**Study Guide #3**

**Human Physiology (Biol. 235)**

**Cardiovascular System – The Electrical Conductions System and Blood Vessels**

1. Describe the electrical conduction of the heart (e.g., SA, AV nodes, bundle of His, Purkinje fibers).
2. Draw and describe each segment of the ECG (P wave, PR interval, QRS complex, ST segment, T wave)
3. Compare abnormal ECG’s that may indicate pathology. What is the fibroskeleton of the heart?
4. Describe the important mechanical events in the 5 phases of the cardiac cycle (one heartbeat).
5. What are EDV, ESV, stroke volume (preload and afterload) & cardiac output? How are they calculated?
6. Describe the most common sequence of blood vessels in the systemic circuit and their characteristics.
7. Explain the different layers found in each of the various types of blood vessels and their function.
8. List at least 5 ways that Veins differ from Arteries in terms of function and structure in the systemic circuit.
9. Describe how are the 3 capillary beds are different from each other and where are they found.
10. What is the driving force for blood flow in a vessel? What opposes flow? How are these regulated?
11. Describe 3 factors that contribute to resistance of flow. Write Poiseuille’s law & how it can be simplified.
12. What is an aneurysm? Thrombus? Embolus? Varicose veins? Hypertension? Hypotension? What is Arteriosclerosis? Atherosclerosis? How can these conditions arise and why can they be dangerous?
13. MAP is a function of: 1) C.O. and 2) R arterioles. It can also be influenced by the 3) distribution of blood and the 4) total volume of blood. Elaborate on how each of these 4 factors influences MAP.
14. Describe how the cardiovascular system is controlled (modulated). What is the *Baroreceptor Reflex*?
15. What is cardiovascular shock? Describe cardiac, volumetric, anaphylactic and septic shock.
16. Describe how the Lymphatic system functions within the circulatory system to maintain homeostasis.

**The Respiratory System**

1. List and briefly describe the functions of the Respiratory system. Trace air from the nose to the alveoli.
2. What is ventilation? What is inspiration? Expiration? How and where is inspired air "conditioned"?
3. Describe atmospheric, intra-alveolar (intrapulmonary), and intrapleural pressures. Describe their values.
4. Explain how pneumothorax can it arise. List the 3 types of alveolar cells and their functions.
5. Explain pulmonary elasticity in terms of elastic recoil, surface tension and compliance. (La Place’s law)
6. Define eupnea, apnea, hyperpnea and dyspnea. Discuss newborn respiratory distress syndrome.
7. What's partial pressure of a gas? What's the partial pressure of O2 (PO2) in the atmosphere and alveoli?
8. How is the Partial Pressure Gradient responsible for transfer of gases from air to blood to tissues?
9. What factors contribute to a gas dissolving into a liquid? Compare CO2 and O2 in plasma.
10. Describe the 3 ways that CO2 is transported in the blood. How much CO2 by each method (%)? Why?
11. Describe hemoglobin. How many O2 molecules can it carry? What else does it have a high affinity for?
12. How is O2 transported in blood? Describe the Bicarbonate buffer: CO2 + H2O ↔ H2CO3 ↔ H+ + HCO3-
13. Describe the Law of Mass Action with respect to Hemoglobin (Hb + O2 ↔ HbO2 and Hb + CO2 ↔ HbCO2).
14. Describe the Hb dissociation (saturation) curve. How can the curve be shifted and in which direction?
15. Inadequate gas exchange can be caused by pulmonary edema and pulmonary fibrosis. Explain.
16. How are bronchiole diameters controlled? What is Asthma? Emphysema? Bronchitis? (COPDs). Fibrosis?

**Lab Concepts:**

* Blood Glucose Tolerance Test and the Regulation of Blood Glucose Levels.
* Blood Pressure changes related to Body Position and Activity Level.
* The Electrocardiogram (ECG) at rest and after exercise. Identifying ECG pathologies & arrythmias.
* The Effects of Drugs on the Heart. Calculations of MAP and Poiseuille’s law.
* Pulmonary Volumes and Capacities from Spirometry data; Diagnostic Tests for Lung Function.