



Endocrinology and Metabolism

General introduction

内分泌及代谢疾病总论


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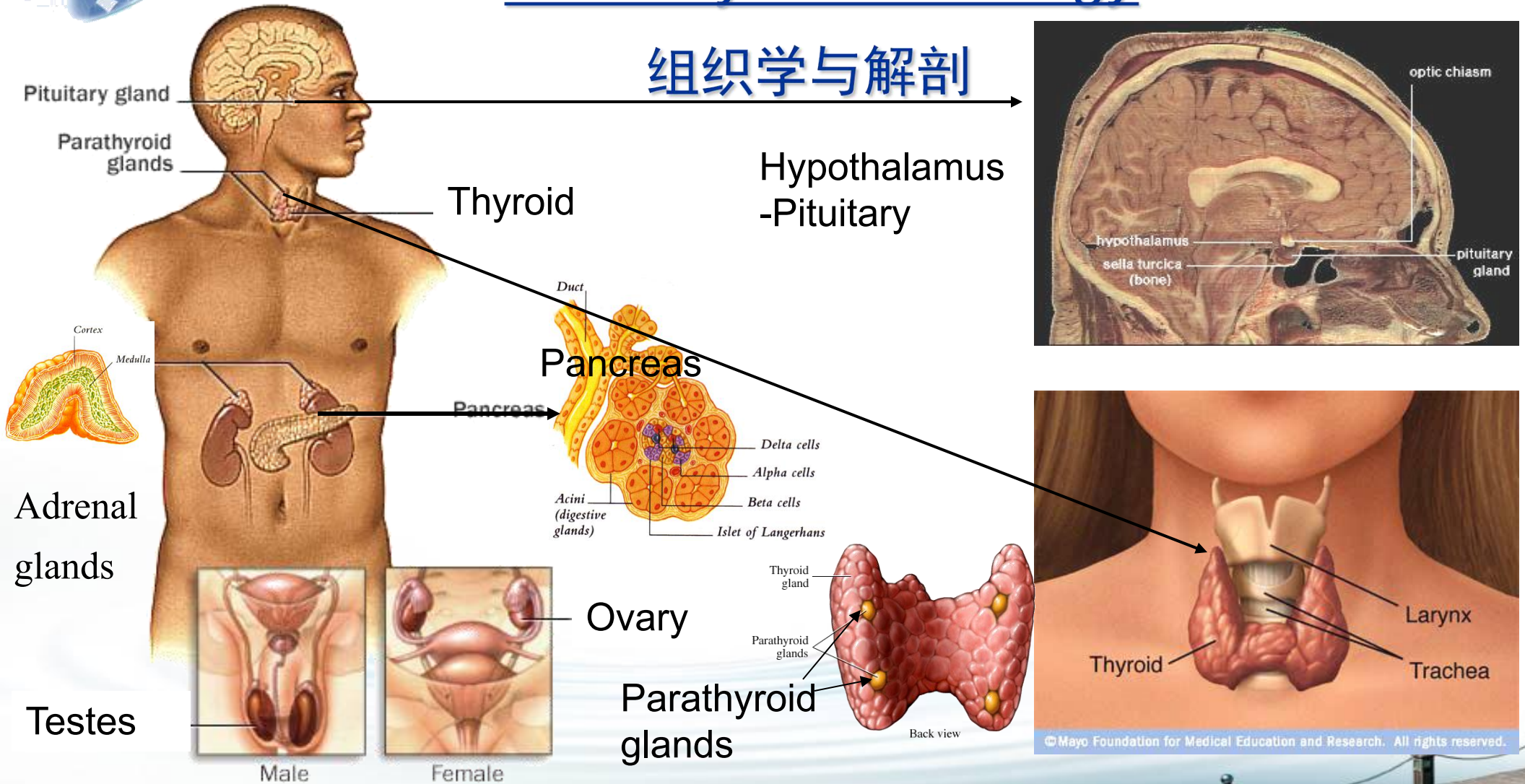
Learning objectives

- ◆ Know define and describe the general function of the endocrine system, and describe how endocrine glands differ from exocrine glands .
 - ◆ Know the conception of Hypothalamus-pituitary axis
(下丘脑—垂体轴)
 - ◆ Know the conception of feedback regulation
(反馈调节)
 - ◆ Understand how biochemical testing and imaging are used to diagnose endocrine disease.
- 

The Endocrine System

Anatomy and Histology

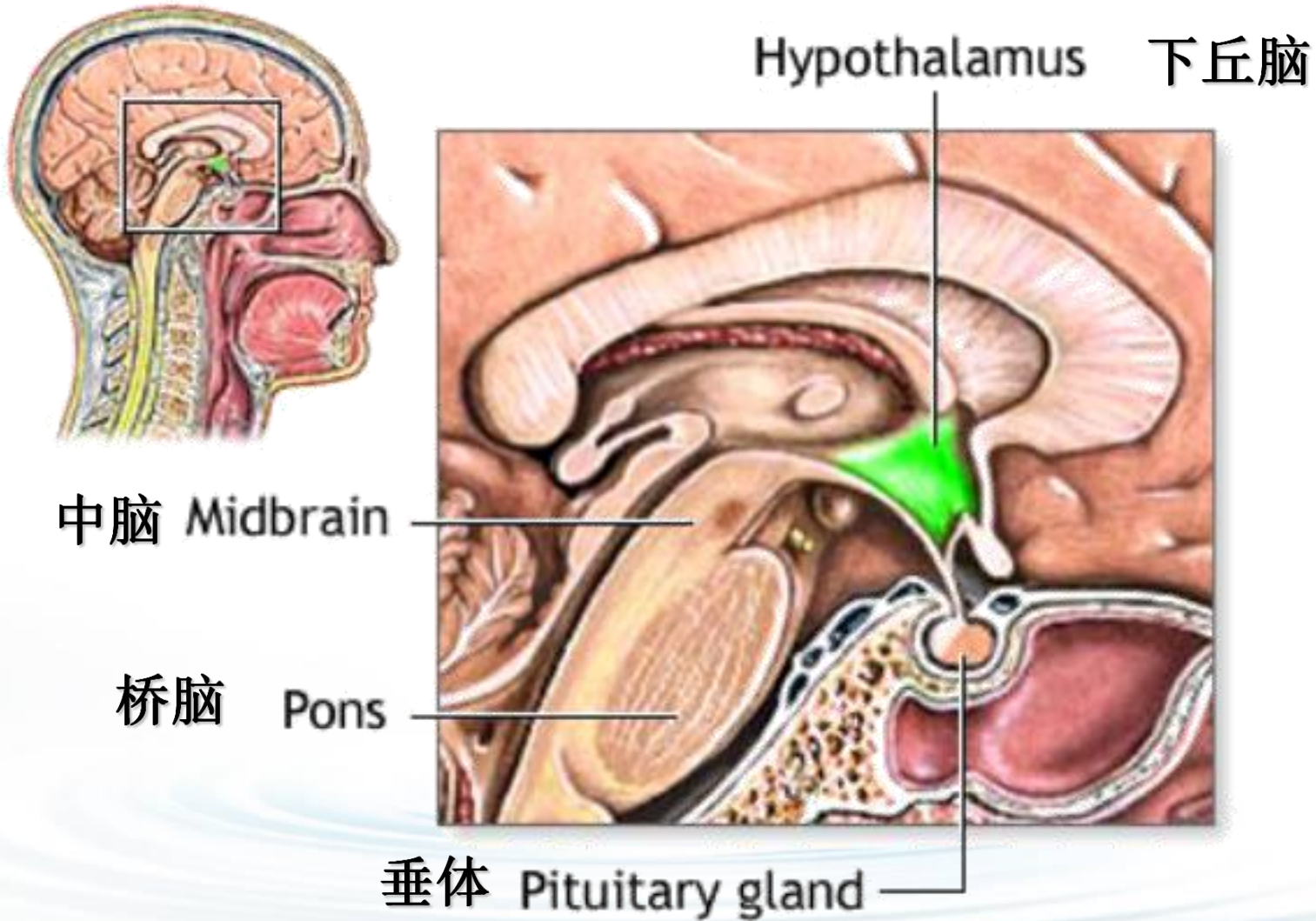
组织学与解剖



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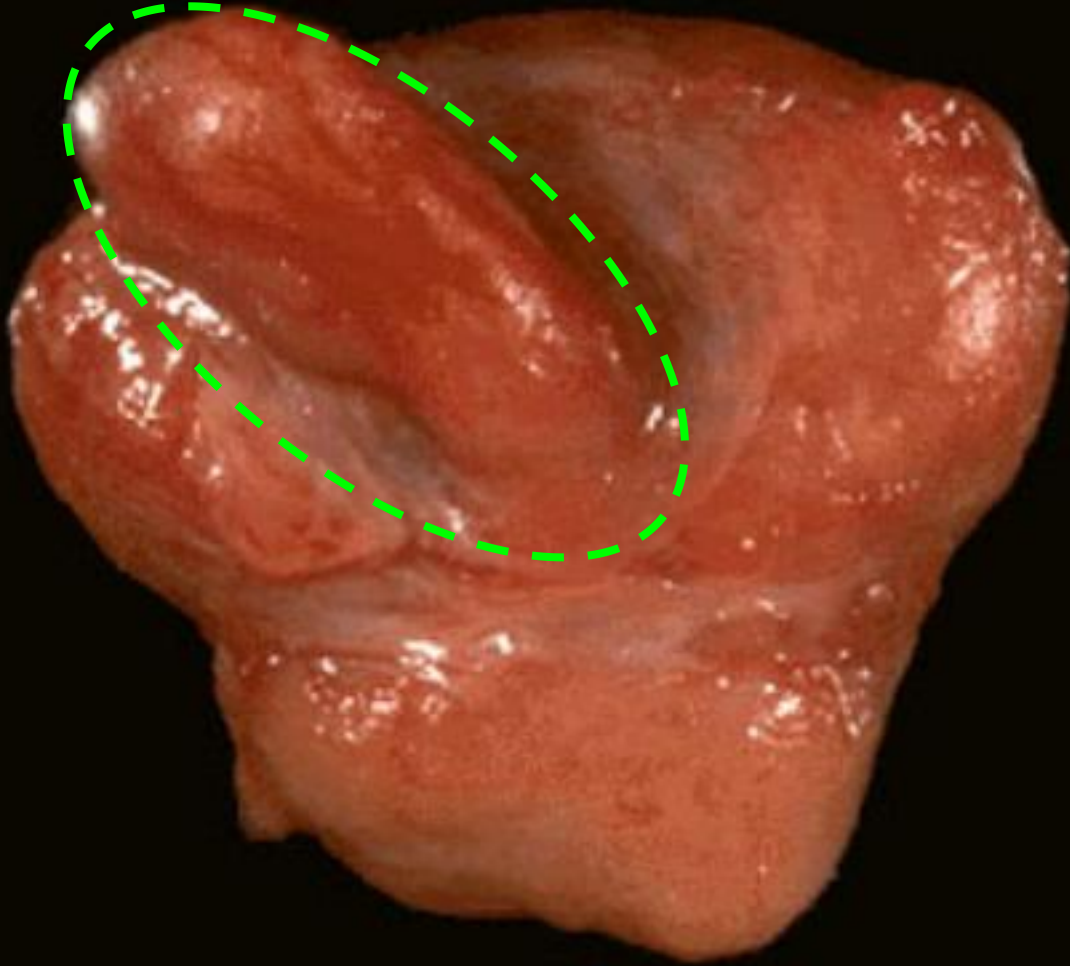
Hypothalamus -Pituitary



