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Learning objectives:

- ✓ Description of the cardiovascular system components including the functions
- ✓ Knowing of the pressure rate in the veins, arteries and capillaries.

THE CARDIOVASCULAR SYSTEM

The cardiovascular system describes the course taken by the blood from the heart through the arteries, capillaries, and veins back to the heart. The different parts of the cardiovascular system are characterised by very different pressures. These pressures are very important for infusion therapy since they require different technical devices to bring fluid into the vessel concerned.

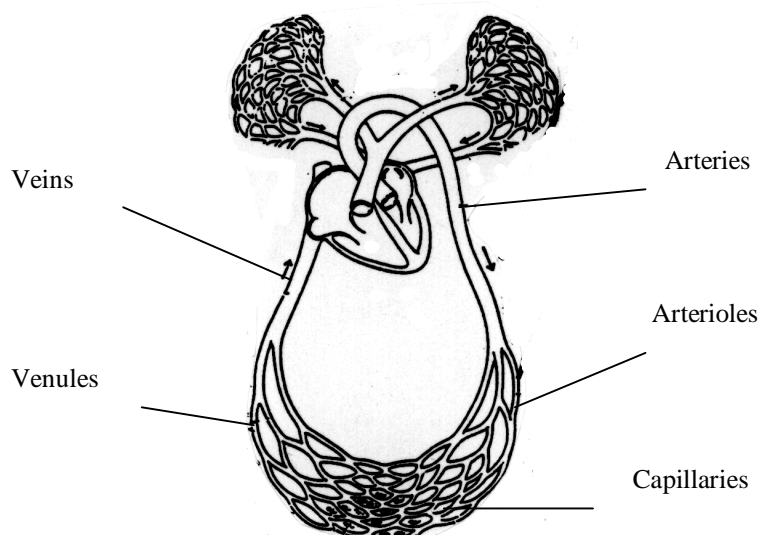


Fig. 3: The cardiovascular system

3.1 The heart

The heart is the beginning as well as the end of the blood's circulation. It is a hollow muscular organ having a suction and compressive function. In a human being the heart has four chambers: right atrium, left atrium, right ventricle and left ventricle.

3.2 The vessels

The Veins

The veins are vessels transporting blood back to the heart. They are thin walled and have only low elasticity. The venous valves serve as a reflux stop. Small venous valves are integrated in the big trunk veins. **Venules** are fine branches of the veins.

The largest vein of the body is the vena cava. The central venous pressure (CVP) is measured here, which is an indicator for the volume contained within the cardiovascular system. It indicates hidden bleedings or wrong infusion rates. As an exception, the pressure is measured in "cm water column" instead of "mm Hg". Normally it is about 2-10 cm water column. In the trunk veins the pressure is approx. 10 mm Hg. The pressure in the venules is about 15 mm Hg.

The Arteries

They are the vessels with the thickest wall in the vascular system and serve to transport the blood away from the heart. Pressures are 120-160 mm Hg. **Arterioles** are finer branches of the arteries. The pressure is about 33 mm Hg.

The Capillaries

Capillaries are small blood vessels connecting the arteries and veins. They come out of small arterioles and lead to the smallest venules. Their diameter is approx. 5 μm .

The capillaries are surrounded by tissue fluid (lymph). Their walls are flimsy and permeable. There is a permanent gas and oxygen exchange between the blood, the capillaries and the lymph. The pressure in them is approx. 15-30 mm Hg. The filtration pressure here exceeds 10 mm Hg.

3.3 Summary

The cardiovascular system is the way of the blood through the arteries, capillaries and veins back to the heart. The heart is the beginning as well as the end of the blood circulation. The thick-walled arteries lead the blood away from the heart; the blood returns through the thin-walled veins. The capillaries connect the arteries and the veins.

The different parts of the cardiovascular system are characterised by very different pressures. Those pressures are very important for infusion therapy.

3.4 Comprehension Questions

- What pressures predominate in the different cardiovascular vessels? What role do these rates play in infusion therapy?
- What is the "central venous pressure" (CVP)?