

Diseases of ENDOCRINE ORGANS

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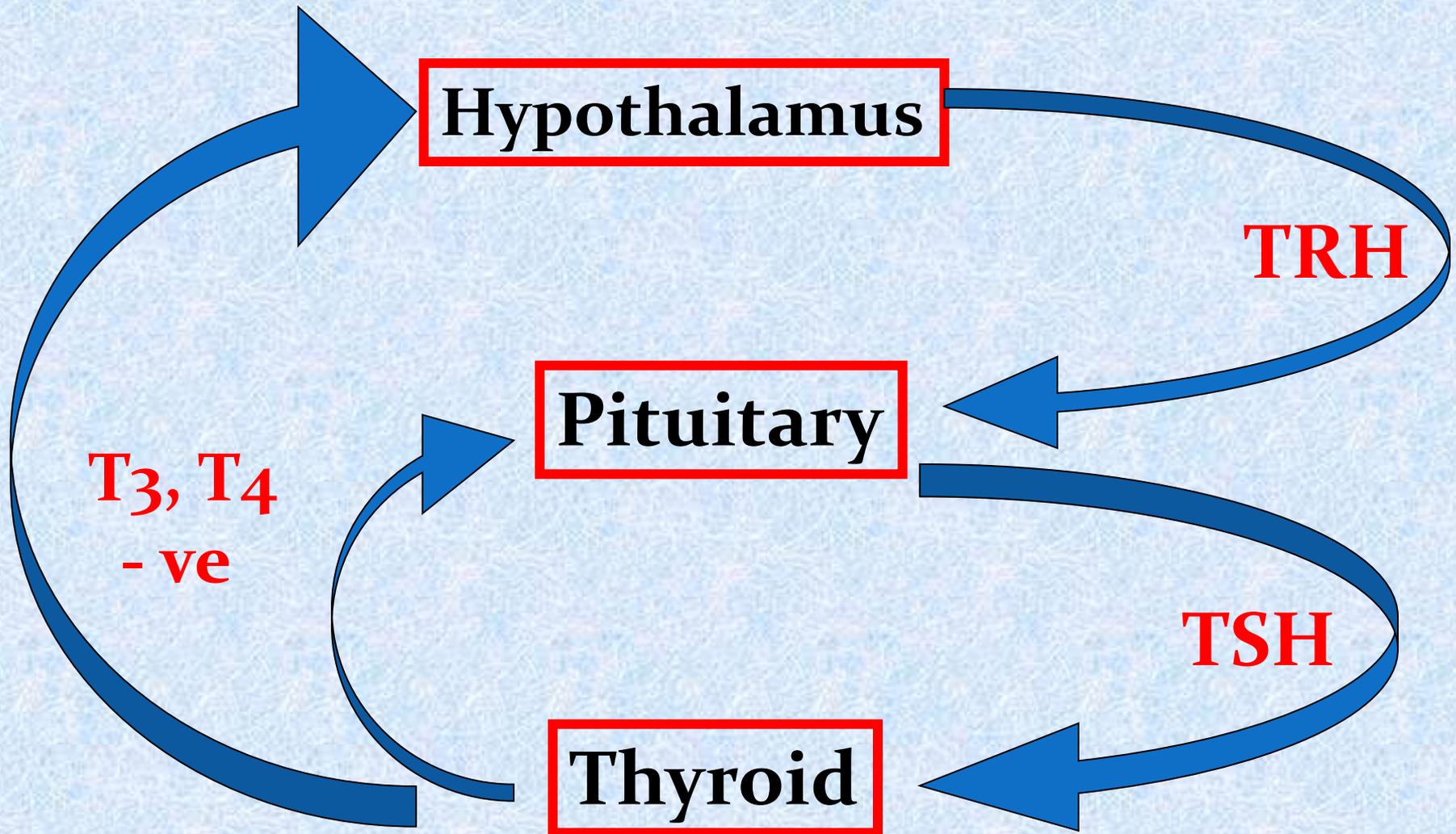
OUTLINES

- Diseases of thyroid gland
- Diseases of parathyroid gland
- Diseases of pituitary gland
- Diseases of adrenal gland
- Diseases of endocrine pancreas

Diseases of THYROID GLAND

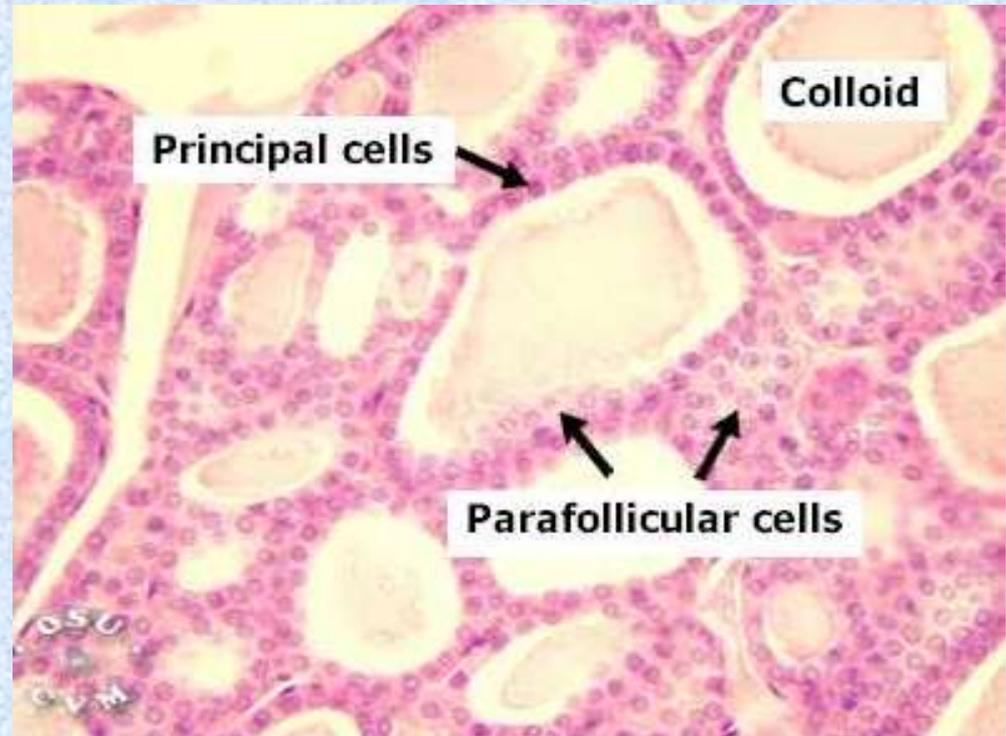
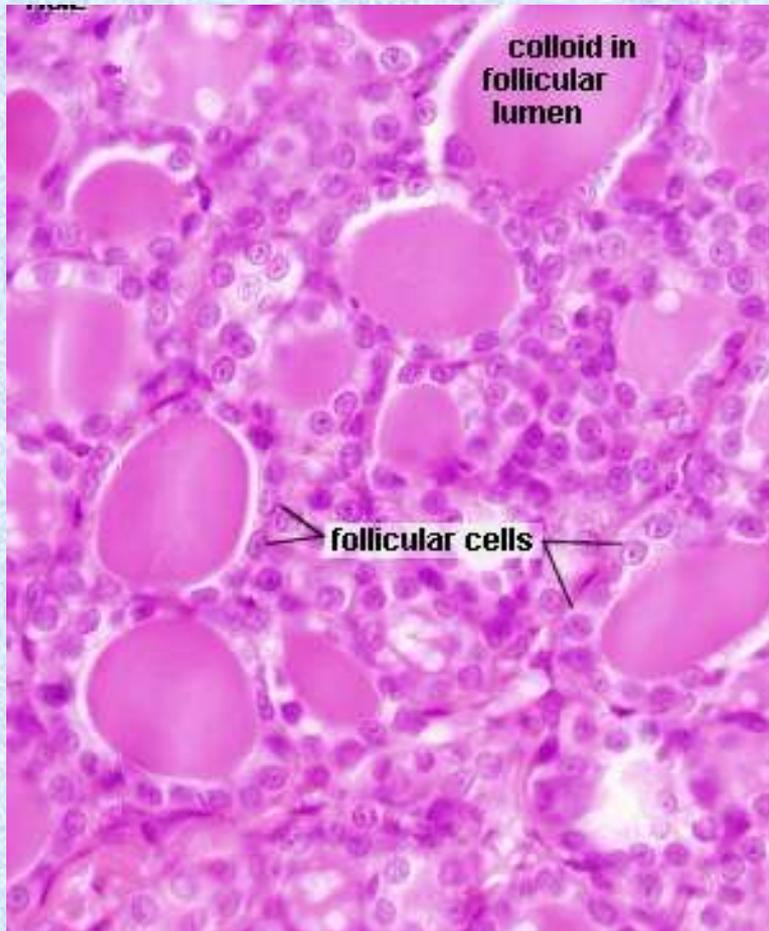
Introduction

□ Physiology



Introduction

□ Histology



Introduction

□ Diseases of thyroid glands

➤ **THYROIDITIS**

➤ **GOITRE**

➤ **TUMOURS**

THYROIDITIS

Thyroiditis

□ Classification

- ❖ Acute thyroiditis
- ❖ Sub acute thyroiditis (granulomatous , giant cell, De Quervian`s thyroiditis)
- ❖ Chronic thyroiditis
 - Hashimoto's thyroiditis
 - Riedel's thyroiditis

Thyroiditis

Hashimoto's thyroiditis

❖ Definition:

Chronic inflammatory reaction of the thyroid gland

❖ Etiology:

- An autoimmune disease.
- Most patients have auto antibodies against one or more thyroid antigens (thyroglobulin, thyroid peroxidase and TSH receptor)

❖ Incidence:

- The most common form of thyroiditis
- Common in middle aged females
- Most common cause of hypothyroidism in iodine sufficient localities