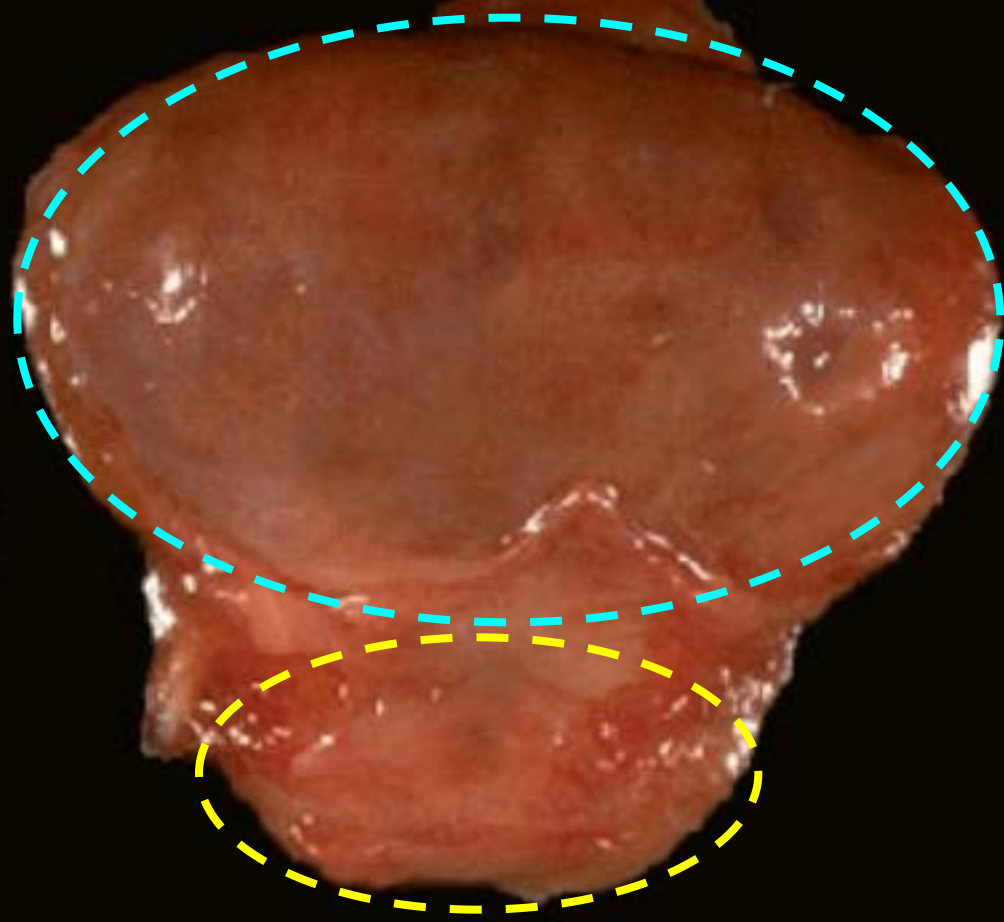
1 cm



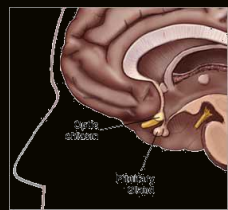
垂体柄



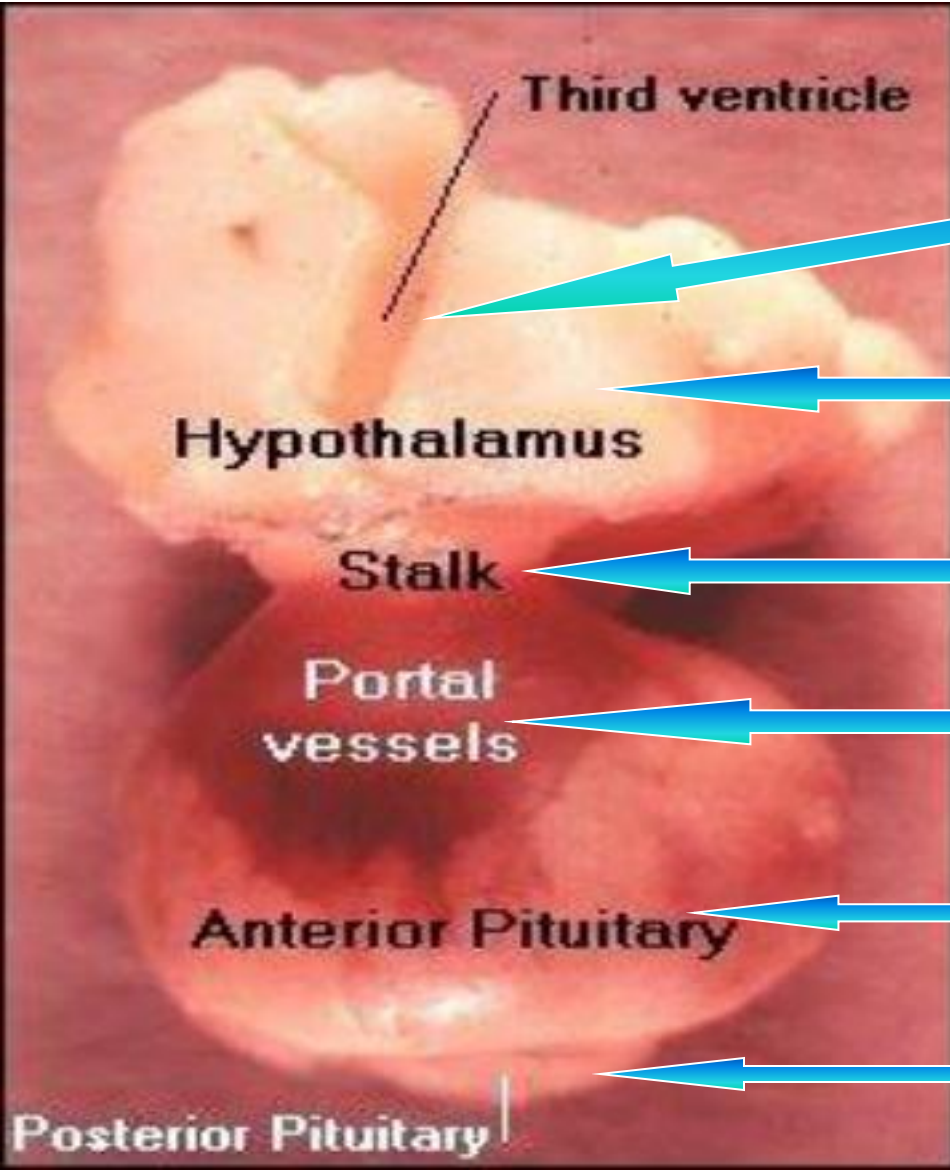
Anterior Pituitary (腺垂体)



Posterior Pituitary (神经垂体)



