

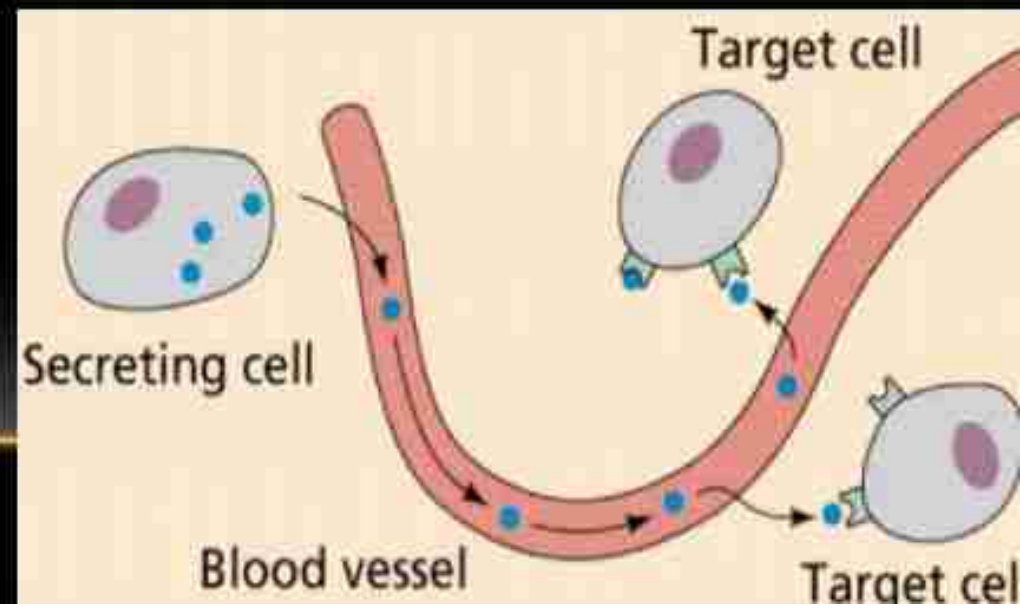
ENDOCRINE SYSTEM- PATHOLOGY

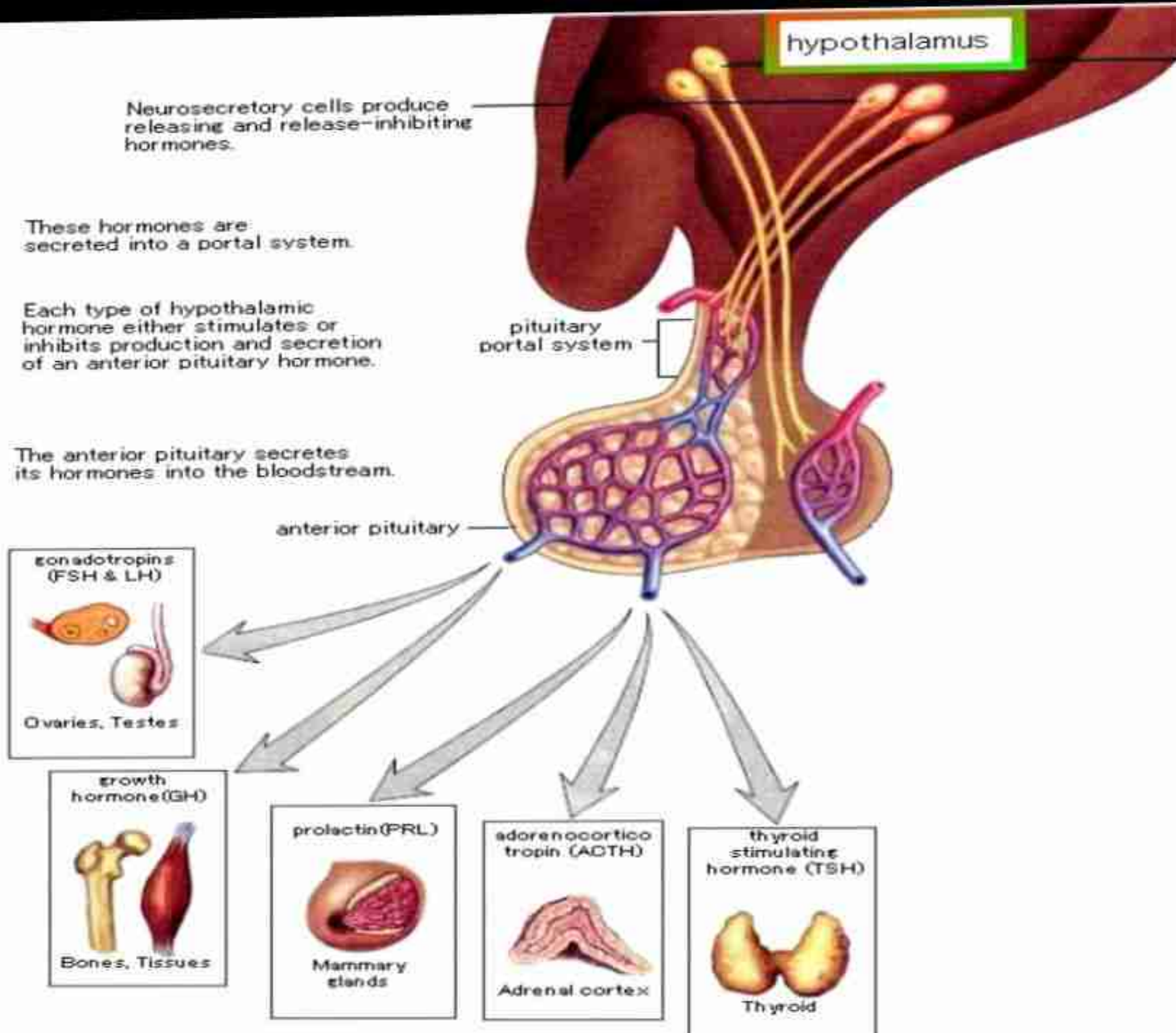
A horizontal, glowing orange-yellow light streak that spans across the width of the slide, positioned just below the title text.

