



## D I A G R A M   S H E E T

AQA A2 Level Biology

Companion to: Control of Heart Rate Explanation Sheet

A2 LEVEL

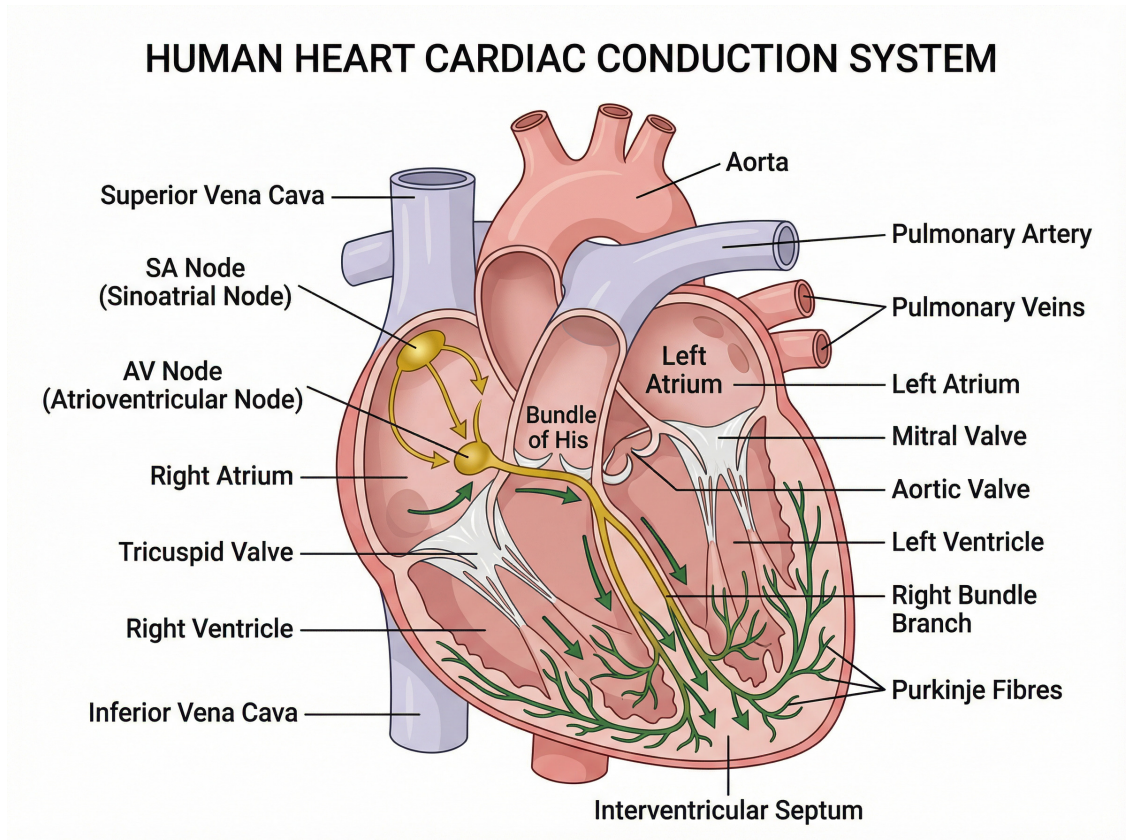
# Control of Heart Rate

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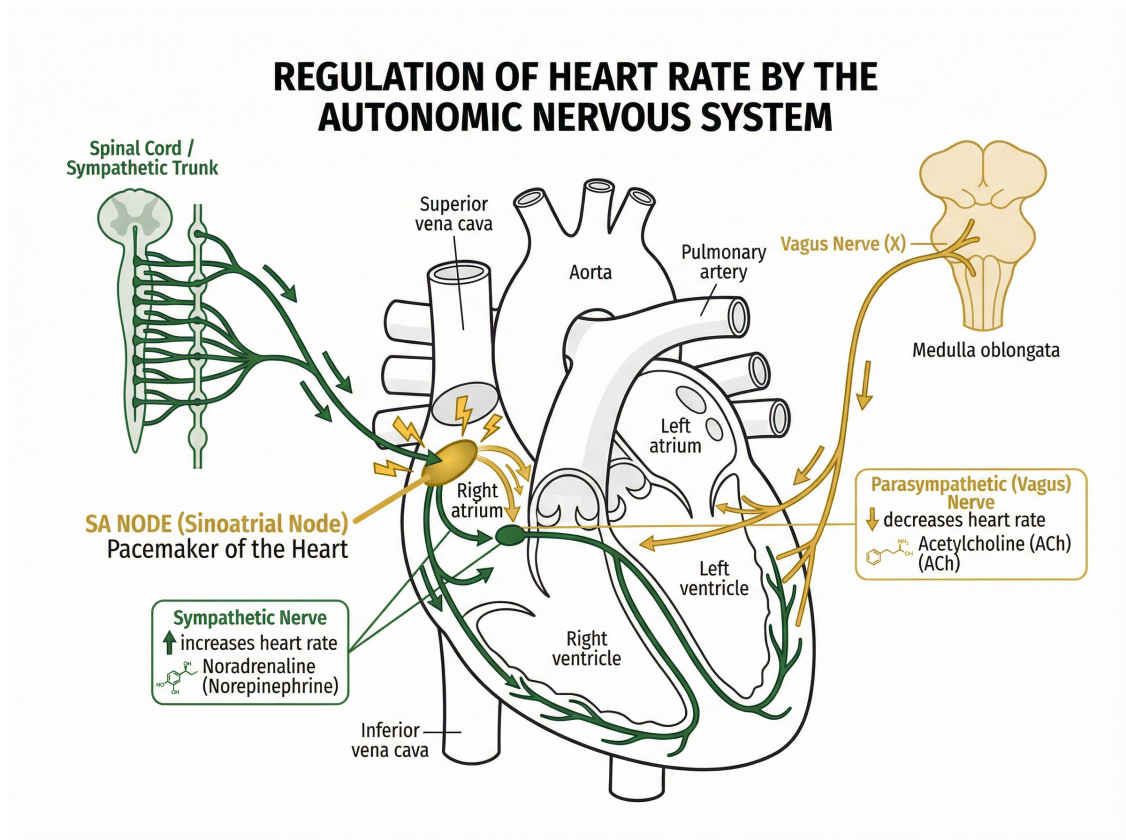
# Control of Heart Rate — Diagram Sheet

