

# Cerebral oxidative metabolism in the fetal lamb: relationship to electrocortical state.

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## Abstract

Cerebral oxidative metabolism and blood flow were measured in 14 chronically prepared fetal lambs with changes in fetal electrocortical activity. Myocardial blood flow was also measured with changes in fetal state in order to determine whether metabolic changes observed were organ specific. Samples of preductal arterial and sagittal vein blood were analyzed for oxygen content, blood gases, and pH. Blood flow was measured with a radioactive microsphere technique. Cerebral oxidative metabolism increased significantly from  $126 \pm 7$   $\mu\text{mol}/100 \text{ gm}/\text{min}$  during the high-voltage electrocortical state to  $152 \pm 7$   $\mu\text{mol}/100 \text{ gm}/\text{min}$  (p less than 0.05) during the low-voltage electrocortical state. The increase in cerebral oxidative metabolism was sustained by an increase in blood flow,  $148 \pm 7$   $\text{ml}/100 \text{ gm}/\text{min}$  to  $173 \pm 10$   $\text{ml}/100 \text{ gm}/\text{min}$  (p less than 0.01), whereas the arterial venous oxygen difference remained unchanged. Changes in myocardial blood flow were in the opposite direction, with a decrease noted during the low-voltage electrocortical state, and were correlated with changes in fetal heart rate. We conclude that cerebral oxidative metabolism is increased during the fetal low-voltage electrocortical state and suggests an important role for the increased incidence of this state during the accelerated growth and development of the brain during the perinatal period