Thyroiditis

Hashimoto's thyroiditis

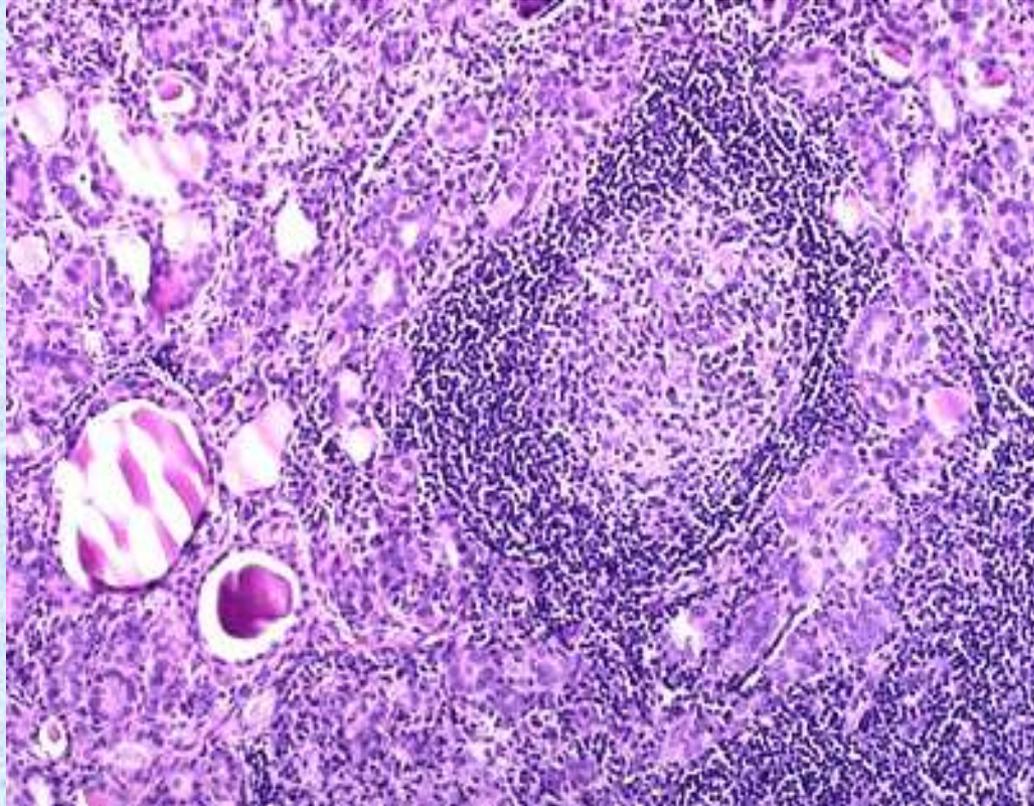
❖ Grossly:

- Symmetrically or asymmetrically enlarged thyroid
- Not adherent to surrounding structures
- Nodular outer surface
- Rubbery or firm consistency
- Grayish cut section with whitish fibrous septa

Thyroiditis

Hashimoto's thyroiditis

❖ MP:

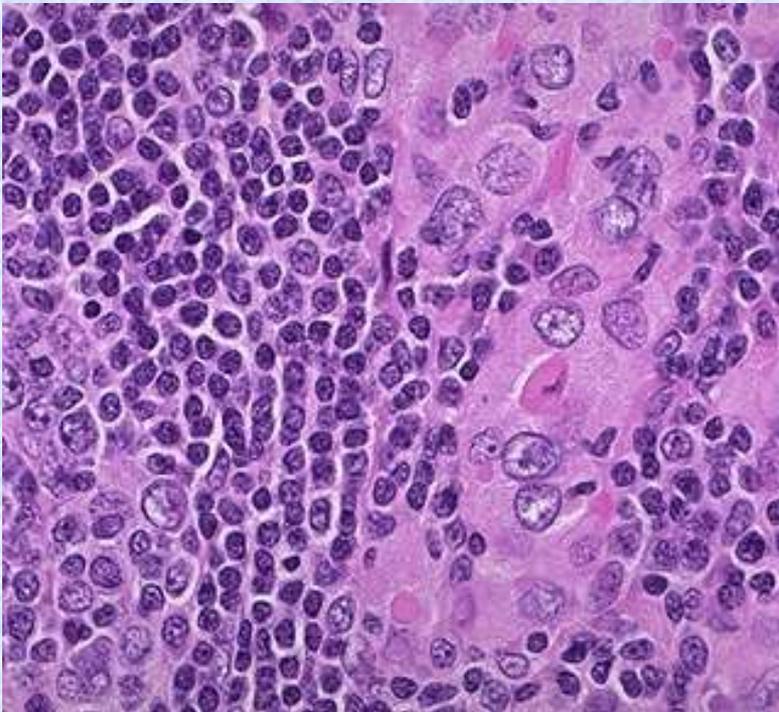


- Dense lymphocytic infiltration of the stroma forming follicles
- Glands is divided into nodules by fibrous septa

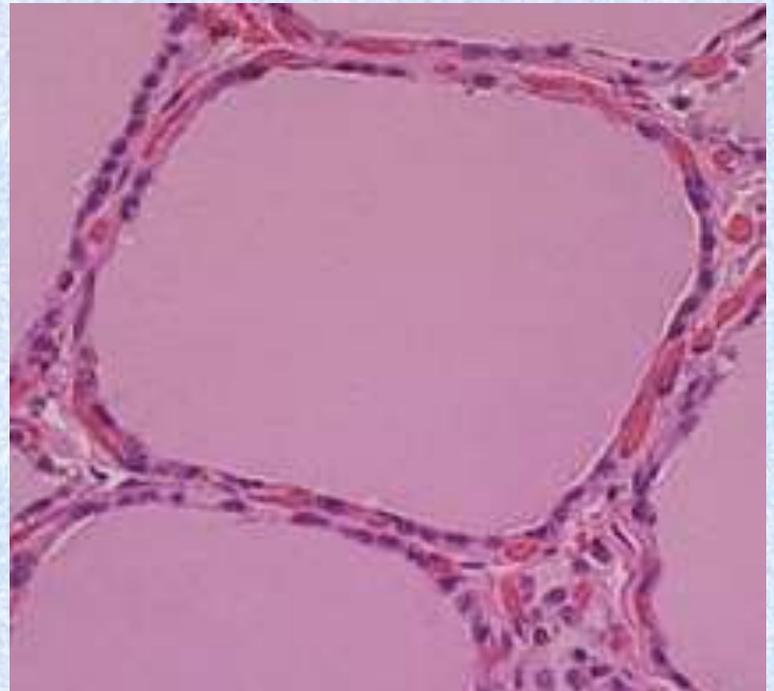
Thyroiditis

Hashimoto's thyroiditis

❖ MP:



Others lined by acidophilic large cubical (**Askanazy**) cells



Some acini are atrophic

Thyroiditis

Hashimoto's thyroiditis

❖ Complications:

- Myxoedema
- Pressure symptoms

GOITRE

Goitre

- Definition

Non neoplastic non inflammatory enlargement of the thyroid gland.

Goitre

- **Definition**

Non neoplastic non inflammatory enlargement of the thyroid gland.

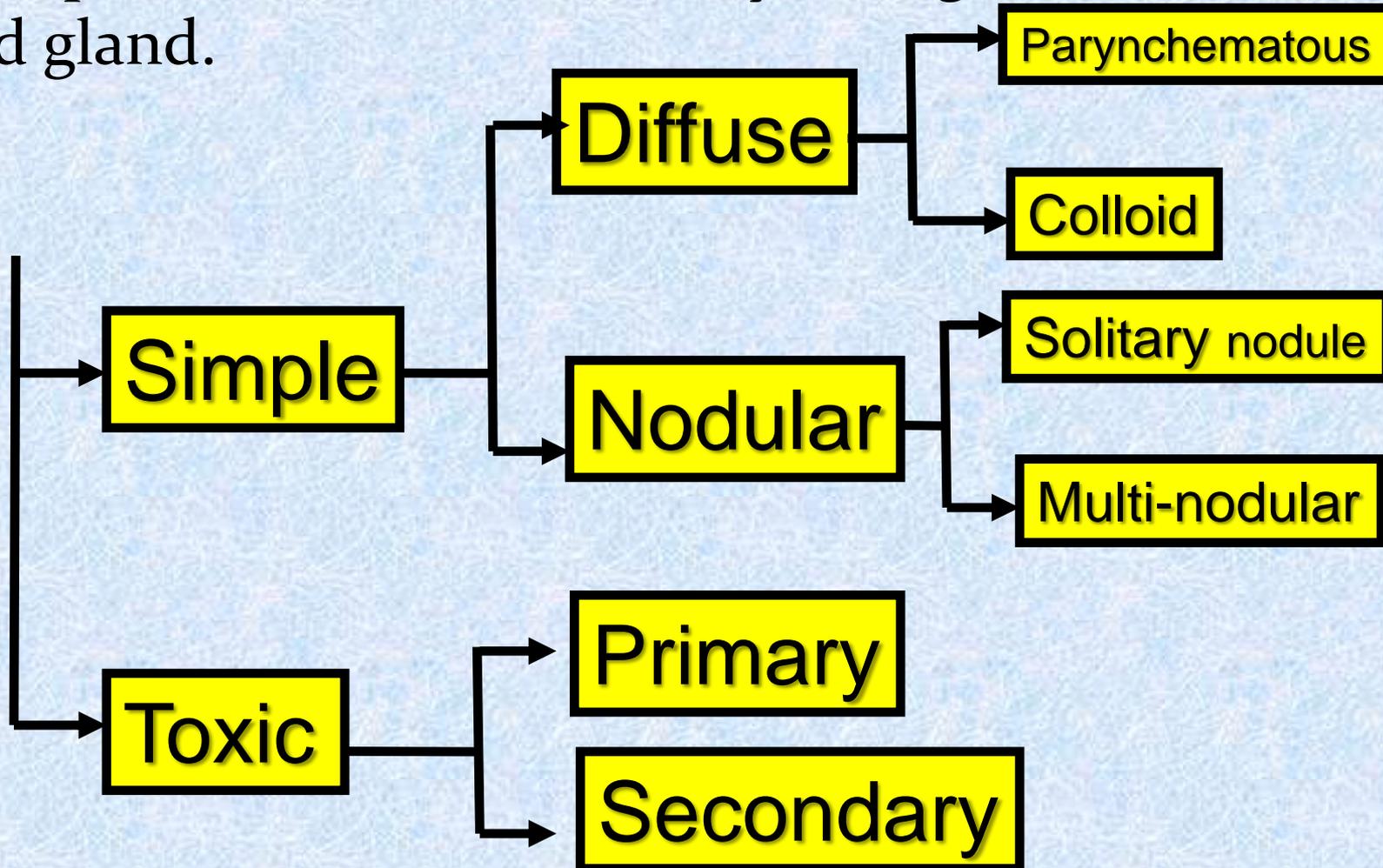
- **Types**

Goitre

- Definition

Non neoplastic non inflammatory enlargement of the thyroid gland.

