

# The Cardiac Cycle

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## Page 1. Introduction

- The cardiac cycle includes all the events related to the flow of blood through the heart during one complete heartbeat.

## Page 2. Goals

- To list the phases of the cardiac cycle in consecutive order.

## Page 3. Heart Valves

- During the cardiac cycle, heart valves open and close in response to differences in blood pressure on their two sides.
- The Heart Valves:
  - Pulmonary semilunar valve
  - Aortic Semilunar Valve
  - Left AV valve or Bicuspid valve or Mitral valve
  - Right AV valve or Tricuspid valve

## Page 4. Overview of Cardiac Cycle

- Phases of the Cardiac Cycle
  1. Ventricular Filling - Occurs during mid to late diastole.
  2. Ventricular Systole - Includes isovolumetric contraction and ventricular ejection.
  3. Isovolumetric Relaxation - Occurs during early diastole.

## Page 5. Ventricular Filling: Passive

- Occurs during mid to late diastole, when the heart chambers are relaxed.
- Blood flows passively into the atria, through open AV valves, and into the ventricles, where the pressure is lower.

## Page 6. Ventricular Filling: Atrial Contraction

- Atria contract, forcing the remaining blood into the ventricles.
- Blood flows through both sides of the heart at the same time.

## Page 7. Ventricular Systole: Contraction

- Isovolumetric contraction: Ventricles contract and intraventricular pressure rises, closing the AV valves. Briefly, ventricles are completely closed chambers.

## Page 8. Ventricular Systole: Ejection

- Ventricular ejection: Rising ventricular pressure forces semilunar valves open. Blood is ejected from the heart into the aorta and pulmonary trunk.

## Page 9. Isovolumetric Relaxation

- Ventricles relax and ventricular pressure drops. Blood backflows, closing semilunar valves. Ventricles are totally closed off again.

## Page 10. Atrial Filling

- Meanwhile, the atria have been filling with blood. When atrial pressure exceeds ventricular pressure, AV valves open and ventricular filling, phase 1 begins again.

## Page 11. Summary

- \*\* Now is a good time to go to quiz questions 1-6:
  - Click the Quiz button on the left side of the screen.
  - Click on the scrolling page list at the top of the screen and choose "1. Blood Flow Through Heart."
  - Work through quiz questions 1-6.

## Notes on Quiz Questions:

### Quiz Question #1: Blood Flow through Heart

- This question asks you to trace the blood through the right side of the heart.

