

1. 45 -years old lady with no significant past medical history presented to the clinic .complaining of new onset unintentional weight loss, palpitations, and dry eyes. she noticed that she has bulging eyes ,she came with elevated free T4 in laboratory test ordered by her family doctor .One of the following is **NOT** a possible positive finding in her examination:

- a. Blood pressure of 160\95
- b. Thyroid bruit
- c. Irregular pulse
- d. Systolic flow murmur
- e. Absent deep tendon reflexes

Answer: e

Hyperthyroidism cause hyperreflexia.

2. A 55-year-old woman is evaluated for an incidentally discovered right adrenal mass. On the physical examination her blood pressure was 169/90 mmHg in both arms. The abdomen is non tender, and no palpable masses. The remainder examination is unremarkable. Non contrast CT of the abdomen demonstrates a 3.2cm right adrenal mass. A plasma free metanephrine level and low dose dexamethasone suppression test result were both within normal range of. Which of the following is **most appropriate next step** :

- a. No additional testing is indicated
- b. CT guided transcutaneous biopsy
- c. Plasma aldosterone /plasma renin ration
- d. Adrenalectomy
- e. 24- hour urine test .

Answer : c

The result of test indicate negative for pheochromocytoma, and Cushing syndrome caused by adrenal adenoma, so we think about primary hyperaldosteronism.

3. A 32-year-old women was found to have a serum calcium of 8.1mg/dl (8.2-10.5 ) ,serum albumin 3.9 g/dl (3.5-4.5) and serum intact PTH of 121 pg/dl (12-65).Her lab data are most consistent with :

- a. primary hypoparathyroidism
- b. Tertiary hyperparathyroidism
- c. Primary hyperparathyroidism
- d. Secondary hyperparathyroidism
- e. Secondary hypoparathyroidism

Answer : d

Low  $\text{Ca}^{2+}$ , and the elevated PTH indicates that the parathyroid glands are functioning but are responding to a deficiency in calcium.

4 . A 56-year-old obese female was recently diagnosed with type 2 DM. She is asymptomatic . Her glycated hemoglobin (HA1C) level was 8.1% . In addition to starting her on healthy lifestyle changes and metformin, **What is your best next step in her diabetes management ?**

- a. Refer to neurology clinic to evaluate peripheral neuropathy
- b. CT pancreas
- c. Check serum C-peptide and islets cell antibody
- d. Refer for exercise stress test
- e. Check urine albumin level and refer for dilated eye exam



Answer :e

Check for diabetic Nephropathy and retinopathy.

5. A 55-year-old female is evaluated for hypercalcemia, she is asymptomatic. Her medical history is significant for hypertension .Her only medication is amlodipine .Laboratory studies revealed a Corrected serum calcium of 12.8 mg/dl (8.4-10.2). Her creatinine is 0.9 mg/dl and PTH 110pg/dl (10-65). The 24-hour urine calcium level was elevated . Dual energy x -ray (DXA) scan show osteoporosis . **Which of the following is the most appropriate therapy to recommend to this patient ?**

- a. Clinical observation
- b. Alendronate
- c. Parathyroidectomy
- d. Zoledronic acid
- e. Cinacalcet

Answer : c

Parathyroidectomy indication here because Ca is (12.1), Osteoporosis) the (disease is primary hyperparathyroidism

6. What the gold standard test to confirm the diagnosis of growth hormone deficiency?

- a. Pituitary MRI
- b. Insulin tolerance test
- c. Insulin like growth factor binding protein 3 (IBGBP-3)
- d. Insulin like growth factor 1 (IGF - 1)
- e. Growth hormone level

Answer: b

7. A 33 years old male pharmacist presented to your clinic with new onset heat intolerance and palpitations. The physical examination was positive for mild goiter and exophthalmos. His laboratory results revealed TSH: 0.006 micro unit /ml (0.03-5.0) and T4:20mg/dl(4.6-12). What is your most likely diagnosis?

- a. TSH secreting pituitary adenoma
- b. Toxic multi nodular goiter
- c. Iatrogenic thyrotoxicosis
- d. Subacute thyroiditis
- e. Graves' disease

Answer :e

### **Graves' disease**

Heat intolerance, enlarged thyroid, palpitations, and exophthalmos are highly suggestive of thyrotoxicosis. Lab tests further enhance the diagnosis of thyrotoxicosis; low TSH levels along with elevated T4 levels and high thyroid uptake indicate a primary cause.

Clinical features suggestive of Graves' disease include exophthalmos, pretibial myxedema, and diffuse thyroid enlargement with bruits.

8. Which of the following statements about hypercalcemia is false ?

- a. Associated with normal alkaline phosphate in multiple myeloma.
- b. It reduce GFR due to vasoconstriction
- c. It can be caused by loop diuretic
- d. It impairs urinary concentration



Answer : c

Loop diuretics (eg; furosemide) increase urinary  $\text{Ca}^{2+}$  excretion.

**2. Lasix?** Saline therapy alone rarely normalizes moderate or severe hypercalcemia. In the past, administration of a loop diuretic was initiated routinely once fluid repletion had been achieved to further increase urinary calcium excretion.

This approach has fallen out of favor for two reasons:

- ✓ The availability of drugs such as the bisphosphonates and calcitonin.
- ✓ The potential fluid and electrolyte complications resulting from a massive saline infusion and furosemide-induced diuresis such as hypokalemia, hypomagnesemia, and, even volume depletion if the diuretic-induced losses are not replaced.

9. What helps differentiate Cushing disease from pseudo-Cushing ?

- a. Abdominal stria
- b. Moon face
- c. Truncal obesity
- d. Proximal myopathy

Answer : d

**Pseudo-Cushing:** Hypercortisolism can occur in several disorders other than Cushing syndrome. When such patients present with clinical features consistent with Cushing syndrome, they may also be referred to as having physiologic hypercortisolism or pseudo-Cushing syndrome. Clinically, patients with these physiologic forms of hypercortisolism seldom have the cutaneous (ie, easy bruising, thinning, and friability) or muscle (ie, **proximal muscle atrophy and weakness**) signs of Cushing syndrome. However, these conditions/disorders should be excluded when evaluating patients for Cushing syndrome. [UpToDate.com](https://www.uptodate.com/contents/pseudo-cushing-syndrome)

10. Unlikely to be seen in Turner's . Normal FSH (1.5-12 mIU/dl), LH (0.5-10 mIU/dl)?

- a. FSH 3
- b. LH 10
- c. 45 OX
- d. poor development of breast

Answer: a

FSH and LH levels are usually elevated in Turner syndrome due to ovarian failure.

## Turner's Syndrome

Blue = Mentioned by Dr. Ayman in the lecture.

- ▶ Turner syndrome is a genetic disorder that affects females, typically resulting from a complete or partial absence of one of the X chromosomes, thus having a karyotype of **45, XO**. It is characterized by various physical features and medical conditions, including:
  - ▶ **Short Stature**: Individuals with Turner syndrome often have a shorter-than-average height, typically due to impaired growth during childhood and adolescence.
  - ▶ **Gonadal Dysgenesis**: Most individuals with Turner syndrome have underdeveloped (streaks of ovarian tissue) or completely absent ovaries, leading to infertility and absence of menstruation (amenorrhea).
  - ▶ **Physical Features**: Common physical features may include a **webbed neck**, low hairline at the back of the neck, low-set ears, drooping eyelids, and a broad chest with widely spaced nipples.
  - ▶ **Lymphedema**: Some individuals with Turner syndrome may develop swelling of the hands and feet (lymphedema) during infancy or early childhood.
  - ▶ **Heart and Kidney Abnormalities**: Turner syndrome can be associated with congenital heart defects, such as aortic coarctation, and kidney abnormalities.
  - ▶ **Hearing Loss**: Sensorineural hearing loss is more common in individuals with Turner syndrome compared to the general population.
  - ▶ **Learning and Developmental Differences**: Some individuals with Turner syndrome may experience learning difficulties, particularly in areas such as mathematics and spatial reasoning.

11. Which of the following is diagnostic of DM?

- a. Asymptomatic patient HBA1C 6.6 + FBG 127
- b. pregnant at 28 weeks with FBG 90 + 2 hours OGTT 178

Answer : a

## Diagnostic Criteria

- **Symptomatic hyperglycemia**

The diagnosis of diabetes mellitus is established when a patient presents with classic symptoms of hyperglycemia (thirst, polyuria, weight loss) with a RBG of 200 mg/dL .

(Most patients with type 1 diabetes and some patients with type 2 diabetes are symptomatic and have plasma glucose concentrations well above  $\geq 200$  mg/dL)

- **Asymptomatic hyperglycemia**

The diagnosis of diabetes in an asymptomatic individual (generally type 2 diabetes) can be established with any of the following criteria:

- FPG values  $\geq 126$  mg/dL.
- Two-hour plasma glucose values of  $\geq 200$  mg/dL during a 75 g OGTT.
- A1C values  $\geq 6.5\%$ 
  - In the absence of unequivocal symptomatic hyperglycemia, the diagnosis of diabetes must be confirmed on a subsequent day by repeating the same test for confirmation.
  - If two different tests are available and are concordant for the diagnosis of diabetes, additional testing is not needed . If two different tests are discordant, the test that is diagnostic of diabetes should be repeated to confirm the diagnosis.

12. A pregnant lady at 28 week's gestation presented with thyrotoxicosis, next step ?

- a. Uptake scan
- b. Give methimazole
- c. Surgery



Answer: b

Women diagnosed with symptomatic, moderate to severe hyperthyroidism after the first trimester should take [methimazole](#).

13. A 29 gentleman has erectile dysfunction. What is the most common causes ?

- a. DM
- b. Psychologic
- c. Hormonal Imbalances
- d. Vascular Issues
- e. Medications

Answer: b

In younger men, psychological factors (such as anxiety, stress, or depression) are often the most common causes.

14. Patient with subacute viral thyroiditis with HR 110 and palpitations, **Next step?**

- a. Propranolol
- b. Observation
- c. Corticosteroids
- d. Levothyroxine
- e. Radioactive iodine therapy

Answer: A

For patients with subacute thyroiditis who experience palpitations or increased sympathetic tone, propranolol is often used for symptomatic control to alleviate these symptoms.

## Treatment?

- ▣ **In cases of Graves' disease, toxic MNG or adenoma:**
  1. Anti-thyroid medications, i.e carbimazole
  2. I131 treatment
  3. Surgery
  4. Temporary beta blockers for symptoms control.
- ▣ **In cases of subacute thyroiditis →** Temporary beta blockers, NSAID's and/or steroids for symptoms control.

15. A women 22 weeks pregnant has dizziness , fatigue ,tremor and palpitations. Soft bruit is heard Over the left thyroid, TSH is 0.04 (0.5-5), and T4 23 (9-20). The **most appropriate next step** ?

- a. Radioiodine ablation
- b. Carbimazole
- c. Observe then repeat TFT in 4 week

Answer: b

Women diagnosed with symptomatic, moderate to severe hyperthyroidism after the first trimester should take **methimazole**. Carbimazole is completely metabolized to methimazole. [UpToDate.com](https://www.uptodate.com/contents/hyperthyroidism-in-pregnancy)

16. Patient with DM, HTN, hypercholesterolemia is on glipizide, metformin, enalapril and simvastatin. If this patient develops vitamin B12 deficiency due to a medication, which drug is most likely responsible?

- a. Metformin
- b. Glipizide
- c. Enalapril
- d. Simvastatin



Answer : a

## **Metformin**

Adverse effects :

1- Gastrointestinal:

- are the most common side effects including a metallic taste in the mouth, mild anorexia, nausea, abdominal discomfort, and soft bowel movements or diarrhea.

- usually mild, transient, and reversible after dose reduction or discontinuation of the drug. They are minimized by taking the medication with food.

2- Vitamin B12 deficiency

- Due to reduced intestinal absorption of vitamin B12 by metformin.

- In some patients, vitamin B12 deficiency may present as peripheral neuropathy.

3- lactic acidosis : very low incidence but high mortality rate!!

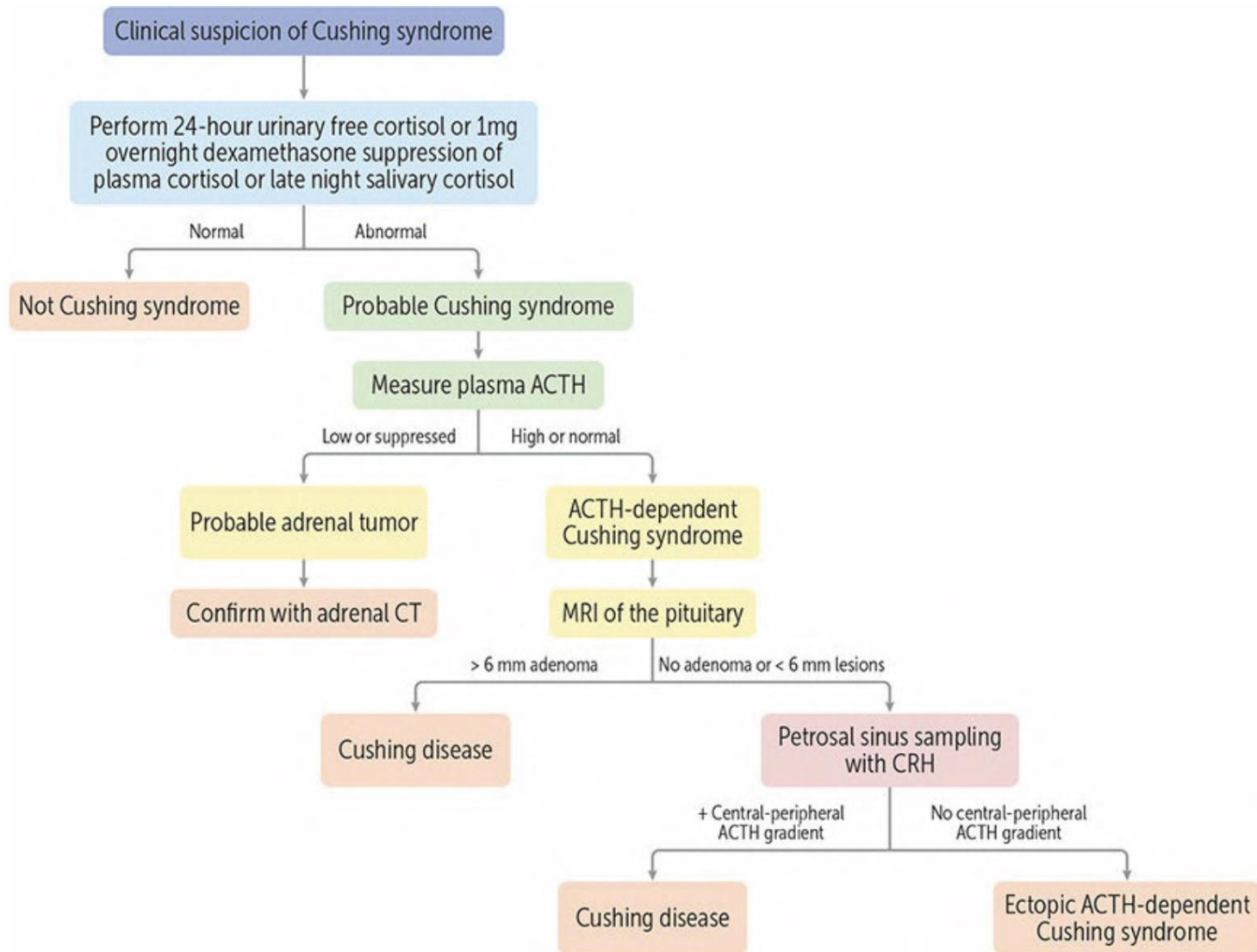
17. In a patient with Cushing syndrome ,which of the following will confirm the presence of an adrenal tumor ?

- a. Low ACTH.
- b. Increase urinary cortisol.
- c. High ACTH.
- d. Low urinary cortisol.

Answer: a

Low ACTH: In cases of adrenal tumors (primary adrenal Cushing syndrome), the adrenal glands produce excess cortisol, which leads to suppression of adrenocorticotrophic hormone (ACTH) production by the pituitary gland. Therefore, low ACTH levels indicate that the source of cortisol excess is likely adrenal.

