

NITROUS OXIDE ANESTHESIA AND PLASMA HOMOCYSTEINE IN ADOLESCENTS

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Background: Nitrous oxide inactivates vitamin B12, inhibits methionine synthase and consequently increases plasma total homocysteine (tHcy). Prolonged exposure to nitrous oxide can lead to neuropathy, spinal cord degeneration and even death in children. This study tested the hypothesis that nitrous oxide anesthesia causes a significant increase in plasma tHcy in children.

Methods: Twenty-seven children (age 10-18 years) undergoing elective major spine surgery were enrolled and serial plasma samples from 0 – 96 hours after induction were obtained. The anesthetic regimen, including the use of nitrous oxide, was at the discretion of the anesthesiologist. Plasma total homocysteine was measured using standard enzymatic assays.

Results: The median baseline plasma tHcy concentration was 5.1 $\mu\text{mol/L}$ (3.9 – 8.0 $\mu\text{mol/L}$, interquartile range) and increased in all patients exposed to nitrous oxide (n=26) by an average of +9.4 $\mu\text{mol/L}$ (geometric mean; 95% CI 7.1 – 12.5 $\mu\text{mol/L}$) or +228% (mean; 95% CI 178% - 279%). Plasma tHcy peaked between 6-8 hours after induction of anesthesia. One patient who did not receive nitrous oxide had no increase in plasma tHcy. Several patients experienced a several-fold increase in plasma tHcy (max. +567%). The increase in plasma tHcy was strongly correlated with the duration

Conclusions: Pediatric patients undergoing nitrous oxide anesthesia develop significantly increased plasma total homocysteine concentrations. The magnitude of this effect appears to be greater compared to adults; however the clinical relevance is unknown.

