ENDOCRINE TESTING

Kenneth Alonso, MD, FACP

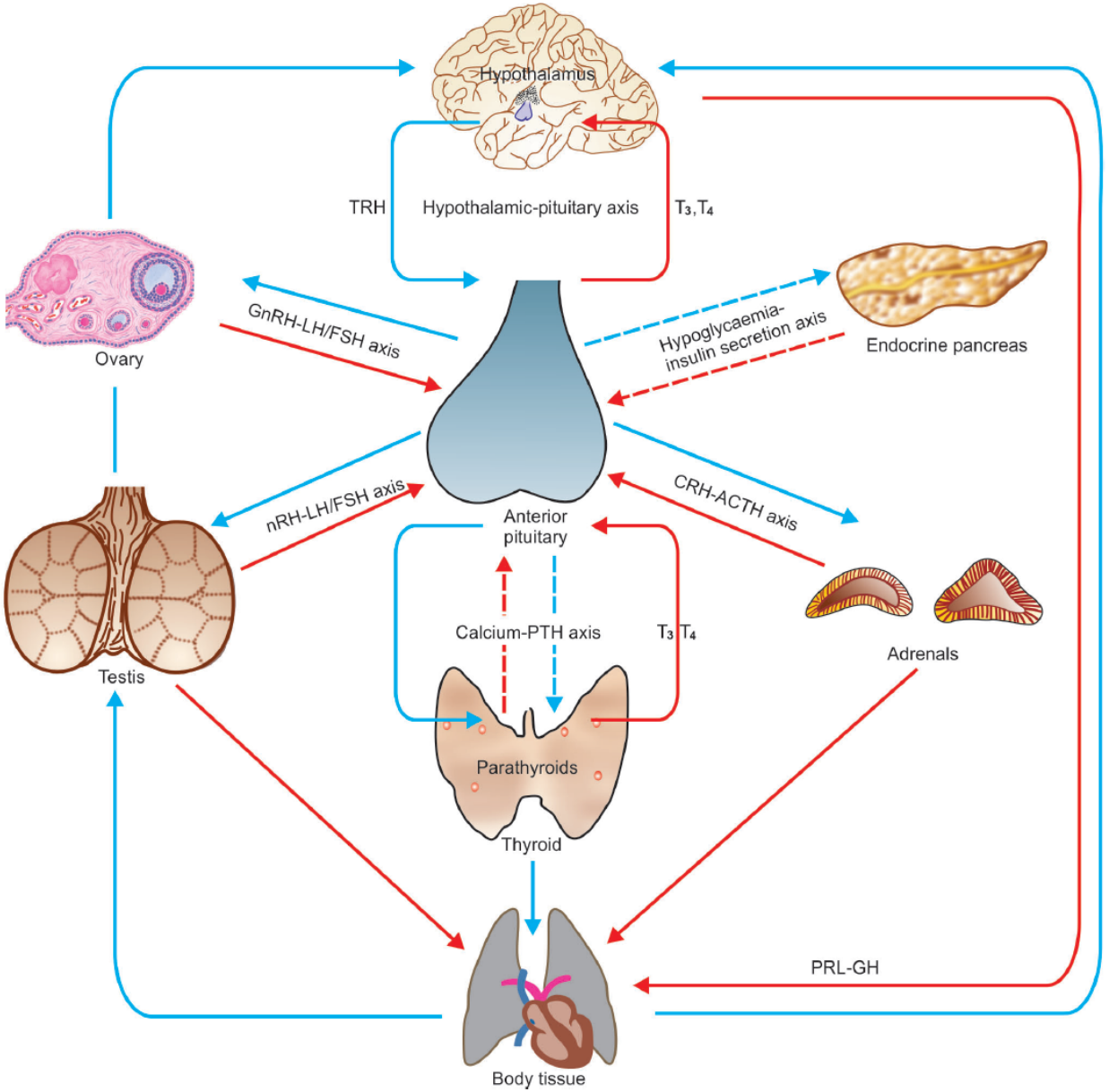


Figure 25.1 Endocrine organs and the presence of feedback controls. Both positive and negative feedback controls exist for each endocrine gland having a regulating (R) and stimulating (S) hormone. Those acting through hypothalamic-pituitary axis include: thyroid hormones on TRH-TSH axis, cortisol on CRH-ACTH axis, gonadal steroids on GnRH-LH/FSH axis and insulin-like GH on GHRH-GH axis. Those independent of pituitary control (shown by interrupted arrows) have also feedback controls by calcium on PTH, and hypoglycaemia on insulin release by pancreatic islets.