Increased urinary free cortisol: This indicates Cushing syndrome but does not specify the source (adrenal vs. ectopic).



18. Female patient presented with hypoglycemic sign and symptoms and episodic sweating . She also noticed weight gain lately , FBG :40 . What the most appropriate next step ?

- a. 24 hours ECG
- b. 72 fasting glucose
- c. Fasting insulin and C peptide
- d. ACTH stimulation test

Answer: c

When evaluating a patient with weight gain and hypoglycemia, consider high insulin levels, which may be due to either endogenous or exogenous sources. To differentiate between these, **measuring C-peptide levels**.

- 19. A 70-year-old female presented with back pain ,constipation, abdominal pain and decrease urinary frequency. Her PTH was high, Ca high and PO4 low . The most likely diagnosis is :
  - a. Multiple myeloma
  - b. Primary hyperparathyroidism
  - c. Paget's disease
  - d. Osteomalacia

Answer: b

High ca and PTH with a symptoms of primary hyperparathyroidism “ stones, bones, groans and psychiatric over tone “



20. An elderly man was recently diagnosed with DM. It is well controlled . He is taking simvastatin, Glimepiride , Metformin. He presented with peripheral Neuropathy. **What explains that?**

- a. DM induce neuropathy
- b. Glimepiride
- c. Simvastatin induce vitamin B12 deficiency
- d. Metformin induce vitamin B12 deficiency

Answer: D

21. Which is least likely to be found in a patient with Klinefelter syndrome?

- a. Soft normal testicles
- b. Azoospermia
- c. Upper body higher than lower

Answer: a

## Klinefelter's Syndrome

Blue = Mentioned by Dr. Ayman in the lecture.

- ▶ Klinefelter syndrome is a chromosomal disorder that occurs in males and is typically characterized by the presence of an extra X chromosome, resulting in a karyotype of **47,XXY** instead of the usual 46,XY. This additional X chromosome leads to various physical, developmental, and hormonal differences compared to males with a typical chromosome configuration. In Klinefelter syndrome:
  - ▶ **Testicular Abnormalities**: Individuals typically have **small, firm testes** and reduced testosterone production, which can result in infertility and impaired spermatogenesis.
  - ▶ **Hormonal Imbalance**: There is often a relative increase in estrogen levels compared to testosterone due to impaired testicular function, leading to features such as **gynecomastia** (enlarged breast tissue), reduced facial and body hair, and decreased muscle mass.
  - ▶ **Tall Stature**: Some individuals with Klinefelter syndrome may be taller than average due to delayed closure of the epiphyseal plates. **They also have disproportionately longer upper/lower limbs relative to their height.**
  - ▶ **Learning and Developmental Differences**: There may be difficulties with learning, language development, and social interaction, although intelligence is typically within the normal range.
  - ▶ **Other Features**: Additional features may include decreased bone density, increased risk of autoimmune disorders, and a higher incidence of certain medical conditions such as type 2 diabetes and breast cancer.

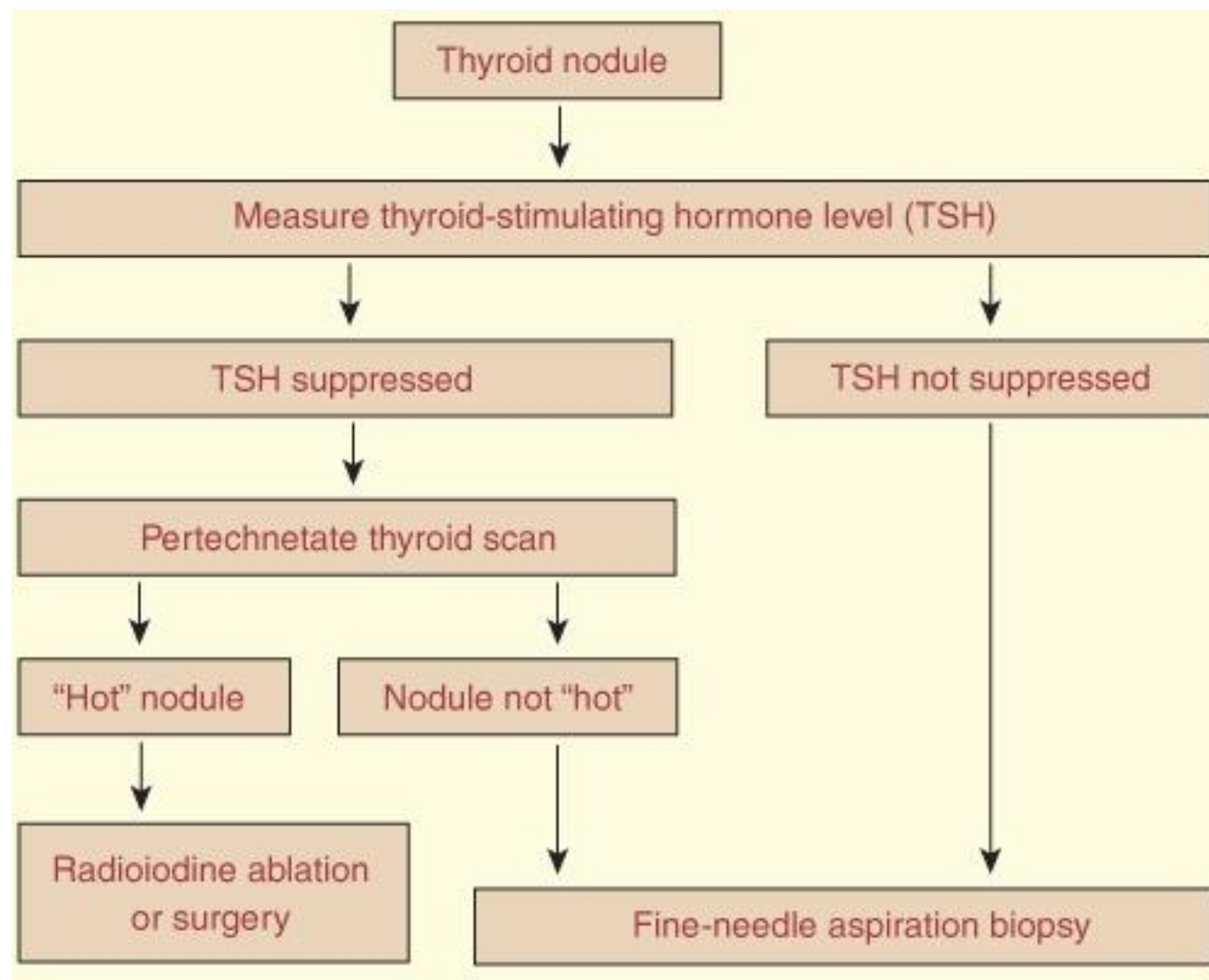


Fig. 10.13 Klinefelter's syndrome. Tall stature, gynecomastia, reduced pubic hair and small testes.

22. An elderly patient had a nodule found on thyroid ultrasound. The TSH level was within normal Range. What the most appropriate next step ?

- a. FNA
- b. Uptake scan
- c. Start on antithyroid medication
- d. Measure T4

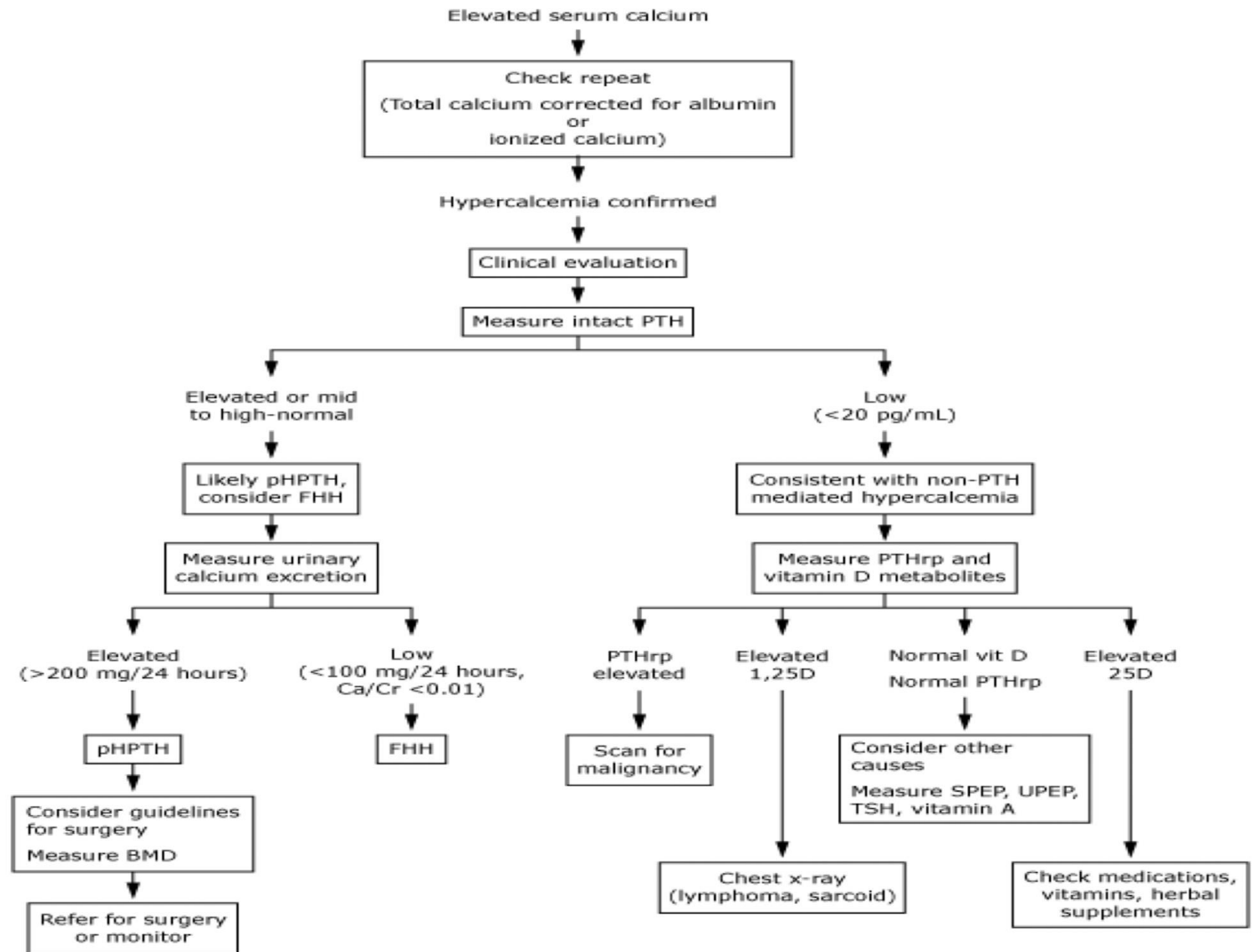
- Answer: a



23. Patient with upper limit of normal PTH and elevated corrected Ca. What is the most likely diagnosis ?

- a. Primary hyperparathyroidism
- b. Secondary hyperparathyroidism
- c. Tertiary hyperparathyroidism
- d. Vitamin D deficiency

Answer : a





24. A patient has symptoms and signs of acromegaly and developed bitemporal hemianopia. **What the definitive test for diagnosis ?**

- a. IGF-BP3
- b. MRI
- c. Glucose suppression test

Answer : c

Definitive test is glucose suppression but for screening is IGF-1.

25. Testing showed a 21-year-old has diabetes. He has a very strong family history for diabetes; His father and grandfather had diabetes without complications. He has no acanthosis nigricans, antibodies were negative: what is the type of diabetes:

- a. LADA
- b. MODY
- c. DM1
- d. DM2

Answer : b

Monogenic diabetes or [maturity onset diabetes of the young \(MODY\)](#) is a clinically heterogeneous disorder characterized by **diabetes diagnosed at a young age** (<25 years) with autosomal dominant transmission and **lack of autoantibodies**.

26. A female patient came to the ER with hypoglycemic attacks. Her lab tests showed normal insulin, normal C- protein, and low Glucose (31), what is the next step?

- a. CT abdomen
- b. MRI
- c. Test for sulfonylurea in urine
- d. Psychiatric evaluation

Answer: c

**Testing for sulfonylurea in the urine**, for evaluation of nonprescribed use of insulin or oral insulin secretagogues ( **factitious hypoglycemia**) as it becomes a strong possibility.

Normal insulin and C-peptide levels rule out endogenous insulin secretion as the cause of hypoglycemia (insulinoma). Therefore, CT of the abdomen and MRI are not indicated.

Psychiatric evaluation might be considered in certain cases, it's not the most immediate step in this scenario.

27. Which of the following is diagnostic of diabetes with symptomatic hyperglycemia ?

- a. Fasting blood glucose 135
- b. OGTT of 230
- c. A1C value of 6.7

Answer: b

In the absence of unequivocal hyperglycemia ( asymptomatic individual), diagnosis requires 2 abnormal test results from the same sample or in 2 separate test samples; - FBG  $\geq 126$  mg/dl. Or - 2-hours plasma glucose  $> 200$  mg/dl during a 75g OGTT. Or - A<sub>1</sub>C value  $\geq 6.5$ . However, in **symptomatic individual** the diagnosis is established when 2-hours plasma glucose  $> 200$  mg/dl during a 75g OGTT.



## Diagnostic Criteria

- **Symptomatic hyperglycemia**

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  - In the absence of unequivocal symptomatic hyperglycemia, the diagnosis of diabetes must be confirmed on a subsequent day by repeating the same test for confirmation.
  - If two different tests are available and are concordant for the diagnosis of diabetes, additional testing is not needed . If two different tests are discordant, the test that is diagnostic of diabetes should be repeated to confirm the diagnosis.

28. True about HbA1C:

- a. Evaluates glycemic control in the past 3 weeks
- b. Evaluates glycemic control in the past 3 months
- c. Evaluates glycemic control in the past 6 months.

Answer: b

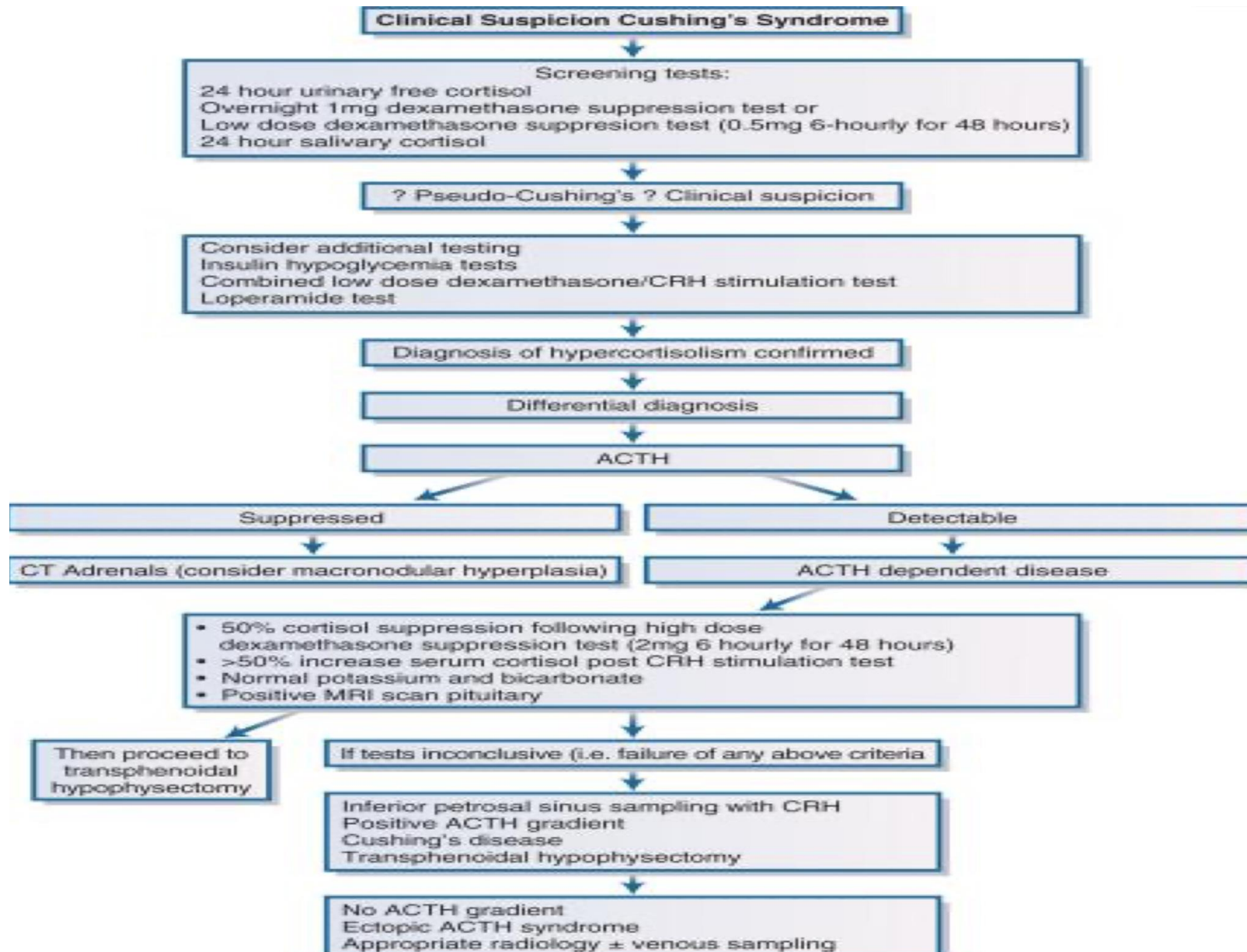
**Glycated hemoglobin (HbA1C; A1C).** It measures glucose bonded to hemoglobin in red blood cells. The average red blood cell lifespan is approximately 120 days, allowing gradual accumulation of glucose over approximately three months.