Pituitary Anatomy



Third ventricle

Third ventricle 第三脑室

Hypothalamus

Hypothalamus 下丘脑

Stalk

stalk hypophysial 垂体柄

Portal vessels

Portal Vessels 门脉

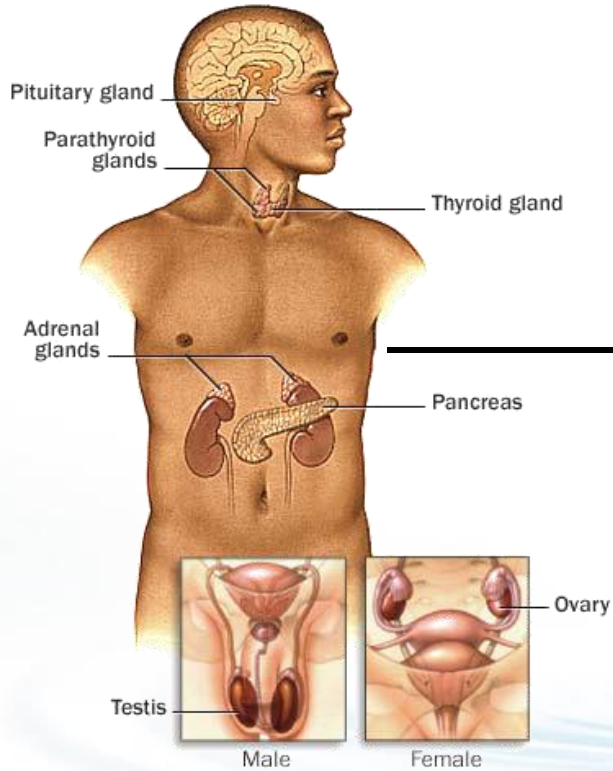
Anterior Pituitary

Anterior Pituitary 垂体前叶

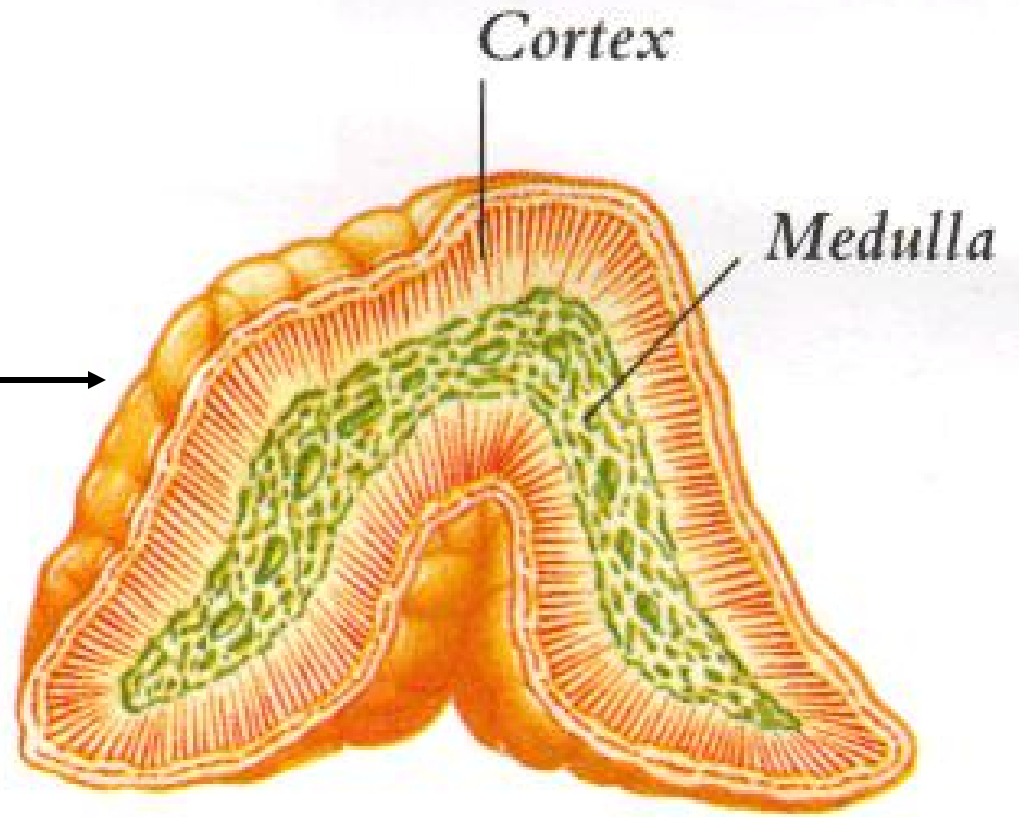
Posterior Pituitary

Posterior Pituitary 垂体后叶

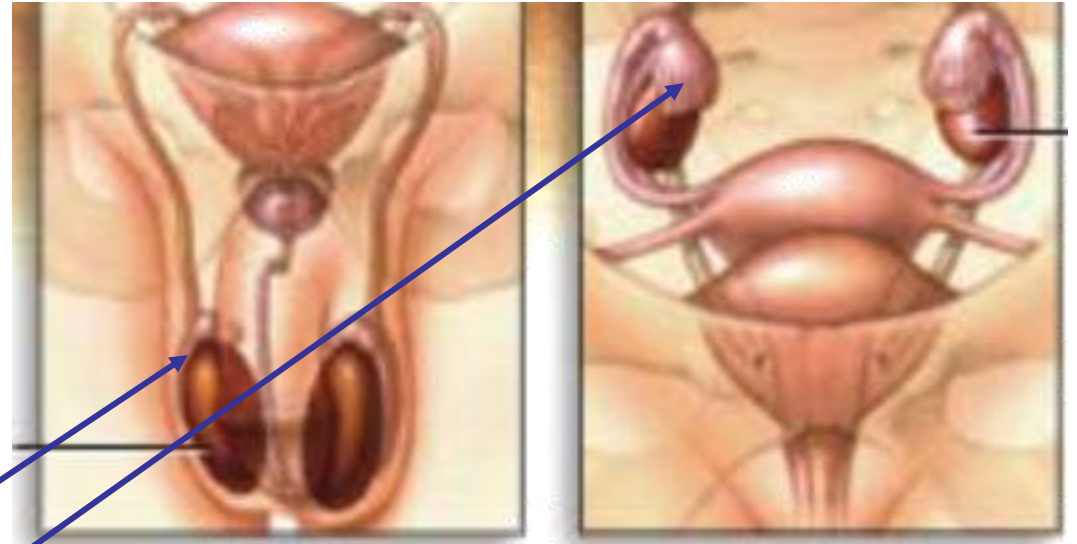
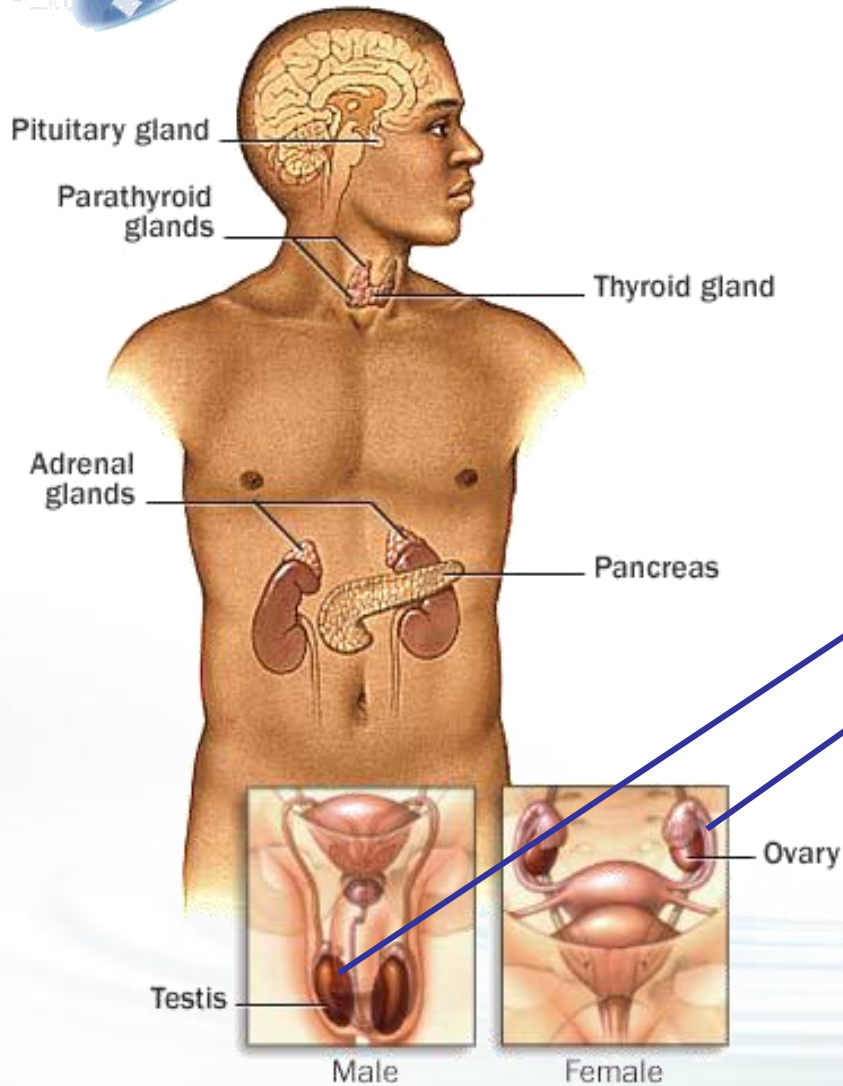
Adrenal Gland: 肾上腺



Adrenal glands

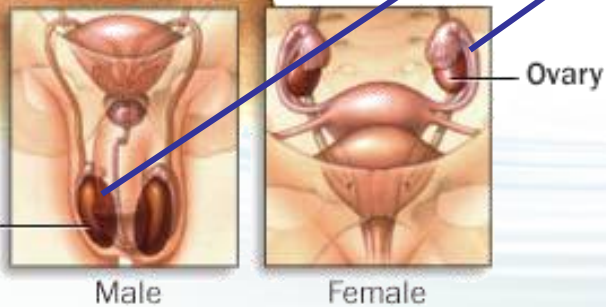


Gonads: 性腺



testis

ovary



Testis

Ovary

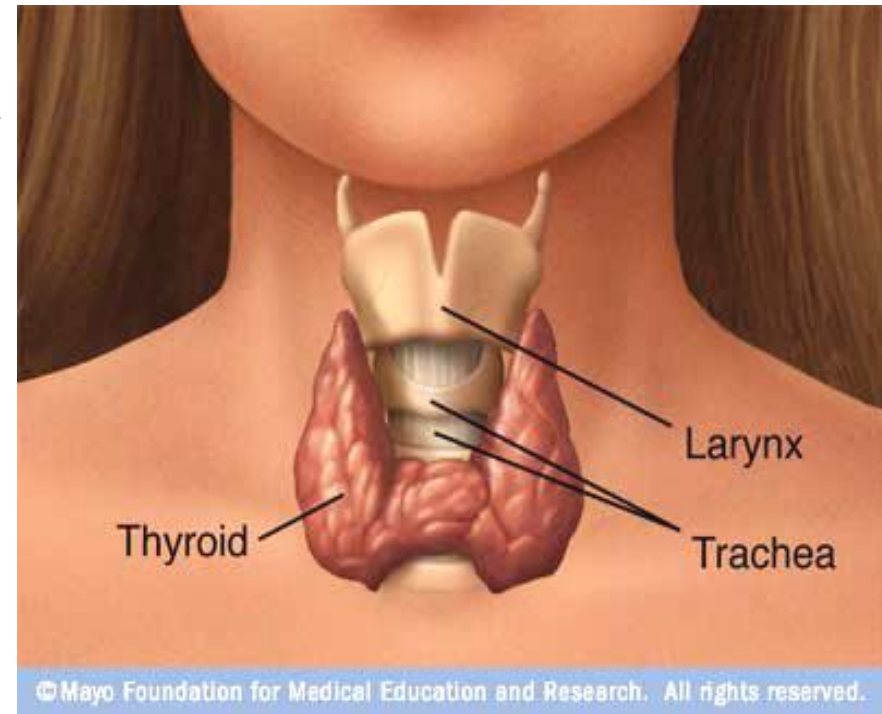
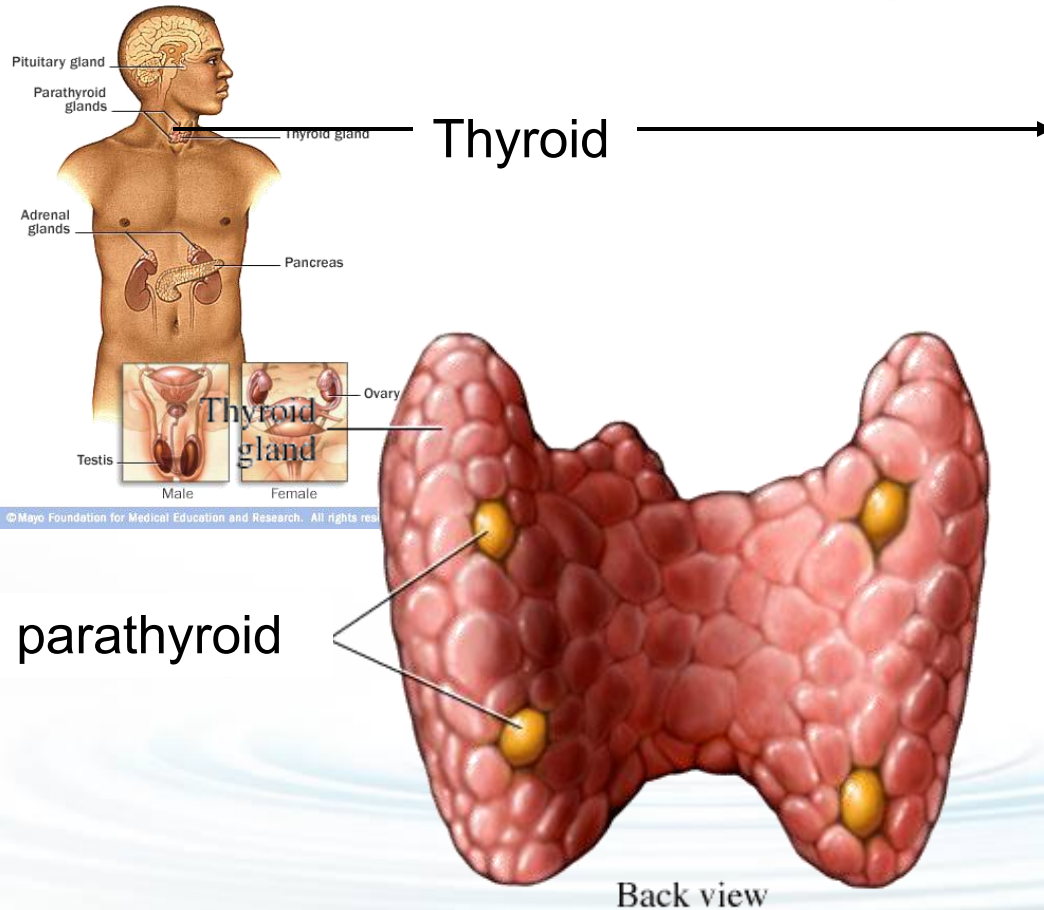
Male

