

appeared in either mean control values or per cent deviation from these values for minute ventilation, hemoglobin or base excess. *Conclusions:* Although there were only slight changes in esophageal temperature, patients receiving warmed blood during ether anesthesia had significantly lower peripheral resistance and higher cardiac output and PCO_2 than patients receiving cold ACD blood. This suggests that warming infused blood results in better tissue perfusion. (Supported by U. S. Public Health Service Grant HE-10248-02.)

Effects of Halothane, Cyclopropane and Nitrous Oxide on Isolated Human Uterine Muscle. EDWIN S. MUNSON, M.D., WARD R. MAJER, and DONALD CATON, M.D., *Department of Anesthesiology, University of Virginia School of Medicine, Charlottesville, Va.* Effects of anesthetic drugs on uterine muscle have been reported by many investigators. Most drugs studied produced some depression of uterine muscle activity. Comparison of drug effects from previous studies is not possible since neither anesthetic dose nor response have been quantitated. The purpose of this study is to measure and compare the responses of isolated human nongravid uterine muscle strips to equipotent concentrations (partial pressures) of halothane, cyclopropane and nitrous oxide. The standard of equipotency used is the minimum alveolar (anesthetic) concentration (MAC), (Saidman *et al.*, *ANESTHESIOLOGY* 27: 225, 1966). *Method:* Forty-seven fundal muscle strips ($15 \times 5 \times 1$ mm.) were excised from 12 nongravid human uteri removed at surgery. Specimens were stored for 18-20 hours at 6° C. in a bicarbonate-buffered solution equilibrated with a gas mixture of oxygen and carbon dioxide (5 per cent). Spontaneous uterine contractions were recorded isometrically at 37° C. Thirty-one muscle strips were exposed to halothane concentrations ranging from 0.37 - 1.11 per cent. Six strips were exposed to 10 per cent cyclopropane and 10 strips were exposed to 50 per cent nitrous oxide. Cyclopropane and nitrous oxide concentrations were achieved by calibrated flowmeters. Halothane concentration was monitored with a Beckman infrared analyzer. Data were analyzed for changes in frequency, developed

tension and resting tension. Contractility was calculated according to Caldeyro-Barcia (*Ann. N. Y. Acad. Sci.* 75: 813, 1959). To permit comparison of results concentrations of anesthetic drugs are expressed relative to their respective MAC values. *Results:* Mean contractility values and standard deviations, expressed as fractions of control values, are as follows: Halothane 0.66 ± 0.22 at 0.5 MAC, 0.40 ± 0.27 at 0.75 MAC, 0.44 ± 0.11 at 1.0 MAC, 0.06 ± 0.10 at 1.25 MAC, and 0.04 ± 0.04 at 1.5 MAC; cyclopropane 1.04 ± 0.59 at 1.0 MAC; and nitrous oxide 1.00 ± 0.41 at 0.5 MAC. Extrapolation of the regression of contractility on halothane concentration (MAC) indicates that zero contractility would occur at 1.6 MAC (1.2 per cent halothane). Contractility values for halothane show significant differences ($P < 0.05$) from control values at each level studied. No significant difference could be demonstrated between halothane and nitrous oxide at 0.5 MAC. However, comparison of halothane and cyclopropane values at 1.0 MAC shows a significant difference ($P < 0.05$). Depression of developed tension during anesthetic exposures did not correlate solely on the basis of changes in frequency. No correlation could be made between variations in contractility, endometrial phase, or patients' ages. The effects of hypoxia and variability of contractility patterns in serially-excised muscle strips were noted also. *Discussion:* Previous studies of the effects of nitrous oxide and cyclopropane on uterine contractility show conflicting results. Our findings reveal no significant depression of mean contractility values during exposure to 0.5 MAC nitrous oxide and 1.0 MAC cyclopropane. However, at equipotent concentrations of halothane, mean contractility values show significant reduction ($P < 0.05$) from control. Further reduction in contractility was proportional to halothane concentration. Our results also show no significant reduction in the resting tension of muscle strips exposed to halothane in concentrations capable of producing marked reductions of contractility. It is concluded that at equipotent concentrations halothane is a more potent depressant of uterine muscle than nitrous oxide or cyclopropane. Of the three drugs studied cyclopropane has the least depressant effect.