29. For a patient diagnosed with Cushing's (over night low dose dexamethasone suppression test was positive), what is the next step ?

- a. Check ACTH levels
- b. High dose dexamethasone suppression test
- c. CT chest
- d. MRI brain

Answer: a

The next step is to differentiate between ACTH- dependent and ACTH- independent cushing's syndrome.



30. A patient with type 1 DM presents with high PTH, low Ca, normal PO<sub>4</sub>, low 25-OH vitamin D, and elevated alkaline phosphatase. What is the most appropriate next step?

- a. PTH technium
- b. Check levels of vitamin D
- c. Anti-tissue transglutaminase antibodies
- d. Bone biopsy

Answer: c

**Anti-tissue transglutamase (tTG) antibodies** are highly specific for **celiac disease**.

↑PTH with ↓Ca<sup>+2</sup> is indicative of secondary hyperparathyroidism. ↓25-OH vitamin D levels suggest decreased vitamin D absorption, a common cause of secondary hyperparathyroidism. Celiac disease, an autoimmune disorder characterized by gluten intolerance, is often associated with malabsorption, including impaired absorption of calcium and vitamin D. Therefore, testing for anti-tTG antibodies is a logical next step to investigate the possibility of underlying celiac disease.



31. A patient with T4 levels of 29.9 (high) and uptake 2% (low), all of the following are possible diagnoses except:

- a. Exogenous thyroid hormones
- b. Infectious thyroiditis
- c. Subacute thyroiditis
- d. Struma ovarii
- e. TSH-secreting pituitary tumor

Answer : e

↑T<sub>4</sub> levels with ↓uptake (radioactive iodine uptake), indicate **thyrotoxicosis** with ↓**thyroid gland activity**. This could be due to ectopic secretion of thyroxine (struma ovarii) or exogenous thyroid hormones or the initial phase of subacute thyroiditis that is usually preceded by viral infection.

32. A male patient presented with delayed puberty, arm span > height, small soft testicles, low testosterone, lower-normal LH & FSH, and decreased prolactin. The most likely diagnosis is:

- a. 5- $\alpha$ -reductase deficiency
- b. Androgen insensitivity
- c. Abnormal karyotyping
- d. GnRH deficiency

Answer: d

Delayed puberty with an increased arm span is a classic sign of hypogonadism (GnRH deficiency), often due to a lack of sex hormone production. This leads to delayed closure of the epiphyses of long bones, resulting in continued linear growth.

33. A female patient presented with abdominal pain. A CT scan was done and showed a 2.6 cm adrenal mass. The most appropriate next step is:

- a. 24-hour metanephrines and cortisol
- b. Needle guided biopsy
- c. Surgical removal

Answer: a

24-hour metanephrines and cortisol to determine whether the mass is functional or non functional.

34. A 28-year-old patient presented with a history of infertility, gynecomastia, small testes, high LH and FSH, and low testosterone. The most appropriate next step is:

- a. Testicular biopsy
- b. Give testosterone
- c. Karyotype testing

Answer: c

Infertility, gynecomastia, small testes,  $\uparrow$  LH and FSH with  $\downarrow$  testosterone indicate **primary testicular failure** associated with congenital disease such as **Turner** and **Kallmann syndromes**



35. A patient presented with hypertension, elevated Na, and decreased K. The most appropriate next step is to check:

- a. plasma aldosterone concentration and plasma renin activity
- b. Metanephrine levels
- c. urine cortisol

Answer: a

The clinical presentation of hypertension, hypernatremia, and hypokalemia is highly suggestive of **primary hyperaldosteronism** (conn syndrome)

36. A patient had low total T4, normal TSH, and normal free T4. Who could this patient be ?

- a. A female patient taking OCPs
- b. A male patient with acute hepatitis
- c. A male patient with bilateral limb swelling from nephrotic syndrome

Answer: c

Both T4 and T3 circulate in blood bound to one of three binding proteins: TBG, Transthyretin and Albumin.

**TBG deficiency** — Patients with **euthyroid hypothyroxinemia** due to TBG deficiency have normal TSH, low total T4, and normal free T4 index. Major causes are; hereditary, hormonal abnormalities ( ↑ androgens, steroids, GH), drugs ( steroids, niacin,..) and **Nephrotic syndrome** ( urinary loss of TBG excretion).

37. A lady presented with recurrent headaches. Her blood pressure was elevated and she had episodes of diaphoresis and palpitations. The most appropriate next step is:

- a. Serum VMA
- b. 24-hour urinary fractionated metanephrines and catecholamines.
- c. Serum ACTH levels
- d. Brain MRI

Answer: b

**24-hour urinary fractionated metanephrines and catecholamines** is more sensitive and specific than Serum VMA (vanillylmandelic acid) in diagnosis pheochromocytoma.

38. Beriberi disease results from deficiency of which of the following:

- a. Vitamin B1
- b. Vitamin B2
- c. Vitamin B6
- d. Vitamin B12
- e. Vitamin C

Answer: a

**Beriberi heart disease** which may present with tachycardia, dyspnea, and peripheral edema associated with cardiomyopathy and high-output HF, is due to severe thiamine (vitamin B1) deficiency. These symptoms can overlap with thyrotoxicosis.



39. All of the following can occur in diabetics except:

- a. Non-alcoholic steatohepatitis
- b. Decreased incidence of gall bladder stones
- c. Alternating symptoms of constipation and diarrhea
- d. Maldigestion and delayed stomach emptying
- e. Intestinal bacterial overgrowth.

Answer: b.

**Diabetic patients are at a higher risk of developing gallstones.** Diabetic neuropathy can affect the nerves of the digestive system, leading to alternating symptoms of diarrhea and constipation, maldigestion, and delayed stomach emptying. All of these factors can contribute to **increased** biliary stasis and, as a consequence, bacterial overgrowth. Diabetes is also associated with **metabolic dysfunction-associated fatty liver disease (MAFLD)** and **non-alcoholic steatohepatitis (NASH)**.

40. A 30-year-old woman is evaluated for a serum calcium of 11.5 mg/dl and a PTH level of 90 pg/ml (10-60). Sestamibi scan shows hyperplasia of all four parathyroid glands. Which of the following is the most appropriate management?

- a. Measurement of serum gastrin and prolactin.
- b. Parathyroidectomy
- c. CT scan of the abdomen
- d. MRI scan of the pituitary gland
- e. Measurement of serum aldosterone and renin

Answer: b

**The patient has primary hyperparathyroidism;** This is confirmed by the elevated serum calcium and PTH levels. The definitive treatment for primary hyperparathyroidism due to parathyroid hyperplasia is surgical intervention.

41. In a 22-year-old woman with postpartum thyroiditis, you would expect all of the following except:

- a. Normal erythrocyte sedimentation rate
- b. Tender thyroid gland
- c. Elevated serum thyroglobulin level
- d. Lymphocytic inflammation within the thyroid
- e. Increased risk of persistent hypothyroidism

Answer: b

**Postpartum thyroiditis**, like painless thyroiditis, is considered a variant form of chronic autoimmune thyroiditis (**Hashimoto's thyroiditis**). The pathologic findings in the two disorders are similar.

42. You are asked to evaluate an 18-year-old male with failure of normal sexual maturation. He is tall and thin, with no beard, axillary or pubic hair. A chromosomal karyotype was done by another physician and showed 47 XXY. Which of the following laboratory result profiles is this patient most likely to have?

	Testosterone	LH	FSH	Prolactin
A	High	High	High	Normal
B	Low	Low	Low	Normal
C	Low	High	High	Norma
D	Normal	Normal	Normal	High
E	Low	Low	High	High

Answer: c

**Klinefelter syndrome** results in progressive fibrosis and destruction of both the seminiferous tubules and the Leydig cells, causing decreased sperm production and decreased testosterone production. The testes are not responding effectively to LH and FSH, leading to elevated levels of these hormones (**hypergonadotropic hypogonadism**).



43. A 33-year-old man is evaluated for progressive fatigue, muscle weakness, and weight loss of 7 kg over 6 months. He was diagnosed with mild hypothyroidism 2 months ago and was given levothyroxine 50 mcg/d. His history is otherwise unremarkable. He takes no other medications. Blood pressure is 95/60 mmHg and pulse rate 110/min, his skin is cool, dry, and tanned. He has mild goiter. Labs:

Plasma glucose..... 64 mg/dl

Serum sodium..... 128 meq/L

Serum potassium ..... 5.5 meq/L

Blood urea nitrogen .....38 mg/dl

Serum TSH..... 1.4 mU/ml

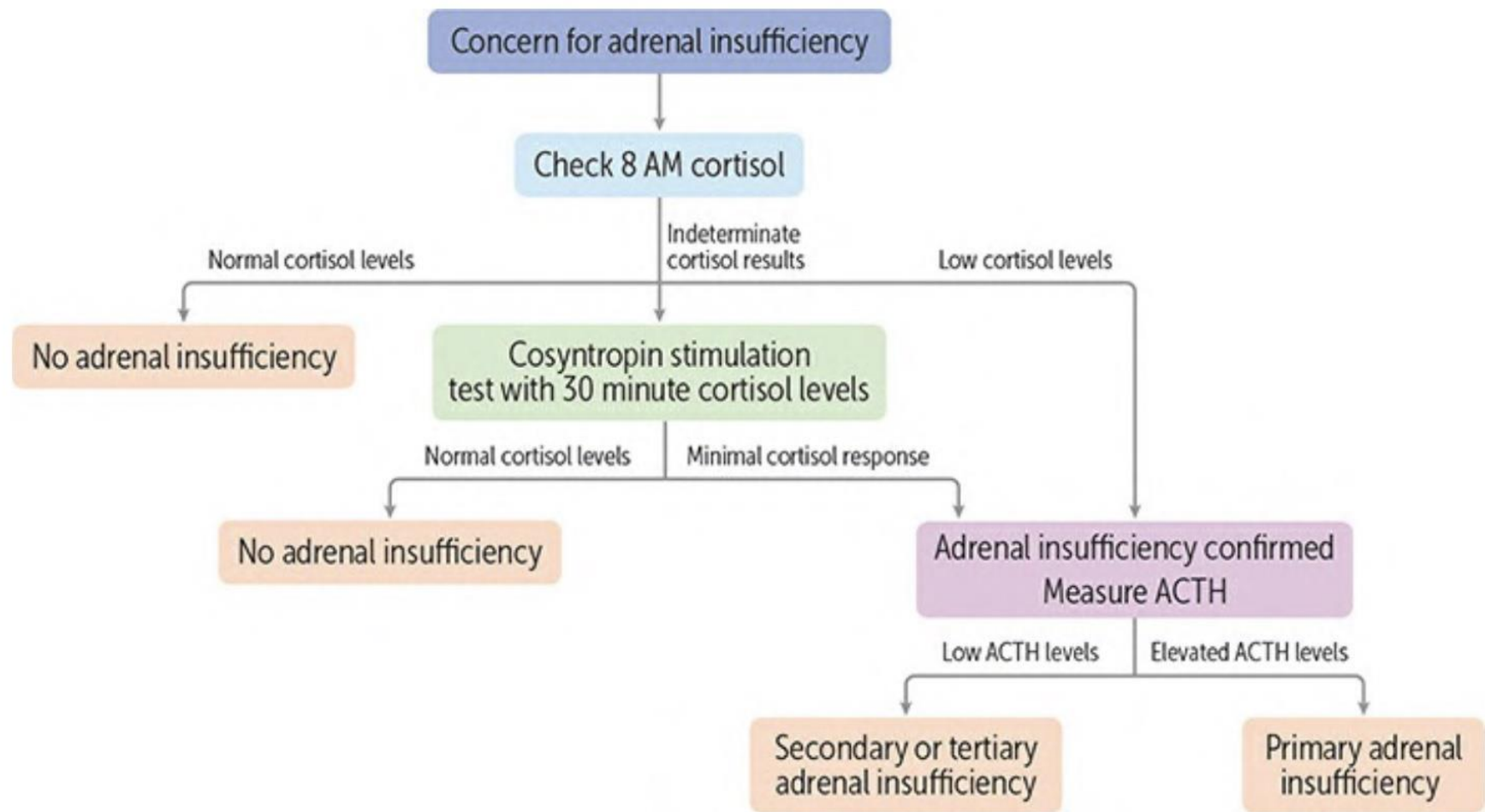
Which of the following tests should be done next?

- a. Plasma aldosterone and renin
- b. Plasma ACTH
- c. Serum cortisol response to cosyntropin administration
- d. CT adrenal glands
- e. Continuous ECG monitoring

Answer: c

**Addison's disease** is an autoimmune disorder affects the adrenal gland. progressive fatigue, muscle weakness, weight loss, hypotension (blood pressure of 95/60 mmHg), tachycardia (pulse rate of 110/min), cool and dry skin, tanned appearance, mild goiter, and laboratory findings ( $\downarrow$  serum  $\text{Na}^+$ ,  $\downarrow$  plasma glucose, and  $\uparrow$  blood urea nitrogen) suggests adrenal insufficiency, potentially consistent with primary adrenal insufficiency (Addison's disease).

A **cosyntropin stimulation test** is the next appropriate step to evaluate the adrenal gland's response to ACTH and assess for adrenal insufficiency.



44. A 73-year-old female suffers a pathological fracture. She has been complaining of constipation, anorexia, thirst and urinary frequency. She is found to have high calcium, low phosphate levels and raised PTH. What is the most likely diagnosis?

- a. Multiple myeloma
- b. Primary hyperparathyroidism
- c. Bony metastases
- d. Paget's disease
- e. Osteomalacia

Answer: b

**↑ calcium, ↓phosphate, and ↑ PTH:** This classic triad is highly suggestive of primary hyperparathyroidism. Primary parathyroidism is the most common cause of hypercalcemia.

45. A 55-year-old male presents with recurrent episodes of headache, palpitations and sweating associated with high blood pressure 180-200/110-120 mm Hg. All of the following antihypertensive medications are appropriate initial therapy except one:

- a. Prazosin (alpha blocker)
- b. Propranolol
- c. Captopril
- d. Valsartan
- e. amlodipine

Answer: b

**Headache, sweating & tachycardia** are the classical triad of **pheochromocytoma**.

Agents known to provoke a pheochromocytoma paroxysm (eg, **beta-adrenergic blocker** in absence of alpha-adrenergic blockade, glucagone, histamine, high-dose corticosteroids) should be avoided.

[UpToDate.com](https://www.upToDate.com)

46. A 48-year-old male is referred for evaluation for erectile dysfunction. He has a history of angina, hypertension and type 2 diabetes. The patient was prescribed Sildenafil (Viagra). Which one of the following drugs is contraindicated in this patient?