Female

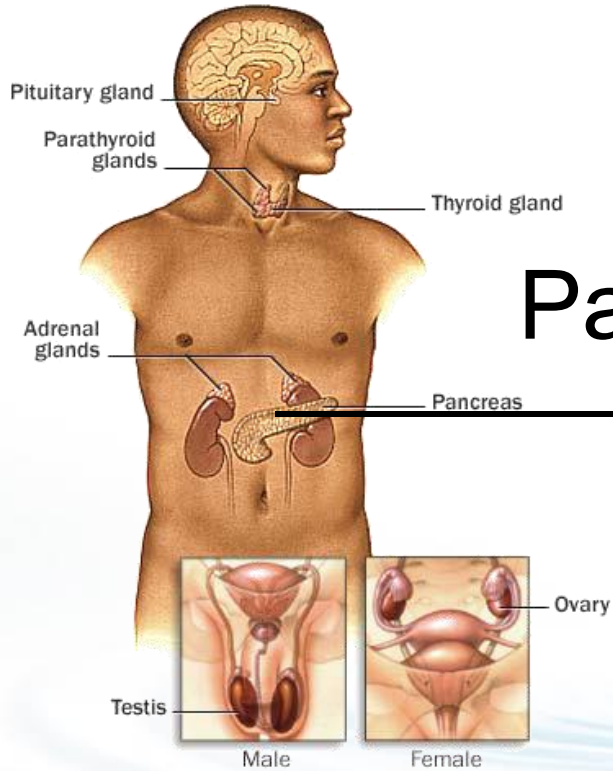
The Endocrine System

Anatomy and Histology

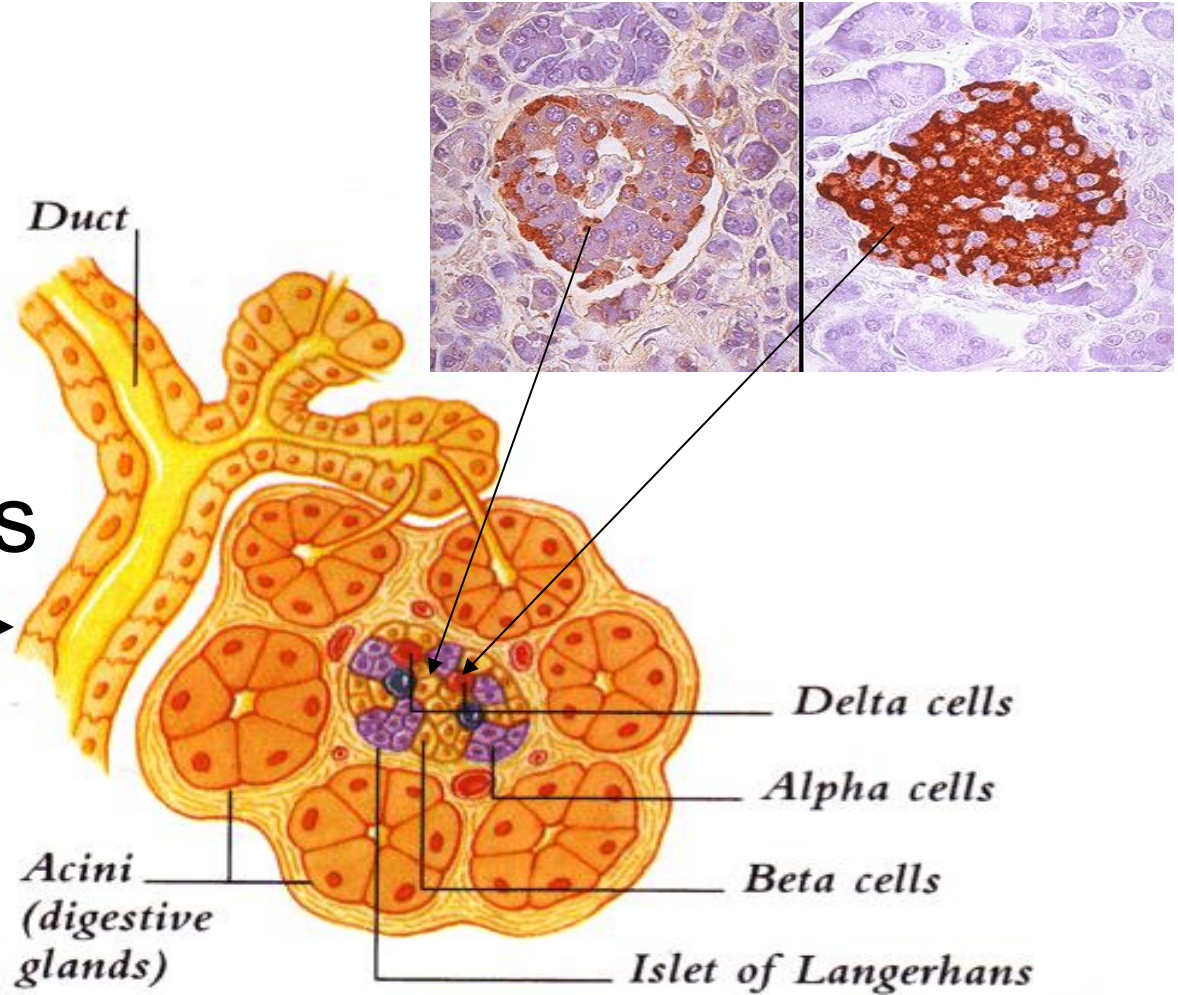
组织学与解剖



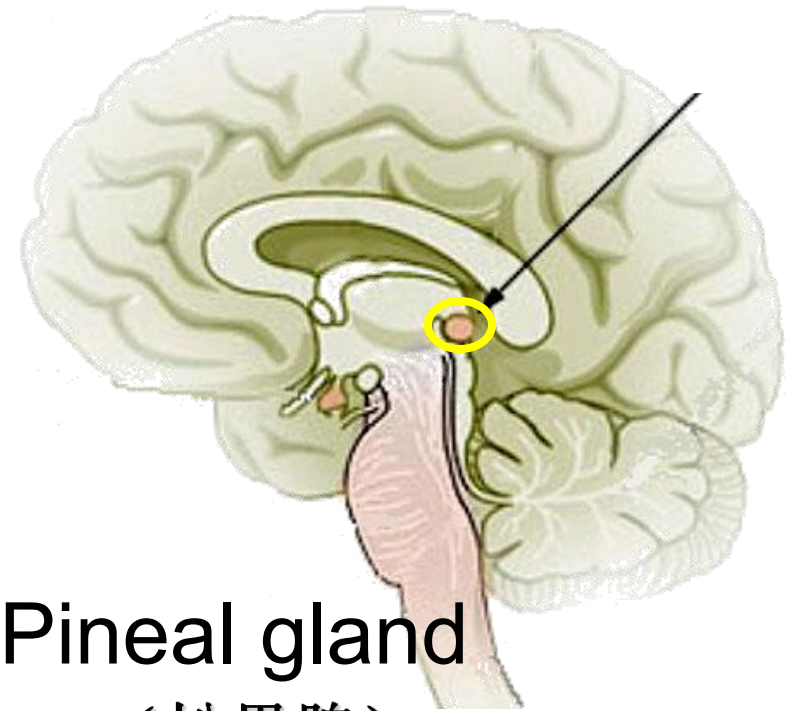
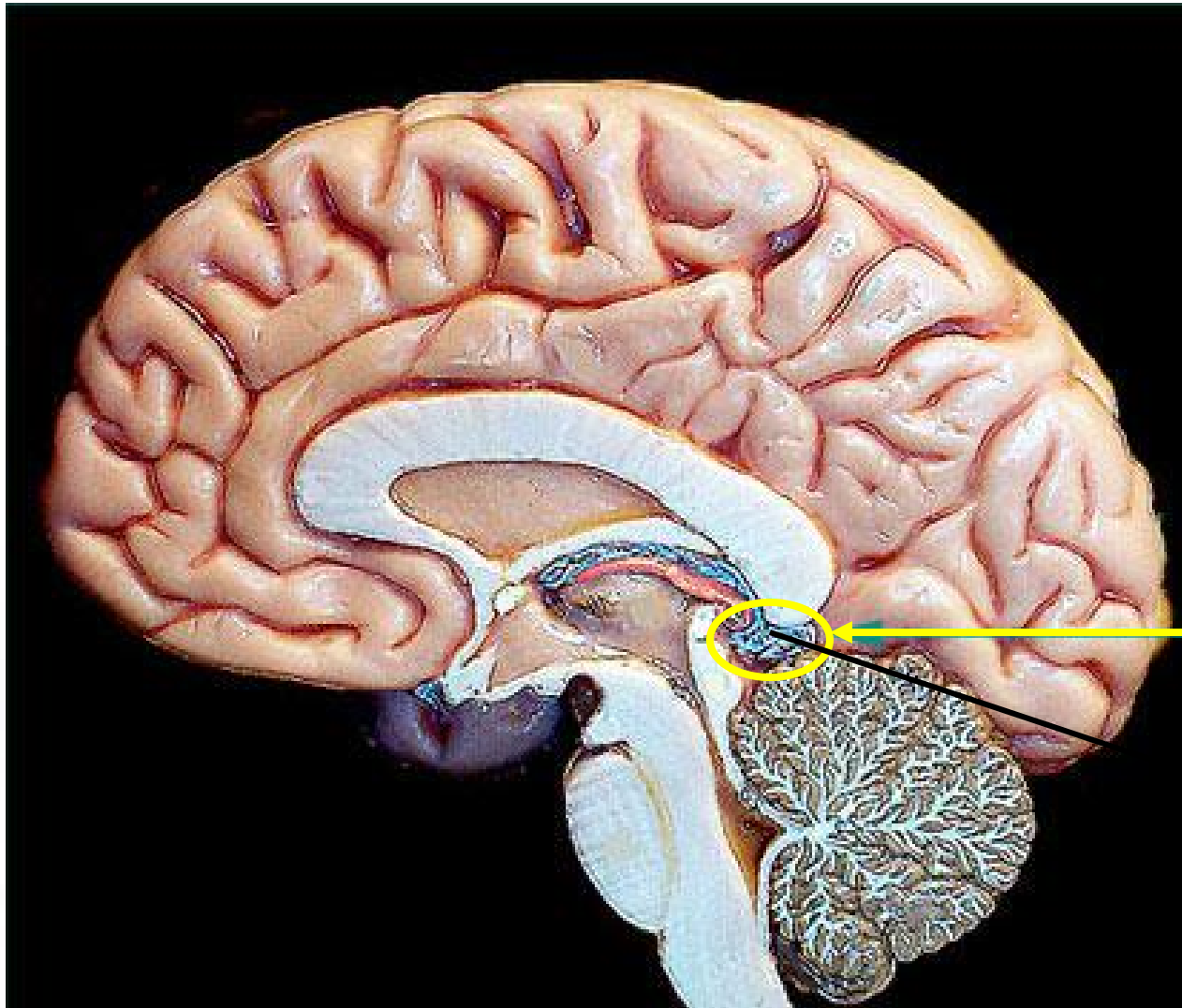
Pancreas: 胰腺



Pancreas



Pineal gland—松果腺



Pineal gland
(松果腺)

Melatonin
(褪黑素)

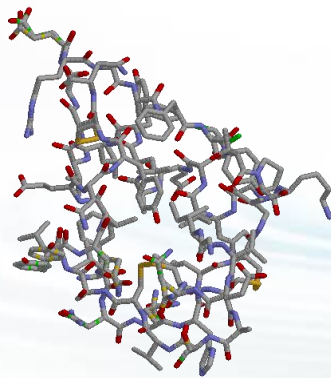
Birth of Endocrinology 内分泌学的诞生

- 1、Bayliss and Starling found secretin which declared the birth of endocrinology and created the word hormone at the same time.
- 2、Aldrich discovered adnephryn in 1901, Banting and Best extracted insulin sterling in 1922.
- 3、Chemical constitution of many kinds of hormone had been illuminated one after another in 20 century, such as Li ZuoHao determin the constitution of growth hormone in 1966.
- 4、Rosalyn Yalow et al developed the **Radioimmunoassay** (RIA) technology in 1950s. In 1977, yalow received the Nobel Prize in Medicine for the development of the RIA.