ENDOCRINE SYSTEM

- A highly integrated & widely distributed group of organs
- Maintain a state of metabolic equilibrium by coordinating the activity of various organs.
(Homeostasis)

- Coordinates activity through secretion of **HORMONES**
 - Chemical messenger
 - Act on target organs in distant sites





Neurosecretory cells produce releasing and release-inhibiting hormones.

These hormones are secreted into a portal system.

Each type of hypothalamic hormone either stimulates or inhibits production and secretion of an anterior pituitary hormone.

The anterior pituitary secretes its hormones into the bloodstream.

gonadotropins
(FSH & LH)



Ovaries, Testes

growth
hormone (GH)



Bones, Tissues

prolactin (PRL)



Mammary
glands

adrenocortico
tropin (ACTH)



Adrenal cortex

thyroid
stimulating
hormone (TSH)



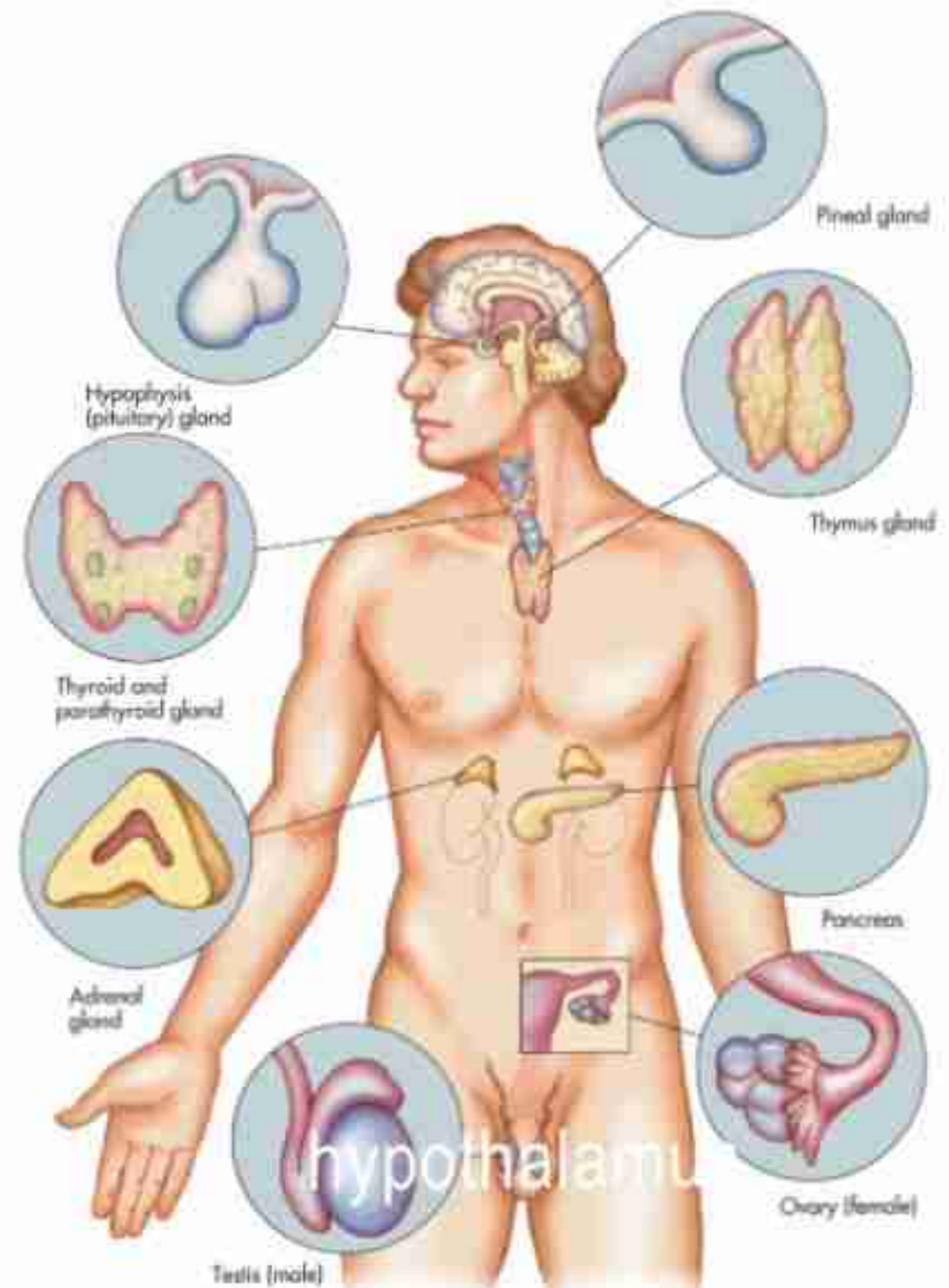
Thyroid

- **Feed back inhibition**

- Target tissue --> secretes factors that down-regulate the activity of the gland that produces the stimulating hormone