- Types



Goitre

A. Simple goitre

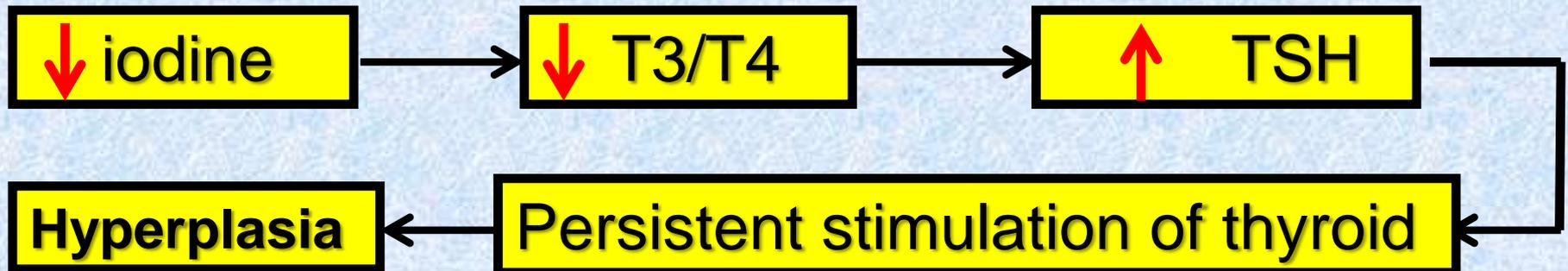
Definition:

Thyroid enlargement with no thyroid hyper-function

Causes: iodine deficiency which is either:

- ***Absolute:*** as in endemic areas as in oasis in Egypt
- ***Relative :*** Due to increased iodine demand in puberty, pregnancy, lactation and menopause

Pathogenesis



Goitre

A. Simple goitre

Types:

1. Diffuse parenchymatous goitre
2. Diffuse colloid goitre
3. Solitary colloid nodule
4. Multi-nodular colloid goitre

Complications:

1. Pressure on the trachea, esophagus and neck veins.
2. Hyperthyroidism.
3. Malignancy.

Goitre

A. Simple goitre

1. Diffuse parenchymatous goitre

- *Pathogenesis:*

Temporal ↓ iodine

→ Thyroid hyperplasia

- *Grossly*

- The gland becomes diffusely enlarged
- The cut surface is grayish pink.

- *Microscopically*

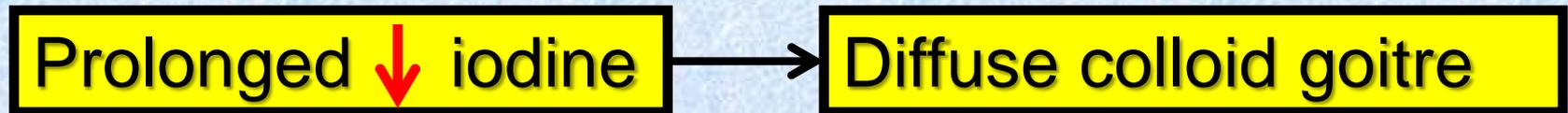
- Thyroid acini → hyperplasia (Increased number)
- Epithelium → columnar
- Colloid → little pale pink

Goitre

A. Simple goitre

2. Diffuse colloid goitre

- *Pathogenesis:*



- *Grossly*

- Diffuse and uniform marked enlargement of thyroid gland
- Soft and gelatinous consistency.
- The cut surface shows variable sized cystic spaces filled with translucent gelatinous colloid.

Goitre

A. Simple goitre

2. Diffuse colloid goitre

- *Microscopically:*

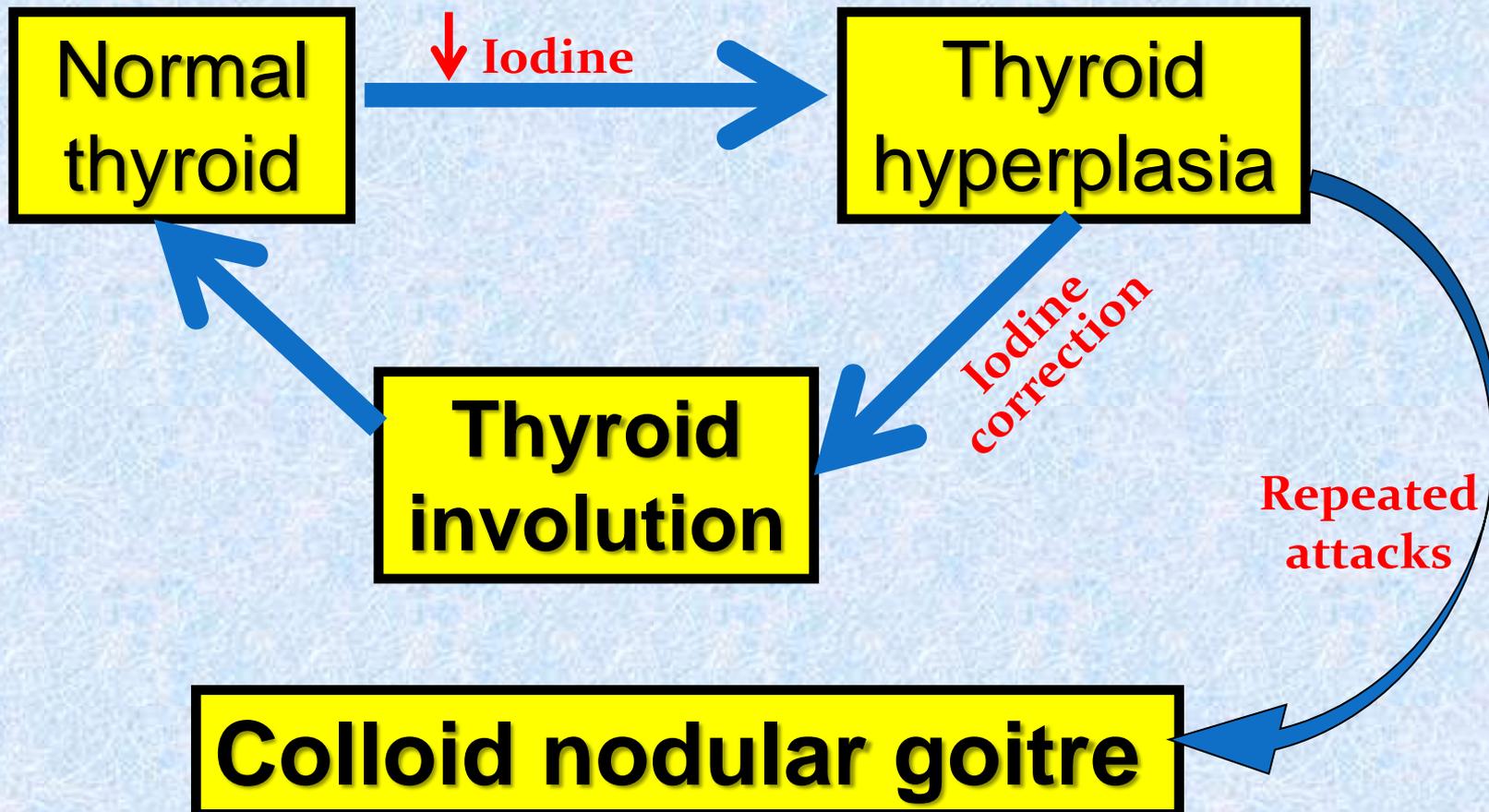
- Acini → large and may be cystic
- Epithelium → flattened or low cuboidal
- Colloid → deeply stained, excessive

Goitre

A. Simple goitre

3. Diffuse nodular goitre

- *Pathogenesis:*



Goitre

A. Simple goitre

3. Diffuse nodular goitre

- *Grossly*

- Diffusely and asymmetrically enlarged thyroid gland
- Nodular outer surface
- The cut surface shows variable sized nodules:
 - Some nodules are firm and brown (hyperplastic).
 - Others are soft and gelatinous (distended with colloid)
- Secondary changes: necrosis, hemorrhage, cystic change and calcification

Goitre

A. Simple goitre

3. Diffuse nodular goitre
- *Grossly*



Goitre

A. Simple goitre

3. Diffuse nodular goitre

- *Microscopically:*

The glands show mixture of:

- *normal acini*
- *Hyperplastic aciniActive*
- *acini distended with colloid.....Inactive*

Goitre

A. Simple goitre

3. Diffuse nodular goitre

- *Microscopically:*

- ***Acini:***
 - variable size and shape
 - lined by single or multiple layers
 - may show papillae formation

- ***Colloid:***
 - abundant
 - deep pink in colour
 - filling the acini

- ***Stroma:***
 - show fibrous septa
 - show lymphocytic infiltration
 - haemorrhage, fibrosis or calcification

