



*Physiology*  
OF THE CARDIOVASCULAR SYSTEM

# Regulation of stroke volume

1- If the ejection fraction increases, there will be a decrease in:

- A. *cardiac output*
- B. *end-diastolic volume*
- C. *end-systolic volume*
- D. *heart rate*
- E. *pulse pressure*
- F. *stroke volume*
- G. *systolic pressure*

2- An increase in contractility is demonstrated on a Frank-Starling diagram by:

- A. *increased cardiac output for a given end diastolic volume*
- B. *increased cardiac output for a given end systolic volume*
- C. *decreased cardiac output for a given end diastolic volume*
- D. *decreased cardiac output for a given end systolic volume*

3- A 30-year-old man has an ejection fraction of 0.25 and an end systolic volume of 150 ml. What is his end diastolic volume:

- A. *50 ml*
- B. *100 ml*
- C. *125 ml*
- D. *200 ml*
- E. *250 ml*

4- Sympathetic stimulation of the heart normally causes which of the following conditions:

- A. *Acetylcholine release at the sympathetic endings*
- B. *Decreased heart rate*
- C. *Decreased rate of conduction of the cardiac impulse*
- D. *Decreased force of contraction of the atria*
- E. *Increased force of contraction of the ventricles*

5- According to the Frank-Starling mechanism of the heart:

- A. *the left ventricle ejects a larger volume of blood with each systole than the right ventricle.*
- B. *the intrinsic rate of the heart's pacemaker is 100 beats/min.*
- C. *cardiac output increases with increased heart rate.*
- D. *stroke volume increases with increased venous return.*

**6- Which of the following does not contribute to increased stroke volume during exercise?**

- A. *Increased contractility of cardiac muscle.*
- B. *Increased venous return*
- C. *Increased length of filling time during diastole*
- D. *Increased sympathetic stimulation of ventricular muscle.*
- E. *Increased end-diastolic volume.*

**7- Which of the following is NOT affected by the preload in the heart muscle?**

- A. *End systolic volume*
- B. *End diastolic volume*
- C. *Stroke Volume*
- D. *Ejection fraction.*
- E. *Cardiac output.*

**8- A 65-years-old man, suffering from dyspnea, anxiety and he has a high blood pressure and heart rate. Also, he has Cheyne strokes breathing with cyanosis?**

- A. *Left ventricular failure*
- B. *Right ventricular failure*
- C. *Cor pulmonale*
- D. *Congestive heart failure*

**9- Which one of the following is a negative inotropic?**

- A. *Adrenaline*
- B. *alkalosis*
- C. *digitalis*
- D. *Acetylcholine*
- E.  $Ca^{2+}$

**10-Which one of the following is a positive inotropic?**

- A. *Adrenaline*
- B. *acidosis*
- C. *bacterial toxins*
- D. *Acetylcholine*
- E.  $K^{+}$

## **Answers:**

**Q1 : C** (An increase in ejection fraction means that a higher fraction of the end-diastolic volume is ejected in the stroke volume (e.g., because of the administration of a positive inotropic agent). When this situation occurs, the volume remaining in the ventricle after systole, the end-systolic volume, will be reduced. Cardiac output, pulse pressure, stroke volume, and systolic pressure will be increased.)

**Q2 : A** (. An increase in contractility produces an increase in cardiac output for a given end-diastolic volume, or pressure. The Frank-Starling relationship demonstrates the matching of cardiac output (what leaves the heart) with venous return (what returns to the heart). An increase in contractility (positive inotropic effect) will shift the curve upward.)

**Q3 : D** (The end diastolic volume is always greater than the end systolic volume. Multiplication of the ejection fraction by the end diastolic volume gives you the stroke volume, which is 50 ml in this problem. Therefore, the end diastolic volume is 50 ml greater than the end systolic volume and has a value of 200 ml.)

**Q4 : E** (Sympathetic stimulation of the heart normally causes an increased heart rate, increased rate of conduction of the cardiac impulse and increased force of contraction in the atria and ventricles. However, it does not cause acetylcholine release at the sympathetic endings because they contain norepinephrine. Parasympathetic stimulation causes acetylcholine release. The sympathetic nervous system firing increases the permeability of the cardiac muscle fibers, the S-A node, and the A-V node to sodium and calcium.)

**Q5 : D**

**Q6 : C**

**Q7 : A**

**Q8 : A**

**Q9 : D**

**Q10: A**