

Bio 2710 // AP Study Guide
C20 // The Heart // Tortora & Derrickson

1. Study the anatomy of the heart (Fig 20.1-6)). We will cover the physiology in lecture. You will be tested on the anatomy in lab. You need to know the anatomy to understand the physiology.
2. What are the three “blood circuits” of the circulatory system? What is the structure (blood flow route) of these three blood circuits?
3. What are the names of the two arteries above and within the area of the aortic semilunar valves?
 - a. What is the significance of an anastomoses between branches of these arteries?
 - b. How might this prevent a myocardial infarction?
 - c. What is the “pump” for the coronary circulation?
 - d. How is the venous blood in the coronary circulation returned to the heart?
4. How does blood flow through the heart? (Start at inferior and superior vena cava)?
5. What is the force that moves blood through the heart?
6. Where is the heart located in the thorax? Why is it described as a fibrous capsule?
7. What is the Pericardium? :
 - a. What are the names for the two layers of the pericardium?
 - b. What is the pericardial cavity?
 - c. What is inside the pericardial cavity (function)?
8. What type of cells make up the middle layer of the heart’s walls?
 - a. What are the inner and outer layers called?
 - b. Which side of the heart has a thicker wall? Why?
 - c. What is the histology of the lining of the heart?
9. The heart is a pump.
 - a. Why might you describe it as actually being two pumps?
 - b. How is the pressure different in the two pumps?
 - c. How is the structure related to the function?
 - d. Describe the pumping action?
10. How many valves are in the heart?
 - a. What is the function of the heart valves?
 - b. What are the names of the 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. Is there a valve at the entrance of the right and left atria?

About the Conduction System:

11. 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.
12. How is an action potential transmitted between individual cardiocytes? Why is this important?
13. What are the metabolic features of cardiocytes? (key words: anaerobic/aerobic; mitochondria; myoglobin; fuel source; fatigue)

About Cardiac Rhythm

14. What are the terms used to describe cardiac contraction and relaxation?
15. Where is the sinus rhythm set? What is sinus rhythm of an adult at rest (BPM)?
16. What is an ectopic focus? What can cause an ectopic focus?
17. What is nodal rhythm? Where does it originate? What is the Beat Per Minute (BPM) of a nodal rhythm?
18. What is the BPM of an ectopic focus? Can this rate of BPM sustain life?
19. What is the difference between a bundle branch heart block and total heart block?

About Pacemaker Physiology

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

About Electrocardiogram

24. Describe events which occur in the heart as they are related to the EKG:
 - a. What is the cardiac cycle?
 - b. How long is the cardiac cycle?
 - c. What creates the “sounds of the heart” and when? (S1 and S2)
 - d. Common terms to describe S1 and S2)
25. What instrument is used to measure blood pressure?
26. 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,

About Cardiac Output

27. What is the definition of cardiac output? (How much blood is in the circulatory system?)
28. What is stroke volume?
29. What is the benchmark for an adult heart rate?
30. What two factors determine CO?
31. What is the difference between the maximum and resting cardiac output called?
32. How is adult heart rate different than HR for new born and the elderly?
33. What are the benchmarks for tachycardia and bradycardia?

34. What is a chronotropic effect? What type of factors can cause either a positive or negative chronotropic effect?
35. What is an inotropic effect? What type of factors can cause either a positive or negative inotropic effect?
36. What does “contractility” mean in relationship to cardiac output?
37. What three factors “govern” stroke volume?
38. What is the definition of preload and afterload?
39. What is cor pulmonale? (Key words: right ventricular failure and afterload)
40. What is fibrillation? How can you stop fibrillation?
41. What is more serious, atrial or ventricular fibrillation? Explain