Achievable

USMLE STEP 1 DUMP SHEET

Endocrine and neurophysiology

Pituitary

Hormone	Raised by	Lowered	Actions
GH	GHRH, sleep, ghrelin	Somatostatin	IGF-1: growth
Prolactin	TRH, suckling	Dopamine	Milk; ↓ GnRH
ADH	↑ osmolality	Ethanol, ANP	V2 water; V1 constricts
Oxytocin	Suckling, cervix	Opioids	Letdown, labor

- **POMC** → ACTH, MSH, β-endorphin: high ACTH darkens skin

Thyroid

- **Synthesis:** NIS traps iodide → TPO oxidizes, iodinates, couples: DIT + DIT = T4, MIT + DIT = T3
- **Deiodinase** (selenium): T4 → T3; D3 makes reverse T3
- **TRH** (Gq) → **TSH** (Gs, cAMP). T3 + nuclear receptor/RXR: ↑ Na+/K+ ATPase, BMR, LDL receptors
- **Iodide excess:** ↓ T4 (Wolff-Chaikoff); ↑ in nodules (Jod-Basedow)
- **↑ TBG** (pregnancy, estrogen): ↑ total T4, free T4 normal

Pancreas

- **Insulin release:** GLUT2 → glucokinase → ATP closes K-ATP → depolarization → Ca2+ in. Biphasic
- **↑ Insulin:** GIP, GLP-1, vagus (M3), β2. **↓:** α2, somatostatin
- **Receptor:** tyrosine kinase; PI3K (GLUT4 in muscle, fat), RAS (growth). Drives K+ into cells
- **Glucagon** (Gs): glycogenolysis, ketones; β-blocker overdose
- **GLUT1** most tissues; **GLUT2** liver, β cell; **GLUT3** neurons; **GLUT4** insulin-driven; **GLUT5** fructose

Adrenal

- **Glomerulosa:** aldosterone (Ang II, K+). **Fasciculata:** cortisol (ACTH). **Reticularis:** DHEA(S)
- **Cortisol:** 90% bound (mostly CBG); ↑ gluconeogenesis, lipolysis; ↓ PLA2 (lipocortin), IL-2; permissive for α1
- **Aldosterone:** ENaC, Na+/K+ ATPase. **Medulla:** epinephrine

Calcium, vitamin D, EPO

- **PTH:** ↑ Ca2+ reabsorption (DCT), ↓ phosphate (PCT), ↑ 1α-hydroxylase; osteoblast RANKL ↑, OPG ↓
- **Mg2+:** mild ↓ raises PTH; severe ↓ or ↑ lowers it
- **Vitamin D:** skin D3 → liver 25-OH (status marker) → kidney 1,25-(OH)2 (PTH, ↓ Ca2+, ↓ PO4); ↑ gut Ca2+, PO4
- **Calcitonin** (C cells): inhibits osteoclasts
- **EPO:** renal peritubular fibroblasts; hypoxia → HIF; JAK2-STAT5

Reproductive

- **GnRH** (Gq): fast pulses → LH, slow → FSH; constant → ↓ both
- **Ovary:** LH → theca androgens; FSH → granulosa aromatase
- **Testis:** LH → Leydig testosterone; FSH → Sertoli: inhibin (↓ FSH), AMH. **DHT** (5α-reductase): external genitalia, prostate
- **Cycle:** luteal phase fixed at 14 days (progesterone: ↑ temperature). Estrogen surge → LH surge → ovulation
- **Menopause:** ↓ inhibin → ↑ FSH (over 30 mIU/mL); estrone from aromatized androgens. **Estriol:** pregnancy

Autonomic receptors

Receptor	G	Key effects
α1	q	Vasoconstriction, mydriasis, sphincters contract
α2	i	↓ NE release, ↓ insulin
β1	s	↑ HR, contractility, renin
β2	s	Bronchodilation, muscle vasodilation, ↑ insulin
M1, M3	q	Secretions, bronchoconstriction, miosis, bladder
M2	i	↓ HR, ↓ AV conduction
N	Ion	Ganglia, adrenal medulla (Nn); muscle (Nm)

- **Sympathetic postganglionic:** NE, except ACh to sweat glands

Neurotransmitters

- **Catecholamines:** tyrosine → L-DOPA (tyrosine hydroxylase) → dopamine → NE (DBH) → epinephrine (PNMT)
- **NE:** locus coeruleus. **5-HT:** raphe; tryptophan → 5-HIAA. **ACh:** nucleus basalis (↓ Alzheimer)
- **GABA** (glutamate, GAD): GABA-A Cl−, benzodiazepines; ↓ Huntington. **Glycine:** spinal cord
- **Dopamine:** ↓ Parkinson, ↑ schizophrenia; D1 ↑, D2 ↓ cAMP

Basal ganglia

- **Direct (D1):** striatum ⊣ GPi ⊣ thalamus: ↑ movement
- **Indirect (D2):** striatum ⊣ GPe ⊣ STN → GPi: ↓ movement
- **Dopamine** (substantia nigra) excites direct, inhibits indirect

Senses

- **Meissner:** light touch. **Pacinian:** vibration. **Merkel:** pressure
- **Light:** all-trans retinal → transducin → ↓ cGMP → hyperpolarize
- **Chiasm:** bitemporal. **Meyer loop:** upper quadrant. **Occipital:** macula spared
- **Cochlea:** base high pitch. Olive → lateral lemniscus → inferior colliculus → MGB
- **COWS:** cold, fast phase opposite; warm, same. **Taste:** VII, IX, X → NTS → VPM