- a. Aspirin
- b. Atorvastatin
- c. Isosorbide Mononitrate
- d. Lisinopril
- e. Metformin



Answer: c

**Isosobic Mononitrate.**

PDE5 inhibitors ( sildenafil) are **contraindicated** in patients taking nitrates of any form, regularly or intermittently, as the combination can lead to severe hypotension.

47. A 76-year-old male patient with known history of diabetes, hypertension and CAD. He had routine laboratory work done with results as following: TSH was 66 mU/mL (0.3 - 5.0), Free T4 was 0.5 ng/dl (0.8 - 2.8). His repeat TSH was 62 mU/ml. What is the best next step in management?

- a. No treatment, but repeat thyroid function tests after 6 months
- b. Start thyroxine treatment, dose 100 mcg daily
- c. Start thyroxine treatment, dose 25 mcg daily
- d. Thyroid ultrasound
- e. Thyroid uptake and scan

Answer: c

The patient presents with significantly ↑ TSH and ↓ free T4 (0.5 ng/dL), indicating **primary hypothyroidism**.

In older patients with CAD, start with a low dose thyroxine and titrate dose up slowly.

48. A 32-year-old man is evaluated for a 1-week history of severe neck pain. He also has heat intolerance, palpitations, and insomnia. Medical history is significant only for a viral upper respiratory tract infection 3 weeks ago. He takes no medications. BP was 130/90, pulse: 110 per minute, Examination of the thyroid reveals a normal-sized gland that is very tender to palpation. There are no thyroid nodules. Laboratory studies reveal as serum Thyroid-stimulating hormone  $<0.008 \mu\text{U/mL}$  (0.3-5.0), Free thyroxine (T4) 25 pmol/L(10-20). A 24-Hour radioactive iodine uptake was low at 1%. Which of the following is the most appropriate treatment?

- a. Observation
- b. Propranolol
- c. Propylthiouracil
- d. Radioactive iodine
- e. Thyroidectomy

Answer: b

A tender neck, especially following a recent viral infection, is consistent with subacute thyroiditis (de Quervain's thyroiditis).

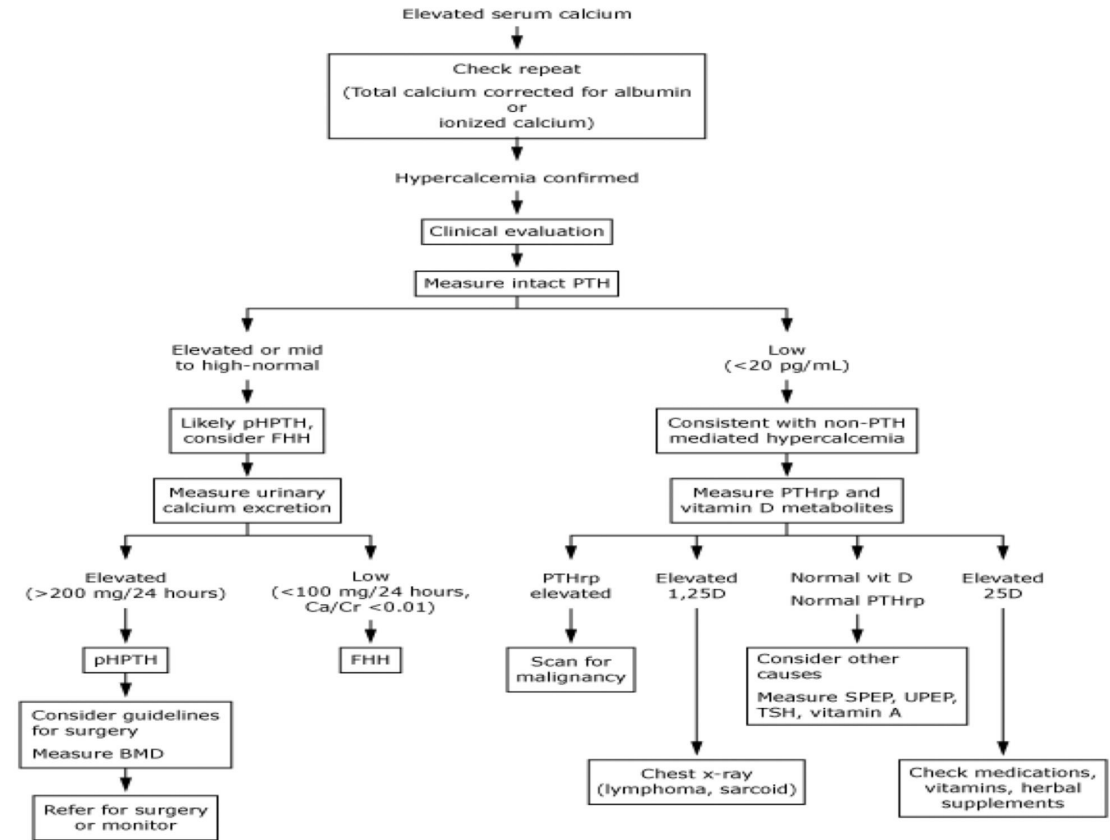
The presence of significant symptoms warrants symptomatic management by propranolol.

49. A 24-year-old woman is evaluated for hypercalcemia incidentally discovered on laboratory studies performed for another indication. She reports no hypercalcemia-related symptoms. Family history is notable for a brother who has a “calcium” problem. He takes no medications. Laboratory studies: corrected calcium 11.2 mg/dl (8.4-10.2), parathyroid hormone: 55 pg/ml (10-65), and 25-hydroxyvitamin D level of 35 ng/ml (30-100). Kidney and thyroid function studies are normal. Which of the following is the most appropriate next step in management?

- a. Bone densitometry
- b. Measurement of urine calcium and creatinine levels
- c. Parathyroid sestamibi scan
- d. Neck ultrasound
- e. Referral for parathyroidectomy

Answer: b

Patients with normal – elevated PTH, measuring urinary calcium is the next step to differentiate between primary hyperparathyroidism and familial hypocalcuric hypercalcemia



50. A 26-year-old man presented with bi-temporal hemianopia. He mentioned that his shoe sizes were above that of his friends since childhood and he often had sweaty episodes. Which one of the following tests is most appropriate to establish the diagnosis?

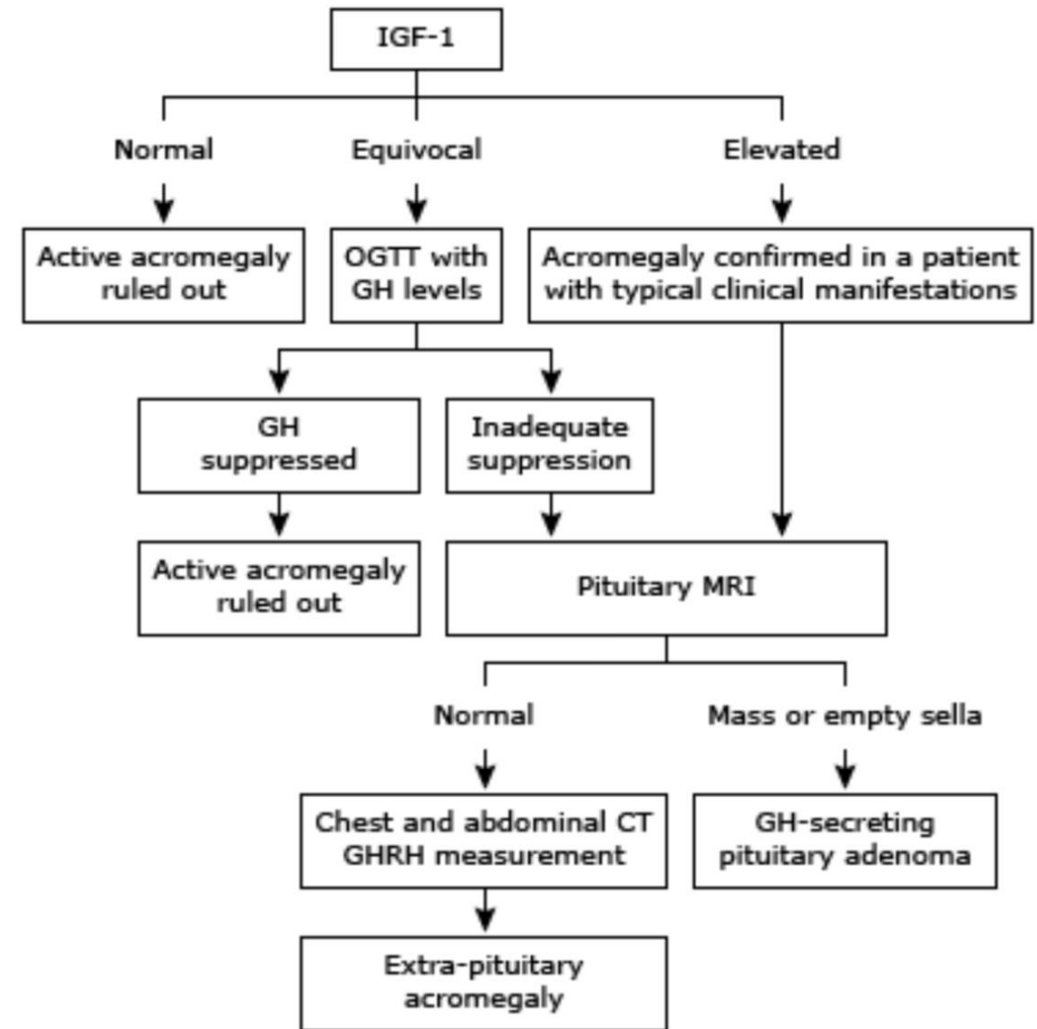
- a. Morning growth hormone
- b. Evening growth hormone
- c. Glucose tolerance test for GH
- d. MRI of pituitary
- e. IGFBP-3



Answer: C

### Glucose tolerance test for GH

Acromegaly diagnosis is biochemical, primarily through serum IGF-1 measurement. If IGF-1 is unclear, a glucose tolerance test for serum GH is essential, as GH levels should suppress after glucose.



51. A 33-year-old female pharmacist who presented to your clinic with new onset heat intolerance and palpitations is reviewed. Physical exam shows mildly enlarged thyroid gland and left eye exophthalmos. Her laboratory results revealed: TSH : 0.06 micro-U/ml (0.3-5.0) and T4 20 microgram/dl (4.6-12). Her 24-hour thyroid uptake was diffuse and increased at 65% (8-35%). What is your most likely diagnosis?

- a. Graves' disease
- b. Factitious thyrotoxicosis
- c. Subacute thyroiditis
- d. Toxic multinodular goiter
- e. TSH secreting pituitary adenoma

Answer : A

### **Graves' disease**

Heat intolerance, enlarged thyroid, palpitations, and exophthalmos are highly suggestive of thyrotoxicosis. Lab tests further enhance the diagnosis of thyrotoxicosis; low TSH levels along with elevated T4 levels and high thyroid uptake indicate a primary cause.

Clinical features suggestive of Graves' disease include exophthalmos, pretibial myxedema, and diffuse thyroid enlargement with bruits.

52. A 52-year-old obese male patient presented to the clinic with polyuria, fasting serum glucose 240 mg/dl (<100), and glycated. hemoglobin (HA1C) level 12%. Kidney function testing was normal. The best next step in management is:

- a. Admit patient and start on insulin drip
- b. Lifestyle counseling and start metformin and glipizide
- c. Schedule for oral glucose tolerance test to confirm diagnosis
- d. Lifestyle counseling and start insulin
- e. No intervention, repeat serum glucose after 6 months.

# Diagnostic Criteria

Answer: d

The patient has a clear diagnosis of type 2 diabetes mellitus based on the fasting serum glucose of 240 mg/dL and a glycated hemoglobin (A1C) level of 12%.

Insulin therapy is considered due to the significantly elevated A1C levels.

- **Symptomatic hyperglycemia**

The diagnosis of diabetes mellitus is established when a patient presents with classic symptoms of hyperglycemia (thirst, polyuria, weight loss) with a RBG of 200 mg/dL .

(Most patients with type 1 diabetes and some patients with type 2 diabetes are symptomatic and have plasma glucose concentrations well above  $\geq 200$  mg/dL)

- **Asymptomatic hyperglycemia**

The diagnosis of diabetes in an asymptomatic individual (generally type 2 diabetes) can be established with any of the following criteria:

- FPG values  $\geq 126$  mg/dL.
- Two-hour plasma glucose values of  $\geq 200$  mg/dL during a 75 g OGTT.
- A1C values  $\geq 6.5\%$
- In the absence of unequivocal symptomatic hyperglycemia, the diagnosis of diabetes must be confirmed on a subsequent day by repeating the same test for confirmation.
- If two different tests are available and are concordant for the diagnosis of diabetes, additional testing is not needed . If two different tests are discordant, the test that is diagnostic of diabetes should be repeated to confirm the diagnosis.

53. Which of the following is not nephrotoxic?

- a. Gentamicin
- b. Ibuprofen
- c. Lithium
- d. Cisplatin
- e. Metformin

Answer : e

Metformin is generally considered safe for the kidneys when used appropriately, although caution is advised in patients with significantly impaired renal function

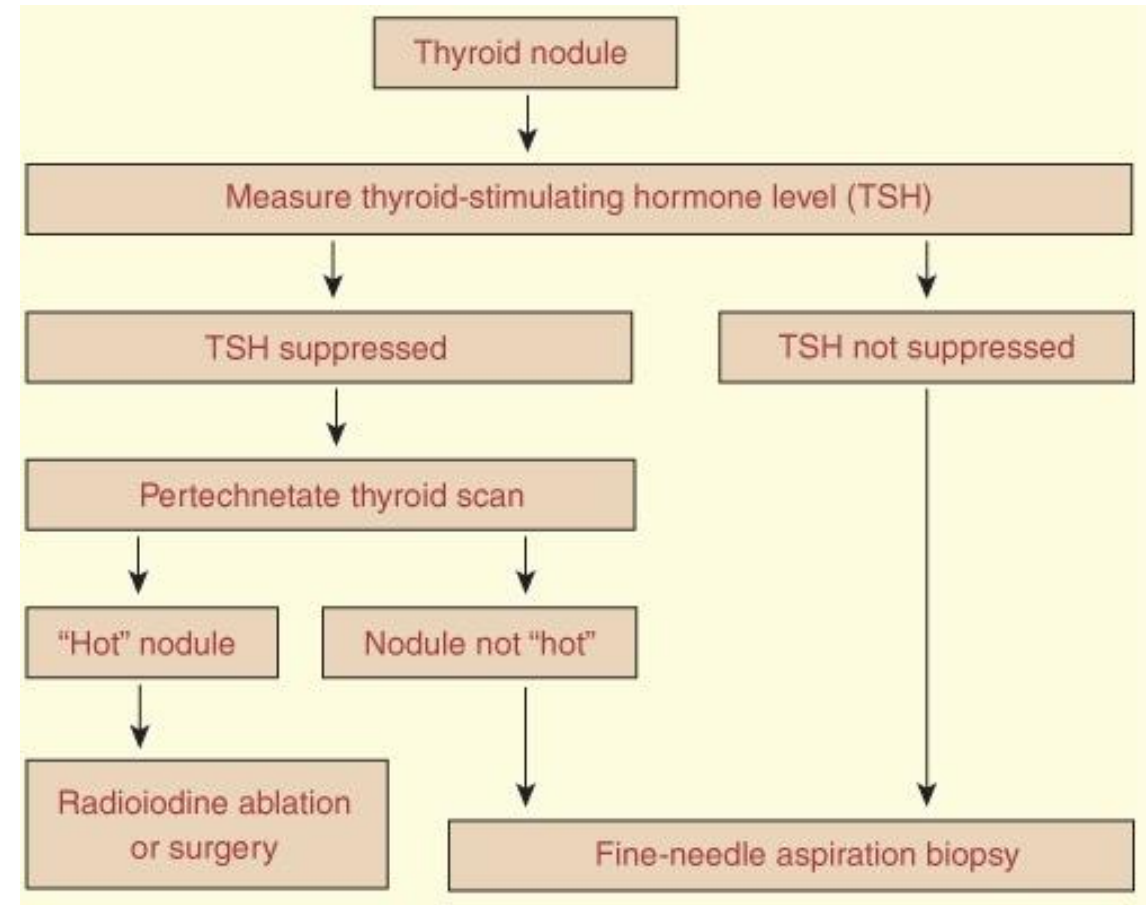
54. A 42-year-old female was found to have a palpable right thyroid nodule. Thyroid ultrasound confirmed the presence of a right 3.7 cm solid thyroid nodule. TSH: 0.006 mU/ml (0.35-4.9). Which of the following is the most appropriate next step in management?