Mohan, H, Textbook of Pathology, 7th ed., Health Science Publishers. New Delhi. 2015.

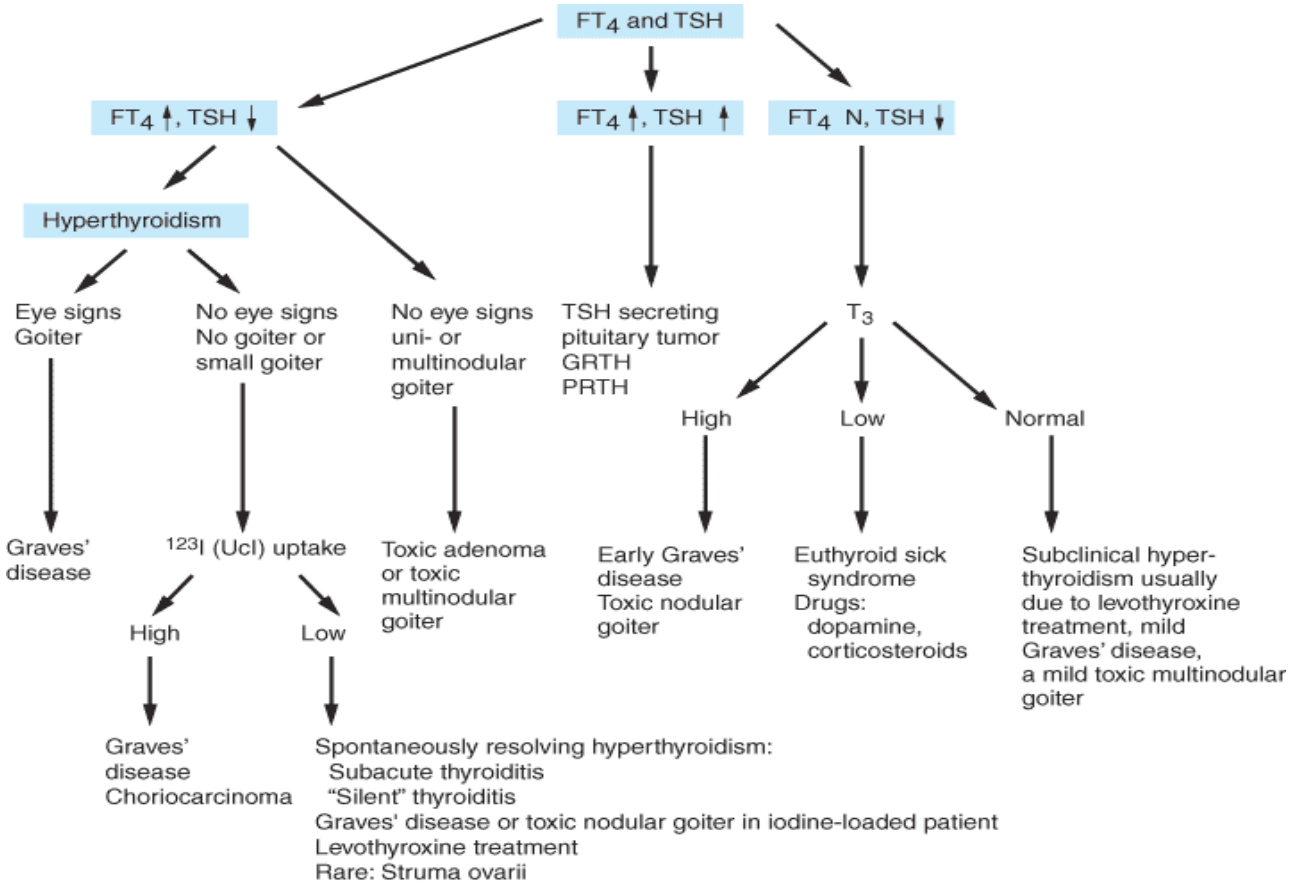
Routine thyroid testing

- Patients with a family history of thyroid disease
- Asymptomatic patients older than 60
- Perimenopausal women
- Pregnant women older than 35 as well as those post-partum
- Diabetics
- Patients with autoimmune disease

