Control of shunting versus control of breathing

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In most ectothermic air-breathers, there is no anatomical separation between the systemic and pulmonary circulations, rendering systemic arterial blood to be a mixture of oxygen-rich blood from the lungs and oxygen-poor blood from the tissue. Arterial blood gases do not, therefore, merely reflect lung gas composition and the degree of admixture of blood streams within the heart represents an effective mean to alter blood gases. Using a simple model for gas exchange, I will argue that control of the cardiac shunt may as effective as ventilation in controlling blood oxygen levels, but that the cardiac shunt has much smaller effect on PCO_2 and pH. Based on these theoretical considerations, I will discuss the neuro-humoral regulation cardiac shunts during hypoxia and when metabolism is increased by exercise or digestion.