

The Heart (S2017)
Study Guide - C20
Tortora & Derrickson

1. Study the anatomy of the heart (Fig 20.1-6). We will cover the physiology in lecture. You will be tested in lab on the anatomy, however. You need to know the anatomy to understand the physiology lectures.
2. What are the three “blood circuits” of the circulatory system?
3. What is the structure (blood flow route) of these three blood circuits? Source of force to move blood?
4. What are the names of the first two arteries to branch off of the ascending aorta? (Trick questions, be careful!)
 - a. What tissue do these arteries perfuse?
 - b. What is the significance of an anastomoses between branches of these arteries?
 - c. Why might this prevent a myocardial infarction?
 - d. What is the “pump” for this circuit?
 - e. How is the venous blood from this circuit returned to the heart?
5. How does blood flow through the heart? (Start at inferior and superior vena cava)?
Note: blood flow and pumping action are two different events)
6. What is the force that moves blood through the heart?
7. What regulates the flow of blood through the heart?
8. Where is the heart located in the thorax? What is the fibrous capsule?
9. What is the Pericardium? :
 - a. What are the names for the two layers of the pericardium?
 - b. What is the space called between the two membranes?
 - c. What is the function of these two membranes?
10. 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 structures do you see from inside the heart? (eight learning objectives)
11. The heart is a pump.
 - a. Why would you want to describe the heart as not one but two pumps?
 - b. How is the pressure different between the left and right side of the heart? Why?

- c. How is the cellular physiology appropriate for the function of the myocardium?
 - d. Describe the pumping action?
12. 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?
 - c. Where are they located?
 - d. How do these valves differ from each other?
 - e. What opens and closes the heart valves?
 - f. Is there a valve at the entrance of the right and left atria?

Intrinsic Conduction System:

13. Cardiac muscle cells are autogenic. What does this mean?
14. How does the Autonomic Nervous System influence the heart rhythm?
- a. Where do sympathetic fibers synapse? Functions (3)?
 - b. Where do the parasympathetic fibers synapse? Function (1)?
 - c. What is cardiac vagal tone?
 - d. Study Figure 19.12 and note the following structures: SA node, AV node, AV bundle, Purkinje fibers.
15. How is an action potential transmitted between individual cardiocytes? Why is this important?
16. What are the metabolic features of cardiocytes? (key words to use in answer: anaerobic/aerobic; mitochondria; myoglobin; fuel source; fatigue)

About the Cardiac Rhythm

17. What are the terms used to describe cardiac contraction and relaxation?
18. Where is the location of the heart's pacemaker? What is this tissue called? Adult rhythm at rest (BPM)?
19. What is an ectopic focus? What can cause an ectopic focus?
20. What is nodal rhythm? Location? What is the heart's rhythm under nodal rhythm?
21. What is the heart's BPM when under control of an ectopic focus? Can this rate of BPM sustain life?
22. What is the difference between a bundle branch heart block and total heart block?

About Pacemaker Physiology

23. Why does the SA node spontaneously fire?
24. How does the pacemaker potential differ from a nerve action potential?
25. Why is the SA node called the pacemaker?

26. How long does it take for the SA node to depolarize and repolarize? What is this called?

About Electrocardiogram

27. Describe these 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”? Specifically, what is S1 and S2 sounds?
- d. What are the common terms to describe S1 and S2 used in a phrase?

28. What instrument is used to measure blood pressure?

29. 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, and isovolumetric relaxation.

About Cardiac Output

30. What is the definition of cardiac output? (How much blood is in the circulatory system?)

31. What is stroke volume?

32. What is the benchmark for an adult heart rate?

33. What two factors determine CO?

34. What is the difference between the maximum and resting cardiac output called?

35. How is adult heart rate different than HR for new born and the elderly?

36. What are the benchmarks for tachycardia and bradycardia?

37. What is a chronotropic effect? What type of factors can cause either a positive or negative chronotropic effect?

38. What is an inotropic effect? What type of factors can cause either a positive or negative inotropic effect?

39. What does “contractility” mean in relationship to cardiac output?

40. What three factors “govern” stroke volume?

41. What is the definition of preload and afterload?

42. What is cor pulmonale? (Key words: right ventricular failure and afterload)

43. What is fibrillation? How can you stop fibrillation?

44. What is more serious, atrial or ventricular fibrillation? Explain