### Quiz Question #2: Valves

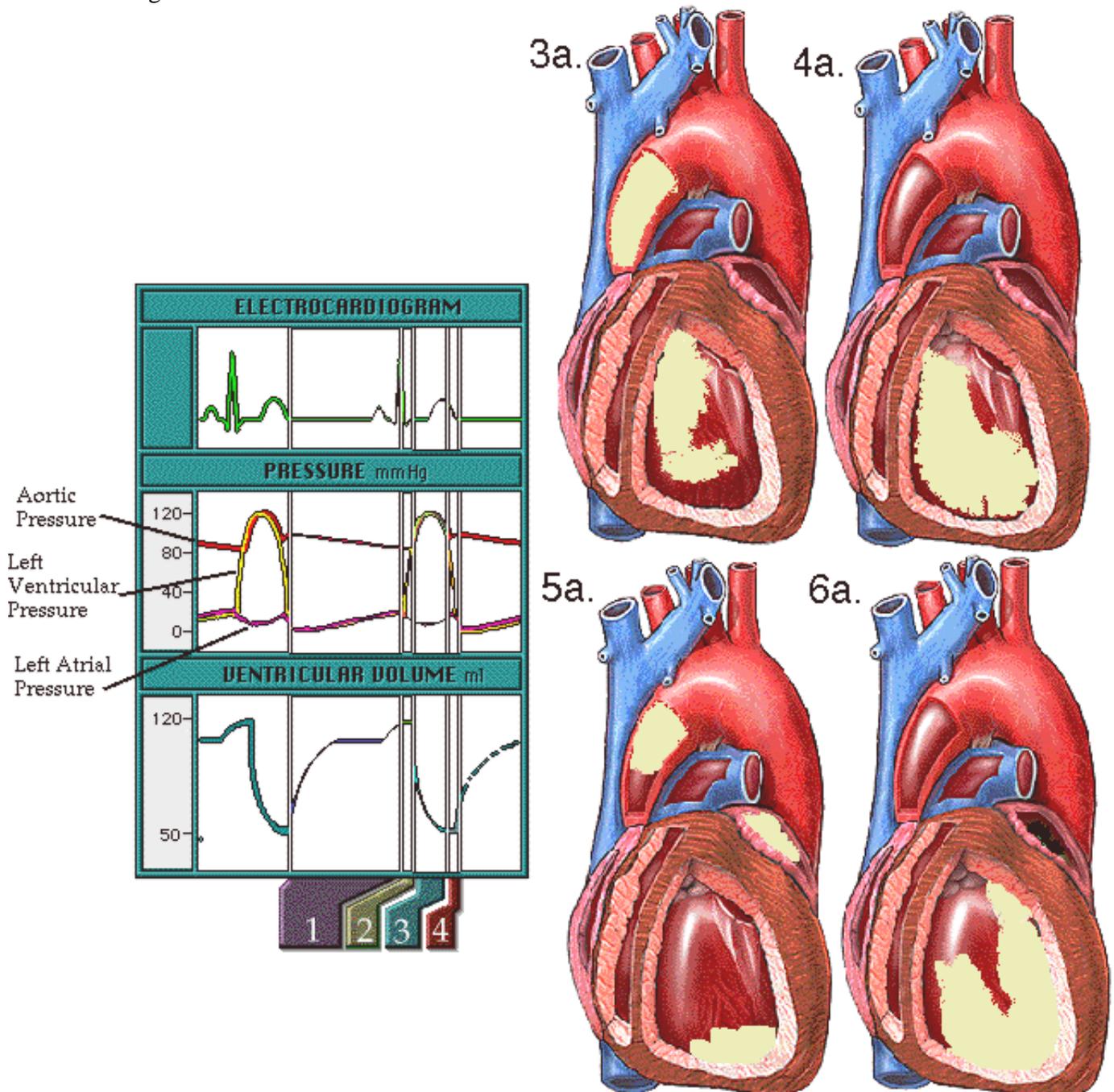
- This question asks you to predict when the valves are open or closed during the various stages of the cardiac cycle.

### Quiz Questions #3a, 4a, 5a, 6a: Cardiac Cycle Phase

- These question asks you to view a diagram of the heart and predict what stage of the cell cycle it's in. You may take notes on the diagrams below. The dye-labeled blood has been colored light here to make it more visible.

### Quiz Question #3b, 4b, 5b, 6b: Cardiac Cycle Graphs

- These questions asks you to predict the correct phase of the cardiac cycle by viewing an ECG, graph of ventricular volume, and a graph of pressures. You may want to take notes on this diagram:



## Study Questions on the Cardiac Cycle:

1. (Page 1.) What is a cardiac cycle?
2. (Page 3.) What opens and closes the heart valves?
3. (Page 4.) List the three phases of the Cardiac Cycle.
4. (Pages 5-10.) Match the stages of the cardiac cycle to their description.
  - 1a. Ventricular Filling: Passive
    - v. Ventricles contract and intraventricular pressure rises, closing the AV valves.
  - 1b. Ventricular Filling: Atrial Contraction
    - w. Ventricles relax and ventricular pressure drops. Blood backflows, closing semilunar valves.
  - 2a. Ventricular Systole: Isovolumetric Contraction
    - x. Blood flows passively into the atria, through open AV valves, and into the ventricles.
  - 2b. Ventricular Systole: Ejection
    - y. Rising ventricular pressure forces semilunar valves open. Blood is ejected from the heart.
  3. Isovolumetric Relaxation
    - z. Atria contract, forcing the remaining blood into the ventricles.
5. (Page 6.) True or false: Blood passes through the bicuspid valve at the same time blood is also passing through the tricuspid valve.
6. (Page 7.) What closes the AV valves?
7. (Page 8.) What opens the semilunar valves?
8. (Page 9.) What closes the semilunar valves?
9. (Page 10.) What opens the AV valves?
10. (Page 11.) True or false: The right side of the heart contracts, then the left side of the heart contract.