Goitre

A. Simple goitre

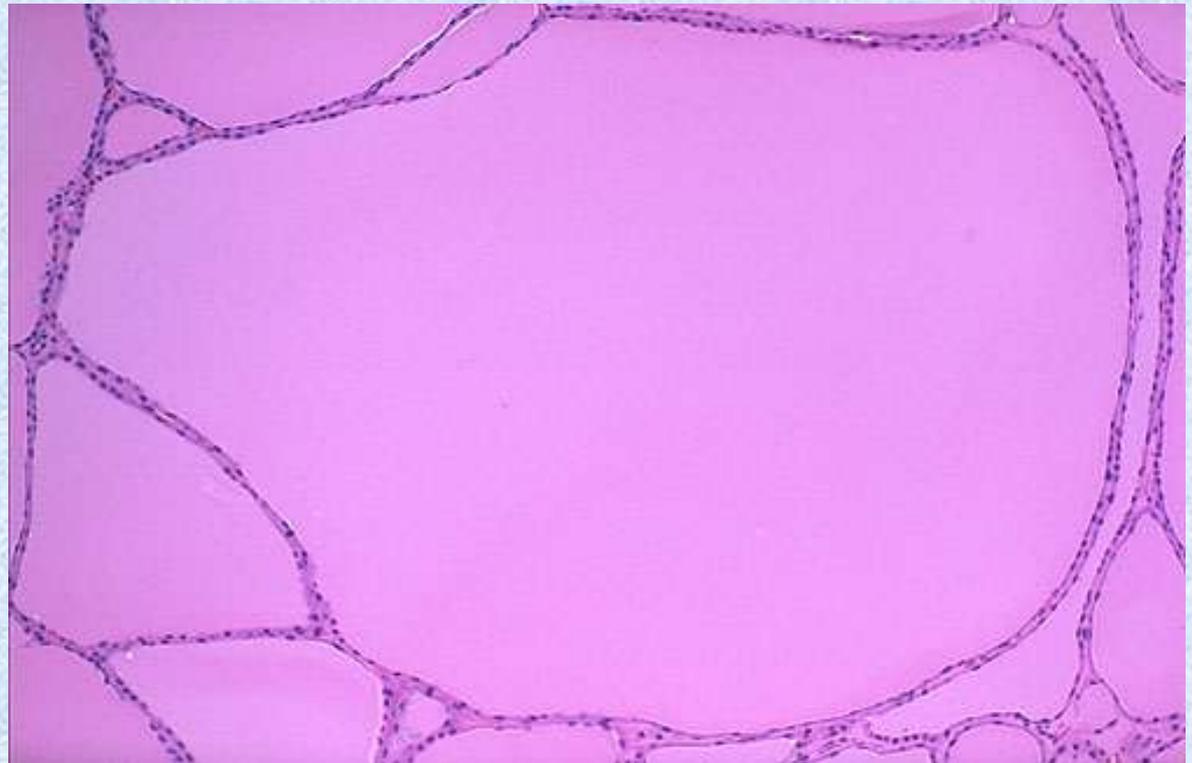
3. Diffuse nodular goitre

- *Microscopically:*

• *Acini:*

• *Colloid:*

• *Stroma:*



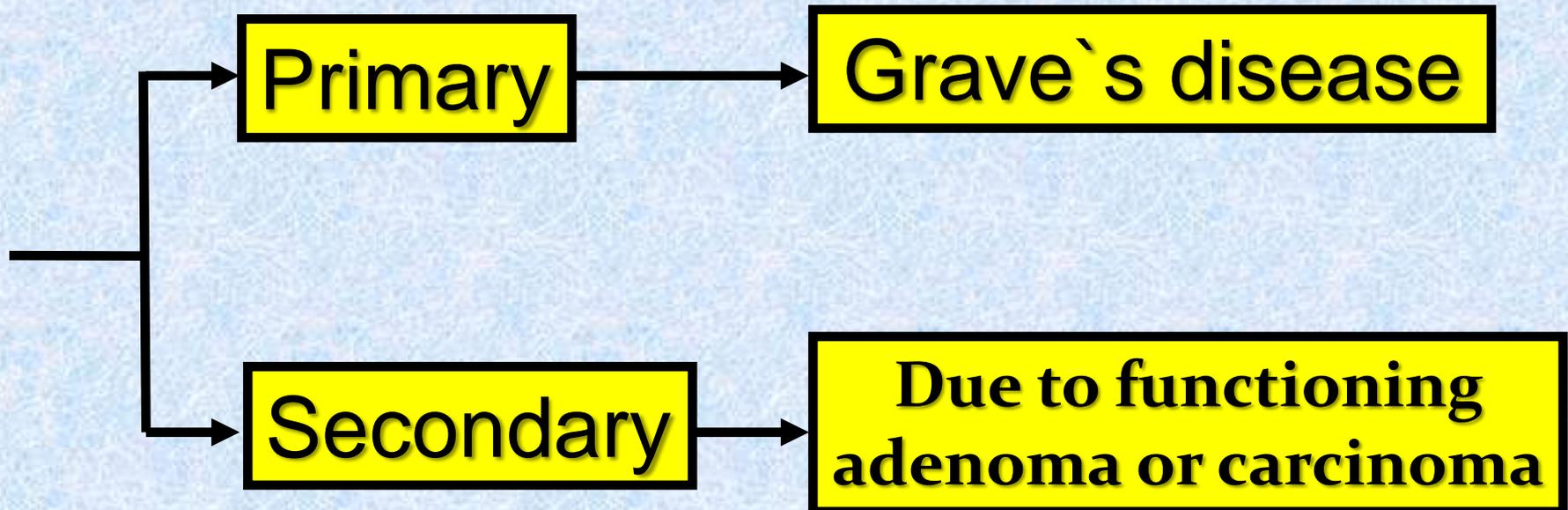
Goitre

B. Toxic goitre

Definition:

Enlargement of thyroid gland associated with excess thyroid hormone secretion

Types:



Goitre

B. Toxic goitre

Grave`s disease:

- ❑ Other names: exospheric goitre / diffuse toxic goitre
- ❑ Etiology: An autoimmune disease:



❑ Incidence:

- ❑ Females are more commonly involved
- ❑ Commonly associated with other autoimmune diseases

Goitre

B. Toxic goitre

Grave`s disease:

- ❑ **Gross features:**
 - Slight or moderate enlargement
 - Symmetrical or asymmetrical
 - Soft fleshy consistency
 - Dark red cut section.

- ❑ **MP**
 - ❑ The acini
 - Lined by multiple layers
 - Papillae formation

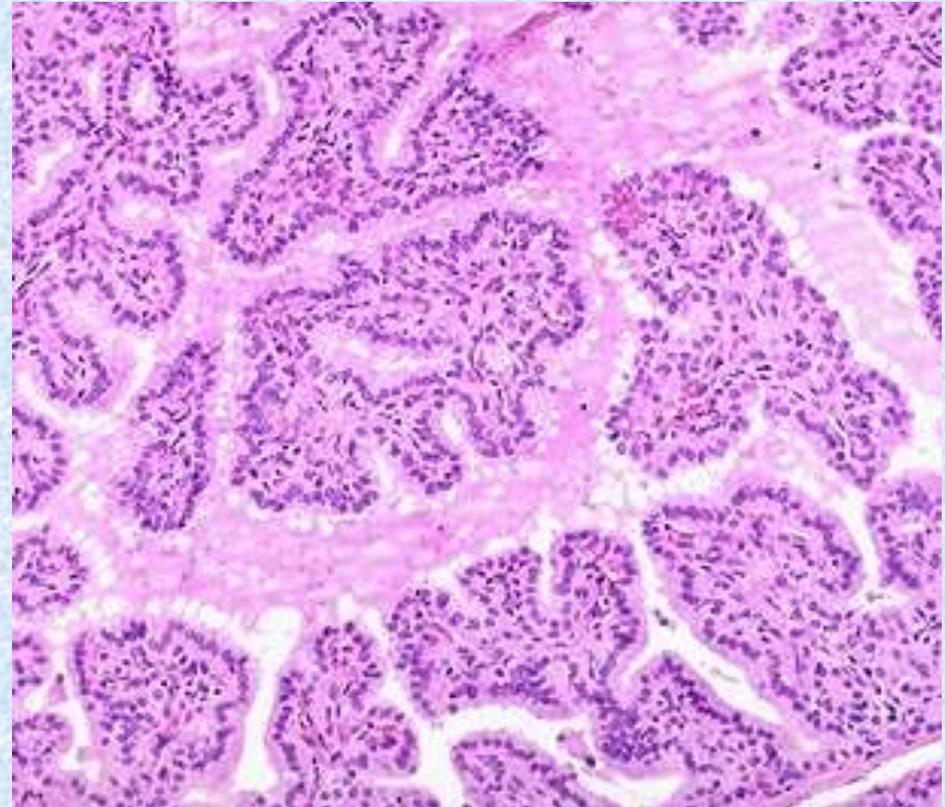
 - ❑ The colloid
 - Scanty
 - Pale pink
 - Retracted from the wall

 - ❑ The stroma
 - Vascular
 - Show lymphocytic infiltration

Goitre

B. Toxic goitre

Grave`s disease:



Goitre

B. Toxic goitre

Grave`s disease:

□ Clinical features and complications:

- Increased serum T₃, T₄
- Decreased serum TSH
- Exophthalmos or protrusion of the eye ball due to fatty infiltration of the extrinsic muscles of the eye.
- Anxiety
- Weight loss
- Tachycardia
- Hypertrophy of the left ventricle as a result of increased work load

TUMOURS OF THYROID GLAND

Thyroid tumours

□ Types

The most common thyroid tumors are

1. Thyroid adenoma
2. Thyroid carcinoma

Thyroid tumours

Follicular thyroid adenoma

□ Definition:

- Benign epithelial tumours of follicular cells
- More common in females

□ Grossly

- Solid
- Solitary
- Capsulated
- Rarely exceeding 3 cm.
- May show secondary changes (mention)