- a. CT with contrast of the neck
- b. Measurement of serum thyroglobulin level
- c. Fine needle aspiration of the nodule
- d. Thyroid uptake and scan with I123
- e. Levothyroxine therapy



Answer: d

**Thyroid uptake and scan with I123,** This is the best next step for evaluating a thyroid nodule that is larger than 1 cm, especially when there is a concern for malignancy. The presence of a large nodule with suppressed TSH raises the suspicion for thyroid cancer, making cytological evaluation critical.



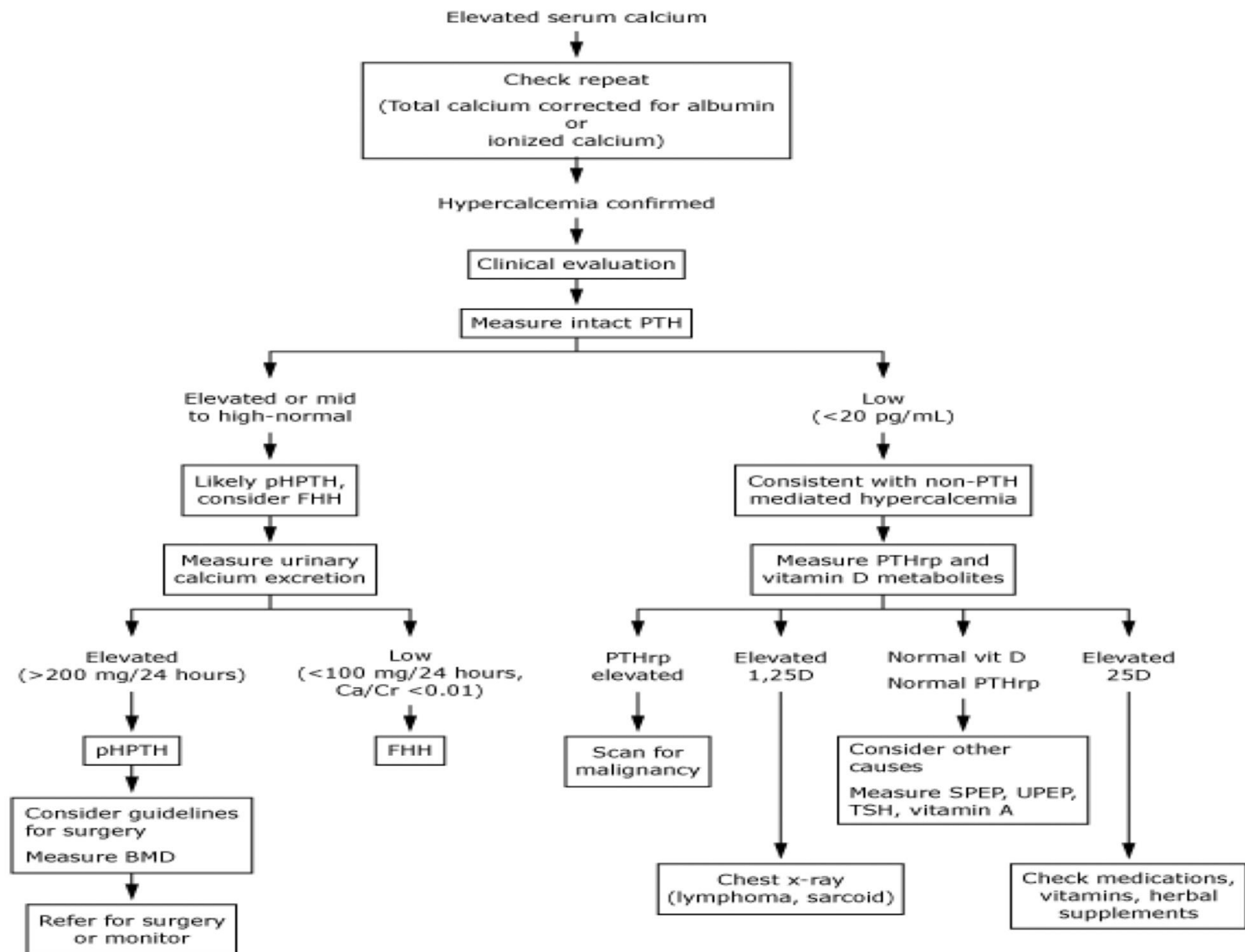
55. A 59-year-old man is evaluated for hypercalcemia. He was recently diagnosed with colon cancer. He does not have anorexia, nausea, or constipation. His physical examination is unremarkable. Corrected serum calcium level is 12.2 mg/dL (8.4-10.2). Which of the following is the most appropriate next laboratory test for evaluating this patient's hypercalcemia?

- a. 1,25-dihydroxyvitamin D level
- b. Parathyroid hormone related protein level
- c. Bone scan.
- d. Ionized calcium level
- e. Parathyroid hormone level

Answer : e

Initial Evaluation: In the workup of hypercalcemia, measuring **parathyroid hormone (PTH)** is indeed the crucial first step to determine **PTH-mediated vs. PTH-independent**.

**PTHrP** is a protein produced by many tumors that mimics the action of parathyroid hormone, leading to increased bone resorption and hypercalcemia. Even in the presence of malignancy, PTH-mediated causes cannot be entirely ruled out. Some tumors can still produce PTH or stimulate PTH production indirectly.



56. A 54-year-old obese female had routine laboratory work done which revealed a glycated hemoglobin A1C level of 6.6%. She reports no polyuria, no polydipsia, or other new complaints. How would you advise this patient?

- a. No intervention is needed but plan repeat glycated hemoglobin A1C level after 6 months.
- b. She has type 2 diabetes and needs to start on metformin.
- c. She needs a repeat hemoglobin A1C level before making a diagnosis.
- d. She has prediabetes and needs to start on metformin.
- e. Assure her that her serum glycated hemoglobin A1C level is within normal range.

## Diagnostic Criteria

Answer : c

In the absence of unequivocal hyperglycemia, diagnosis requires 2 abnormal test results from the same sample or in 2 separate test samples.

- **Symptomatic hyperglycemia**

The diagnosis of diabetes mellitus is established when a patient presents with classic symptoms of hyperglycemia (thirst, polyuria, weight loss) with a RBG of 200 mg/dL .

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57. A 58-year-old man with a history of hypertension presents with a 2-week history of fatigue and exertional shortness of breath. He is afebrile. Blood pressure is 147/84 mmHg. Chest X-ray showed hilar lymphadenopathy. Lab results showed a serum creatinine of 4.65 (mg/dL) (0.9-1.3), calcium 12.3 mg/dl (9-10.5), albumin 3.8 g/dl (3.4-5.4), PTH 6 pg/ml (10-65). In addition to volume expansion with normal saline, which of the following is the most appropriate strategy for management of this patient's hypercalcemia?

- a. Dialysis
- b. Calcitonin
- c. Prednisone
- d. Denosumab
- e. Zoledronic acid

Answer : c

Treatment of hypercalcemia is categorized based on severity. ( mild-moderate-severe)

In this scenario, hypercalcemia is most likely caused by a granulomatous disease indicated by the presence of hilar lymphadenopathy. Therefore, glucocorticoids (**prednisone**) are the drug of choice, as they effectively decrease the production of calcitriol from mononuclear cells in the lungs and lymph nodes.

Hypercalcemia	Serum Calcium level	Treatment
Mild	<12 mg/dl	Adequate hydration + the cause of the hypercalcemia
Moderate	12-14 mg/dl	Adequate hydration + the cause of the hypercalcemia
Severe	> 14 mg/dl	(IV) isotonic saline, subcutaneous calcitonin, and an IV bisphosphonate



## 5. GLUCOCORTICOIDS —

- ✓ Glucocorticoids ↓ calcitriol production by the activated mononuclear cells in the lung and lymph nodes.
- ✓ ↑ Calcitriol production can occur in chronic granulomatous diseases (eg, sarcoidosis) and in lymphoma.
- ✓ Glucocorticoids (Ex. prednisone 20-40 mg qd) will usually ↓ serum Ca within 2-5 days

58. A 28-year-old man presented with progressive fatigue and erectile dysfunction over the past year. He noted decreased libido and reports loss of morning erections. He also feels tired, has difficulty concentrating, noticed darkening of his skin and has diffuse joint aches. He was recently diagnosed with diabetes. He reports normal puberty and normal growth. He takes metformin and glipizide for his diabetes. His laboratory studies were consistent with hypogonadotropic hypogonadism, with normal serum prolactin and TSH level. Pituitary MRI is normal. Which of the following is the most appropriate next step in management?

- a. Begin testosterone replacement therapy
- b. Testicular ultrasound
- c. Serum iron, TIBC, and ferritin level
- d. Karyotyping
- e. Begin LH/FSH therapy

Answer: c

**Hereditary hemochromatosis (HH)** is an inherited disorder in which most of the affected individuals are homozygous for the C282Y variant in the *HFE* gene. [UpToDate.com](https://www.uptodate.com/contents/hereditary-hemochromatosis)

The combination of hypogonadotropic hypogonadism, skin darkening, diffuse joint aches, and diabetes in a young man should raise suspicion for an infiltrative disease, most likely hemochromatosis.

## Other Causes of Primary Hypogonadism

- ▶ Viral infection of the testicles
  - ▶ Radiation exposure
  - ▶ Chemotherapy
  - ▶ Infiltrative disease (e.g., hemochromatosis)
- 
- ▶ **Kallman syndrome** is characterized by infertility + anosmia. It is a cause of central hypogonadism.

59. A patient underwent transsphenoidal surgery for tumor removal, the most appropriate next step to assess his thyroid function is:

- a. measure TSH
- b. measure T4
- c. measure T3
- d. measure alpha-subunit of TSH
- e. measure thyroglobulin

Answer: b

**Measure T<sub>4</sub>** . After pituitary surgery, the most appropriate next step to assess thyroid function is to measure the free T<sub>4</sub> level. TSH levels may not accurately reflect thyroid status in these patients due to potential pituitary dysfunction, making free T<sub>4</sub> a more reliable indicator. [UpToDate.com](https://www.uptodate.com)

60. What should be done for a patient with hypoglycemia, high insulin, and low c-protein:

- a. psychiatry evaluation
- b. urine sulfonyleurea
- c. Start Metformin

Answer : a

The findings of hypoglycemia, high insulin, and low C-peptide suggest that the hypoglycemia mostly due to exogenous insulin administration rather than endogenous production.

61. Which of the following drugs cause neutropenia:

- a. Carbimazole
- b. Clomipramine
- c. Erythromycin
- d. Aminoglycosides



Answer: a

Thioamides (methimazole and carbimazole) are anti-thyroid medications, which inhibit the production of thyroid hormone.

The risk of developing **Neutropenia** – Absolute neutrophil count (ANC)  $<1500/\mu\text{L}$ , or **Agranulocytosis** – Absence of granulocytes (ie, ANC = 0) is increased in patients with thioamide therapy

62. In a patient with a 3 cm well-circumscribed adrenal incidentaloma discovered during imaging, who underwent a comprehensive Cushing's workup that returned negative results and has normal blood pressure, what would be the appropriate next step?

- a- Measure PAC/PRA ration.
- b- Measure fractionated plasma metanephrines.
- c- Do nothing.

Answer : b

Measure fractionated plasma metanephrines.

- Some “incidentalomas” may cause abnormal hormone secretion without obvious clinical manifestations of a hormone excess state; the best example of this relates to “preclinical” Cushing's syndrome, which may occur in up to 20% of all cases → All patients with incidentally discovered adrenal masses should undergo appropriate endocrine screening tests:
  - **24-hour urinary catecholamine collection**
  - **Low dose DST**
  - **If history of HTN, check supine circulating PRA/aldosterone levels.**
  - **DHEAS should be measured as a marker of adrenal androgen secretion based on the clinical picture.**

63. Patient with random blood sugar of 220, she complains of polyurea and polydipsia, what is your advice?

- a. do fasting blood sugar
- b. Diagnosis with DMT2 and give insulin
- c. Prediabetes and give metformin
- d. Do HbA1C
- e. No need to investigate more and reevaluate after 6 months

## Diagnostic Criteria

- **Symptomatic hyperglycemia**

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Answer: b

In **symptomatic individual** ( polyuria, polydipsia) the diagnosis is established when 2-hours plasma glucose  $> 200$  mg/dl during a 75g OGTT.

64. What is the mechanism of action (MOA) of SGLT2 inhibitors in decreasing blood glucose levels?

- a. Increased insulin secretion from the pancreas
- b. Inhibition of glucose reabsorption in the kidneys
- c. Enhanced peripheral insulin sensitivity
- d. Decreased hepatic glucose production

Answer: b

7. SGLT2 inhibitors:  
inhibit sodium and glucose reabsorption in  
proximal tubules.  
CVS protection  
S/E: UTI, dizziness, hypotension,  
dehydration



**TABLE 2.3-3. Treatment of Type 2 Diabetes Mellitus**

PHARMACOTHERAPY (MONOTHERAPY OR COMBINATION THERAPY IF POOR GLYCEMIC CONTROL)			
DRUG	MECHANISM	ADVERSE EFFECTS	NOTEWORTHY BENEFITS
Metformin (first-line)	Inhibits hepatic gluconeogenesis and ↑ peripheral sensitivity to insulin	Gastrointestinal (GI) upset, lactic acidosis (rare)—avoid use in renal insufficiency, hepatic failure, or heart failure	Weight loss, decrease in CVD events Expected decrease in A1c = 1.5%–2%
Sulfonylureas (glipizide, glyburide, glimepiride)	↑ endogenous insulin secretion	Hypoglycemia and weight gain—avoid use in older patients	Decrease in microvascular events Expected decrease in A1c = 1%–2%
Thiazolidinediones (rosiglitazone, pioglitazone) <sup>a</sup>	↑ insulin sensitivity	Weight gain, edema (avoid in heart failure patients), hepatotoxicity, and bone loss	Expected decrease in A1c = 0.5%–1.5%
Dipeptidyl peptidase (DPP)-4 inhibitors (sitagliptin, linagliptin, and other -gliptins)	Inhibit degradation of glucagon-like peptide (GLP)-1; ↑ insulin secretion and ↓ glucagon secretion	Increased risk of infections, rash	Expected decrease in A1c = 0.5%–1%
Incretins (exenatide, liraglutide, and other -tides)	GLP-1 agonists delay gastric emptying and decrease hunger; ↑ insulin secretion and ↓ glucagon secretion	Injected subcutaneously; slow GI motility, nausea, and increased risk of pancreatitis	Decrease in CVD events and mortality in high-risk patients (liraglutide) Expected decrease in A1c = 0.5%–1%
Sodium-glucose transporter (SGLT)2 inhibitors (empagliflozin and other -gliosins)	Inhibit SGLT2 in proximal tubule to ↓ glucose reabsorption	Urinary tract infections (UTIs), vulvovaginal candidiasis, Fournier gangrene, volume depletion, and hypotension	Weight loss, decrease in CVD events and mortality in high-risk patients (empagliflozin), decreased risk for development/worsening of nephropathy
α-glucosidase inhibitors (acarbose, miglitol)	↓ intestinal absorption of carbohydrates	Flatulence, diarrhea, and hypoglycemia	Potential decrease in CVD events in pre-DM Expected decrease in A1c = 0.5%–0.8%
Insulin	Given alone or in conjunction with oral agents	Weight gain and hypoglycemia	Greatest potential A1c reduction

<sup>a</sup>In September 2010, the US Food and Drug Administration restricted access to rosiglitazone because of concern for increased cardiovascular risks. The drug is still available but is restricted to patients currently on the medication who acknowledge that they understand the risks and to patients who cannot achieve adequate glycemic control with other medication.



