

# Cardiac Physiology Study Guide

## Overview

This study guide provides a detailed review of two quizzes covering cardiac physiology. It includes correct answers, conceptual breakdowns, and explanations, as well as corrections for incorrect responses. Core topics include ECG interpretation, cardiac cycle dynamics, cardiac output calculations, effects of parasympathetic and sympathetic nervous systems, pharmacological interventions, and clinical correlations (e.g., aortic stenosis, intra-aortic balloon pumps).

## Correct Answer Highlights

**Parasympathetic Effect on HR:** Increases potassium efflux and reduces sodium influx via the 'funny current' in SA node cells, slowing depolarization.

**Cardiac Output Control:** Best controlled by oxygen demand of peripheral tissues (Starling's mechanism).

**Valve Dynamics:** Higher velocity through aortic/pulmonary valves due to smaller area with same flow.

**Intercalated Discs:** Enable synchronized contraction via physical linkage and electrical signal propagation.

**ECG Wave Matching:** P = Atrial depolarization, QRS = Ventricular depolarization, T = Ventricular repolarization, PR = AV node delay.

**Balloon Pump Function:** Inflate during diastole to increase coronary perfusion, deflate before systole to reduce afterload.

## Corrections & Clarifications

**Organ with Highest % CO:** GI tract/liver receives the highest percentage (~25-30%) of CO. Lungs receive full CO but not a higher % since it's one circuit.

**Refractory Period Ranking:** Correct order: SA node < AV node < Bundle of His. Bundle has longest refractory period.

**CO Definitions:** Flow into the right atrium  $\neq$  cardiac output. CO is defined as  $HR \times SV$  or flow out of LV or RV in one minute.

## Key Takeaways

- Cardiac output =  $HR \times SV$ ; influenced by preload, afterload, and contractility. - Parasympathetic input slows HR via vagus nerve and SA node. - Sympathetic stimulation increases HR and contractility. - Aortic stenosis increases LV pressure  $\rightarrow$  hypertrophy. - Starling's Law:  $\uparrow$  preload  $\rightarrow$   $\uparrow$  stroke volume. - Balloon pumps reduce afterload and improve coronary perfusion when timed with diastole.