

The Heart

Study Guide Chapter 19

(Please Note: This is slightly larger than the typical chapter study guide but Chapter 20 will be slightly less than the typical chapter; so it will average out!)

1. What are the two divisions of the cardiovascular system? What is the function(s) of the cardiovascular system?
2. Study the anatomy of the heart (19.2 – 19.12). We will cover the physiology in lecture. You will be tested on the anatomy in the lab section.
3. Where is the heart positioned in the thorax?
4. The Pericardium:
 - a. What are the two layers called?
 - b. Where is the pericardial cavity?
 - c. What is inside the pericardial cavity (function?)?
5. Heart Wall:
 - a. What are the three layers?
 - b. Which side of the heart is thicker? Why?
 - c. What is the histology of the lining of the heart?
 - d. How do you describe the heart when the ventricles contract?
 - e. What is the fibrous skeleton? Function(s)
6. The Chambers:
 - a. How many chambers are in the heart?
 - b. What are the interior margins?
 - c. Pectinate muscles
 - d. Trabeculae carneae
7. The Valves:
 - a. What is the function of the heart valves?
 - b. What are the names of the four heart valves and where are they located?
 - c. How do these valves differ from each other?
 - d. What opens and closes the heart valves?
 - e. What type of valve is at the entrance of the right atria?
8. Blood Flow Through the Heart
 - a. What is the coronary circulation?
 - i. Where does it start?
 - ii. What are the names of the two main arteries?
 - iii. What is the significance of an anastomoses between branches of these arteries?
 - iv. How might this prevent a myocardial infarction?

- b. When is blood pumped through the coronary circulation and what functions as the pump for the coronary circulation?
- c. How is the venous blood in the coronary circulation returned to the heart? (note: explain only the “two” general ports of re-entry)

Conduction System:

- 9. Cardiac muscle cells are autogenic but also have autonomic nervous fibers:
 - a. What is the function of these fibers?
 - b. Where do most of the efferent sympathetic fibers synapse? Maximum effect?
 - c. Where do the efferent parasympathetic fibers synapse? What is vagal tone?
 - d. Study Figure 19.12 and note the following structures: SA node, AV node, AV bundle, Purkinje fibers.
- 10. How is an action potential transmitted between individual cardiocytes? Why is this important?
- 11. What is an intercalated disc? Where are they found? What are the three distinctive features of an intercalated disc?
- 12. How would you describe the metabolism of cardiocytes? (key words: anaerobic/aerobic; mitochondria; myoglobin; fuel source; fatigue)

Cardiac Rhythm

- 13. What are the terms used to describe cardiac contraction and relaxation?
- 14. Where is sinus rhythm set? What is sinus rhythm of an adult at rest?
- 15. What is an ectopic focus? What can cause an ectopic focus?
- 16. What is nodal rhythm and where does it originate? What is the BPM of a nodal rhythm?
- 17. What is the BPM of an ectopic focus other than at the SA or AV node? Can this rate of BPM sustain life?
- 18. What is the difference between bundle branch heart block and total heart block?

Pacemaker Physiology

- 19. Why does the SA node spontaneously fire?
- 20. How does the pacemaker potential differ from an action potential?
- 21. Why is the SA node called a pacemaker?
- 22. How long does it take for the SA node to depolarize and repolarize? (BPM?)

Electrocardiogram

- 23. Study Figures 19.16, 19.17, & 19.18: What events in the heart are associated with the electrical events measured on the surface of the skin?

Blood Flow & the Cardiac Cycle

24. Define cardiac cycle.
25. What are the two main variables that regulate fluid movement (fluid dynamics)?
26. What instrument is used to measure blood pressure?
27. What term describes “listening to body sounds”?
28. What are the events associated with heart sounds S1 and S2?
29. Study Figure 19.20 and explain these terms in relationship to the Cardiac Cycle: Ventricular filling, end-diastolic volume, isovolumetric contraction, ventricular ejection, stroke volume, ejection fraction, end-systolic volume, isovolumetric relaxation, aortic notch,
30. In a resting person, atrial systole is 0.1 sec and ventricular diastole is 0.3 seconds; total duration of the cardiac cycle is 0.8 seconds; therefore 75 beats per minute. What is the quiescent period and how long does it last? (p740)
31. Using benchmarks, be able to do the balance sheet to show volume changes between end-systolic during one complete cardiac cycle:

Cardiac Output

32. What factors determine cardiac output? What is the difference between the maximum and resting cardiac output called?
33. What is the benchmark for an adult heart rate? What is the heart rate for a new born and elderly people?
34. What are the benchmarks for tachycardia and bradycardia?
35. What is a chronotropic effect? What type of factors can cause either a positive or negative chronotropic effect?
36. What is an inotropic effect? What type of factors can cause either a positive or negative inotropic effect?
37. What does “contractility” mean in relationship to cardiac output?
38. What three factors “govern” stroke volume? (p743)
39. What is the definition of preload and afterload?
40. What is cor pulmonale? (Key words: right ventricular failure and afterload)