65. 19-years male with delayed puberty, small testicles (high LH, low testosterone) what is the best diagnostic test to confirm his diagnosis:

- a. Testicular biopsy
- b. Give testosterone
- c. karyotyping

Answer: c

The combination of high LH and low testosterone suggests primary hypogonadism, and karyotyping can help identify genetic conditions such as Klinefelter syndrome (47,XXY), which is a common cause of primary testicular failure and delayed puberty in males.

66. Patient presented with bitemporal hemianopia and with prolactin = 32 ng /mL (normally <20), which of the following is the least likely cause ?

- a. Exercise
- b. Hypothyroidism
- c. Nonfunctioning pituitary adenoma
- d. 2 cm functional prolactinoma
- e. Antipsychotic drugs

Answer: a

## Hyperprolactinemia Causes

The causes of hyperprolactinemia could be:

- ▶ Physiologic: Such as pregnancy, breastfeeding, and stress.
- ▶ Drugs: Such as dopamine antagonists (e.g., antipsychotics, methyldopa), oral contraceptives, cimetidine, metoclopramide.
- ▶ Pathologic: Such as hypothyroidism and prolactinoma:
  - ▶ Hypothyroidism:  $\downarrow$  T3, T4  $\rightarrow$   $\uparrow$  TSH, TRH  $\rightarrow$   $\uparrow$  Prolactin
  - ▶ Prolactinoma: A tumor of the lactotroph cells (PL-secreting cells) in the anterior pituitary.

67. Which of the following is not associated with increase in CK:

- a. MI
- b. Hypothyroidism
- c. Hyperparathyroidism
- d. Dystrophy

Answer: c

Creatine kinase (CK) levels rise in conditions related to muscle injury or stress, therefore it increases in :

**MI** : Damage to muscle tissue in the heart due to ischemia or lack of blood flow

**Hypothyroidism**: Decreased thyroid hormone levels can lead to muscle dysfunction ( proximal myopathy).

**Dystrophy**: Various muscle dystrophies, such as Duchenne or Becker muscular dystrophy, are characterized by progressive muscle degeneration.

68. Hyperthyroidism symptoms, T<sub>4</sub>: 30 ( normal : 5.0-12.0 µg/dL), and TSH : 3.5 ( normal: 0.4-4.0 mIU/L), what's your diagnosis?

- a. Primary hyperthyroidism
- b. Subclinical Hyperthyroidism
- c. Central hyperthyroidism

Answer: c

Central hyperthyroidism (TSH-mediated hyperthyroidism) is due to either a TSH-secreting pituitary adenoma or partial resistance to the feedback effect of T4 and T3 on TSH secretion. These patients have normal or high serum TSH despite high free T4 and T3 concentrations. [UpToDate.com](https://www.uptodate.com/contents/central-hyperthyroidism)

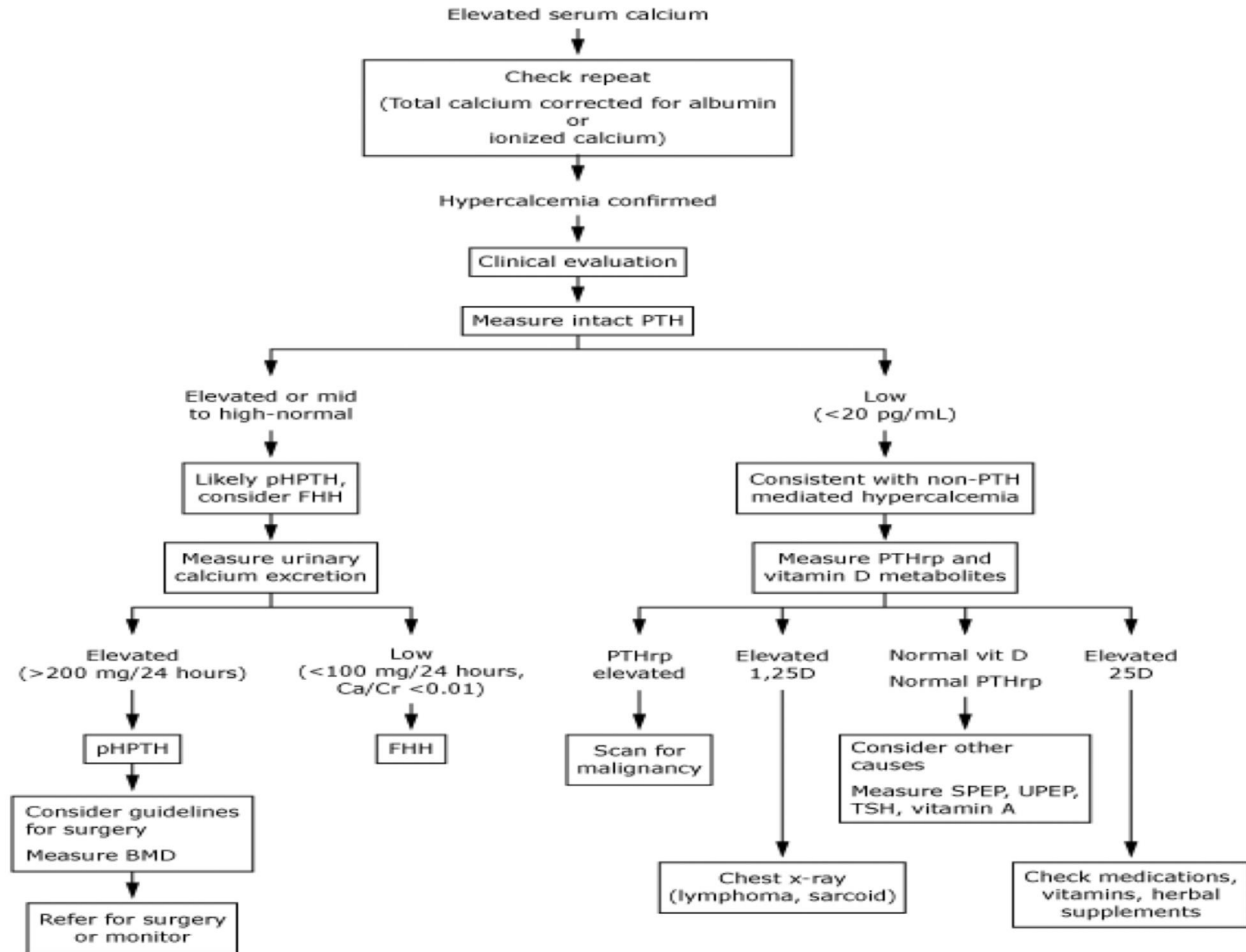
Serum TSH	Serum free T4	Serum T3	Assessment
Normal	Normal	Normal	Euthyroid
<b>Normal hypothalamic-pituitary function</b>			
Low	High (or normal)	High	Hyperthyroidism
	Normal	High	T3 toxicosis
	High	Normal	T4 toxicosis
Low	Normal	Normal	Subclinical hyperthyroidism*
<b>Abnormal hypothalamic-pituitary function</b>			
Normal or high	High	High	TSH-mediated hyperthyroidism
Low <sup>¶</sup>	Normal	Low or normal	Euthyroid with nonthyroidal illness or hyperthyroidism in a critically ill patient. Consider hyperthyroidism in a critically ill patient when TSH is lower <sup>¶</sup> and free T4 and T3 are higher than expected in nonthyroidal illness*.



69. Case with labs of hypercalcemia and low PTH, what is least likely the cause:

- a. Malignancy
- b. FHH
- c. Chronic kidney disease

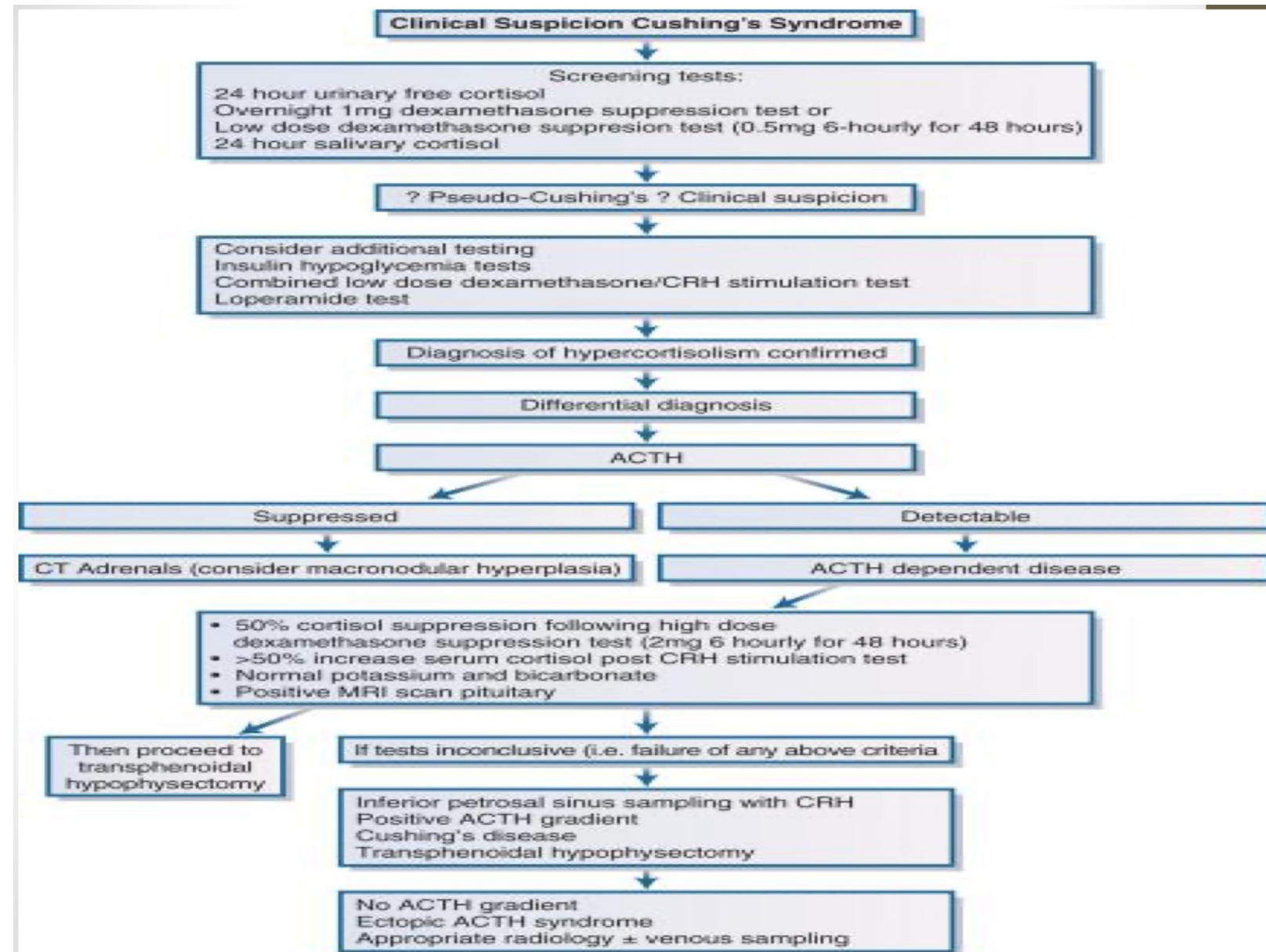
Answer: b



70. Cushing syndrome case, which test of the following is not useful for Dx:

- a. Midnight salivary cortisol
- b. 24-hour urine cortisol
- c. Low dose dexamethasone suppression test
- d. Midnight serum cortisol
- e. 8 A.M cortisol test

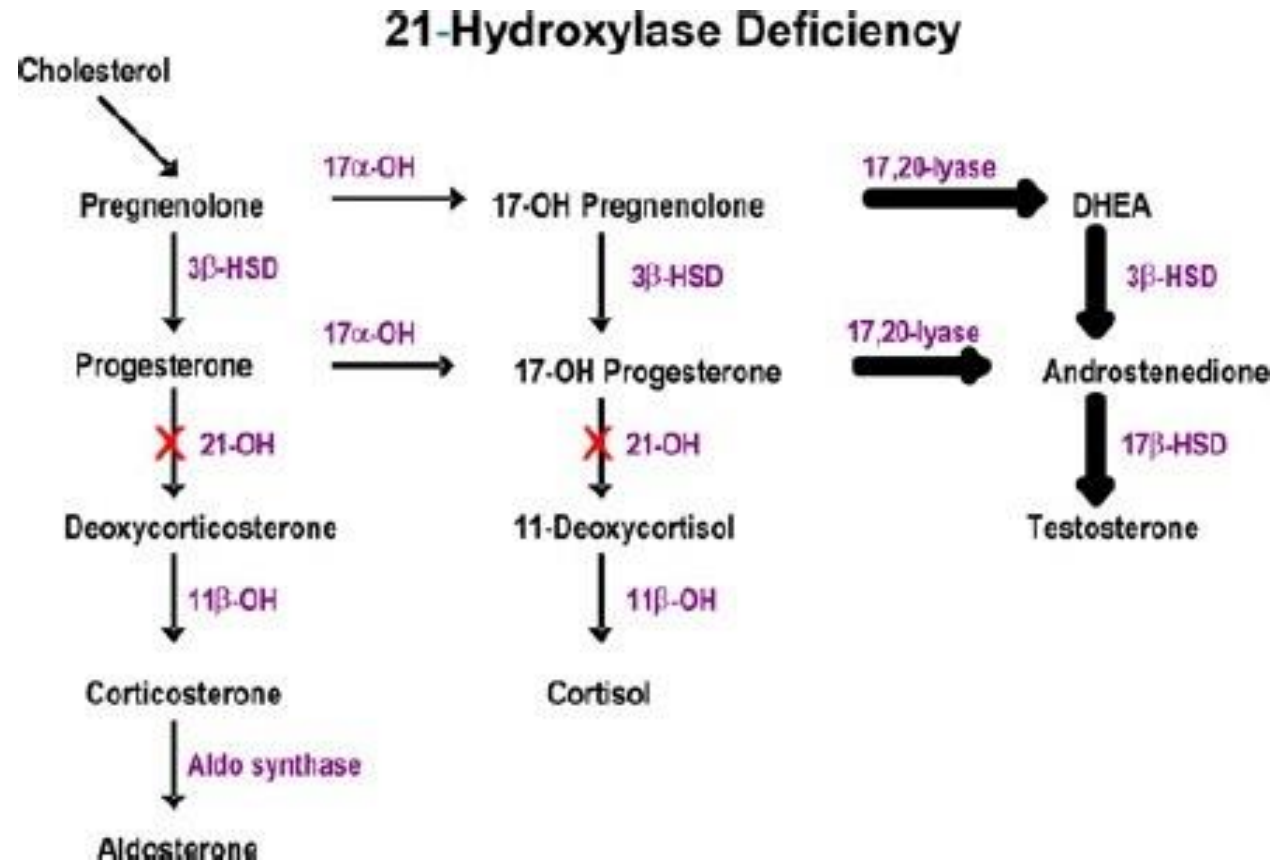
- Answer: d



71. Patient with 21-hydroxylase deficiency, what is the most appropriate test:

- a. 17-hydroxyprogesterone
- b. 17-hydroxypregnenolone
- c. Cortisol and aldosterone
- d. DHEA

Answer: a



72. A patient has symptoms and signs of acromegaly, What is the definitive test for the diagnosis?

- a. IGF-BP3
- b. Glucose suppression test
- c. MRI
- d. Insulin stimulation test

- Answer: b



73. Patient 30 y/o diagnosed with DM, what test support DM2 over DM1 :

- a. Waist circumference 70cm
- b. Presence of other autoimmune diseases
- c. Anti glutamic acid decarboxylase antibody
- d. Elevated c peptide

Answer: d

74. Least likely associated with hypothyroidism

- a. Hypertension
- b. Hyponatremia
- c. Hypokalemia
- d. Macrocytosis

Answer: c

A variety of metabolic abnormalities can occur in hypothyroidism, including **hyponatremia**, hyperlipidemia, **macrocytic anemia**, and high serum creatine kinase. [UpToDate.com](https://www.uptodate.com)

Many of the manifestations of hypothyroidism reflect one of two changes induced by lack of thyroid hormone: a generalized slowing of metabolic processes and accumulation of matrix glycosaminoglycans in the interstitial spaces of many tissues. Other symptoms and signs include depression, decreased hearing, **diastolic hypertension**, and pleural and pericardial effusions.. [UpToDate.Com](https://www.uptodate.com)

Important notes

1. What is the most appropriate next step for a case of acromegaly?

Measure IGF-1

2. What is the most appropriate next step for a suspected case of Klinefelter's?

Karyotype testing

3. For a case of thyroid nodule, what is the most appropriate next step?

Measure TSH



4. What is the most appropriate next step for a case of suspected adrenal insufficiency (hypotension, fatigue, etc.)?

ACTH stimulation test

5. The case describes a young adult with thyroid acropachy. They have high T4 and low TSH (primary hyperthyroidism). What is the most common cause?

