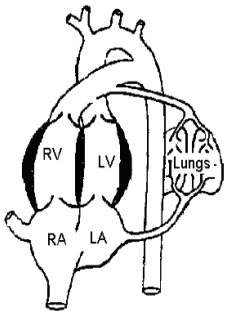


First 2008
VIVA 7

Identify the features on this diagram of the foetal circulation.

Candidates were expected to identify the major features on a diagram of the foetal circulation. Additional questions concerned the changes to this that occur with birth (Syllabus section P and O1), the haemoglobin oxygen dissociation curve (B1 h), the factors that impact on this and the significance of these changes.



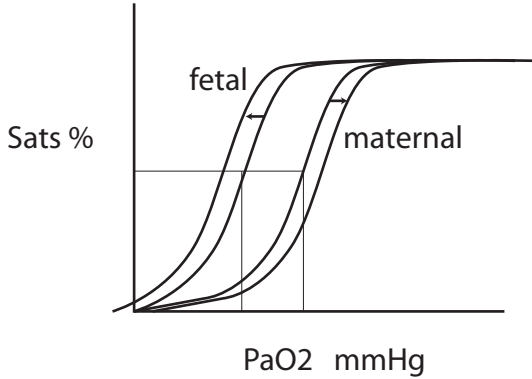
“Describe the Neonatal Cardiovascular system”

Oxygenated blood from the placenta p_{aO_2} of 30mm (sats 80% due to HbF)
 Mixes with IVC blood of around 67% and SVC blood of 32%.
 The lungs are high resistance, blood shunts thru PFO and ductus arteriosis
 the two ventricles have similar thickness and work in parallel

“What changes occur at birth”

it changes from parallel to in series due to changes in resistance
 as the lungs inflate the PVR drops significantly and blood flows from the RV
 when the umbilicus is clamped the placenta becomes higher resistance
 LAP increases due to lung blood flow and the PFO closes
 the ductus arteriosis constricts due to increased p_{O_2} and eventually fibroses

“How is gas exchange facilitated between the mother and fetus”



Bohr effect is the observation that in the presence of increased p_{CO_2} , oxygen is offloaded more easily, and in the presence of reduced p_{CO_2} oxygen affinity increases. Fetal blood offloads PCO_2 shifting the curve left, and increases uptake of O_2 . Maternal blood takes on p_{CO_2} and which causes a right shift, increasing O_2 offload

“Describe the first breaths of a newborn”

Due to stimulation through the birth canal, the reticular activating system kicks in and increases the sensitivity of the peripheral and central chemoceptors. As the neonate is both hypoxic (PO_2 as low as 15mmHg) and hypercapnoeic (PCO_2 as high as 60mmHg) the neonate attempts to take a big breath. This develops a very large negative inspiratory pressure which must overcome the uninflated lungs (laplace $2T/r$). After several breaths the lungs inflate and the pressure decrease significantly.