ENDOCRINE ORGANS

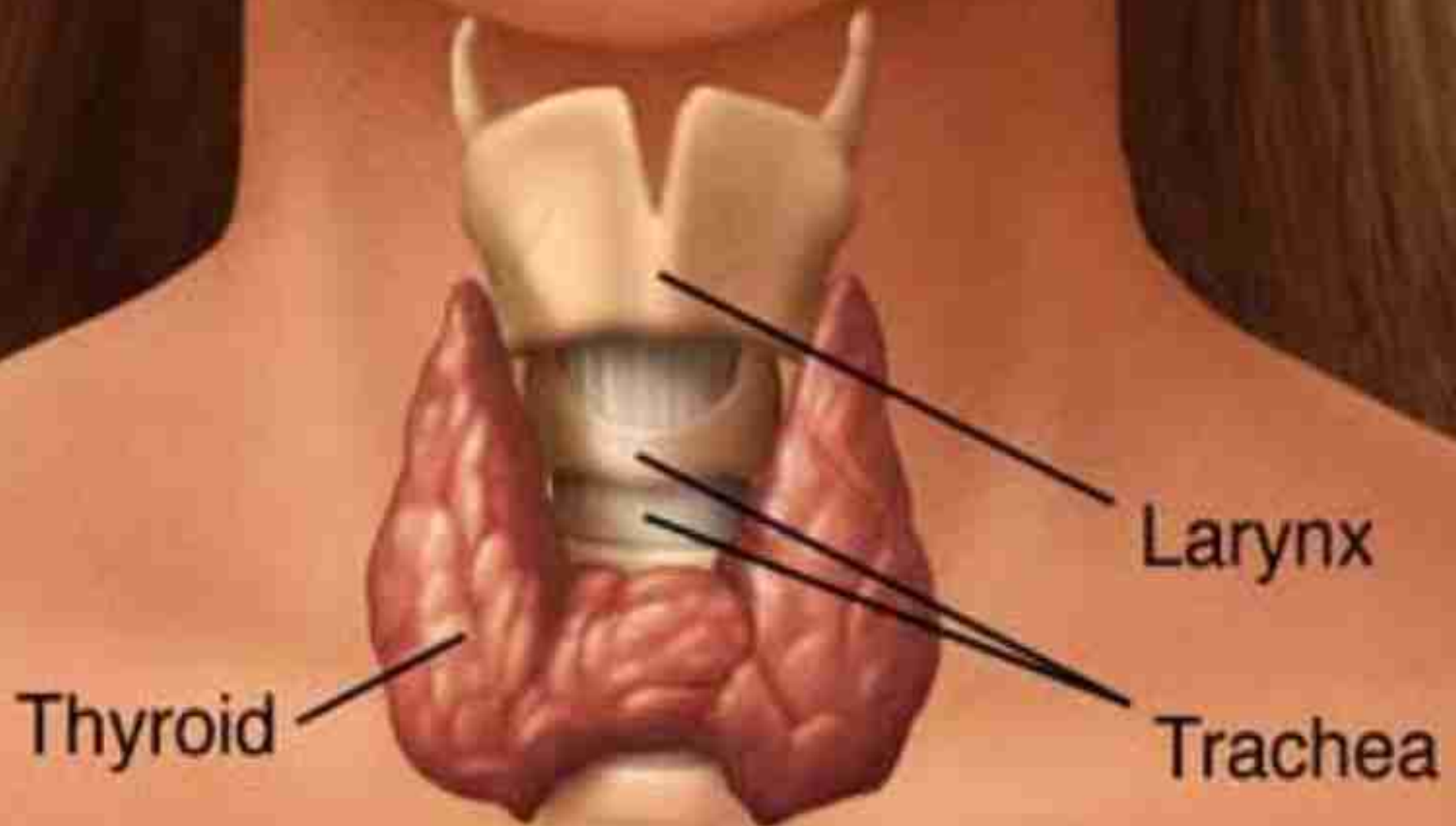
- Pituitary
- Thyroid & Parathyroid
- Adrenals
- Pancreas
- Ovary
- Testis
- Others – pineal gland, thymus

