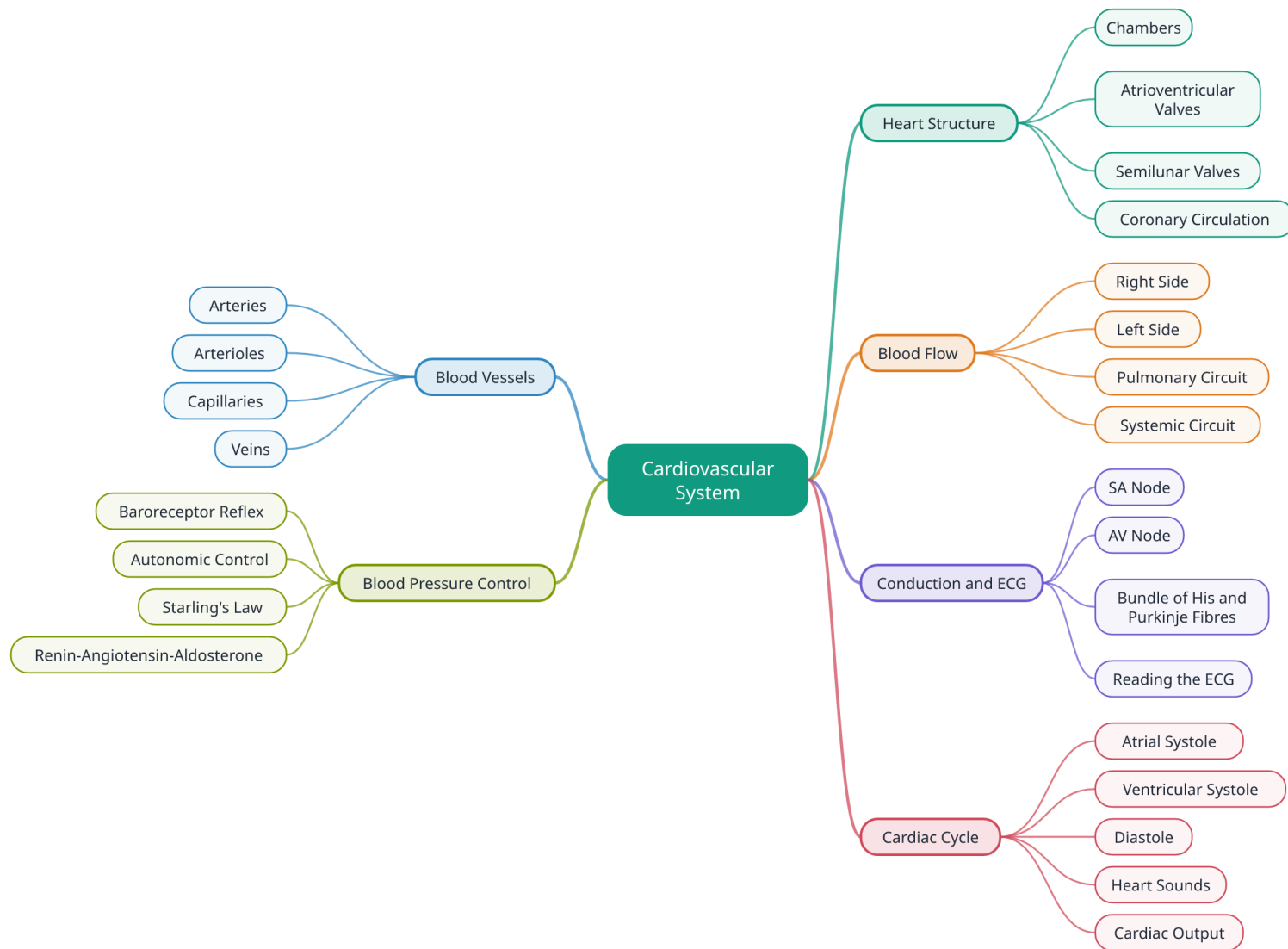


Cardiovascular System Mind Map

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Cardiovascular System mind map explained

Heart Structure

A muscular pump with four chambers and four valves.

Chambers

Two atria receive blood; two ventricles pump it out. The left ventricle has the thickest wall because it pumps blood around the whole body.

Atrioventricular Valves

The tricuspid valve (right) and the mitral, or bicuspid, valve (left) stop backflow into the atria. Chordae tendineae and papillary muscles stop them turning inside out.

