

## Key Physiology Topics for USMLE Step I

### Cell Physiology

- Transport mechanisms
- Ionic basis for action potential
- Excitation-contraction coupling in skeletal, cardiac, and smooth muscle
- Neuromuscular transmission

### Autonomic Physiology

- Cholinergic receptors
- Adrenergic receptors
- Effects of autonomic nervous system on organ system function

### Cardiovascular Physiology

- Events of cardiac cycle
- Pressure, flow, resistance relationships
- Frank-Starling law of the heart
- Ventricular pressure-volume loops
- Ionic basis for cardiac action potentials
- Starling forces in capillaries
- Regulation of arterial pressure (baroreceptors and renin-angiotensin II-aldosterone system)
- Cardiovascular and pulmonary responses to exercise
- Cardiovascular responses to hemorrhage
- Cardiovascular responses to changes in posture

### Respiratory Physiology

- Lung and chest-wall compliance curves
- Breathing cycle
- Hemoglobin-O<sub>2</sub> dissociation curve
- Causes of hypoxemia and hypoxia
- $\dot{V}/\dot{Q}$ , PO<sub>2</sub>, and PCO<sub>2</sub> in upright lung
- $\dot{V}/\dot{Q}$  defects
- Peripheral and central chemoreceptors in control of breathing
- Responses to high altitude

### Renal and Acid-Base Physiology

- Fluid shifts between body fluid compartments
- Starling forces across glomerular capillaries
- Transporters in various segments of nephron (Na<sup>+</sup>, Cl<sup>-</sup>, HCO<sub>3</sub><sup>-</sup>, H<sup>+</sup>, K<sup>+</sup>, and glucose)
- Effects of hormones on renal function
- Simple acid-base disorders
- Common mixed acid-base disorders

### Gastrointestinal Physiology

- Gastrointestinal hormones
- Salivary, gastric, pancreatic, and biliary secretions
- Digestion and absorption of carbohydrates, proteins, and lipids

### Endocrine and Reproductive Physiology

- Mechanisms of hormone action
- ADH actions and pathophysiology
- Thyroid: steps in synthesis, pathophysiology of hypo- and hyperthyroidism
- Adrenal cortex: hormone synthesis, pathophysiology of Addison's disease, Cushing's syndrome, and adrenogenital syndromes
- Insulin: secretion, insulin receptors and actions, type I and II diabetes mellitus
- PTH: actions, hyperparathyroidism, hypoparathyroidism, PTH-rp, pseudohypoparathyroidism
- Actions of testosterone and dihydrotestosterone
- Menstrual cycle
- Hormones of pregnancy