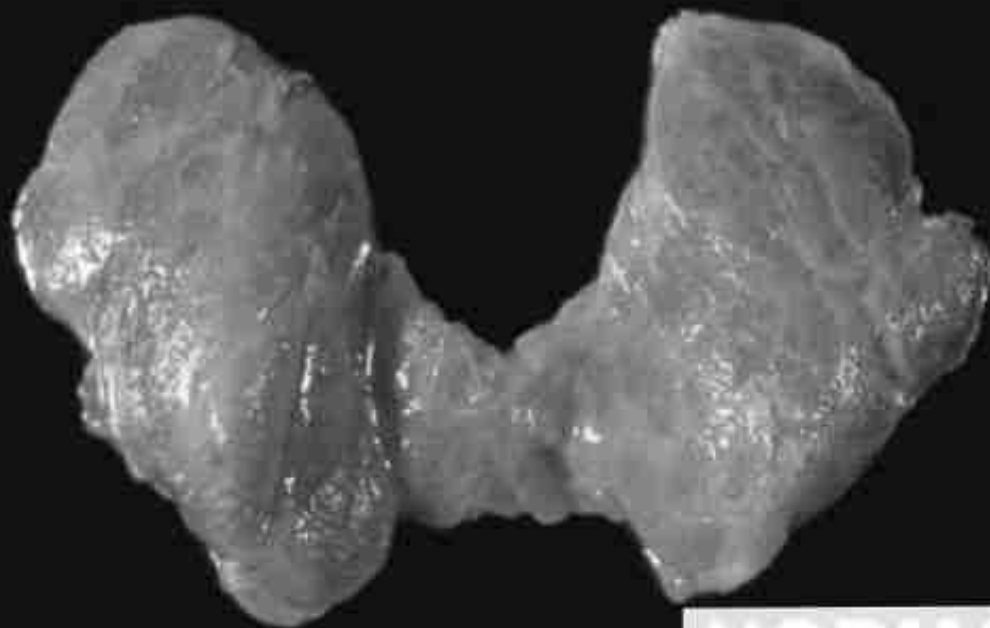


ENDOCRINE DISEASES- CLASSIFICATION

- Underproduction of hormones (Hypo)
- Overproduction of hormones (Hyper)
- Mass lesions - hyper/ hypo/ non-functional