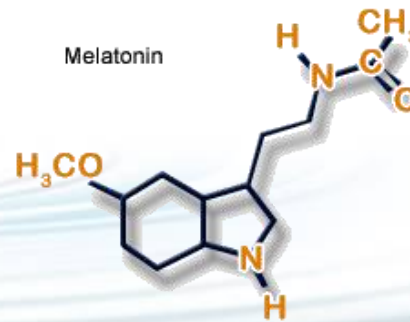
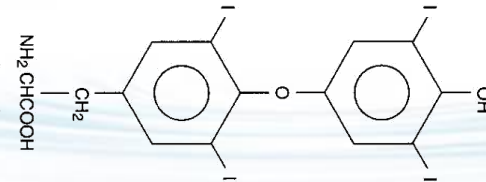


Hormone Category 激素分类

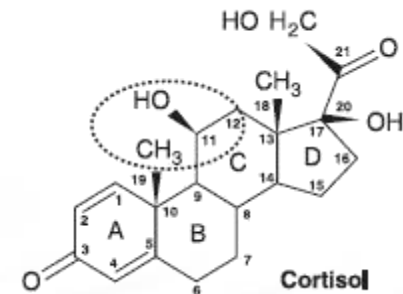
1. Peptide hormone 肽类激素: parathyroid hormone, insulin, calcitonin
2. Amino acids hormone 氨基酸激素: thyroid hormones
3. Amine hormone 胺类激素: adrenaline, noradrenalin, dopamine, melatonin
4. Steroid hormone 甾体类固醇激素: sexual hormone, mineralocorticoid hormone, glucocorticoid, activity vit D₃



Thyroxine



Melatonin



Cortisol



Hormone Releasing Rhythm

激素分泌节律

- ◆ **Circadian**昼夜节律: Rhythms that last about a day.

Such as :

ACTH/Cortisol/Prolactin/GH /Gonadotropins

- ◆ **Ultradian**超日节律 : Rhythms that are shorter than a day
(Pulsatile脉冲)

Such as: GnRH / CRH

- ◆ **Infradian**月节律: Rhythms that are longer than a day.

Such as: menstrual cycle(月经周期)



Hormone Releasing Rhythm

circadian rhythms: 昼夜节律

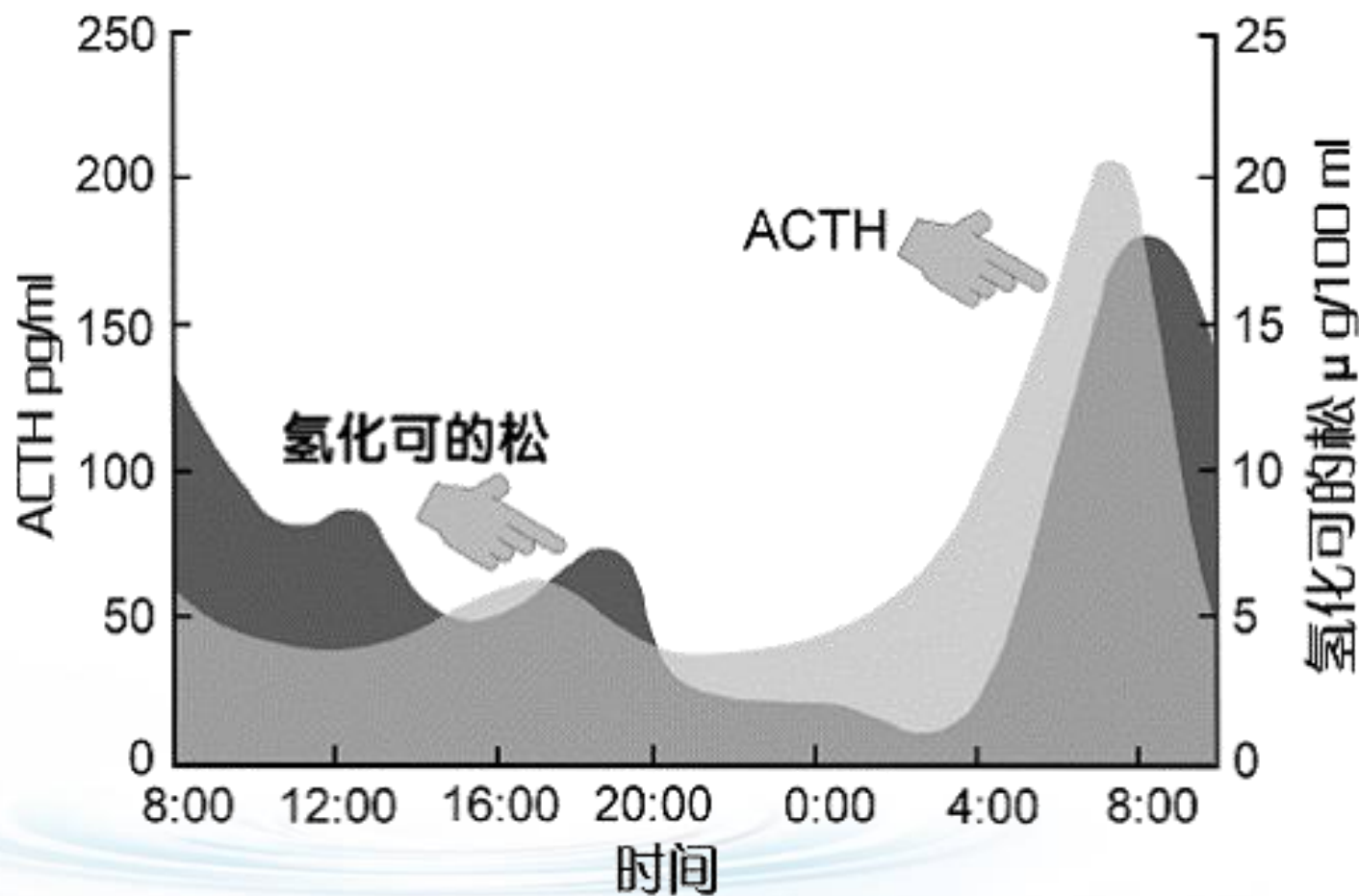
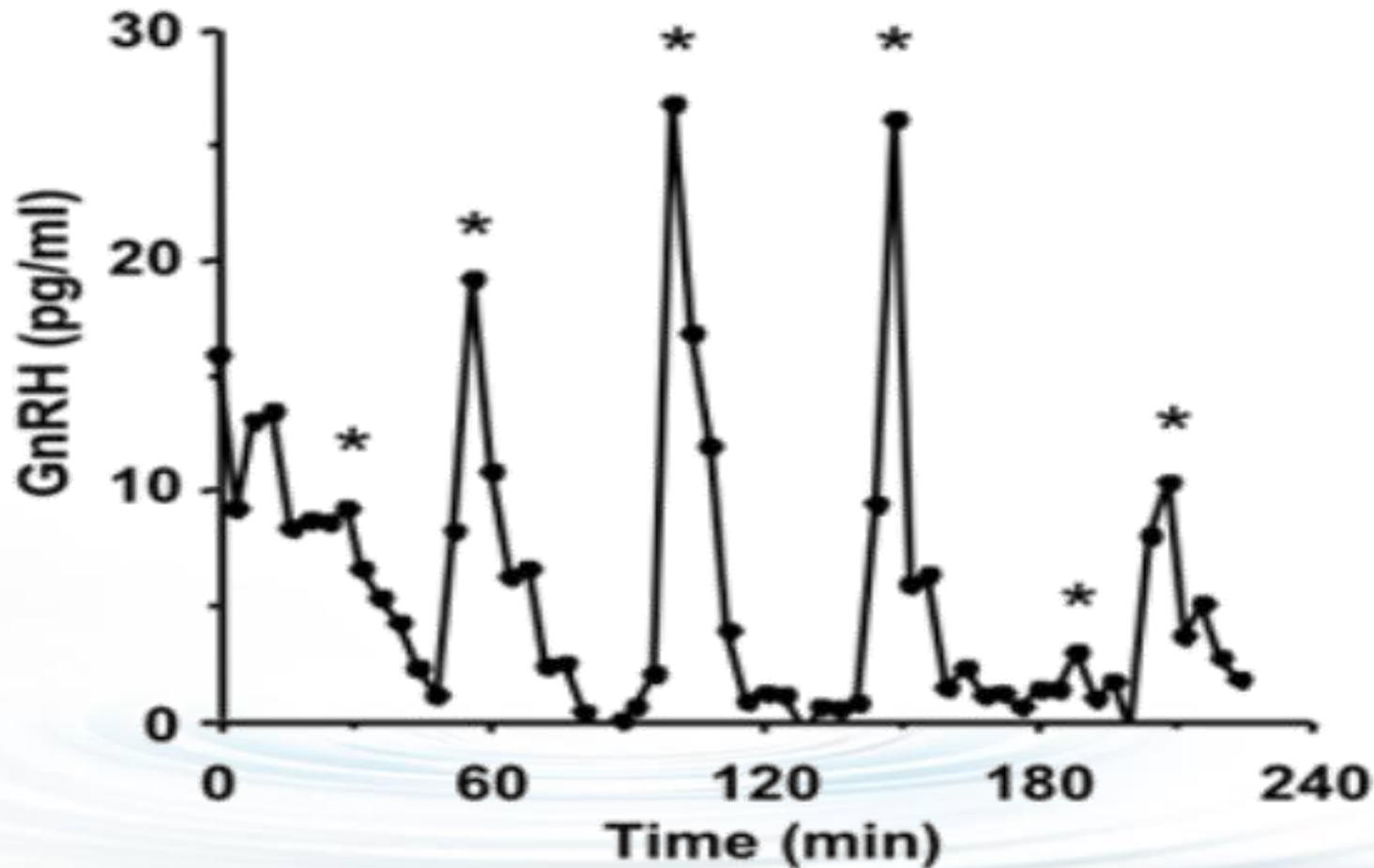