Thyroid tumours

Follicular thyroid adenoma

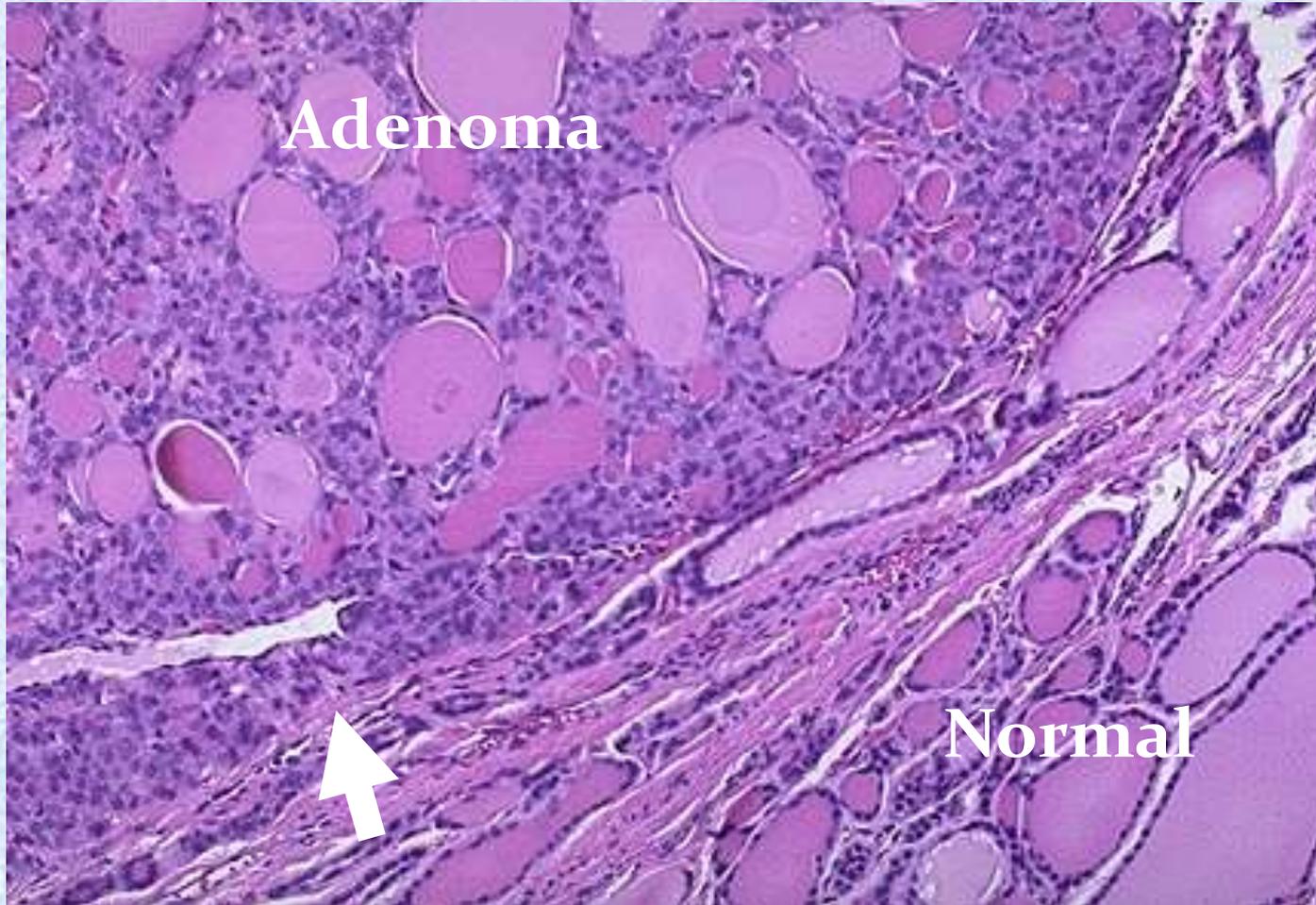
□ Microscopic picture:

- The neoplastic cells grow in follicles
- The tumour is surrounded with an intact capsule
- Types are based on size of the formed follicles
 - A. **Simple** (normofollicular): Normal sized acini.
 - B. **Colloid** (macrofollicular): Large acini filled with colloid.
 - C. **Fetal** (micro follicular): Small acini with scanty colloid.
 - D. **Embryonal**: Solid cords of small cells in abundant stroma.
 - E. **Hurthle** cell type: Polyhedral cells with abundant granular eosinophilic cytoplasm.

Thyroid tumours

Follicular thyroid adenoma

□ Microscopic picture:



Thyroid tumours

Follicular thyroid adenoma

□ Complications:

- Hyperthyroidism.
- Malignant transformation
- Pressure on the surroundings.

Thyroid tumours

Thyroid carcinoma

□ Definition

Malignant epithelial tumour of thyroid tissue

□ Incidence:

- More common in females
- Involves old age: 50-70 years.
- Papillary type could involve young adult females

□ Predisposing factors:

- Ionizing radiation
- On top of adenoma
- On top of nodular Goitre.

Thyroid tumours

Thyroid carcinoma

□ Grossly:

- Irregular thyroid mass
- Usually solid
- Firm to hard
- Non capsulated
- Grayish to white in colour
- May show hemorrhage or necrosis
- Infiltrates neck structures and may lead to asphyxia.
- Papillary carcinoma:
 - May arise within a cyst
 - May be multifocal

Thyroid tumours

Thyroid carcinoma

□ Microscopic types:

A. Papillary

B. Follicular

C. Anaplastic

D. Medullary

Thyroid tumours

Thyroid carcinoma

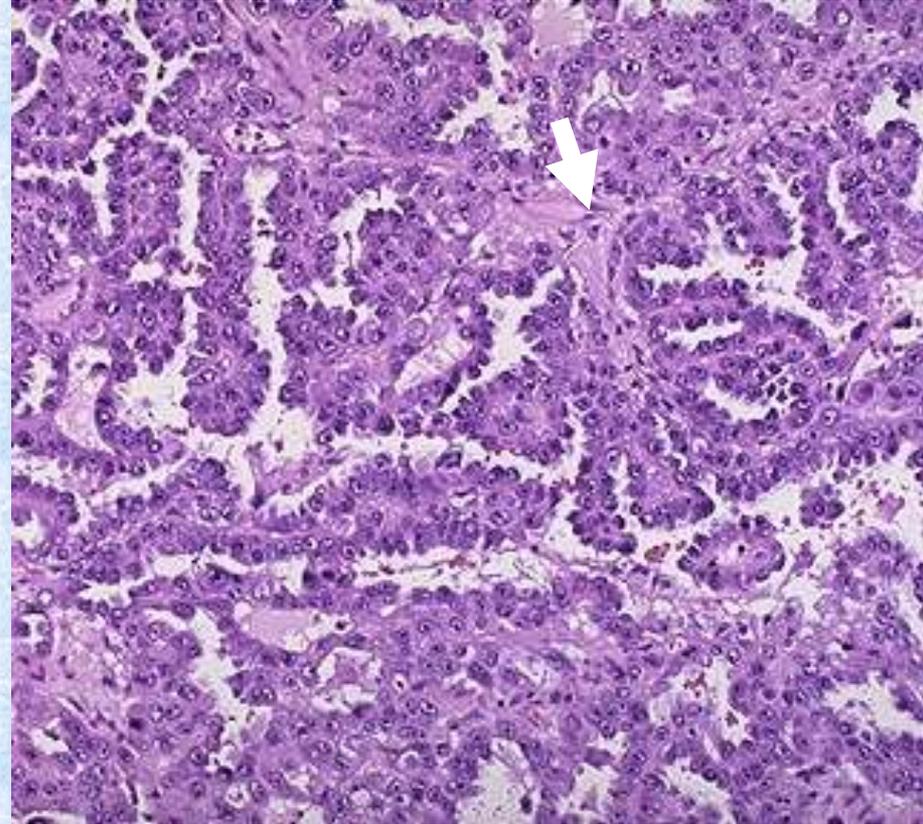
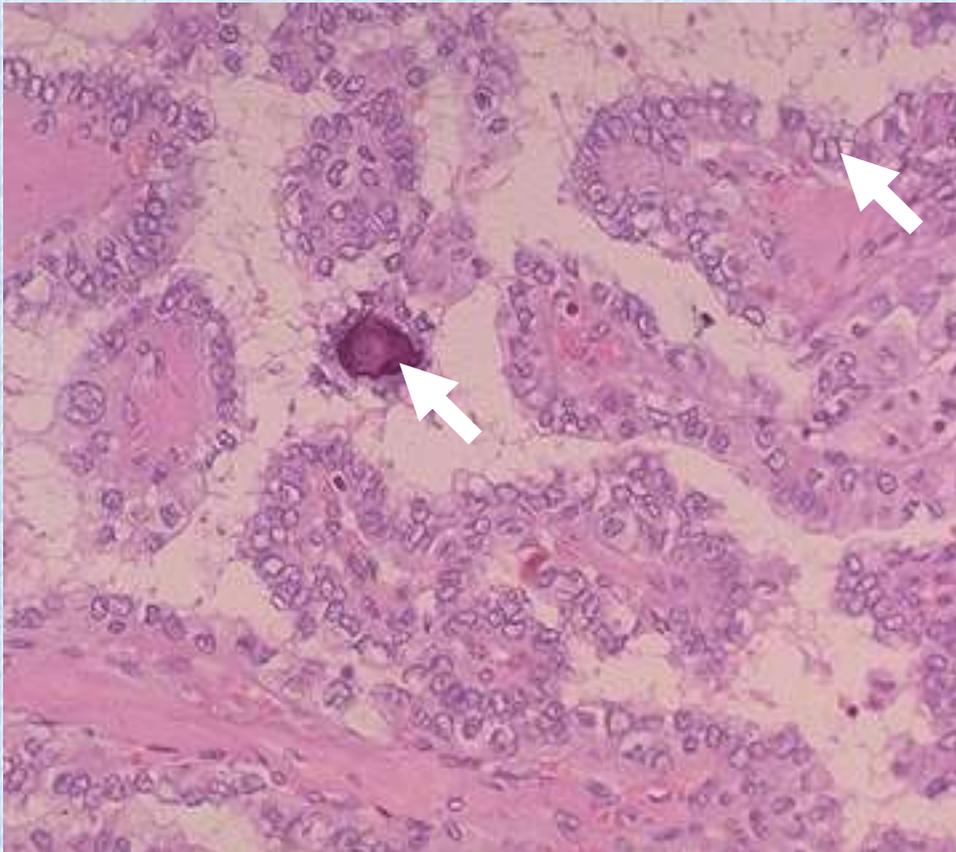
□ Papillary carcinoma:

- Malignant cells tend to grow in papillary structures
- The commonest type of malignant thyroid tumours
- Involves any age (commonly young adult)
- More common in females
- One of the commonest occult tumours
- Microscopic features:
 - Tumour cells arrange in complex thin branching papillae
 - Papillae have thin fibro-vascular core and covered by a single or stratified lining of cuboidal cells.
 - The nuclei are optically clear (ground glass)
 - Psammoma bodies.

Thyroid tumours

Thyroid carcinoma

□ Papillary carcinoma:



Thyroid tumours

Thyroid carcinoma

□ Papillary carcinoma:

- Lymph node spread (to cervical LN) is very frequent
- May presents with enlarged cervical lymph node
- The prognosis is excellent if treated early.