Routine thyroid testing

- Patients with new onset of dementia or psychiatric disease
- Patients with new onset of heart disease
- Patients with obstructive sleep apnea
- Patients on Lithium therapy [ion uncouples receptor from its G-protein]

Diagnostic strategy



TSH is secreted in a pulsatile fashion with highest levels at midnight.

Fig. 8-37 Accessed 02/01/2010

Cortisol excess

- 10% of cortisol circulates unbound and is physiologically active.
- Majority is reabsorbed in renal tubules.
- A 24-hour urine free cortisol (UFC) measurement should reflect the integrated cortisol secretion
- Corrected for urine creatinine levels (reflects adequacy of collection).
- Levels may be elevated in depressed patients as well as women with polycystic ovary disease.
- Used for screening for glucocorticoid excess.
- However, a serum cortisol obtained from a sleeping patient at midnight is highly sensitive and specific for glucocorticoid excess.

Cortisol excess

- Administration of 1.0mg dexamethasone followed by determination of an a.m. cortisol level the next day evaluates the hypothalamic-pituitary axis.
- If the morning cortisol is <5ug/dl, the patient does not have adrenal excess.
- Does not suppress adenomas or carcinomas
- Drugs that induce the hepatic enzymatic clearance of dexamethasone reduce plasma dexamethasone concentration (false positive)
- 50% false positive results in women taking oral contraceptives.

Cortisol excess

- Hyperplastic adrenal tissue possesses hormone receptors and will suppress with 2mg dose dexamethasone.
- Following high dose dexamethasone administration (8mg), ACTH and cortisol levels are measured the following morning.
- ACTH not detectable, cortisol minimally affected: proceed to MRI of adrenal.
- ACTH normal or increased, cortisol not suppressed: proceed to MRI of chest.
- ACTH normal or increased, cortisol may be partially suppressed: proceed to MRI of pituitary.

