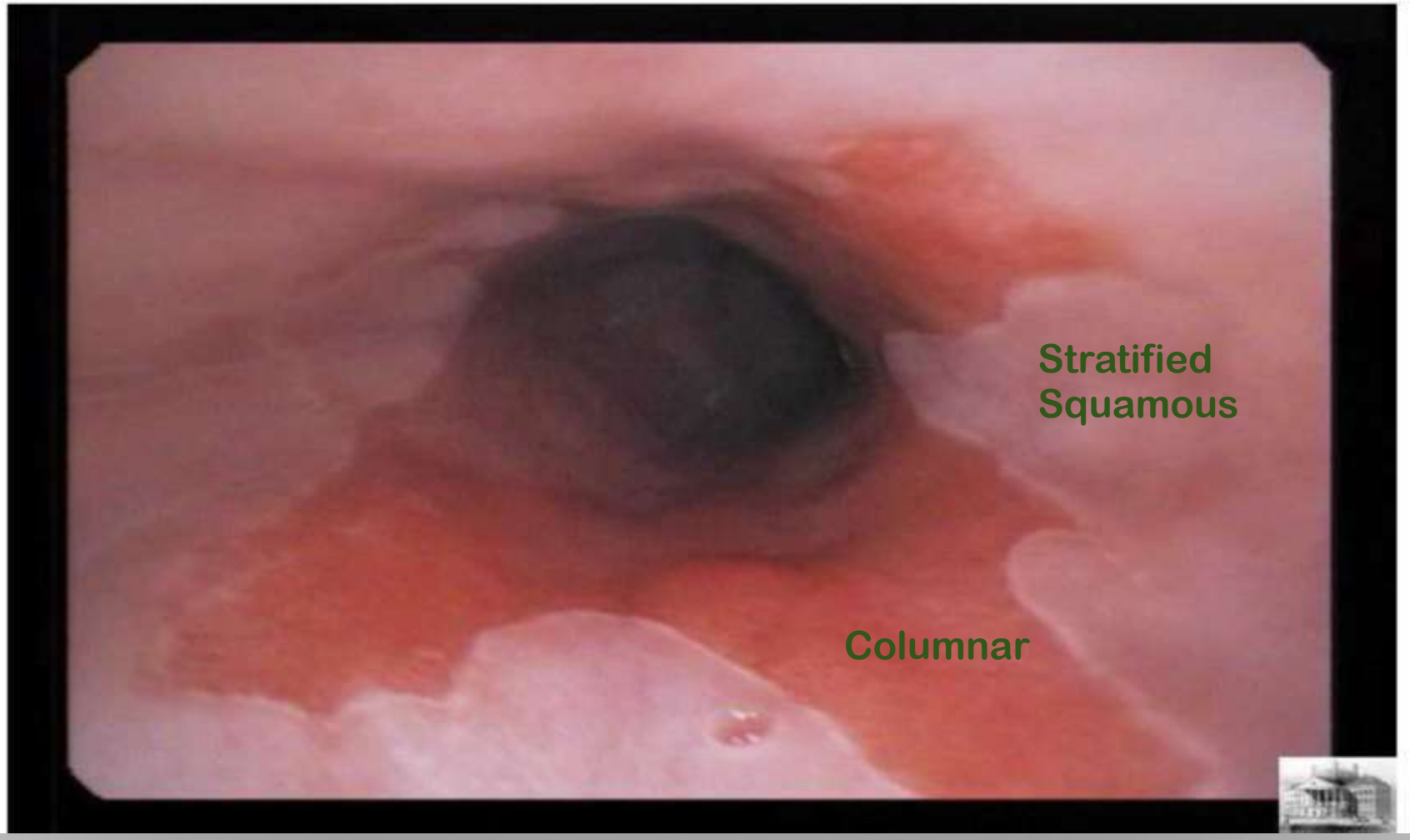


Fig. 30 - Barrett Esophagus : Endoscopic view of esophagus ,show change of the normal squamous epithelium (white color) , into Mucous secreting epithelium (red color)

