

late anesthetic requirement to age and cerebral metabolic rate. Our findings of no significant changes in $CMRO_2$ or MAC in experimental animals are compatible with this concept. It is concluded that acute drug-induced hypo- and hyperthyroidism do not influence cyclopropane requirement in the rat. Clinical impressions that hyperthyroid patients require concentrations of inhalation agents which vary from "normal" can be explained on the basis of alterations in drug pharmacokinetics secondary to circulatory changes which results from the primary disease processes.

Arterial Blood Gases in Older Patients during N_2O-O_2 Anesthesia with Unassisted Respiration and with Controlled Hyperventilation. H. H. HURT, JR., M.D., T. D. GRAFF, M.D., AND D. W. BENSON, M.D., Ph.D., *Department of Anesthesiology, Johns Hopkins University School of Medicine, Baltimore, Md.* Hypoxia has been reported as frequent during anesthesia when less than 50 per cent oxygen was inspired. This prompted a study of blood gases in ten patients more than 60 years of age, undergoing prostatectomy in the lithotomy position. **Methods:** All patients were studied twice preoperatively as well as during anesthesia and within 90 minutes after operation. Blood samples were drawn during breathing of 20–21 per cent oxygen and again during breathing of 99–100 per cent oxygen to estimate true shunt. Samples were analyzed for P_{O_2} , pH, P_{CO_2} , standard bicarbonate, and hematocrit. Anesthesia incorporated endotracheal intubation, semiclosed-circle system, and a gas inflow of 8 l./min. N_2O , 2 l./min. O_2 for 45 minutes. A blood sample was drawn and 99–100 per cent oxygen given with up to 1 per cent halothane or with thiamylal for an additional 45 minutes before drawing a second sample. Five patients were allowed to breathe spontaneously, and the remaining patients were ventilated at two to three times their resting ventilation using a mechanical ventilator. **Results:** Average arterial P_{O_2} decreased 11 mm. during anesthesia with spontaneous respiration. Coincident hypercapnia occurred with an average increase in P_{CO_2} of 11 mm. and calculated

oxygen saturations decreased from an average 96 per cent to 89 per cent. In the ventilated group, average P_{iO_2} increased 11 mm., average P_{CO_2} decreased 14 mm., and oxygen saturation increased 2 per cent. Standard bicarbonate fell an average of 3 mEq./l. in patients with spontaneous respiration, and was unchanged in the controlled-ventilation patients. "True shunt," calculated with an assumed 4.5 vol. per cent arteriovenous oxygen difference during oxygen breathing, revealed an average increase of 7 per cent in the patients with spontaneous ventilation and a 1 per cent increase in those mechanically ventilated. In the spontaneous respiration group, standard bicarbonate increased an average of 1 mEq./l. between anesthesia and recovery, but in the mechanically-ventilated group there was a decrease in bicarbonate averaging 2 mEq./l. between anesthesia and recovery. All studies returned to approximately control values with this exception. **Conclusions:** The studies to date confirm the previous suggestions that hypoxia was likely during anesthesia with 20 per cent inspired oxygen and unassisted respiration. Mechanical hyperventilation with adequate gas inflows was associated with normal blood gas values. The findings of Prys-Roberts and Kelman (Brit. J. Anaesth. 38: 661, 1966) regarding the positive correlation of cardiac output and arterial oxygen tension during anesthesia suggest that the actual increase in true shunt in our patients during anesthesia with spontaneous respiration was greater than that calculated using an assumed 4.5 vol. per cent arteriovenous O_2 difference. Conversely, it seems likely that true shunt probably decreased during anesthesia with controlled hyperventilation. Simultaneous hypoventilation and increase in true shunt in the subjects with spontaneous respiration appeared adequate to explain the degree of hypoxemia found. This suggests that primary ventilation perfusion alteration was not severe. Most changes in standard bicarbonate were consistent with *in vivo* versus *in vitro* CO_2 dissociation curve differences. Hypoxia may have contributed to the more marked drop in standard bicarbonate noted during anesthesia with spontaneous ventilation.