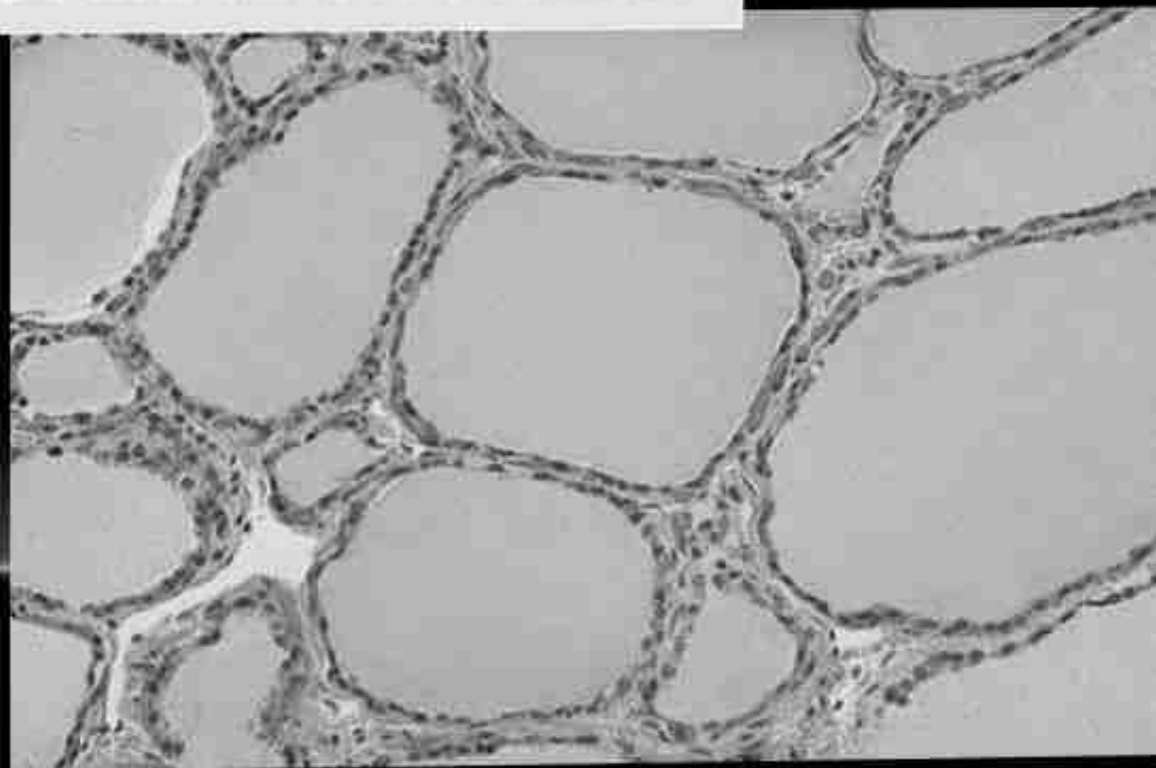
THYROID GLAND PATHOLOGY

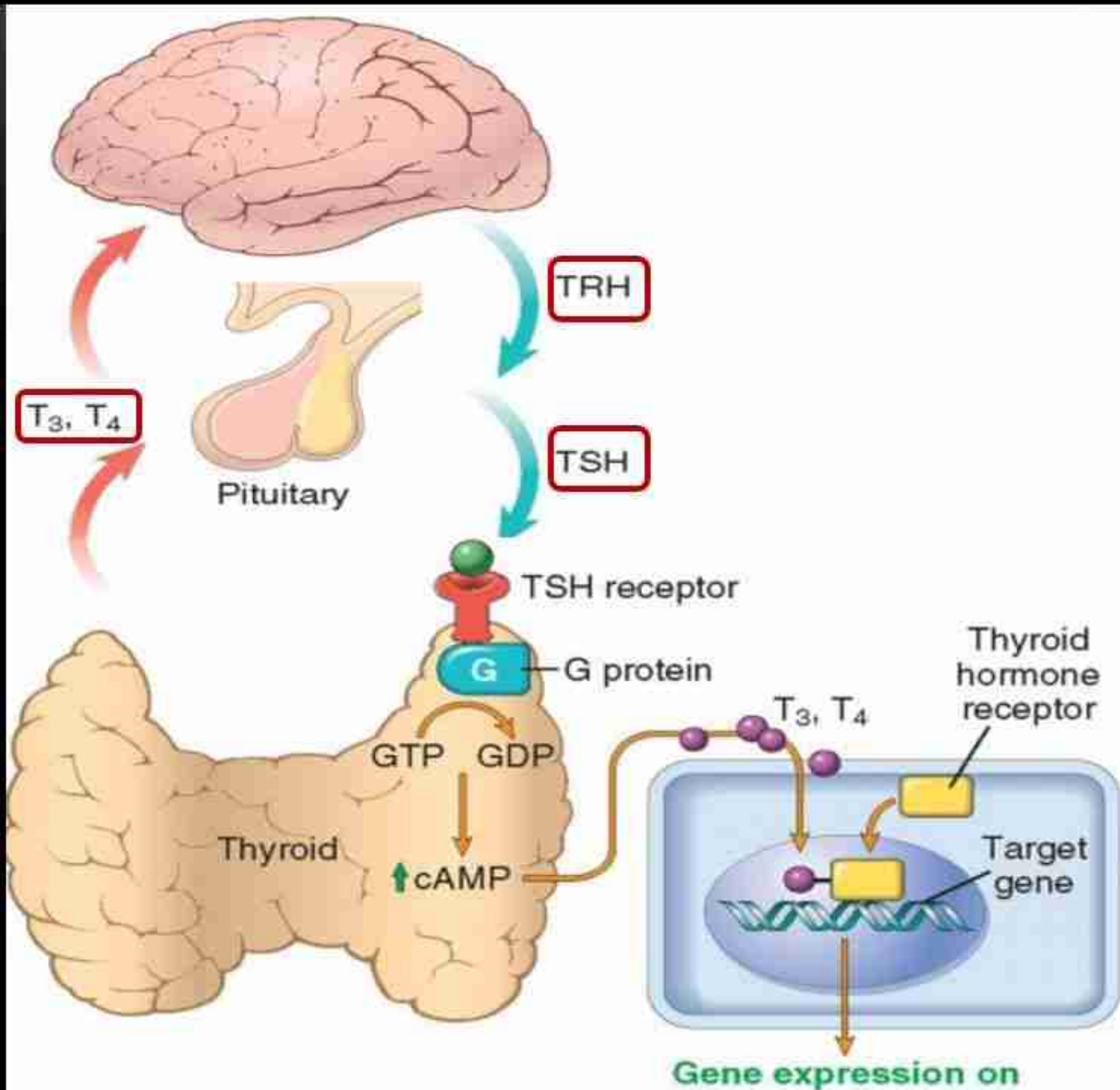




4 cm

NORMAL THYROID





Follicular cells

Parafollicular or C cells

- T3 , T4

- Calcitonin

- Upregulates Carb & Fat catabolism and protein biosynthesis
- Increases the basal metabolic rate (BMR)
- Critical role in brain development

