Second 2010
VIVA 2

Outline the factors that affect CO. This viva tested the candidates' knowledge of cardiovascular physiology, specifically determinants of CO, ventricular stroke work, volume loops, etc. It also tested knowledge of invasive arterial pressure measurement, including that relating to ideal design features of measuring systems and sources and types of errors of measurement. Candidates seemed to only have a superficial understanding of CO and it's determinants, they lacked depth in their explanations and were less familiar with right sided heart pressures and function. Measurement principles were better covered.

"Discuss the factors which affect cardiac output"

CO = SV x HR

HR is determined by phase 4 of the cardiac pacemaker cells in the SA node

phase four is lengthen by parasympathetic actions and shortened by sympathetic actions

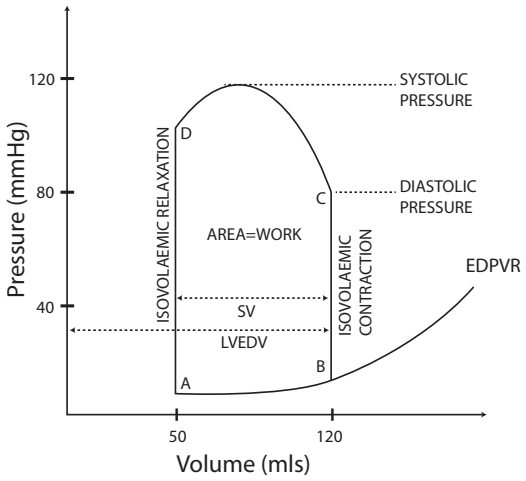
SV is determined by preload, afterload and contractility

preload is the length of a cardiac myocyte immediately prior to contraction

afterload is the tension that must be generated before myocyte shortening can occur

contractility is the force of contraction independent of preload and afterload

"Please draw and label a pressure volume loop for the cardiac cycle"



Cardiac cycle events

valve openings and closings

A = MV opening,

B = MV closes

C = Aortic Valve opens

D = Aortic Valve closes

isovolaemic contraction and relaxation,

systolic blood ejection and diastolic ventricle filling

Measurable values

the diastolic and systolic pressures,

the stoke volume (SV)

left ventricular end diastolic volume (LVEDV)

the area of the loop represents external work

ejection fraction = SV/LVEDV

Surrogate markers

preload surrogate marker is the LVEDV point on the abscissa (x-axis) r

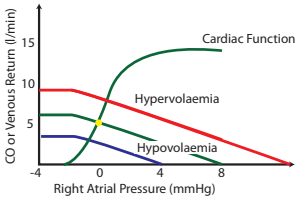
afterload is the angle formed between the preload and D

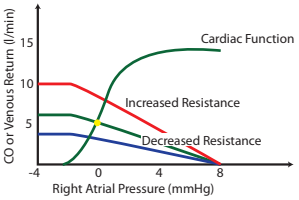
contractility is the angle formed by the End Systolic Pressure Volume Relationship ESPVR.

elastance relates to the end diastolic pressure volume relationship EDPVR,

compliance may be inferred (1/elastance)

"Demonstrate how fluid status and peripheral resistance affect cardiac output"





"Describe the ideal features of a measuring system"

accurate across a wide range physiologically significant values

easily calibrated without significant change despite prolonged use

unaffected by changes in temperature, position, environment

minimally invasive without significant side-effects

the process of observing only causes very minor changes on that which is being observed

cheap and reusable

results are reproducible with a range of operators