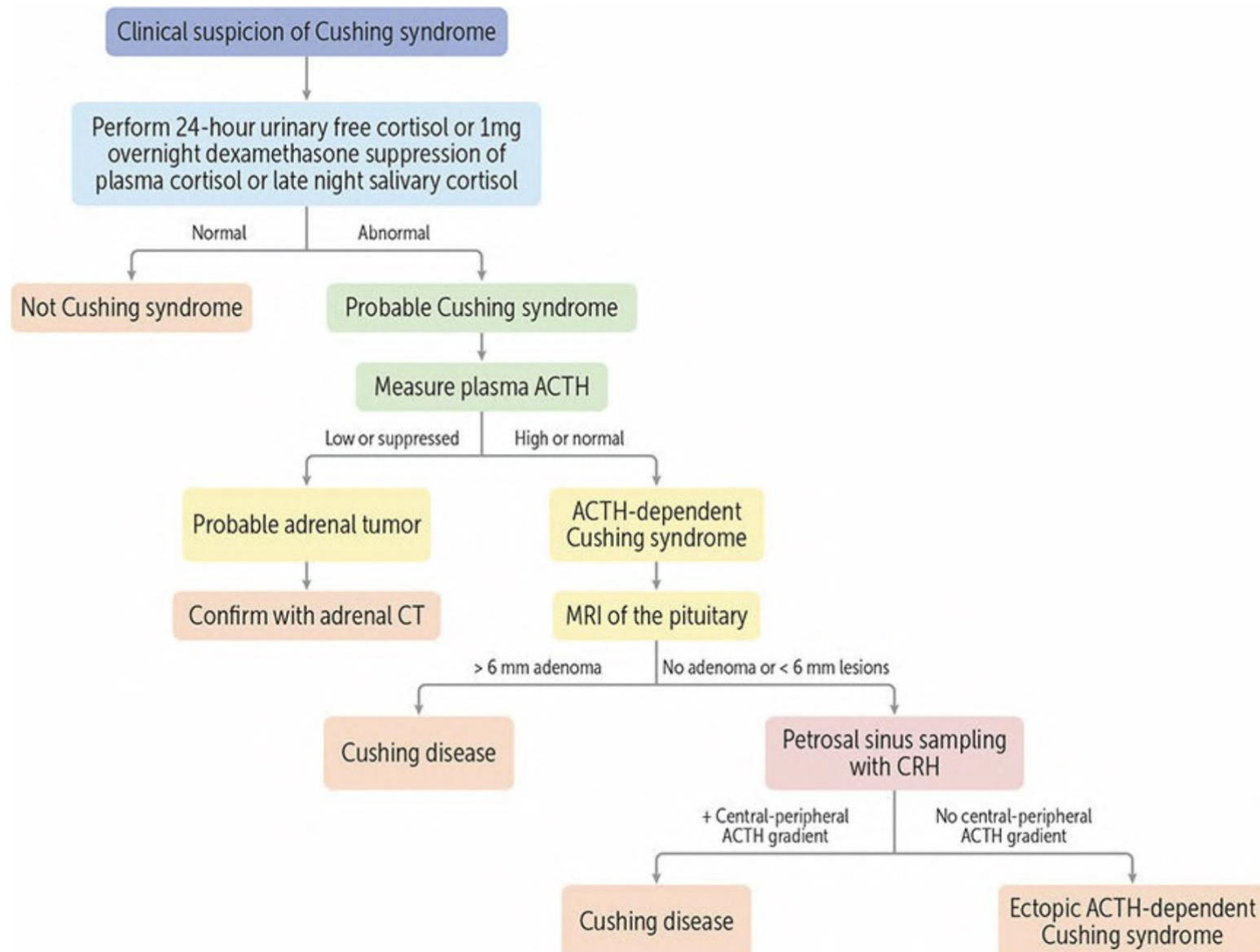
Grave's disease

7. A woman has obesity, proximal myopathy, and abdominal striae.  
What is the most appropriate next step?

24-hour urine cortisol- Cushing's Syndrome

8. A case of Cushing's was diagnosed with a high 24-hour urine cortisol. The cortisol levels were not suppressed by low-dose dexamethasone and the ACTH is high. What is the most appropriate next step?

Pituitary MRI



9. A case of sarcoidosis with hypercalcemia, which will not be found?

High PTH

Sarcoidosis causes hypercalcemia by activating renal  $\alpha_1$ -hydroxylase and increasing vit D.

10. An asymptomatic woman comes with a fasting plasma glucose (FBG) of 136, what should you do?

Repeat FBG

## Diagnostic Criteria

- **Symptomatic hyperglycemia**

The diagnosis of diabetes mellitus is established when a patient presents with classic symptoms of hyperglycemia (thirst, polyuria, weight loss) with a RBG of 200 mg/dL .

(Most patients with type 1 diabetes and some patients with type 2 diabetes are symptomatic and have plasma glucose concentrations well above  $\geq 200$  mg/dL)

- **Asymptomatic hyperglycemia**

The diagnosis of diabetes in an asymptomatic individual (generally type 2 diabetes) can be established with any of the following criteria:

- FPG values  $\geq 126$  mg/dL.
- Two-hour plasma glucose values of  $\geq 200$  mg/dL during a 75 g OGTT.
- A1C values  $\geq 6.5\%$ 
  - In the absence of unequivocal symptomatic hyperglycemia, the diagnosis of diabetes must be confirmed on a subsequent day by repeating the same test for confirmation.
  - If two different tests are available and are concordant for the diagnosis of diabetes, additional testing is not needed . If two different tests are discordant, the test that is diagnostic of diabetes should be repeated to confirm the diagnosis.



11. A patient with known prostatic cancer presented with hypercalcemia.  
What is the most appropriate next step?

Check PTH

12. A patient presented with sweating and signs of hypoglycemia. She developed hypoglycemia after fasting for 8 hours in the hospital. What is the most appropriate next step to know the cause?

Measure C-peptide

13. What is the cause of diabetes that has nothing to do with insulin resistance?

Cystic fibrosis related DM

# Classification of Diabetes Mellitus by Etiology

- **Type 1**                      autoimmune destruction of the beta cells (type 1A)  
                                      nonautoimmune islet destruction (type 1B)
- **Type 2**                       $\beta$ -cell dysfunction and insulin resistance
- **Gestational**                 $\beta$ -cell dysfunction and insulin resistance during pregnancy
- **Other specific types**
  - Pancreatic diabetes.
  - Endocrinopathies
  - Drug- or chemical-induced
  - Other rare forms

## Secondary insulin resistance

Obesity (free fatty acids and adipocytokines may contribute)

Stress, infection due to excess counterregulatory hormones (cortisol, catecholamines, growth hormone, glucagon)

Medications (eg, glucocorticoids, HIV antiretrovirals, oral contraceptives)

Inactivity

Pregnancy (placental lactogen)

Immune mediated (anti-insulin antibodies, anti-insulin receptor antibodies in type B syndrome)

Miscellaneous (starvation, uremia, cirrhosis, ketoacidosis)

## Consequences of insulin resistance

Most cases of type 2 diabetes mellitus

Cardiovascular disease, hypertension

Polycystic ovary syndrome

Metabolic syndrome

Obesity-related cancers

## 14. Treatment of hyperthyroidism in a patient planning to get pregnant

Propylthiouracil (PTU)

15. A 45-year-old has a random plasma glucose of 260, polyuria, polydipsia, and weight loss. What is the next step?

This is type 2 DM and begin treatment

16. Most common site for gastrinoma?

Duodenum



17. In a patient with hyperglycemia who you want to start insulin, what test should be done beforehand?

Potassium level

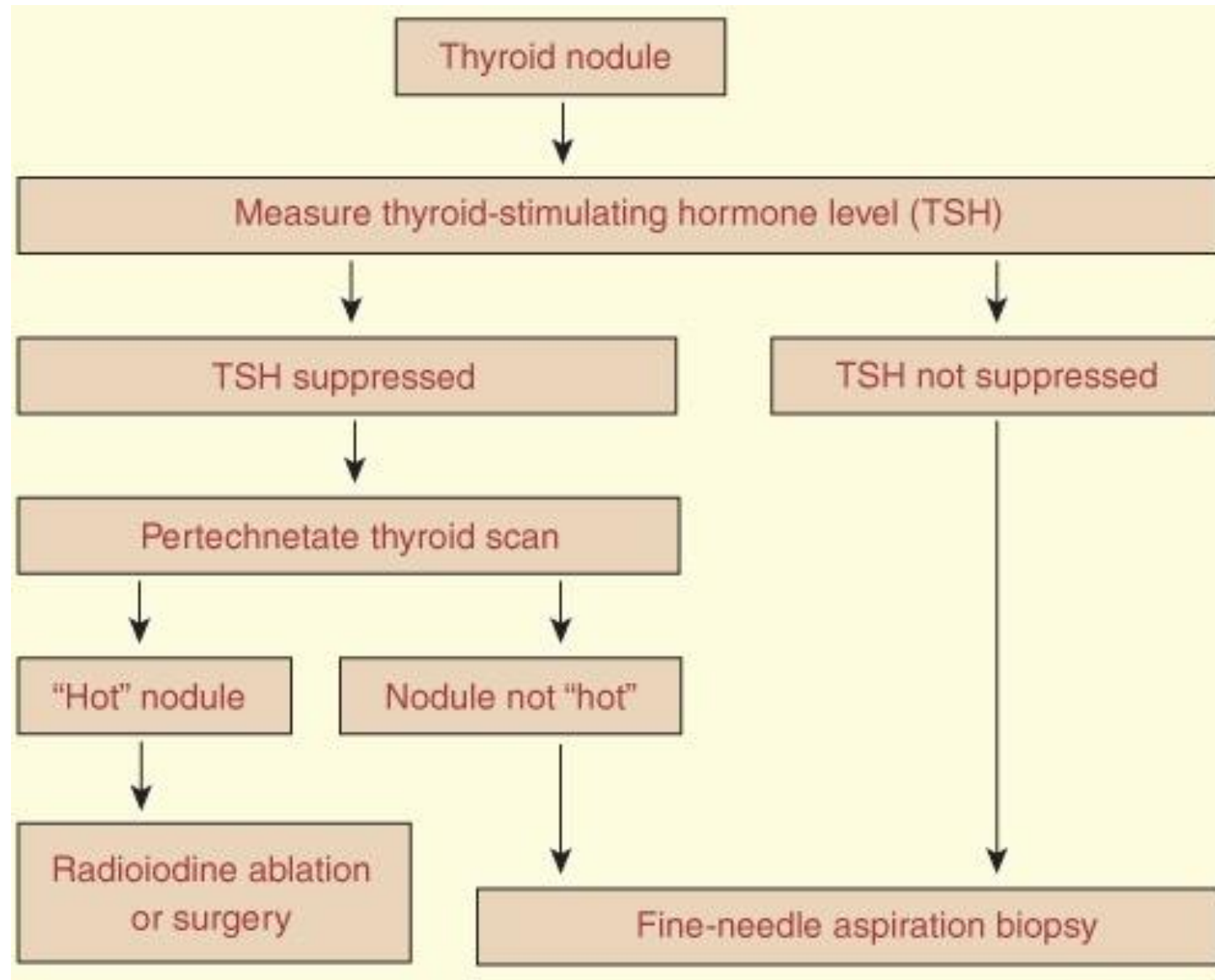
Insulin promotes the entry of potassium into skeletal muscle and hepatic cells, predominantly by increasing the activity of the Na-K-ATPase pump. This effect is most prominent after the administration of exogenous insulin to patients with diabetic ketoacidosis or severe nonketotic hyperglycemia who are often normokalemic or hyperkalemic at presentation, even though they have lost potassium. Hypokalemia can rarely result from an insulin overdose. [UpToDate.com](https://www.uptodate.com)

18. What is the next step in management of a 50-year-old patient with an HBA1C of 6.8, FBS of 180, and normal KFT:

Metformin and lifestyle modifications

19. Female with a thyroid nodule and normal TFT, next step:

Fine needle aspiration (FNA)



20. A diabetic patient on a regimen of metformin, glipizide, and a statin presents with new-onset anemia. What is the most likely cause of the anemia in this patient?

**Metformin-** vitamin B12 deficiency.

21. A 50-year-old woman with a history of autoimmune disease presented after tapering off exogenous cortisol over the past month. She reported fatigue, weight loss, dizziness, and weakness. Examination showed BP of: 85/55 mmHg, and signs of dehydration. Laboratory tests indicated ↓ serum cortisol and ↑ ACTH, what is the most appropriate next step?

IV Hydrocortisone- adrenal insufficiency

22. Patient with acromegaly, best way to diagnose (definitive diagnosis test) :

Glucose suppression test



23. patient with thyroid nodule, hypoechoic on US, next step?

TSH

24. A cause of low uptake thyrotoxicosis?

Factitious thyrotoxicosis -thyroid hormone abuse.

25. A patient with decreased libido, fatigue, small, firm testicles, family history of infertility, and 1.92 meters in height. What is the most appropriate next step?

Karyotype testing

26. Gold standard for confirming low growth hormone in a child with short stature?

Insulin Tolerance Test.

27. Hypoglycemic patient with high insulin and low C-peptide, most likely cause ?

Exogenous insulin

28. A patient of multiple myeloma and constipation,  $\text{Ca}^{2+}$  is 10.2, next step in evaluating  $\text{Ca}^{2+}$  ?