- Promotes calcium absorption by bone
- Inhibits bone resorption by osteoclasts

CLINICAL PRESENTATION

- **Hyperthyroidism--** Excessive release
- **Hypothyroidism--** Deficiency
- **Goiter--** Bilateral thyroid enlargement
- **Thyroid mass**

APPROACH TO DIAGNOSIS

- Clinical features—
hyper/hypo/euthyroid
- Biochemical
 - **TSH - (most useful screening test)**
 - Free T4 & T3 levels
- Radioactive iodine uptake

APPROACH TO DIAGNOSIS

- Clinical features—
hyper/hypo/euthyroid
- Biochemical
 - **TSH - (most useful screening test)**
 - Free T4 & T3 levels
- Radioactive iodine uptake
- Thyroid antibody levels
- USG
- Fine needle aspiration cytology (FNAC)
- Histopathological examination

HYPOTHYROIDISM

HYPOTHYROIDISM

- Derangement anywhere in the hypothalamic-pituitary-thyroid axis ---> decrease production of T3, T4
- Prevalence increases with age
- Female preponderance

- **Primary hypothyroidism**

- ***Congenital***- endemic dietary iodine deficiency- genetic defects
- ***Autoimmune***- most common cause in iodine sufficient areas
- ***Iatrogenic***- surgery, radioablation, drugs(lithium)

- **Secondary hypothyroidism**

- Pituitary/Hypothalamic failure (rare)

HYPOTHYROIDISM - CLINICAL FEATURES

- Hypometabolic state
- Depends on age
 - Infants /childhood --> **Cretinism**
 - Older child/ Adults --> **Myxedema**

MYXEDEMA (ADULTS)

- Reduced BMR –
 - Lethargy with **Cold intolerance**
 - **Weight gain** inspite of reduced appetite.
- General –
 - Pale thick dry skin , non-pitting edema
 - Brittle hair , hair loss
- GIT- **Constipation**
- CVS- Bradycardia
- Ovary –menstrual irregularity, abortions



CRETINISM (INFANCY & EARLY CHILDHOOD)

- French 'Cretin' = "Christ like"
- Severe mental retardation

Causes

- **Endemic** –
 - Dietary iodine deficient areas.
 - *Less prevalent now - widespread iodine supplementation*
- **Sporadic**- Dyshormonogenesis, genetic defects, fetal exposure to anti-thyroid drugs

CRETINISM

- *Impaired development of skeletal system & CNS*
 - Mental retardation
 - Short stature
 - Coarse facial features
 - Protruding tongue
 - Pot belly with umbilical hernia.





- Severity of mental impairment -- *related to the time at which thyroid deficiency occurs in utero*
- Normally, maternal T3 and T4 cross the placenta -- critical for foetal brain development
- Maternal thyroid deficiency
 - **Before** development of foetal thyroid gland --> Severe MR
 - **After** foetal thyroid has become functional --> Normal brain development

DIAGNOSIS

- Serum TSH levels- (most sensitive screening test)
 - **Increased** in primary hypothyroidism
(not in secondary)
- Free T4 levels – decreased
- Serum Cholesterol – increased (atherogenic profile
- usually in adults)



GOITER



- Most common thyroid disease- persistent thyroid enlargement
- Deficiency of T3, T4 --> hypertrophy and hyperplasia of follicular cells --> Gross enlargement of the thyroid gland

- Compensatory increase in TSH levels
- Compensatory increase overcomes the hormone deficiency -- **euthyroid**
- Inadequate compensatory responses -- **goitrous hypothyroidism.**

TYPES OF GOITRE

- Depending on cause/ incidence
 - Endemic
 - Sporadic
- Depending on clinical presentation
 - Diffuse
 - Multinodular

ENDEMIC GOITER

- If $> 10\%$ of population in a given region affected - ENDEMIC
- **Iodine deficiency** - Mountainous areas – low levels in soil, water & food
- **Goitrogens** - substances that interfere with thyroid hormonesynthesis

- **GOITROGENS-** substances that interfere with thyroid hormone synthesis
- Food – cauliflower, cabbage, turnip, cassava root
- Native populations on these diets– high risk



TYPES OF GOITER

- **Diffuse nontoxic goiter (Simple/Colloid)-**
- **Multinodular goiter**