Figure 1: Anatomy of the Cardiac Conduction System



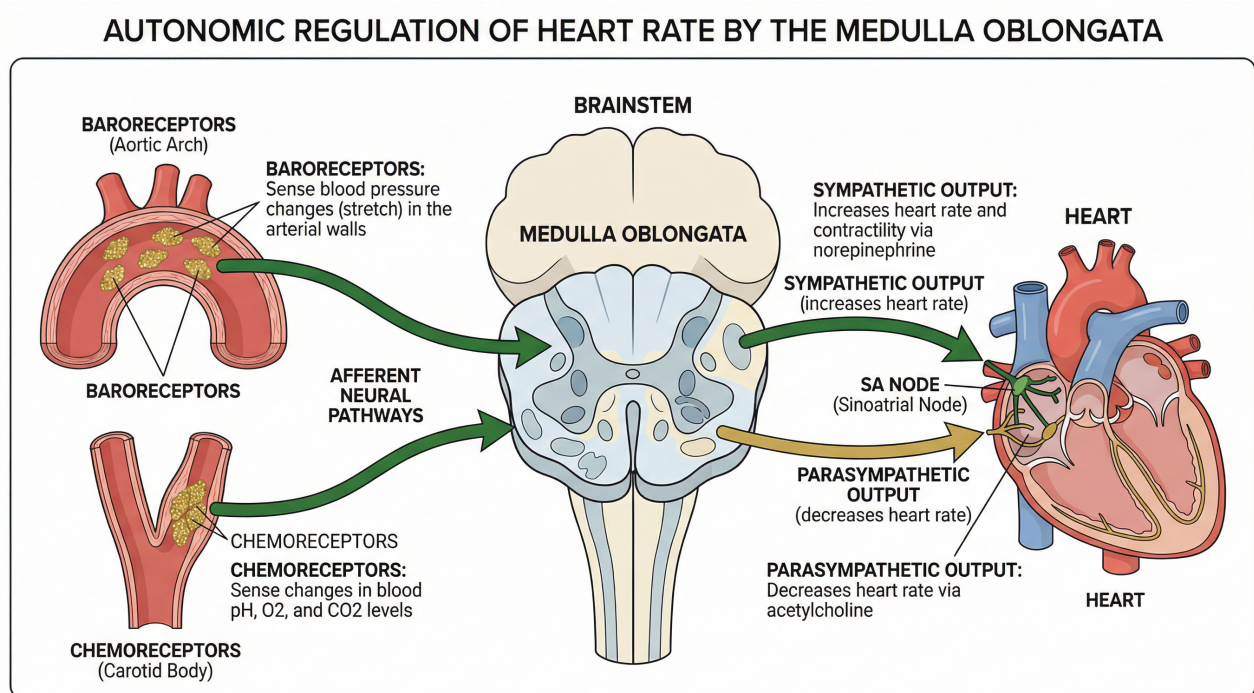
This diagram illustrates the key components of the **cardiac conduction system** responsible for controlling heart rate. It shows the **sinoatrial (SA) node**, **atrioventricular (AV) node**, **bundle of His**, **bundle branches**, and **Purkinje fibres** within a stylized heart. The SA node, located in the right atrium, acts as the natural **pacemaker**, initiating electrical impulses that propagate through the heart to coordinate contraction. Understanding this system is crucial because it explains how electrical signals regulate the rhythmic beating of the heart, ensuring efficient blood circulation.

Figure 2: Neural Control of Heart Rate via the Autonomic Nervous System



This diagram demonstrates how the **autonomic nervous system** controls heart rate by modulating the cardiac conduction system. It shows the interaction between the **sympathetic** and **parasympathetic** nerves with the heart, highlighting the **acceleratory effects** of sympathetic stimulation and the **inhibitory effects** of parasympathetic stimulation on the SA node. Sympathetic nerves release neurotransmitters that increase heart rate and force of contraction, whereas parasympathetic nerves release acetylcholine to slow the heart rate. This balance is essential for responding to changing physiological demands such as exercise or rest.

**Figure 3: Mechanism of Chemoreceptor and Baroreceptor Feedback on Heart Rate**



This figure depicts how **chemoreceptors** and **baroreceptors** provide sensory feedback to the cardiovascular control center in the medulla oblongata to regulate heart rate. Chemoreceptors detect changes in blood CO<sub>2</sub>, O<sub>2</sub>, and pH levels, while baroreceptors monitor blood pressure. Signals from these receptors influence the balance of sympathetic and parasympathetic stimulation to the heart, adjusting heart rate to maintain homeostasis. This feedback system is vital for adapting heart rate during activities such as exercise or blood loss.

### Study Notes

Use this space to annotate the diagrams above, add your own labels, or note down exam-style questions that relate to each figure. Try covering the labels and testing yourself from memory.