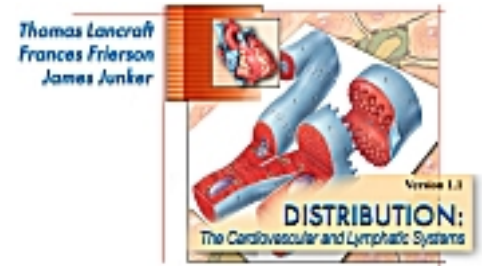


Cardiac Output

Directions:

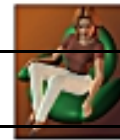
- Click the "Contents" button,
- Open the *Cardiovascular System* File,
- Click *Animations*,
- Click *Cardiac Output*



1. a. Define *cardiac output* and explain how it is calculated. _____

b. What is normal cardiac output? _____

2. How does exercise affect cardiac output? _____



Stroke volume
×
Heart rate



3. a. Explain how the End Diastolic Volume (EDV) and the End Systolic Volume (ESV) produce the Stroke Volume (SV). _____

b. How much is normal stroke volume? _____



4. The following three factors affect stroke volume. Define each.

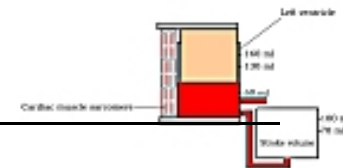
a. Preload - _____

b. Contractility - _____

c. Afterload - _____



5. Describe how End Diastolic Volume (EDV) affects the degree of cardiac muscle stretch, known as *preload*. _____



6. Explain how sarcomere stretch and contraction strength affects stroke volume. _____

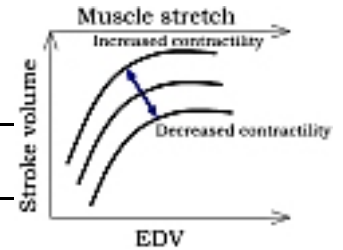


7. a. Explain the *Frank-Starling Law*. _____



b. What are the limits of the Frank-Starling Law? _____

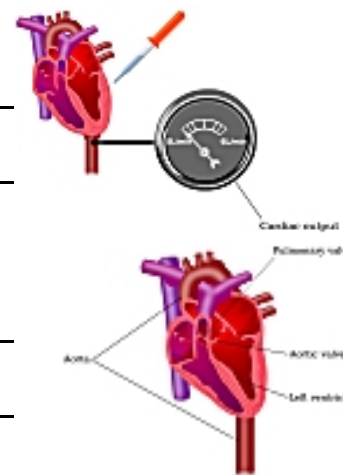
8. Contrast the effects of positive and negative inotropic agents on stroke volume and cardiac output.



b. Name specific types of inotropic agents.

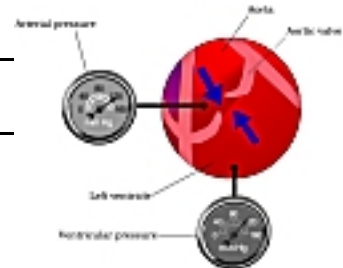
Positive - _____

Negative - _____



9. How does ventricular pressure and afterload affect activity of the semilunar valve?

10. a. How does *high blood pressure* or *hypertension* affect aortic pressure? _____



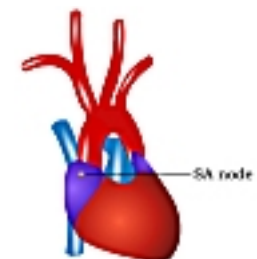
b. Eventually, ventricular pressure will build and overcome aortic pressure thereby opening the semilunar valve and ejecting the blood.

How does increased afterload affect ejection and stroke volume? _____

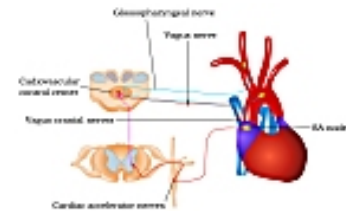
How does the heart adjust to maintain homeostasis? _____

11. a. What part of the heart initiates the 60-100 (75 normal resting) heartbeats per minute? _____

b. Describe the correlation between cardiac output and heart rate. _____

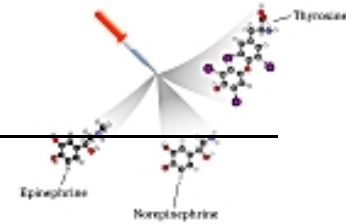


12. Describe the sympathetic nervous system and hormonal responses to low blood pressure. How does this response contribute to maintaining homeostasis?



13. Describe the parasympathetic nervous system and hormonal responses to high blood pressure. How does this response contribute to maintaining homeostasis?

14. What affect do epinephrine, norepinephrine, and thyroxine have on heart rate?



15. How does low blood O_2 and pH, high blood CO_2 , and increasing cytosolic Ca^{++} affect heart rate?