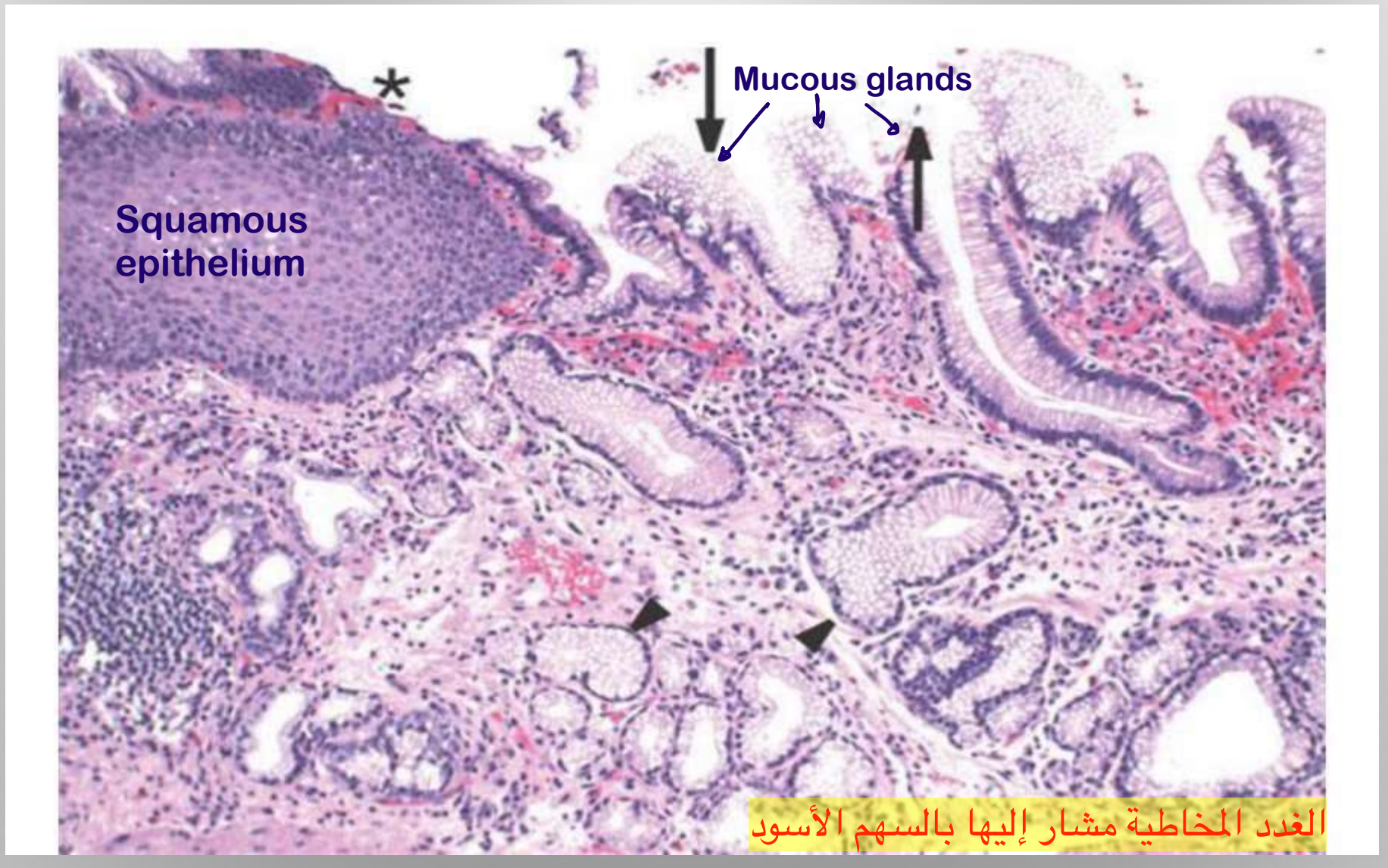
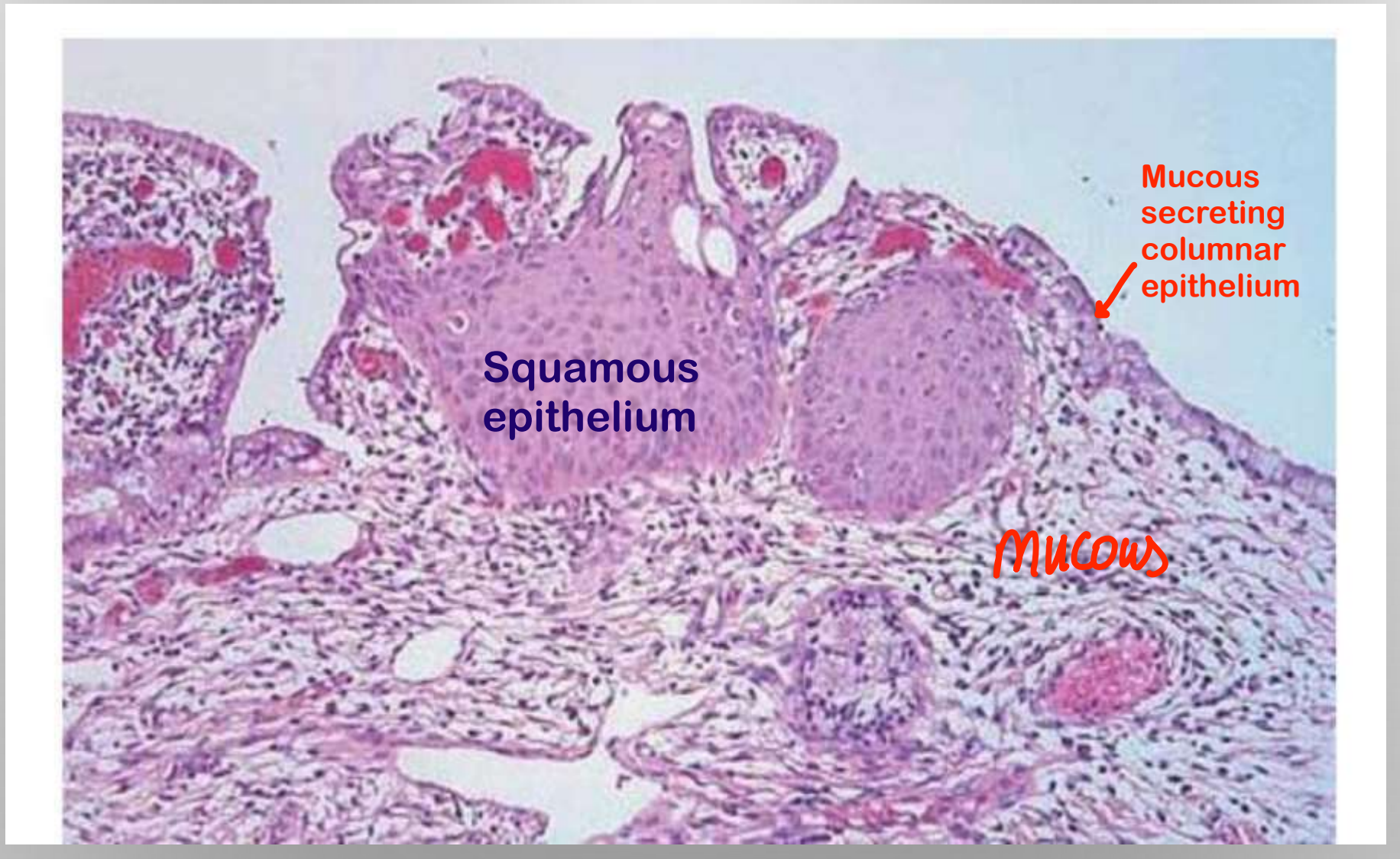