Adrenal steroid biosynthesis

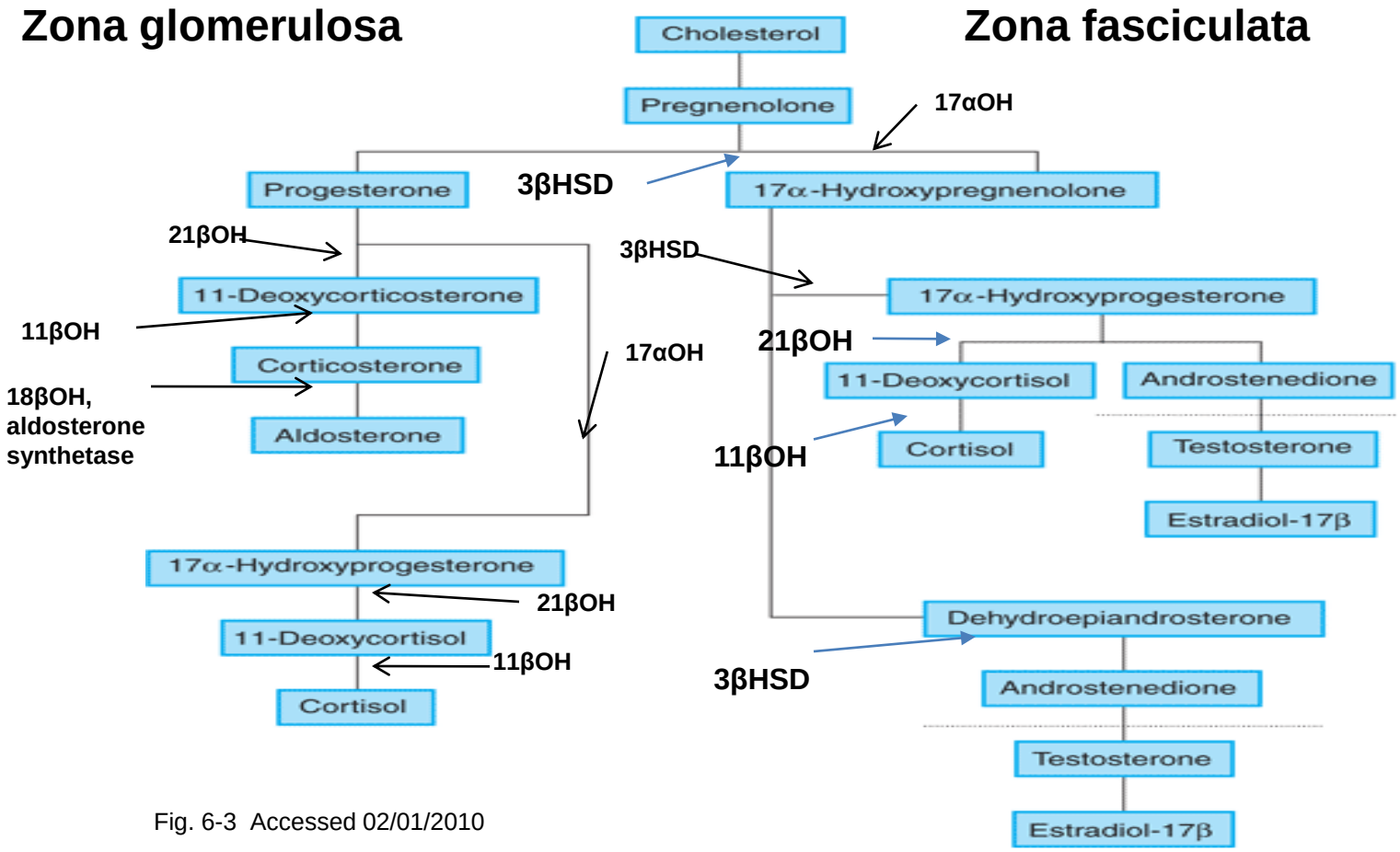


Fig. 6-3 Accessed 02/01/2010

Aldosterone excess

- Aldosterone levels are elevated in 50% of patients with hypertension
- If 18OH-DOC levels elevated on standing, probably bilateral nodular hyperplasia
- 60% of cases
- If 18OH-DOC levels fall on standing, probably solitary adenoma (Conn's syndrome).
- 35% of cases
- <2cm nodules rarely produce visible enlargement
- Generally left-sided
- 67% occur in women
- Ages 30-40 years

Asymptomatic hypercalcemia

- An elevated serum calcium level is often an unsuspected finding .
- High calcium levels probably reflect chronic vitamin D ingestion. (PTH is not elevated.)
- If that is excluded, a work-up for parathyroid disease is necessary.
- Chloride/phosphorous ratio >30 in the fasting patient suggests parathyroid disease.
- Other causes of hypercalcemia include Lithium use, sarcoidosis, as well as Paget's disease of bone.

Symptomatic hypercalcemia

- Symptomatic hypercalcemia is likely a result of malignancy, not parathyroid disease.
- PTH will be low or normal if malignancy.
- (Parathyroid hormone related peptide may be produced by malignancy.)
- QT interval is shortened.

Diagnosis of diabetes

Diagnosis	A1C (percent)	Fasting plasma glucose (FPG)[a]	Oral glucose tolerance test (OGTT)[ab]	Random plasma glucose test (RPG)[a]
Normal	below 5.7	99 or below	139 or below	
Prediabetes	5.7 to 6.4	100 to 125	140 to 199	
Diabetes	6.5 or above	126 or above	200 or above	200 or above

[a]Glucose values are in milligrams per deciliter, or mg/dL.

[b]At 2 hours after drinking 75 grams of glucose. To diagnose gestational diabetes, health care professionals give more glucose to drink and use different numbers as cutoffs.

https://www.niddk.nih.gov/health-information/diabetes/overview/tests-diagnosis