图 30-3 氢化可的松和促肾上腺皮质激素 (ACTH) 的昼夜节律性变化

Hormone Releasing Rhythm

Pulsatile Rhythm: 脉冲节律



(A) Pulsatile GnRH secretion from cultures of GT1-1 cells.

How to Regulate The Hormone Releasing?

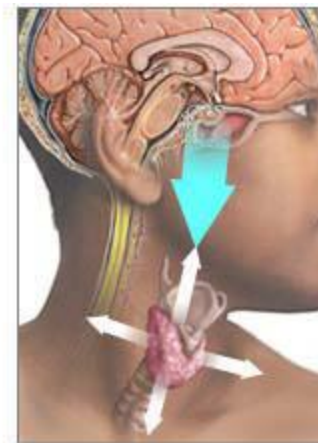
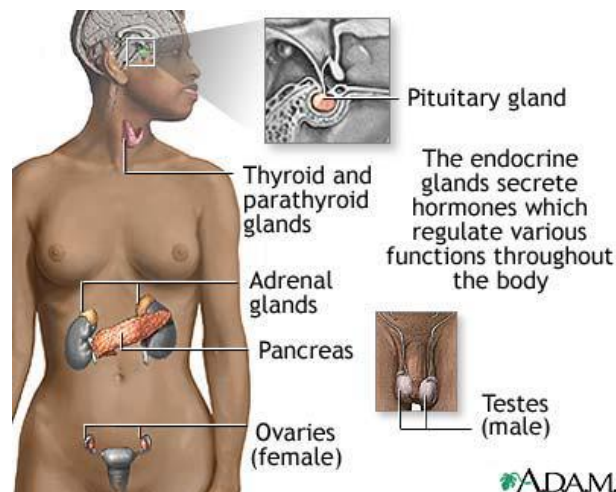
TWO CONCEPTION

1. Hypothalamic-Pituitary-Endocrine Axis

下丘脑—垂体—内分泌腺轴

2. Feedback loop: negative and positive feedback

反馈环：负反馈和正反馈



Primary hypothyroidism: thyroid can't produce amount of hormones pituitary calls for



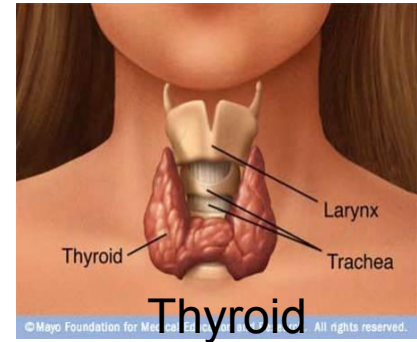
Secondary hypothyroidism: thyroid isn't being stimulated by pituitary to produce hormones

Hypothalamic-Pituitary Axis

下丘脑-垂体-内分泌腺轴

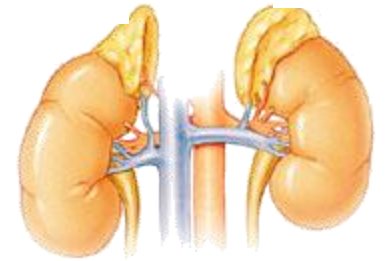
1. Hypothalamic-Pituitary-Thyroid Axis

下丘脑-垂体-甲状腺轴



2. Hypothalamic-Pituitary-Adrenal Axis

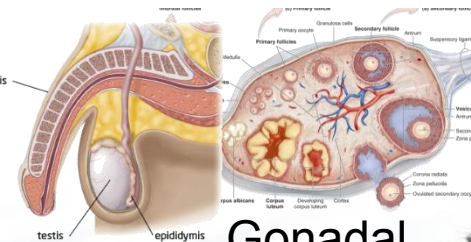
下丘脑-垂体-肾上腺轴



Adrenal

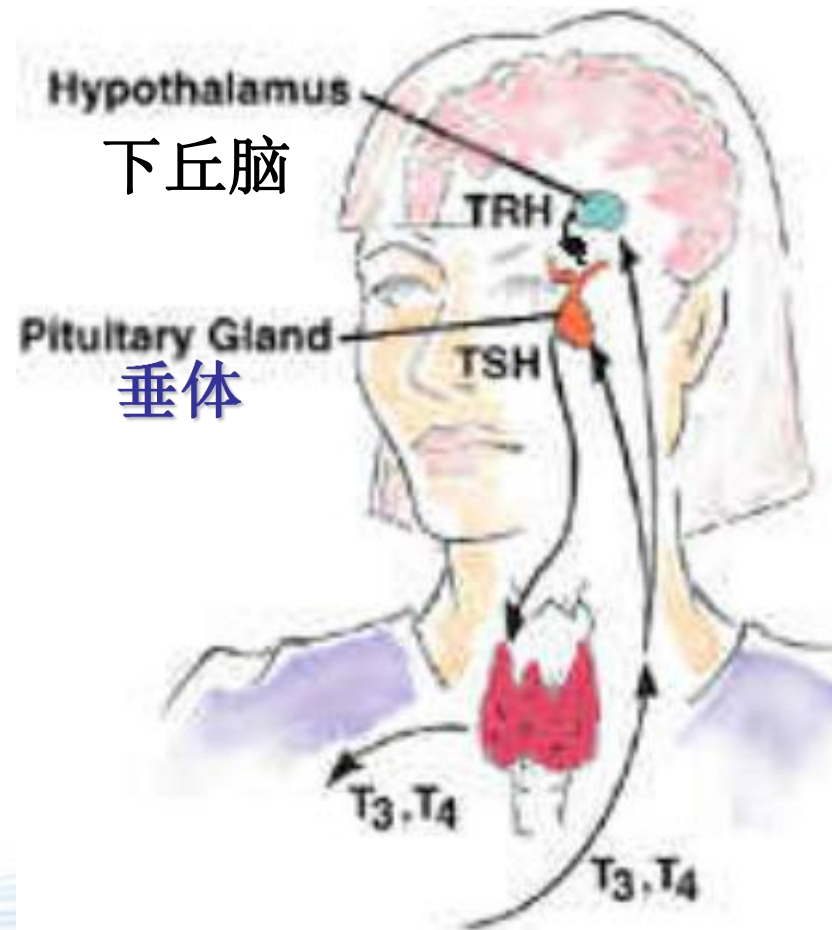
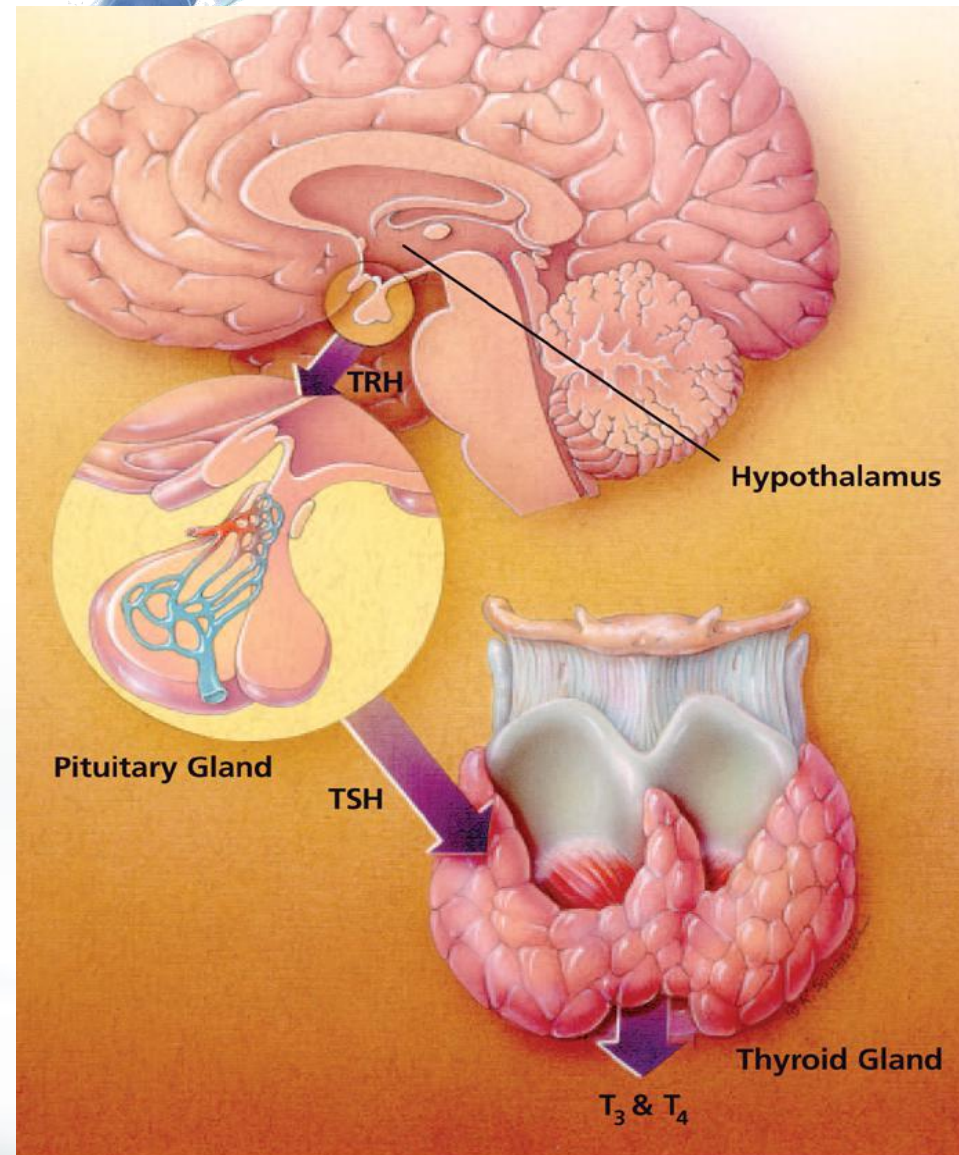
3. Hypothalamic-Pituitary-Gonadal Axis