Serum albumin

29. Not a cause of high phosphate and low calcium?

Vitamin D deficiency

Vitamin D deficiency  $\Rightarrow$   $\downarrow\text{PO}_4^{3-}$ ,  $\downarrow\text{Ca}^{2+}$

30. A patient has adrenal insufficiency and is on steroids. Which is not an indication to increase the steroid dose?

Hypertension



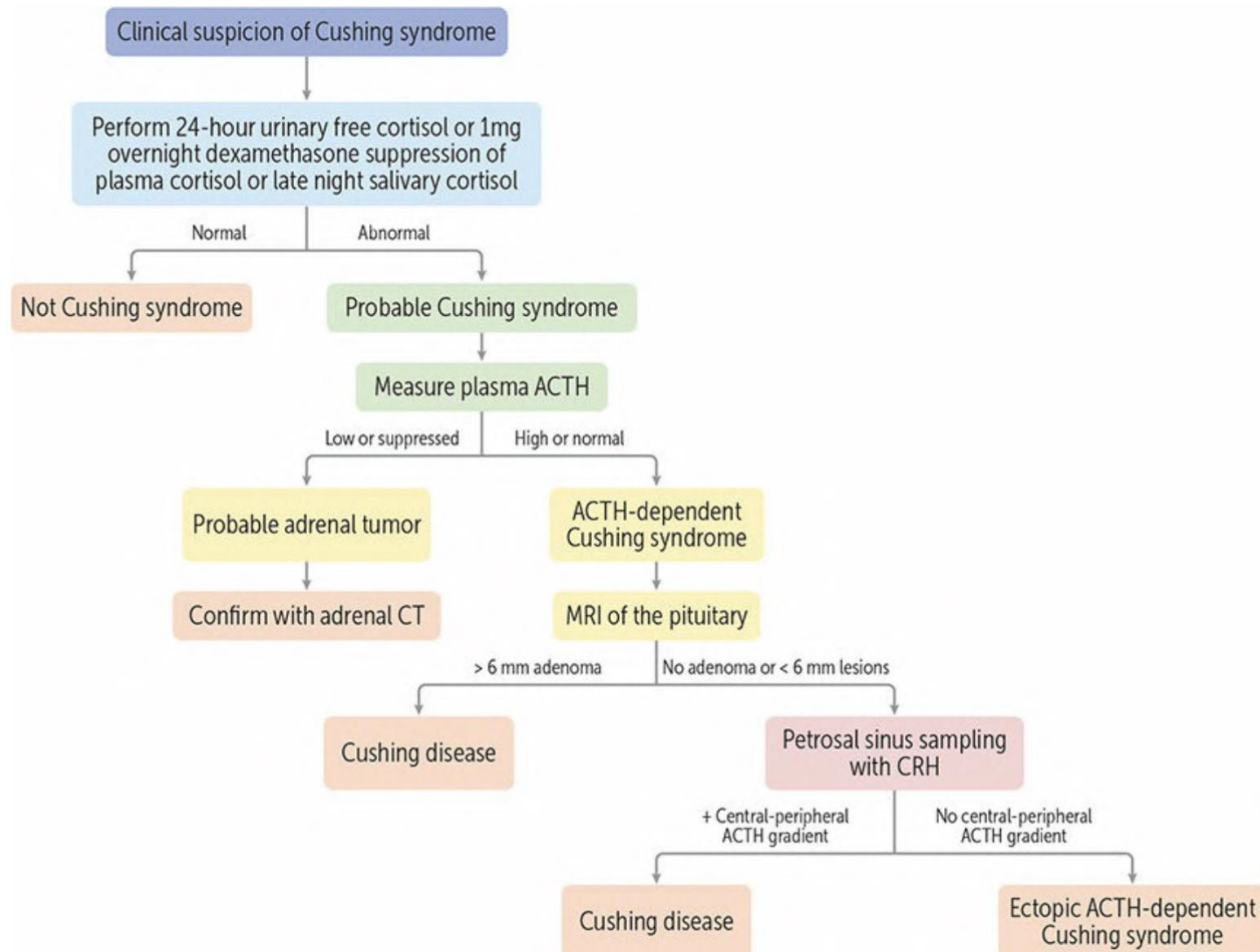
# Adrenal crises

- **Similar symptoms and signs of adrenal insufficiency but are more severe, including but not limited to: severe hypotension, hyperkalemia, fever & decreased level of consciousness.**



31. A patient suspected to have Cushing's syndrome has a positive low-dose dexamethasone test and 24h urine cortisol. What is the most appropriate next step?

Serum ACTH



32. Confirms DM diagnosis:

Polydipsia, polyuria, weight loss and FBG of 135

33. Vitamin D deficiency, what is wrong?

Normal PTH

## Lab values in hypocalcemic disorders

DISORDER	Ca <sup>2+</sup>	PO <sub>4</sub> <sup>3-</sup>	PTH	ALP	VITAMIN D
Vitamin D deficiency	↓	↓	↑	↑	↓
Hypoparathyroidism	↓	↑	↓	—	↓
2° hyperparathyroidism (CKD)	↓	↑	↑	↑	—/↓
Pseudohypoparathyroidism	↓	↑	↑	↑	—
Hyperphosphatemia	↓	↑	↑	↑	↓

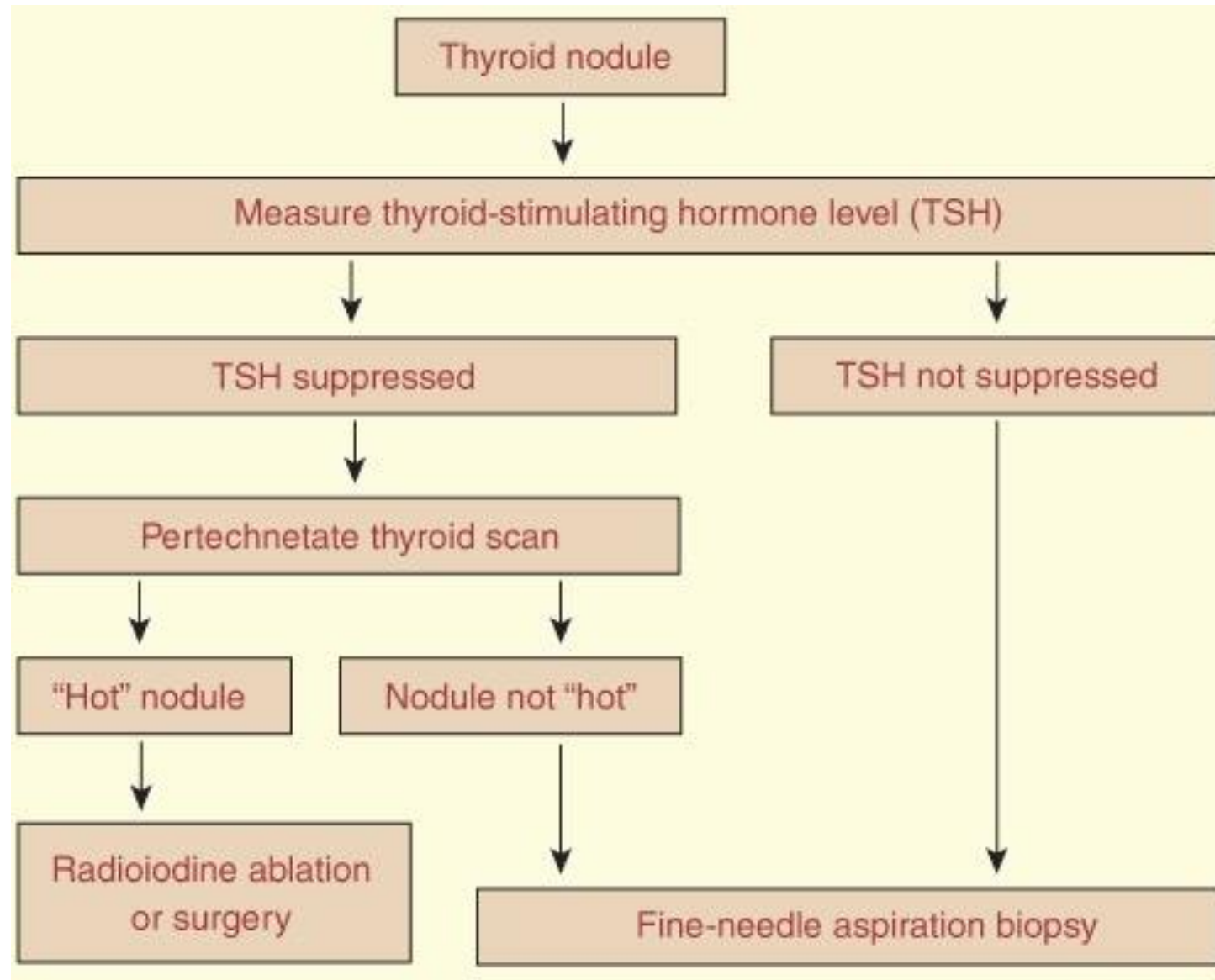
34. A female patient has ↑ serum Ca ↑PTH ↓urine Ca, and family history of ↑ Ca. What is the diagnosis?

FHH

35. A patient with a thyroid nodule is found to have TSH within normal levels. What is the most appropriate next step?

FNA





36. ↓FSH, ↓LH, ↓Testosterone, and anosmia. Diagnosis?

Kallman syndrome

37. Adrenal insufficiency, most appropriate next step?

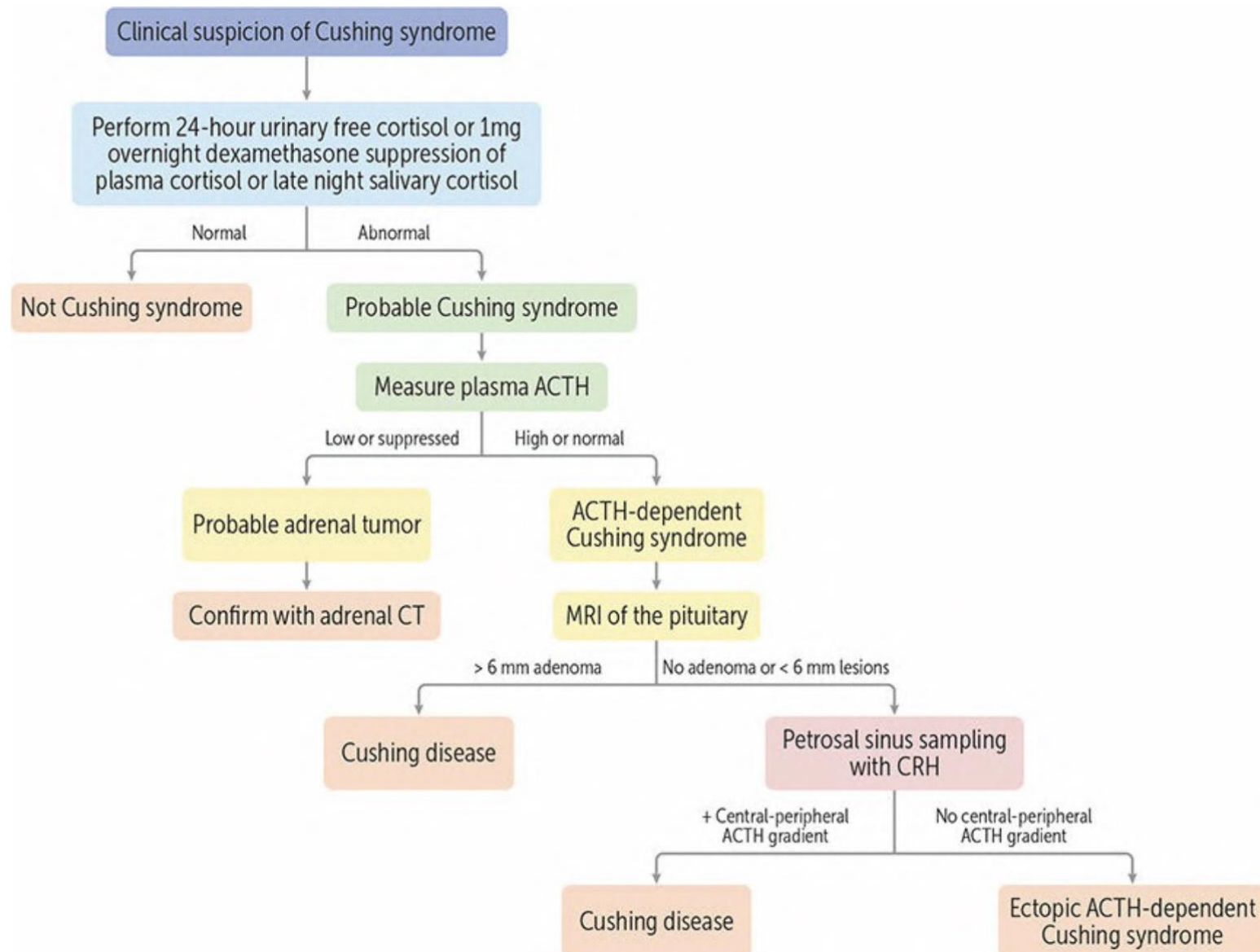
ACTH stimulation test

38. For a patient with Cushing's and ↑ 24 hr urine cortisol, what is the most appropriate next step?

Check ACTH level

39. For a patient with signs and symptoms of Cushing's what is the most appropriate next step?

24 hr urine cortisol



40. Acromegaly, diagnostic test?

Oral glucose tolerance test (OGTT)

41. Acromegaly, best treatment?

Trans- sphenoidal surgery



42. Psychotic patient, which drug causes her increased  $\text{Ca}^{2+}$  levels?

Lithium

43. Obesity does not cause?

Osteoporosis

44. For a patient with hypoglycemia + ↑ insulin, what is the most appropriate next step?

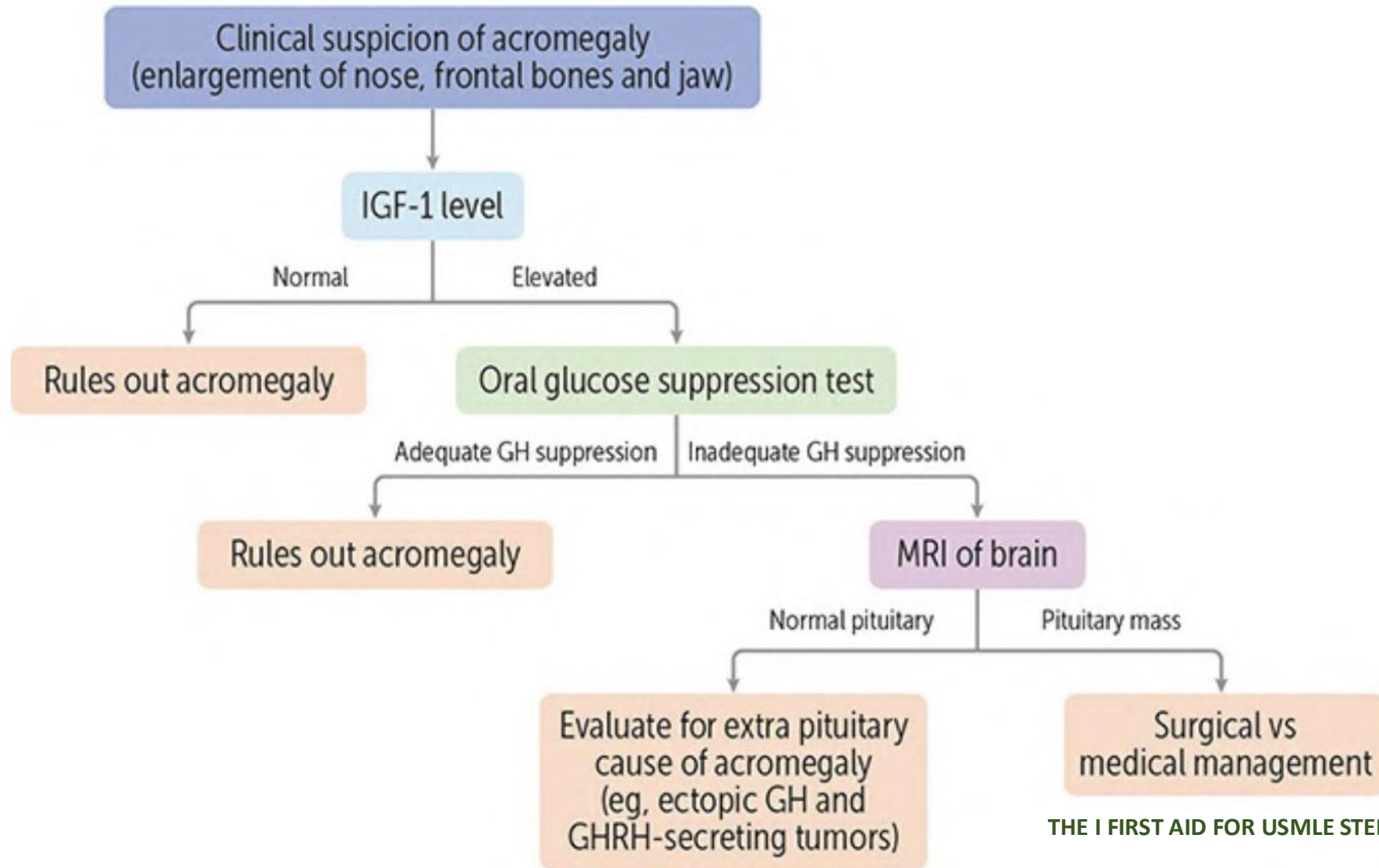
C-peptide

45. A postpartum woman gave birth 4 months ago. She developed goiter, symptoms of hyperthyroidism, elevated T4, and low TSH. What would you expect to find?

Elevated thyroglobulin

46. What is the screening test for acromegaly?

IGF1 levels in the blood



47. A young lady with hypothyroidism and hyperprolactinemia, what to tell her?

Her condition will improve with levothyroxine

Resources :

- ✓ Lectures' slides
- ✓ Lectures' notes
- ✓ UpToDate
- ✓ THE I FIRST AID FOR USMLE STEP 2 CK
- ✓ THE I FIRST AID FOR USMLE STEP 1

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