Title: **Comparison of Curve Analysis Methodology for ^{133}Xe Cerebral Blood Flow during CPB**

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Cerebral blood flow was measured by arterial-bolus ^{133}Xe washout in 32 adult patients scheduled for cardiopulmonary bypass during elective cardiac surgery. 1.5 - 3.0 mCi of ^{133}Xe was injected directly into the pump arterial line during stable cardiopulmonary bypass and cardiac arrest. Bilateral temporally placed collimated solid-state gamma detectors were used to measure and record digital counts per minute as a function of time for a total of 15 minutes during each determination. Two separate determinations at different times and different cerebral blood flow were performed on each patient, providing a total of 64 measurements for this analysis. Each washout curve was analyzed using five methodologies commonly described in the literature[1]: Non-compartmental (height/area) analysis at 10 minutes (CBF_{10}), 15 minutes (CBF_{15}), and extrapolated using the final slope to infinity (CBF_{∞}), initial slope index (ISI), and bicompartmental indices (Fg) and (Fav). The blood-gas partition coefficients were corrected for temperature and hematocrit and Wg = Ww = 0.5 was assumed for the non-compartmental indices. Results of each method were compared using linear regression with CBF_{∞} as the reference value.

Method:	Slope:	Intercept:	r^2:
ISI	1.3	-3.9	0.90
CBF_{10}	1.1	24.2	0.87
CBF_{15}	1.0	15.4	0.90
Fg	0.5	33.8	0.05
Fav	0.90	2.0	0.97

Table - Regressions - Comparison of alternate methodology with CBF_{∞}. (units in ml / 100g-min) -> (Method) = Slope•(CBF_{∞}) + Intercept.

Calculated values ranged from 6.0 - 60.0 ml / 100g-min. Bicompartmental analysis by nonlinear regression[1] resulted in a value for Fg which was disproportionally large at low flows, since the two compartments were very difficult to resolve. Calculated Fav (Fg•Wg + Fw•Ww), however, correlated with CBF_{∞} to a high degree, as did all of the other indices except for Fg (Table). CBF_{10} and CBF_{15} were consistently higher than CBF_{∞} by fixed amounts (24.2 and 15.4 ml/100g-min respectively). ISI demonstrated a slope of 1.3, which we interpreted as an increased sensitivity to changes in cerebral blood flow under these conditions. We conclude that any of these indices except for Fg are valid for detecting changes in cerebral blood flow during cardiopulmonary bypass, although they differ numerically and slightly in sensitivity to changes in flow.

1) Zierler KL. Equations for Measuring Blood Flow by External Monitoring of Radioisotopes. Circ. Research 1965:4;309-321

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Title: **THE EFFECTS OF PROPOFOL ON NEUROLOGIC OUTCOME FROM INCOMPLETE CEREBRAL ISCHEMIA IN THE RAT**

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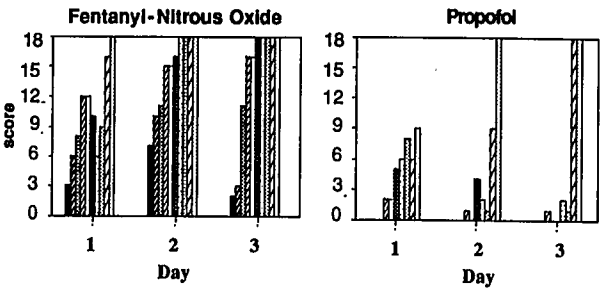
The present study investigates the effects of propofol on neurologic outcome in a rat model of incomplete cerebral ischemia.

Methods: Following institutional approval of the Animal Care Comittee 20 rats were anesthetized with isoflurane, their tracheas intubated and mechanically ventilated. Saline filled catheters were inserted in both femoral arteries and veins for continuous blood pressure monitoring, blood sampling and drug administration. EEG was recorded from temporo-frontal leads over both hemispheres (bandpass: 0.15-45 Hz). A loose ligature was placed around the right common carotid artery. At completion of surgery isoflurane was removed from the inspiratory gas mixture and the animals were equilibrated for 15 min. The rats were divided into two groups. Group I (n=10) received an i.v. fentanyl bolus of 10 µg/kg followed by a continous infusion of 25 µg/kg/min and were ventilated with 70% nitrous oxide in oxygen. Group II (n=10) received 70% nitrogen in oxygen and a continous infusion of propofol starting with 2.0 mg/kg/min until burst suppression patterns were seen in the EEG. After this the propofol dosage was adjusted to maintain burst suppression (0.8-1.2 mg/kg/min). Cerebral ischemia was induced by unilateral common carotid artery occlusion and hemorrhagic hypotension (mean arterial blood pressure: 35 mmHg) for 30 min. Body temperature, arterial blood gases and pH were maintained constant. Plasma glucose was assayed at control, during and post-ischemia. At the end of ischemia the ligature was removed and the blood reinfused. Following this the administration of anesthetics was terminated. Neurologic outcome was evaluated for 3 days using a 18 point scale (0=no neurologic deficit, 18=stroke related death).

Results: Mean arterial blood pressure was not significantly different between groups over time. In group I EEG activity during ischemia shifted to predominantly lower wave activity (0.5 to 6 Hz). In group II, but not in group I, EEG-activity improved significantly 5 to 20 min after ischemia. Neurologic outcome was significantly improved in the propofol group when compared to nitrous oxide (Figure 1).



Discussion: The present study demonstrates that propofol at a dosage that maintains EEG burst suppression activity significantly improves neurologic outcome from incomplete ischemia in the rat when compared to nitrous oxide - fentanyl. Possible mechanims involved may be decreased cerebral metabolism and/or differences in blood glucose levels between groups.