下丘脑-垂体-性腺轴

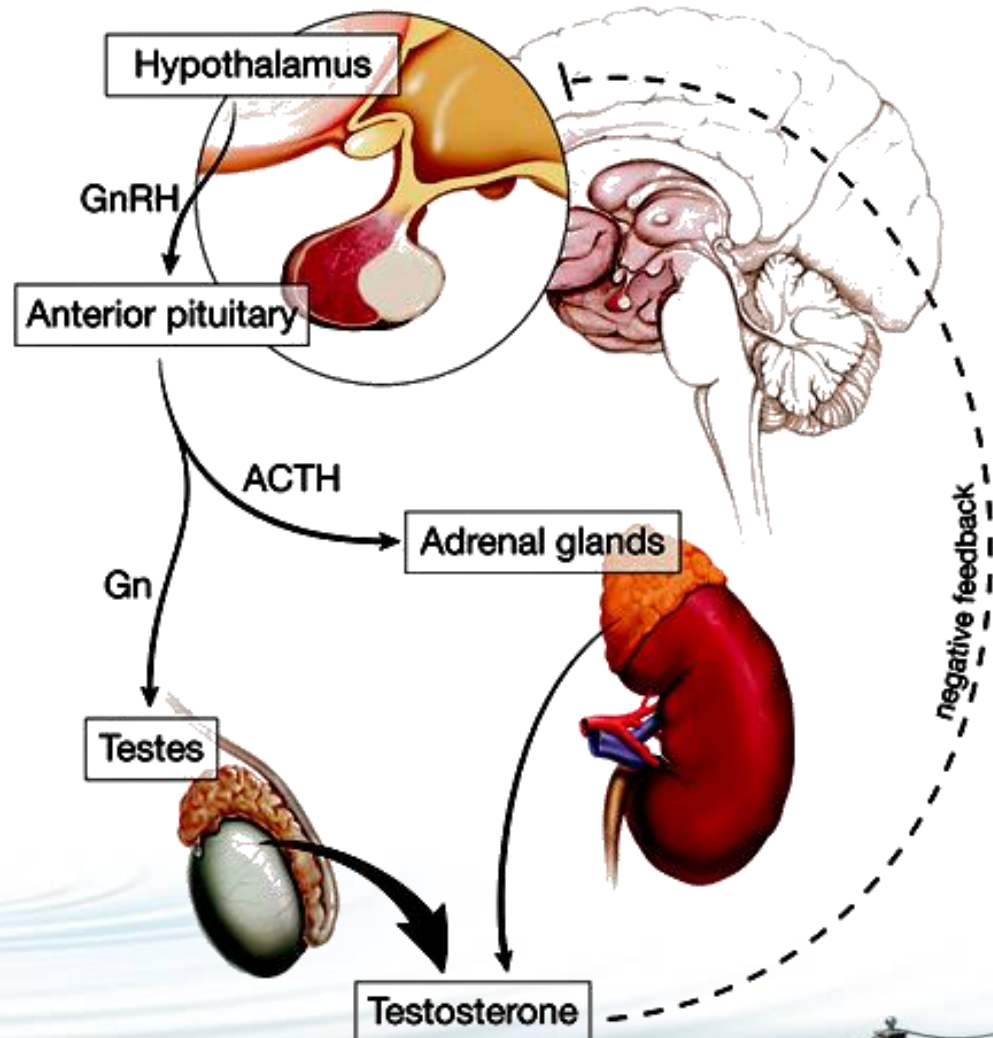
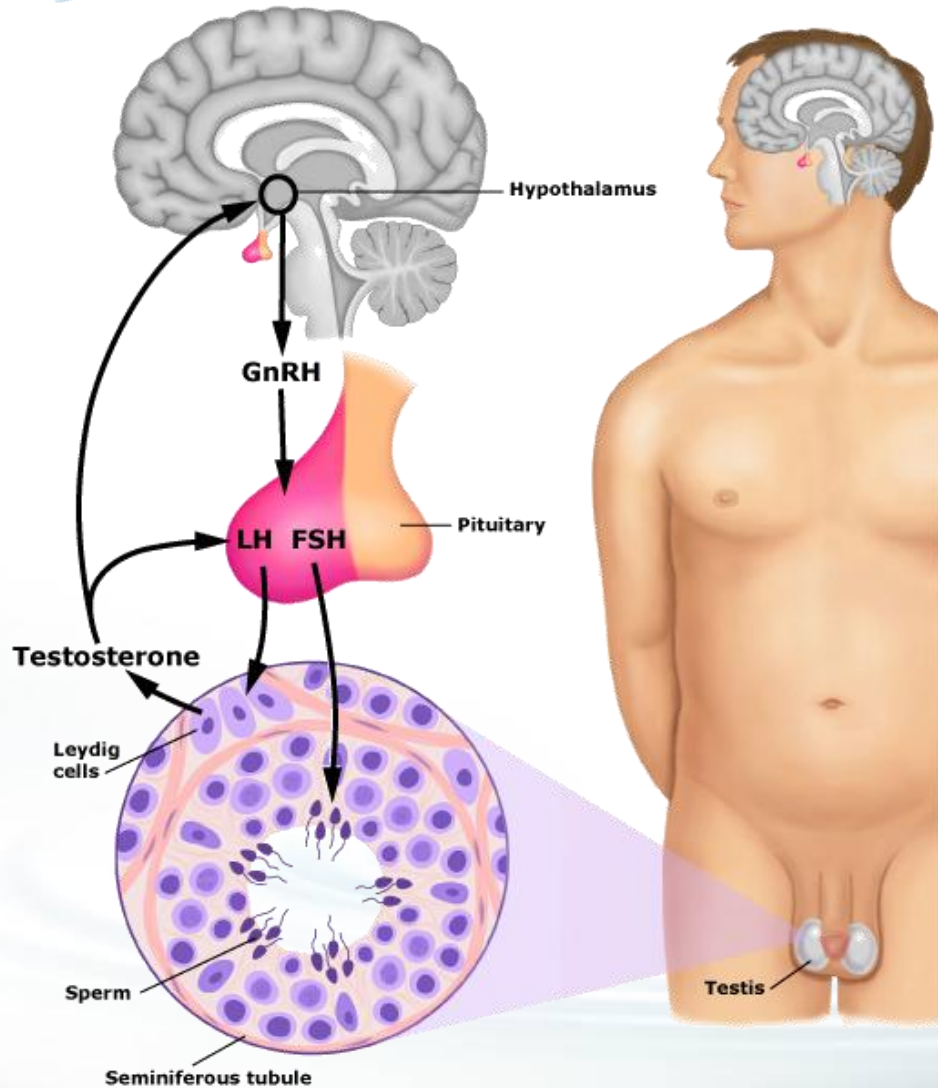