Thyroid tumours

Thyroid carcinoma

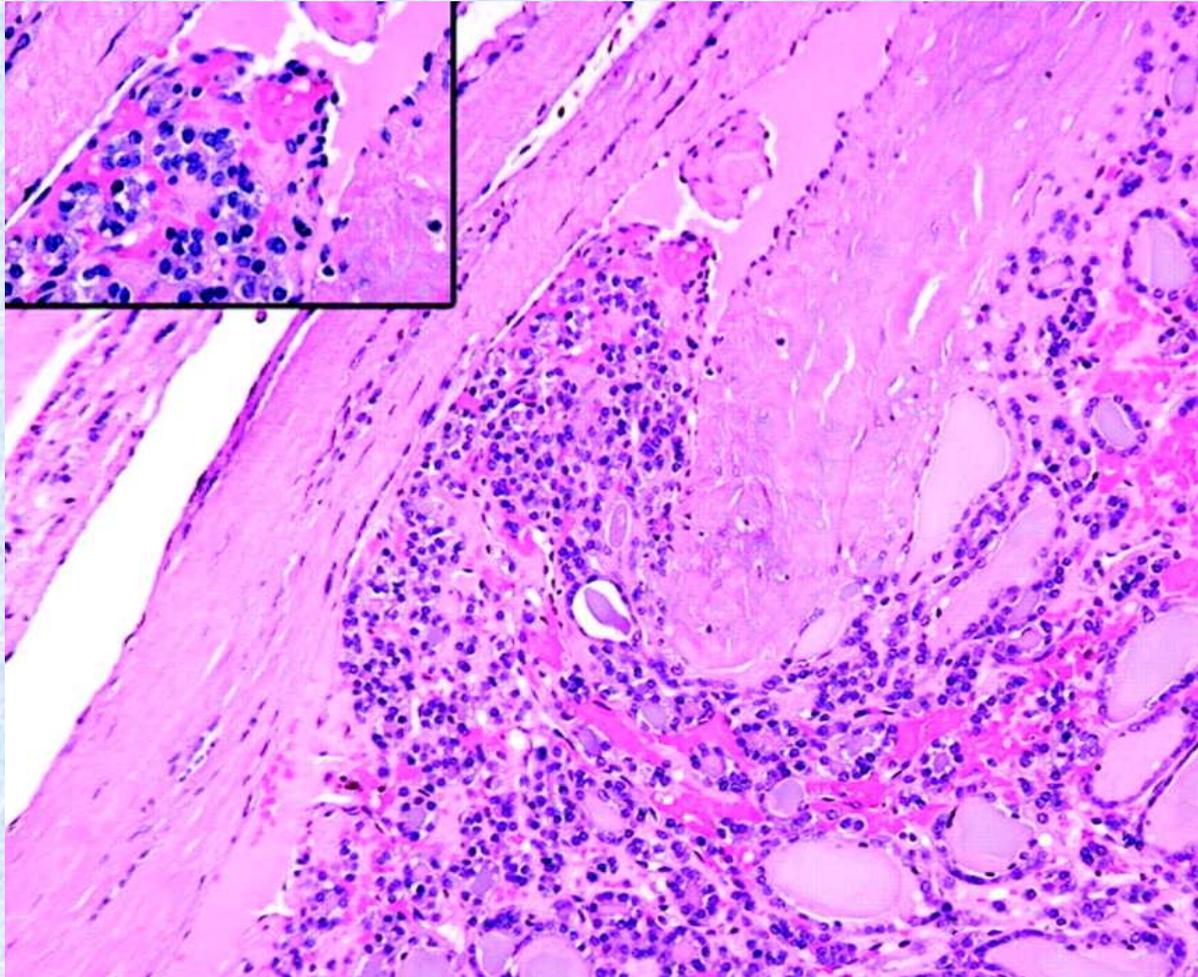
□ Follicular carcinoma:

- Malignant cells tend to grow in follicles with deficient intervening stroma
- Cytological features of malignancy are absent or minimal in most occasions
- It is similar to thyroid adenoma except for:
 - invasion of the fibrous capsule
 - Invasion of blood vessels
- Metastasis to lung and bone is common

Thyroid tumours

Thyroid carcinoma

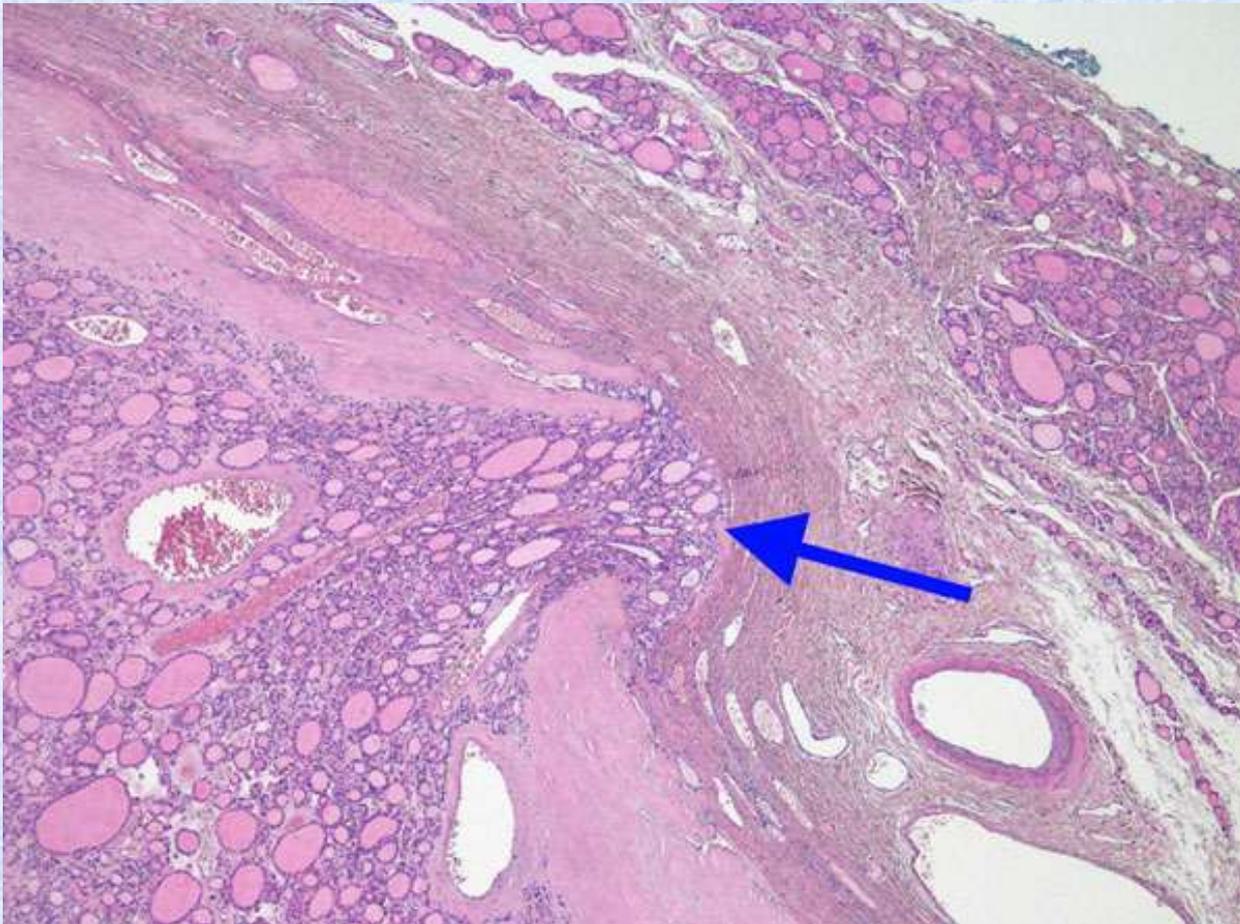
□ Follicular carcinoma:



Thyroid tumours

Thyroid carcinoma

□ Follicular carcinoma:



Thyroid tumours

Thyroid carcinoma

□ Anaplastic Carcinoma

- Undifferentiated tumour in which the cells are round, spindle or giant and arrange in solid sheets
- Less common than papillary and follicular tumours
- Has bad prognosis

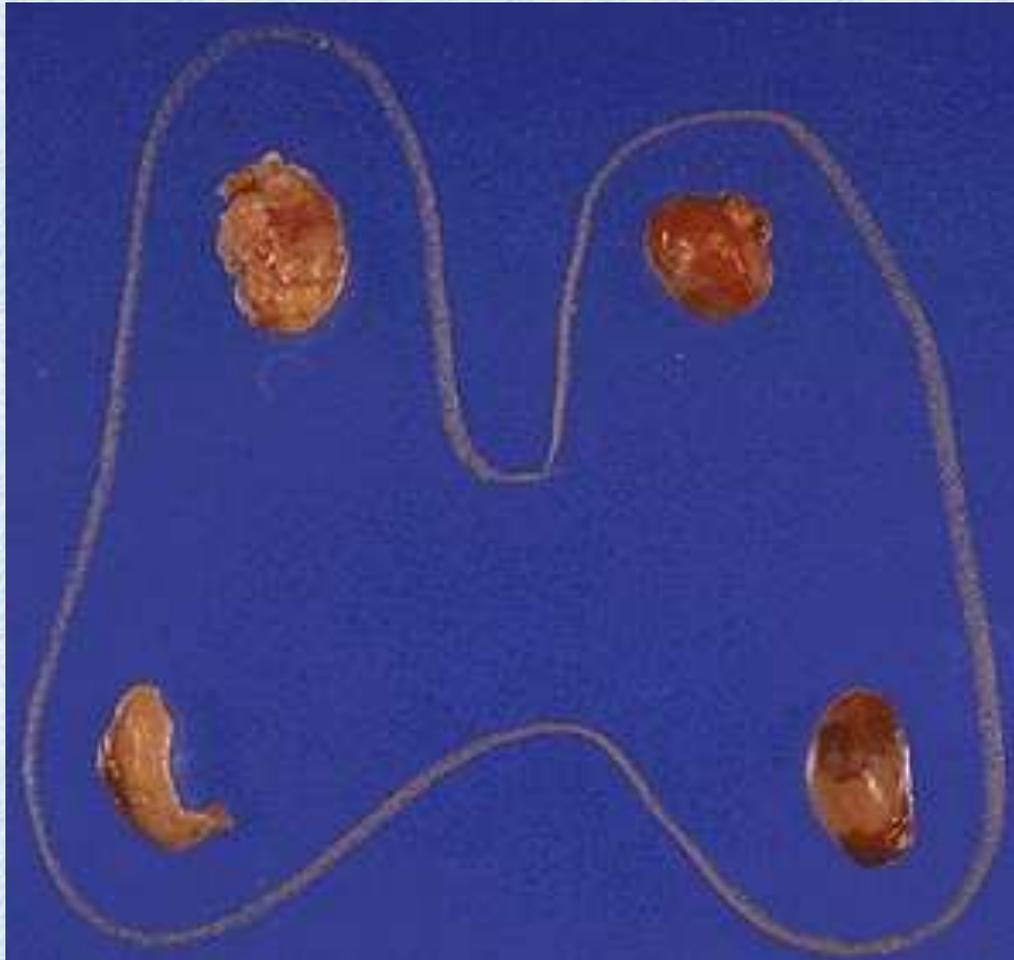
□ Medullary Carcinoma:

