

Biology Exam 3

Cardiovascular System

What are the functions of the cardiovascular system?

1. Generate blood pressure
2. Transport blood
3. Exchange of nutrients and wastes at the capillaries
4. Regulate blood flow as needed

Anatomy of the heart

- A large, muscular organ consisting of mostly cardiac tissue called the myocardium
- Consists of two sides, right and left, separated by a septum
- Consists of 4 chambers: 2 atria and 2 ventricles
- 2 sets of valves: semilunar valves and atrioventricular valves (AV valves)
- The valves give the resulting “lub” and “dup” sound of the heart

How does blood flow through the heart?

- Inferior and superior vena cava (1) dump blood into the right atrium (2)
- Right ventricle (3)
- 2 pulmonary arteries (4) that lead to the lungs (5) where blood becomes oxygenated
- Pulmonary veins (6) bring blood from the lungs back the left atrium (7)
- Left ventricle (8) is large and muscular to pump blood into the aorta (9) and to the rest of the body (10)
- Eventually blood will be pumped back to each vena cava(1)

What are the two cardiovascular pathways in the body?

- Pulmonary circulation: blood leaves the right ventricle, travels to the lungs to become oxygenated, and returns to the left atrium
- Systemic circulation: the left ventricle pumps oxygen-rich blood to the entire body, which then returns to the right atrium

Arteries and arterioles:

- Arteries carry blood away from the heart
 - Have highest blood pressure
 - Thick muscular, elastic walls
 - Oxygen rich
- Arterioles are small arteries that regulate blood pressure

Capillaries:

- Microscopic vessels between arterioles and venules
- Only one cell thick
- Form beds of vessels where gas and nutrient exchange occurs

Veins and venules:

- Venules are small veins that drain blood from the capillaries
- Veins and venules carry blood toward the heart
- Oxygen poor
- Low blood pressure
- Veins that carry blood against gravity have valves to keep blood flowing toward the heart

How does blood in the lower extremities return to the heart?

1. Skeletal muscle contraction
2. Valves

The Cardiac Cycle

- The cardiac cycle is one heartbeat (lub-dub); on average occurs 70 times/minute
- Lub = closing of the AV valves upon ventricular contraction (systole)
- Dub = closing of the SL valves as the ventricles relax (diastole)

Regulation of Heart Rate

- Internal control:
 - The SA node in the right atrium initiates the heartbeat and signals the atria to contract
 - This impulse reaches the AV node, also in the right atrium, to send a signal down the AV bundle and Purkinje fibers that causes ventricular contraction
 - These impulses travel from cell to cell via intercalated disks
- External control:
 - heartbeat is also controlled by a cardiac center in the brain and hormones such as epinephrine and Norepinephrine

What is an electrocardiogram (ECG)?

- A record of the electrical changes in the heart muscle during a cardiac cycle
- P wave- current travels through the atria
- QRS complex- current travels through the ventricles and atrial diastole
- T wave- ventricular diastole
- Looking at these electrical changes allows doctors to detect abnormalities

What is blood pressure?

- The pressure against a blood vessel wall, usually measured in an artery in the arm
- The highest pressure is during blood ejection from the heart called the systolic pressure
- The lowest pressure is the diastolic pressure when the ventricles relax