Hypothalamic-Pituitary-Thyroid Axis

下丘脑—垂体—甲状腺轴



Hypothalamic-Pituitary-Gonadal and Adrenal Axis



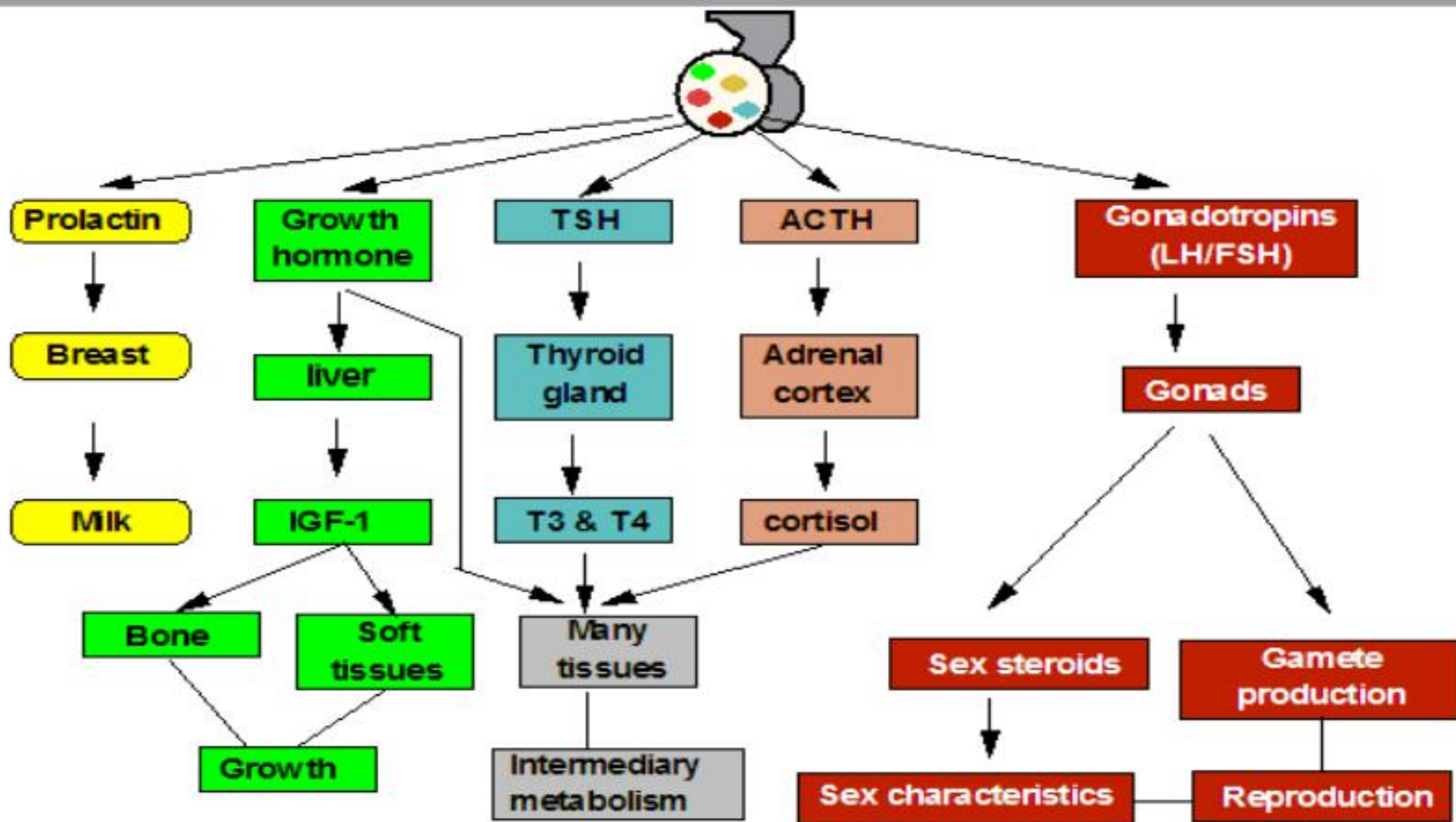
A circular inset image in the top-left corner shows laboratory glassware including a beaker with blue liquid, a test tube with red liquid, and a pipette.

Hypothalamic Releasing/Inhibiting Hormone

下丘脑释放/抑制激素

Hypothalamic RH	Target	Action
Dopamine	Prolactin	Inhibits
LHRH/GnRH	LH and FSH	Stimulates
Somatostatin	GH	Inhibits
GHRH	GH	Stimulates
CRH	ACTH	Stimulates
TRH	Thyroid Hormone	Stimulates

Overview of anterior pituitary hormone functions



Feedback loop of Endocrine system : 反馈回路

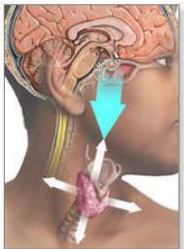
1、 Feedback Regulation of Endocrine System

Feedback regulation relation exist in hypothalamus, pituitary and target gland

2. Negative feedback and positive feedback regulation

3. Regulation between hormone and body fluid

(glucose — insulin, calcium — parathyroid hormone)



Primary hypothyroidism:
thyroid can't produce
amount of hormones
pituitary calls for



Secondary hypothyroidism:
thyroid isn't being
stimulated by pituitary
to produce hormones

Diseases of Endocrine System

内分泌系统疾病

◆ According to the function: Hypo- 低 Hyper高-- Normal正常

◆ According to the Position: Primary 原发, Secondary 继发, Tertiary 三发

1. Endocrine hypofunction

- a. Destruction 破坏
- b. Composition defection 构成缺陷
- c. Other diseases 其他疾病

2. Endocrine hyperfunction

- a. tumor 肿瘤
- b. multiple endocrine neoplasia 多发性内分泌瘤
- c. ectopic endocrine syndrome 异位内分泌综合症
- d. iatrogenic 医源性
- e. abnormal hormone metabolism (liver disease)

3. Hormonal sensitivity impairment 激素敏感性受损

Hormonal resistance 激素抵抗

Diagnosis:诊断



1. Functional diagnosis:功能诊断

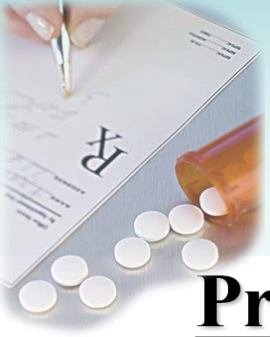
- ◆ Evidences of metabolic disorder 代谢紊乱的证据
- ◆ Measurement of hormone 激素测定
- ◆ Dynamic experiment 动态功能实验

2. Pathological diagnosis:病理诊断

- ◆ Imageology examination 影像检查
- ◆ Radionuclide examination 放射性核素检查
- ◆ Ultrasonic inspection 超声检查
- ◆ Cytological examination, 细胞学检查
- ◆ Venous duct 静脉导管

3. Etiological diagnosis: 病因诊断

- ◆ Autoantibody 自身抗体
- ◆ Chromosome examination 染色体检查
- ◆ HLA identification HLA 鉴定



Treatment: 治疗

Prevention 预防

- 1) Iodized salt 碘盐预防碘缺乏疾病
- 2) Education 教育如：糖尿病

Hyperfunction 功能亢进

- 1) Operation 手术
- 2) Radiation 放射
- 3) Medicine 内科

Hypofunction 功能减退

- 1) Hormone replacement therapy 激素替代
- 2) Endocrine tissue transplantation 内分泌组织移植

附件一专业词汇

内分泌总论

(Endocrinology: General introduction)

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

□ Growth hormone

■ Too much:

- Before puberty: gigantism

- After puberty: acromegaly

■ Too less:

- Dwarfism

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

□ Prolactin

■ Too much:

- Hyperprolactinemia 高催乳素血症
- Prolactinoma 泌乳素瘤
- Galactorrhea 溢乳
- Amenorrhea 闭经
- Gynecomastia 男子女性型乳房

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

□ ACTH

■ Too much:

- Cushing disease
- Cushing syndrome
- Moon face
- Acne 痤疮, 粉刺
- Buffalo hump 水牛背
- Amenorrhea 闭经
- Purple abdominal striae 腹部紫纹

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

□ ADH (Antidiuretic hormone)

■ Too much:

- SIADH (Syndrome of inappropriate antidiuretic hormone secretion) 抗利尿激素分泌不当综合症
- Hyponatremia

■ Too less

- DI (Diabetes insipidus) 尿崩症
- Urine osmolarity 尿渗
- Hypernatremia

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

- Panhypopituitarism (全垂体功能减退症)
- Pituitary apoplexy (垂体卒中)
- Sheehan's syndrome
- Hypogonadism (性腺机能减退)

Hypothalamus & Pituitary gland (下丘脑 & 垂体)

□ Eating disorder

- Anorexia nervosa 神经性厌食症
- Bulimia 易饥
- Nausea 恶心
- Vomiting 呕吐
- Acid regurgitation 反酸
- Abdominal pain
- Abdominal fullness
- Early satiety

Thyroid gland (甲状腺)

- T3
- T4
- TSH
- Free T4

Thyroid gland

□ Hyperthyroidism

- Exophthalmos 突眼
- Palpitation 心悸
- Tachycardia 心悸亢进
- Hand tremor 手抖
- Graves' disease
- Thyroid storm 甲状腺危象
- Antithyroid drug
- Thyroidectomy 甲状腺切除

Thyroid gland

□ Hypothyroidism

- Hashimoto's thyroiditis 桥本氏甲状腺炎
- Autoimmune thyroiditis
- Autoantibody
- Myxedema coma 粘液(性)水肿
- Cretinism 呆小病
- Thyroxine 甲状腺素

Thyroid gland

- Goiter甲状腺肿
 - Diffuse goiter弥漫性甲状腺肿
 - Nodular goiter结节性甲状腺肿
 - Multinodular goiter多结节性甲状腺肿
 - Thyroid cyst甲状腺囊肿

Thyroid gland

- Thyroid sonography 甲状腺超声检查
 - =Thyroid echo
- Thyroid puncture 甲状腺穿刺
- Fine needle aspiration 细针抽吸
- Thyroid scan 甲状腺扫描

Thyroid gland

- Thyroid cancer (carcinoma)
 - Papillary cancer 乳头状癌
 - Follicular neoplasm 滤泡状癌
 - Follicular adenoma 滤泡性腺瘤
 - Follicular cancer 滤泡状癌
 - Medullary cancer 髓样癌
 - Anaplastic cancer 未分化癌
- Radioactive iodide 放射性碘
- I-131 (Iodide one-thirty-one) 碘131

Parathyroid gland

- Hyperparathyroidism
 - Hypercalcemia
 - Hypophosphatemia
- Hypoparathyroidism
 - Hypocalcemia
 - Hyperphosphatemia
 - Chvostek's sign
 - Trousseau's sign
 - Tetany手足搐搦


Adrenal gland

□ Cortex

- Cushing syndrome
- Conn's disease
- Addison's disease
 - =Primary adrenal insufficiency
- Iatrogenic Cushing syndrome

□ Medulla

- Pheochromocytoma嗜铬细胞瘤

The background features a blue-to-white gradient with a central bright white area. Surrounding this area are numerous dark blue silhouettes of people engaged in various sports and physical activities, such as running, jumping, cycling, and playing ball games.

谢谢!