- A rare tumor
- Arises from calcitonin producing C cells of thyroid gland
- Tumour cells grow in broad sheets
- Tumour stroma show amyloid deposits (a sign for diagnosis)
- May be associated with paraneoplastic syndrom **OR** with other endocrine tumours (**MEN₁ & MEN₂**)

DISEASES OF PARATHYROID GLAND

Parathyroid gland

- Four parathyroid glands
- located at the upper and lower poles of both thyroid lobes



Parathyroid gland

□ Diseases of parathyroid:

Hyperparathyroidism

❖ Primary

1. Parathyroid hyperplasia
2. Parathyroid adenoma
3. Parathyroid carcinoma (rare)

❖ Secondary

In association with chronic renal diseases

Hypoparathyroidism

- Commonly caused by surgical removal of parathyroid glands.....**why??**
- May be idiopathic
- Decrease of blood ionized calcium causing tetany.

Parathyroid gland

□ Diseases of parathyroid:

Primary hyperparathyroidism

❖ **Other names:** Osteitis fibrosa cystica OR Von Recklinghausen's disease

❖ **Etiology:** Hyper-secretion of parathormone caused by hyperplasia, adenoma or carcinoma of parathyroid gland

❖ **Pathology:**

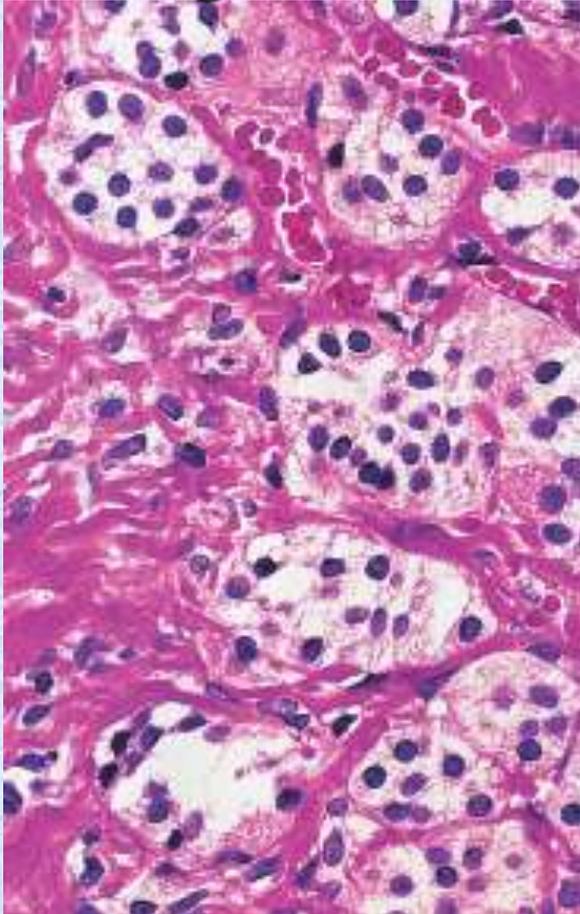
- Hypercalcemia → metastatic calcification
- Bone destruction: leading to
 - Fibrosis and cyst formation of the bone
 - Pathological fracture
- Brown tumour of bone:
 - A tumour like lesion
 - Collection of osteoclasts around areas of hemorrhage

DISEASES OF ADRENAL GLAND

Adrenal gland

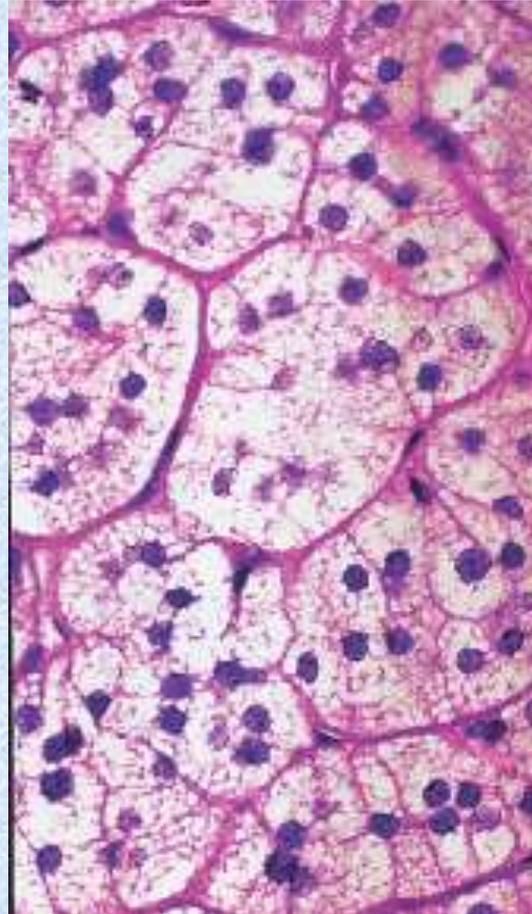
Adrenal cortex

Outer layer
Zona glomerulosa



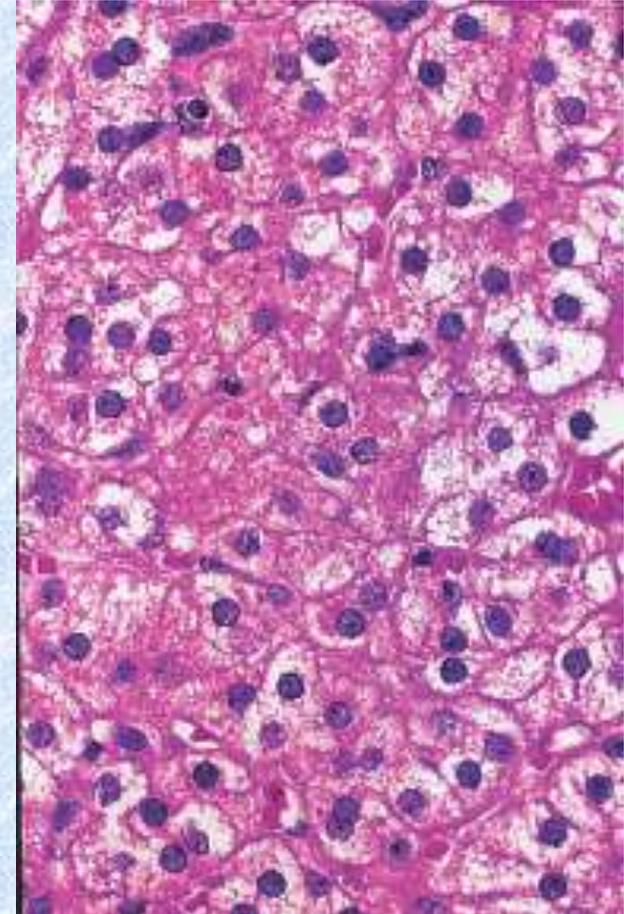
Mineralocorticoids

Middle layer
Zona fasciculata



Glucocorticoids

Inner layer
Zona reticularis



Sex hormones

Adrenal gland

❑ Diseases of adrenal:

Adrenal cortex hyper-function

❖ Etiology:

- Hyperplasia
- Adenoma
- Carcinoma

❖ Effects: Depend on cells affected and hormone produced:

- ↑ aldosterone → Conn's syndrome
- ↑ glucocorticoids → Cushing's syndrome
- ↑ androgens → Adrenogenital syndrome

Adrenal gland

□ Diseases of adrenal:

Adrenal cortex hypo-function

❖ Acute Adrenal Insufficiency (**fatal**):

○ **Etiology:**

➤ Severe adrenal hemorrhage due to:

- Toxemia as diphtheria
- Septicemia

➤ Bilateral adrenalectomy.

➤ Sudden severe stress as by trauma and surgical operations.

○ **Effect:**

Shock and electrolyte imbalance in the form of sodium loss and potassium retention.

❖ Chronic adrenal insufficiency (Addison's Disease)

Adrenal gland

❑ Diseases of adrenal:

Tumours of adrenal gland:

❖ Tumours of adrenal cortex:

- Epithelial: Adenoma
- Mesenchymal: Fibroma, neurofibroma, lipoma and haemangioma
- Adrenocortical carcinoma

❖ Tumours of adrenal medulla

- Neuroblastoma
- Ganglioneuroma
- Pheochromocytoma
- Metastatic tumors

DISEASES OF ENDOCRINE PANCREAS

Endocrine pancreas

□ Diabetes mellitus:

❖ Definition:

A chronic systemic disease characterized by disturbed carbohydrate, fat & protein metabolism due to insulin deficiency

❖ Types

➤ **Primary or Idiopathic**

□ Type I or IDDM (Insulin dependent DM)

□ Type II or NIDDM (Non-insulin-dependent MD)

➤ **II. Secondary Diabetes Mellitus**

Endocrine pancreas

□ Diabetes mellitus:

❖ Etiology:

- Type I or IDDM (Insulin dependent DM): may be due to
 - Genetic susceptibility.
 - Autoimmune destruction of islet's cells

- Type II or NIDDM (Non-insulin-dependent MD)
 - Commonly associated with obesity
 - Probably due to
 1. Decreased amount of insulin secreted by islet's cells.
 2. Synthesis of abnormal insulin molecule.
 3. Impaired or delayed insulin release from beta cells.
 4. Inability of peripheral tissue to respond to insulin.

