

CHAPTER 19 – MUSCLE PHYSIOLOGY

I. Structure

- A. Gross morphology of muscles
- B. Components of muscle cells (fibers)
 - 1. sarcolemma and t-tubules
 - 2. sarcoplasmic reticulum
 - 3. myofibrils
 - a. sarcomeres
 - i. structural features - zones
 - ii. myofilaments (actin & myosin)

II. Function

- A. Sliding Filament Theory
- B. Cycle of Contraction
- C. Regulation of Contraction
 - 1. ATP
 - 2. Ca^{2+}
- D. Excitation-Contraction Coupling

III. Muscle Fiber Types

- A. Tonic
- B. Twitch
 - 1. Slow Oxidative
 - 2. Fast Oxidative
 - 3. Fast Glycolytic

CHAPTER 21 – RESPIRATORY GASES

I. Partial Pressure

- A. Dalton's Law
- B. Henry's Law

II. Respiratory Media

- A. Air
- B. Water

III. Gas Transport

- A. Convection
- B. Diffusion

CHAPTER 22 – EXTERNAL RESPIRATION

I. Respiratory epithelia

- A. General characteristics
 - 1. Unidirectional and bi-directional flow
 - 2. Active and passive ventilation
- B. External (gills)
 - 1. Structure
 - 2. Countercurrent exchange
- C. Internal (lungs)
 - 1. Structure
 - 2. Tidal flow

CHAPTER 23 – TRANSPORT OF RESPIRATORY GASES

I. Oxygen

- A. Methods of transport in blood
 - 1. Dissolved in plasma
 - 2. Bound to hemoglobin (respiratory pigment)
 - a. Cooperative binding
- B. O₂ equilibration curve (sigmoidal shape)
 - 1. P₅₀
 - 2. Factors affecting O₂ affinity
 - 3. Bohr shift

II. Carbon dioxide

- A. Methods of transport in blood
 - 1. Dissolved in plasma
 - 2. Bound to hemoglobin (respiratory pigment)
 - 3. Bicarbonate
- B. Haldane effect

CHAPTER 24 – CIRCULATORY SYSTEM

I. General Anatomy

- A. Central and peripheral circulation
- B. Pulmonary and systemic circulation
- C. Arteries and veins
- D. Heart

II. Cardiac function

- A. Systole and diastole
- B. Electrical activity of heart
 - 1. Pacemaker cells and spontaneous depolarization
 - 2. Patterns of depolarization
 - 3. Cardiac action potentials
 - 4. Autonomic nerve input on heart rate

III. Pressure and Flow

- A. Physics of blood flow
 - 1. Poiseuille equation
- B. Patterns in blood vessels of different diameter
- C. Patterns in pulmonary and systemic circulation

CHAPTER 25 – DIVING PHYSIOLOGY

I. Challenges for air-breathing divers

II. Physiological solutions

- A. Enhanced O₂ stores
 - 1. Hb and blood volume
 - 2. tissue O₂ stores (Mb)
- B. Circulatory adjustments
 - 1. Bradycardia
 - 2. Peripheral vasoconstriction