Fig. 31 - Barrett esophagus : mucous metaplasia (black arrows) of squamous epithelium (star *).



mucous = الأبيض

Figure 32 : Microscopic view of Barette mucosa showing metaplasia of esophageal squamous epithelium into mucin-secreting columnar epithelium .

جميع الحالات المذكورة فوق كانت لل **epithelium**
الان سنبدأ بحالات ال **mesenchymal**

★ Metaplasia may also occur in mesenchymal cells, but less clearly as an adaptive response.

- ❑ At sites of injury to soft tissue and skeletal or even smooth muscles bone or cartilage may form in tissues where they are normally not encountered, e.g., bone is occasionally formed in soft tissues so-called **ossification**, e.g., injury to skeletal muscle may cause a tumor-like swelling at site of injury called **myositis ossificans**

عند تعرض ال **soft tissue** او **skeletal tissue** او **smooth tissue** لإصابة، ستبدأ العظم او ال **cartilage** بالتكون مكان الإصابة وهاي اسمها **ossification**

قد تحدث إصابة بال **skeletal muscles** الى انتفاخ يشبه الورم في مكان الإصابة وهاي اسمها **myositis officiants**

Fig 33 - Myossitis ossificans : Swelling in left femur mesenchymal metaplasia in skeletal muscle after injury.

Fig. 34 : X-ray appearance of right arm showing myositis ossificans (arrow) .

f i- 3. M icrophotograph from the patholopic examination of the surgical specimen showing: cartilaginous tissue wdth aieas of endochondral ossification, rounded t*y striated muscle tissue (he-matoxjlin-eosin. X20O)L

Fig. 35 - Myossitis ossificans : Mesenchymal metaplasia in skeletal muscle showing cartilage & bone (left) due to injury , normal red skeletal muscle seen (right) & arrow .

زمان والله عن جملة
بس كده انتهى التفريغ 😤