What is the Venous System?

Worksheet

The venous system is the network of veins - venules, small veins, and large veins like the vena cavae - that collects blood from capillary beds and returns it to the right atrium, using valves and the muscle pump to overcome low pressure.

Questions

1. What percentage of total blood volume is typically found in the venous system?

A) About 15%
B) About 35%
C) About 64%
D) About 90%

2. What prevents backflow of blood in the veins of the legs?

A) High arterial pressure
B) One-way venous valves
C) The pulmonary valve
D) Elastic recoil of the aorta

3. Which structure helps push venous blood upward against gravity?

A) Skeletal muscle pump
B) Right ventricle
C) Aortic valve
D) Coronary sinus

4. Where does venous blood ultimately empty into the heart?

A) Left atrium
B) Left ventricle
C) Right atrium
D) Right ventricle

5. The venous system holds about 64% of total blood volume. If total blood volume is 5 liters, how much blood is in the veins at any moment?

6. Venous valves in the leg are spaced roughly every 2-4 cm. If the great saphenous vein is about 45 cm long, roughly how many valves might it contain?

7. Normal central venous pressure (CVP) is 2-8 mmHg. A patient's CVP is measured at 12 mmHg. Is this within the normal range?

8. Define: What is the venous system?

9. Define: Why do veins need one-way valves?

10. Define: What is the skeletal muscle pump?

Answer Key

1. C) About 64% - Veins are capacitance vessels holding roughly 64% of total blood volume at any given time.

2. B) One-way venous valves - One-way venous valves close if blood tries to flow backward, keeping it moving toward the heart.

3. A) Skeletal muscle pump - Contracting skeletal muscles compress nearby veins, aided by valves, to propel blood toward the heart.

4. C) Right atrium - The superior and inferior vena cavae both drain into the right atrium.

5. Venous volume = 64% Total blood volume Venous volume = 0.64 5 L = 3.2 L This is why veins are called 'capacitance vessels' - they act as a blood reservoir.

6. Use the midpoint spacing of 3 cm Number of valves Length / Spacing = 45 cm / 3 cm 15 valves This dense valve spacing is essential to prevent blood pooling in the legs against gravity.

7. Compare 12 mmHg to the normal range of 2-8 mmHg 12 mmHg > 8 mmHg (upper limit) No - this is elevated CVP, which can indicate fluid overload or right heart failure.

8. The network of low-pressure veins that returns deoxygenated blood from tissues to the right atrium.

9. To prevent blood from flowing backward under gravity, since venous pressure is too low to push blood upward on its own.

10. Contraction of surrounding muscles (especially in the legs) that squeezes veins and helps push blood toward the heart.