Endocrine System

United States Medical Licensing Examination (USMLE) Step 1

3 to 7% of Step 2 CK · 9 sections · content outline and specifications

The endocrine system is 3 to 7% of Step 2 CK. Most questions ask for the best next test, the next step in management or the first-line drug. Diabetes and its emergencies are the largest part. Thyroid, adrenal, pituitary and calcium disorders follow, with osteoporosis screening and growth and puberty problems in children. Learn the order of tests: first prove the hormone is too high or too low, then find where the problem is, and only then image.

You should be able to: After this guide, a learner can choose the first test, the next step and the first-line drug for common endocrine problems in adults, pregnancy and children, and can manage DKA, HHS, thyroid storm, adrenal crisis and severe hypercalcemia safely.

Every section: the key point and the trap

1 Diabetes mellitus: screening and diagnosis

Diagnosis: hemoglobin A1c 6.5% or more, fasting glucose 126 mg/dL or more, 2-hour glucose 200 mg/dL or more on a 75 g oral glucose tolerance test, or a random glucose of 200 mg/dL or more with symptoms.

Trap: Do not start drugs for prediabetes before offering the lifestyle program, and do not diagnose diabetes from one high value in a person without symptoms.

2 Diabetes mellitus: long-term treatment

Type 2 diabetes: metformin plus lifestyle change is first-line for most patients. Stop or reduce it when eGFR falls below 30 to 45 mL/min.

Trap: Choosing the drug that lowers A1c most is a wrong turn. On Step 2 CK, choose the drug that also protects the heart and kidneys when the patient has those diseases.

3 Diabetic emergencies: DKA, HHS and hypoglycemia

Diabetic ketoacidosis (DKA): glucose usually above 250 mg/dL, pH below 7.30, bicarbonate below 18 mEq/L, an anion gap and ketones. SGLT2 inhibitors can cause DKA with near-normal glucose.

Trap: Starting insulin first is the classic error. Fluids come first, and a low potassium must be corrected before insulin.

4 Thyroid function disorders

TSH is the first test for almost every thyroid question. Then free T4 shows the degree and the type.

Trap: Iodine given before the thionamide can feed new hormone production. In thyroid storm, block synthesis first, then give iodine.

5 Thyroid nodules and thyroid cancer

First test for any nodule: TSH. Then ultrasound of the thyroid and neck.

Trap: Ordering FNA before TSH is a wrong turn. A low TSH sends the patient to an uptake scan first, and a hot nodule needs no biopsy.

6 Adrenal disorders

Adrenal crisis: hypotension that does not respond to fluids, often with low sodium, high potassium and low glucose. Give intravenous hydrocortisone at once. Do not wait for tests.

Trap: A beta blocker before alpha blockade in pheochromocytoma leaves alpha receptors unopposed and can cause a hypertensive crisis.

7 Pituitary disorders

Hyperprolactinemia: first exclude pregnancy, hypothyroidism, kidney disease and drugs (antipsychotics, metoclopramide). Then MRI of the pituitary.

Trap: Surgery is not first-line for prolactinoma, even a macroadenoma with visual loss. Dopamine agonists shrink most tumors quickly.

8 Calcium, parathyroid disease and osteoporosis

High calcium with high or normal PTH: primary hyperparathyroidism. High calcium with low PTH: cancer (PTHrP, bone metastases), vitamin D excess or granulomatous disease.

Trap: Loop diuretics are not first-line for hypercalcemia. They are used only for fluid overload after volume is restored.

9 Endocrine disorders in children: growth and puberty

Plot height on the growth chart and measure bone age (an x-ray of the left hand and wrist).

Trap: A delayed bone age separates constitutional delay from familial short stature. Do not order growth hormone tests for a child with a normal growth rate.

Key terms

Anion gap: Sodium minus chloride and bicarbonate; a high value shows extra acids such as ketones.

C-peptide: A piece cut off when the pancreas makes insulin; it is low when insulin is injected.

Thionamide: A drug that blocks thyroid hormone production, such as methimazole or propylthiouracil.

Fine-needle aspiration: Taking cells from a lump with a thin needle to look for cancer.

Metanephrines: Breakdown products of adrenaline and noradrenaline measured to find pheochromocytoma.

Bone age: The age a child's bones look on a hand x-ray, compared with the real age.

DXA: Dual-energy x-ray absorptiometry, a low-dose scan that measures bone density.

T-score: Bone density compared with a healthy young adult; -2.5 or lower means osteoporosis.

Stress dose: An extra glucocorticoid dose given during surgery or severe illness to replace what the body cannot make.

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