26368 - HEMODILUTIONAL ANEMIA INCREASES NNOS IMMUNOPOSITIVE CEREBRAL CORTICAL CELLS IN RATS

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INTRODUCTION: Acute anemia has been associated with accentuated neurological injury and mortality in surgical patients by unknown mechanisms. Hypoxia is one potential mechanism by which anemia-induced cerebral injury may occur. Mutual responses to hypoxia and anemia include an increase in neuronal nitric oxide synthase (nNOS) mRNA and protein in the cerebral cortex. This adaptive physiological response may contribute to neuroprotective mechanisms which optimize oxygen homeostasis within the brain. During hypoxia, an increase in the number of nNOS positive cells has been demonstrated in the cerebral cortex, cerebellum, and hippocampus. We hypothesized that acute hemodilutional anemia will also increase the number of nNOS immunopositive cells in the rat brain.

METHOD: With Animal Care Committee approval, rats were hemodiluted by exchanging 30 ml/kg of blood with pentastarch to a hemoglobin concentration near 60 g/L. Control animals were not hemodiluted. Brain tissue was extracted 18 hours following hemodilution. Tissue was fixed, paraffin embedded and sectioned. Immunostaining was performed utilizing a primary monoclonal antibody for nNOS. Immunopositive cells were counted by a blinded individual and reported as cells per coronal section (n=4 rats; 2 slides per rat).

RESULTS: Anemic rats demonstrated an increase in nNOS immunopositive cells in the cerebral cortex (60.13 ± 24.09 vs 16.50 ± 6.52 , $p < 0.001$) and basal ganglia (32.88 ± 9.76 vs 10.38 ± 3.38 , $p < 0.001$) (anemia vs control; mean $\pm$ stdev, t-test). No significant differences in the number of nNOS immunopositive cells was observed in the hippocampus (4.25 ± 2.66 vs 3.38 ± 1.85).

DISCUSSION: These nNOS immunopositive cells resembled neurons and often contained axonal protrusion which surrounded cerebral blood vessels, suggesting that they may play a role in regulating cerebral blood flow.

CONCLUSION: We have demonstrated that there is an increase in the number of nNOS immunopositive cells in the cerebral cortex and basal ganglia, but not in hippocampus in acute anemic rats. This data supports the hypothesis that hypoxic mechanisms may be activated in the brain during acute hemodilutional anemia. (CAS and PSI Support).