Semilunar Valves

The pulmonary and aortic valves stop blood flowing back into the ventricles.

Coronary Circulation

The coronary arteries, the first branches of the aorta, supply the heart muscle (myocardium) itself.

Blood Flow

A double circulation: the pulmonary circuit to the lungs and the systemic circuit to the body.

Right Side

Venae cavae -> right atrium -> tricuspid valve -> right ventricle -> pulmonary valve -> pulmonary arteries -> lungs. Carries deoxygenated blood.

Left Side

Pulmonary veins -> left atrium -> mitral valve -> left ventricle -> aortic valve -> aorta -> body. Carries oxygenated blood.

Pulmonary Circuit

Low pressure, so fluid is not forced into the lungs. The pulmonary arteries are the only arteries carrying deoxygenated blood.

Systemic Circuit

High pressure, to push blood through the whole body.

Conduction and ECG

The heart's own electrical system sets the rhythm (it is myogenic).

SA Node

The natural pacemaker in the right atrium. Its impulse spreads across both atria, which contract.

AV Node

Delays the impulse by about a tenth of a second, so the ventricles fill before they contract.

Bundle of His and Purkinje Fibres

Carry the impulse down the septum and through the ventricle walls, so the ventricles contract from the apex upwards.

Reading the ECG

- P wave: atrial depolarisation
- QRS complex: ventricular depolarisation (atrial repolarisation is hidden in it)
- T wave: ventricular repolarisation
- PR interval: time from atrial to ventricular depolarisation, including the AV node delay

Cardiac Cycle

One heartbeat: contraction (systole) and relaxation (diastole).

Atrial Systole

The atria contract and top up the ventricles, which are already mostly filled passively.

Ventricular Systole

The ventricles contract. The AV valves close, pressure rises with all valves shut (isovolumetric contraction), then the semilunar valves open and blood is ejected.

Diastole

The ventricles relax. The semilunar valves close, pressure falls (isovolumetric relaxation), then the AV valves open and the ventricles fill.

Heart Sounds

The first sound, "lub", is the AV valves closing. The second, "dub", is the semilunar valves closing.

Cardiac Output

cardiac output = heart rate $\times$ stroke volume. At rest, roughly 70 beats per minute $\times$ 70 mL approx. 5 litres per minute.

Blood Vessels

Each type of vessel is built for its job.

Arteries

Thick, elastic, muscular walls to carry blood at high pressure away from the heart. Elastic recoil smooths the flow.

Arterioles

Small arteries whose smooth muscle controls resistance and directs blood flow. They are the main site of resistance.

Capillaries

Walls one cell thick, for exchange of oxygen, nutrients and waste with the tissues.

Veins

Thin walls, a wide lumen and valves. Blood returns at low pressure, helped by the skeletal muscle pump.

Blood Pressure Control

Mean arterial pressure = cardiac output $\times$ total peripheral resistance. A typical resting value is around 120/80 mmHg.

Baroreceptor Reflex

Stretch receptors in the carotid sinus and aortic arch signal the cardiovascular centre in the medulla, which adjusts the heart and vessels within seconds.

Autonomic Control

Sympathetic nerves raise heart rate and contractility and constrict vessels. The vagus nerve (parasympathetic) slows the heart.

Starling's Law

More venous return stretches the ventricle more, so it contracts more forcefully and stroke volume rises.

Renin-Angiotensin-Aldosterone

Longer-term control. The kidneys release renin; angiotensin II constricts vessels and triggers aldosterone, which makes the kidneys retain sodium and water, raising blood volume.

How to revise with this mind map

1. Trace the blood. Practise following blood from the venae cavae back to the aorta, naming every chamber, valve and vessel in order, until you can do it without notes.
2. Link the ECG to the cardiac cycle. For each wave, say what is happening electrically and what the chambers and valves are doing at the same time.
3. Learn the equations and use them: $\text{cardiac output} = \text{heart rate} \times \text{stroke volume}$, and $\text{mean arterial pressure} = \text{cardiac output} \times \text{total peripheral resistance}$. Practise predicting what happens when one value changes.
4. Think in reflexes. For blood pressure, follow each control loop from the receptor to the effect and back, from the fast baroreceptor reflex to the slower renin-angiotensin-aldosterone system.
5. Make it yours. Build your own cardiovascular map in Mindmapi from your lecture notes, and ask the AI about any branch you are unsure of. The answer is saved into that branch's notes for next time.