Endocrine pancreas

□ Diabetes mellitus:

❖ Etiology:

➤ II. Secondary Diabetes Mellitus

Due to destruction of the pancreatic tissue by:

1. Pancreatitis
2. Haemochromatosis
3. Malignant tumors.
4. Surgical removal of pancreas

Endocrine pancreas

□ Diabetes mellitus:

❖ Pathological features:

➤ **Gross Picture:**

The pancreas usually appears normal except in cases of secondary diabetes

➤ **Microscopically:**

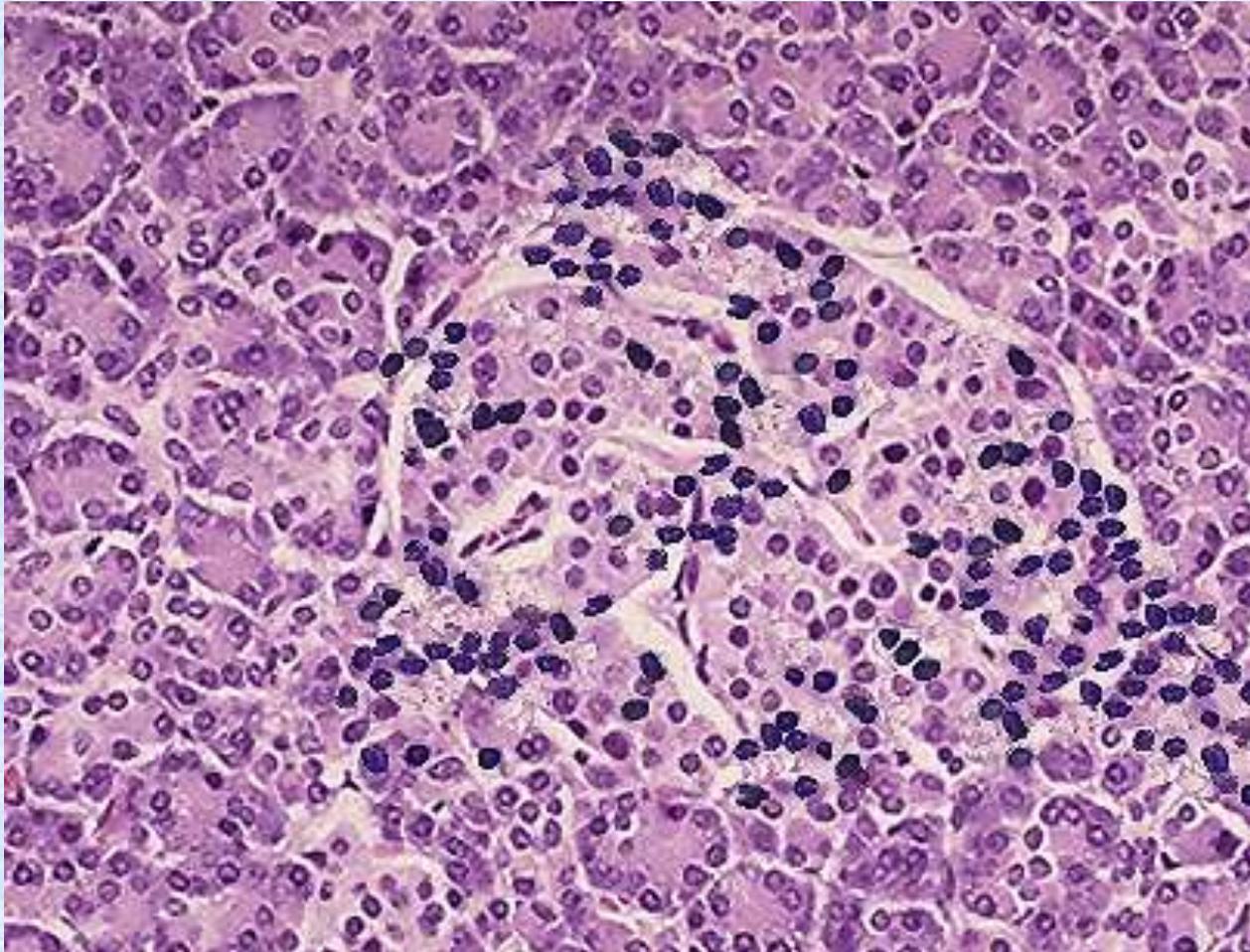
1. Type I diabetes: Islet cells may show inflammatory reaction (insulinitis) in early cases followed by beta cell depletion and marked atrophy and fibrosis

2. Type II diabetes: Islet cells show mild beta cell depletion, focal atrophy and amyloid deposition

Endocrine pancreas

□ Diabetes mellitus:

❖ Pathological features:



Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

- (1) Diabetic ketoacidosis and diabetic coma.
- (2) Renal complications (diabetic nephropathy)
- (3) Cardiovascular complications (diabetic microangiopathy or vasculopathy)
- (4) Diabetic retinopathy
- (5) Respiratory system complications
- (6) Skin complications
- (7) Peripheral neuritis (diabetic neuropathy).

Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

Diabetic nephropathy:

1. Diabetic glomerulosclerosis (Kimmelstiel-Wilson disease):
Pathogenesis: Deposition of glycoproteins at glomerular BM leading to impaired glomerular permeability + **proteinuria**

Microscopically:

Early: glomeruli show deposition of a homogenous eosinophilic hyaline material (glycoprotein), which is either:

- Nodular glomerulosclerosis: few nodules in the centre of one or more glomerular capillary lobules.
- Diffuse glomerulosclerosis: diffuse hyaline thickening of the glomerular basement membrane.

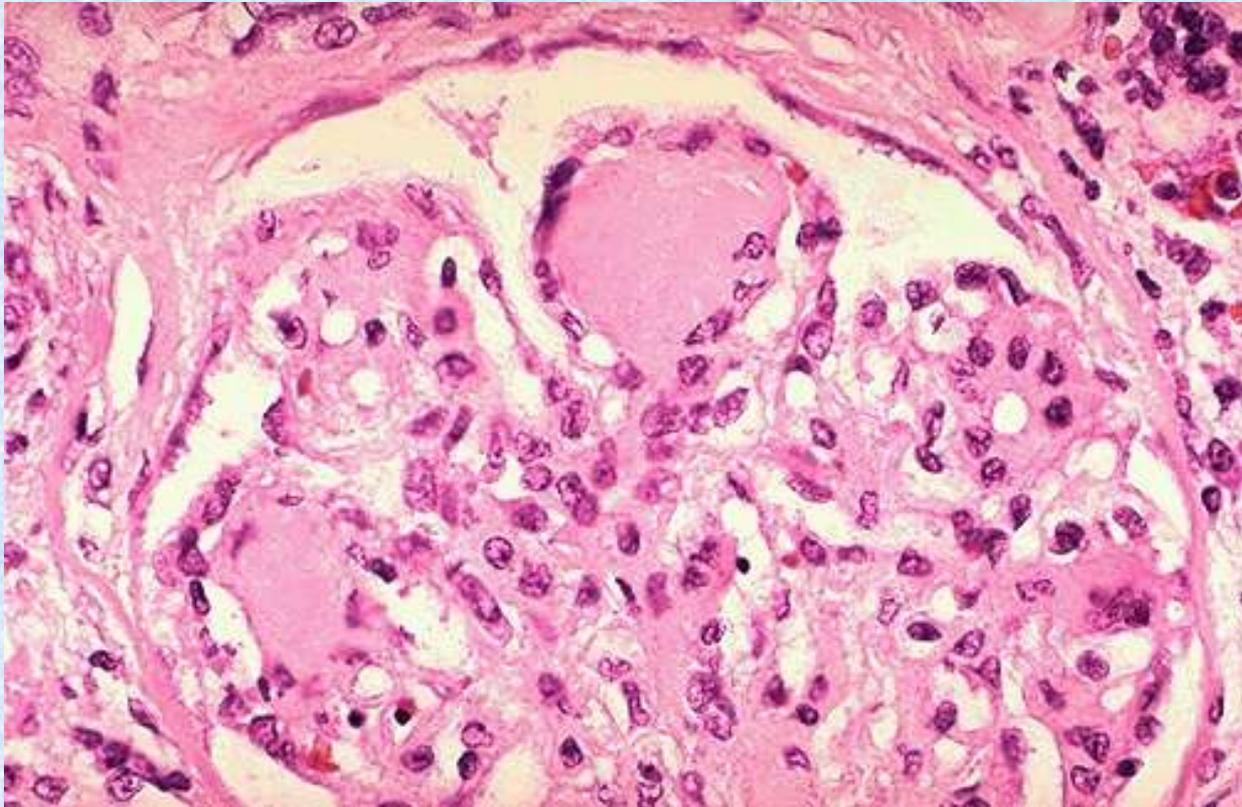
Late: Focal glomerular sclerosis

Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

Diabetic nephropathy:



Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

Diabetic nephropathy:

2. Pyelonephritis.
3. Atherosclerosis of the renal arteries.
4. Renal failure.

Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

Cardiovascular complications (diabetic microangiopathy or vasculopathy)

A. Atherosclerosis.

B. Diabetic microangiopathy:

Mainly thickening of arterioles and capillaries which interferes with emigration of leucocytes in sites of infection

C. Diabetic gangrene of the limbs.

D. Myocardial infarction

E. Heart failure.

Endocrine pancreas

□ Diabetes mellitus:

❖ Complications:

Diabetic retinopathy

- Microaneurysms of retinal arterioles
- Retinal hemorrhage

Respiratory system complications

- Repeated infections (bronchopneumonia)
- Susceptibility to lung abscess, lung gangrene and pulmonary tuberculosis.

Peripheral neuritis (diabetic neuropathy):

- Numbness and hypoesthesia

Skin complications

- Diabetic foot (gangrene)

Thank you
Dr Ahmed Roshdi