systemic circulations suggested the feasibility of maintaining catheters in the coronary sinus as well as the great vessels for prolonged periods of time. Healthy mongrel dogs weighing 15–20 kg. were anesthetized with ether. A right thoracotomy was performed through the bed of the fourth rib exposing the right ventricle, right atrium and great vessels. A 12 gauge, thin-walled, metal trocar was inserted under the control of a purse-string suture into the right ventricle and a 60 cm. length of soft, polyvinyl tubing (I.D. 0.047 inch and O.D. 0.081 inch) was introduced into the pulmonary artery. Similarly, aiming at a point about 1 cm. anterior to the entrance of the inferior vena cava, a catheter was inserted for a distance of 1.5–2 cm. into the coronary sinus through the right atrium. For sampling of arterial blood, catheters were inserted either into the brachiocephalic trunk through the right internal mammary or subclavian artery, or into the aorta through the left ventricle after the heart had been lifted 90 degrees. The catheters were sutured with silk to the myocardium, pericardium and thoracic cage before being passed beneath the scapula and through the skin of the neck. They were fastened externally with adhesive tape which encircled the neck several times. The catheters were immediately filled with 1 ml. of 0.5 per cent heparin solution and plugged with blunt 18 gauge needles fitted with Luer caps. The ends of the catheters were protected in a folded towel which encircled the neck and fastened with safety pins. The catheters were flushed with saline daily and refilled with 0.5 per cent heparin. During operation the position of each catheter was verified by palpation and observation of the color of the blood. Postoperatively, position was confirmed by analysis of the oxygen content of the blood samples drawn simultaneously. When dogs were sacrificed, postmortem examination of the heart further established the position of each catheter. In 10 dogs coronary sinus catheters were maintained in a patent state from 5 to 37 days with an average duration of 16 days. Arterial and pulmonary artery catheters could be maintained for a much longer time. In a number of instances clotting was temporarily corrected by injection of a fibrinolytic enzyme, Actase. Irreversible clotting within the lumina or formation of fibrinous deposits on the outside occurred eventually in all of the coronary sinus catheters. In 9 fasting dogs following a rest period of 30–60 minutes duplicate analyses of blood gases, *p*H and hematocrit were performed on samples drawn simultaneously from the aorta, coronary sinus and pulmonary artery. Average arterial values were as follows: whole blood carbon dioxide content, 17.59 m*M*/l. (14.80–18.87); calculated pCO_2, 33.0 mm. of mercury (30–38); *p*H, 7.39 (7.32–7.44); hematocrit, 43 per cent (39–51); oxygen content, 17.35 volumes per cent (15.76–21.13); oxygen capacity, 19.00 volumes per cent (16.81–22.60); and oxygen saturation, 91.4 per cent (86.0–93.9). The coefficient of myocardial oxygen extraction averaged 79 per cent, and the coefficient of total body oxygen extraction averaged 33 per cent. We believe this technique will overcome some of the problems inherent in metabolic studies performed on animals wherein anesthesia may be a modifying factor.

The Effect of Anesthesia on Thyroid Activity in Humans. NICHOLAS M. GREENE, M.D., AND IRA S. GOLDENBERG, M.D. *Section of Anesthesiology and Department of Surgery, Yale University School of Medicine, New Haven, Conn.* Circulating levels of thyroid hormones were determined as follows: each patient was given an oral tracer dose of I^{131} 48 hours prior to operation. On the day of operation, venous blood samples were drawn prior to preanesthetic medication, after medication prior to anesthesia, following the induction of anesthesia prior to surgery, and 50 to 100 minutes after the start of surgery. Each blood sample was centrifuged and the radioactivity in 2 ml. of serum was determined in a scintillation well detector following which the amount of radioactivity associated with protein-bound iodine (PBI) was determined. PBI was obtained by passage of serum through an ion-exchange column. Results were tabulated in terms of a conversion ratio (C.R.) calculated by dividing the net counts of PBI^{131} in 2 ml. serum by net counts of I^{131} in 2 ml. serum and multiplying the result times 100. Eighteen patients unselected except for elimination of those with thyroid disease were studied. All but 2 were males. Premedica-

tion consisted of 100 mg. pentobarbital and 0.4 mg. scopolamine intramuscularly per 70 kg. of body weight. Five patients were given hyperbaric tetracaine spinal anesthesia (4 for inguinal herniorrhaphy, one for excision of pilonidal sinus). Thirteen patients were given gas-oxygen-ether anesthesia (3 for inguinal herniorrhaphy, 5 for gastrectomy, and 5 for colon operations). No other drugs were given at any time. The results (mean ± standard error of the mean) showed control C.R. to be 48.6 ± 8.1, after premedication 56.6 ± 7.9, after induction of anesthesia 52.2 ± 6.7, and during operation 58.2 ± 6.8. Because of the wide individual variations, none of these changes were statistically significant. Thirteen of the 18 patients had, however, a C.R. during operation which was elevated above control levels. The type of operation had no significant effect on the extent to which the C.R. changed. Age appeared to play a role in that patients under 50 tended to show a greater rise in C.R. than did those over 50, but the paucity of patients under 50 (6 in number) prevented satisfactory statistical evaluation. The type of anesthesia also bore no relation to the change in C.R.: the mean rise during surgery under spinal was 12.0 ±11.1, under ether 11.0 ± 4.4. The fact that the C.R. changed as much under spinal as under ether anesthesia suggests that the blood levels of thyroid hormones are controlled by factors other than those controlling blood levels of certain other hormones during surgery. Blood was also drawn for determination of plasma 17-hydroxycorticosteroids according to a modification (*J. Clin. Endocrinol. 16: 1333, 1956*) of the method of Porter and Silber. Samples were obtained in all 18 patients at the same time the C.R. was determined. Results confirmed the findings of others (*Virtue et al., Surgery 41: 549, 1957; Hammond et al., Ann. Surg. 148: 199, 1958*) in that the levels of steroids were significantly higher during operations performed during ether anesthesia (46.5 ± 3.5 μg per cent) than they were during spinal anesthesia (30.2 ± 4.3 μg per cent). This suggests that the hypothalamic neurosecretory center influencing pituitary output of thyrotropin (*Ganong et al., Endocrinology 57: 355, 1955*) does not respond to afferent peripheral surgical stimuli in the same manner as does the hypothalamic neurosecretory center influencing pituitary output of adrenocorticotropic hormone. (*This study was supported by a grant from the Josiah Macy, Jr. Foundation, aided by a contract between the Office of Naval Research, Department of the Navy, and Yale University School of Medicine, NR 105057.*)

Polarographic Method for Arterial Oxygen Tension Studies During Nitrous Oxide-Oxygen Anesthesia. MORRIS L. HELLER, M.D., FERDINAND KREUZER, M.D., AND T. RICHARD WATSON, JR., M.D. *Departments of Anesthesia and Surgery, Hitchcock Clinic and Dartmouth Medical School, Hanover, N. H.* Previous blood gas studies during nitrous oxide-oxygen anesthesia were concerned with O_2 content and O_2 saturation of the hemoglobin. With the recent development of the polarograph, arterial O_2 tension values can now be obtained for all concentrations of O_2 irrespective of other gases administered simultaneously. The Roughton-Scholander syringe technique is restricted usually to those cases without anesthetic gas in the blood. In 1957, Kreuzer and Watson incorporated the oxygen electrode of Clark into a simple and reliable arrangement for measuring blood oxygen tension *in vitro* (*Experientia 13: 300, 1957; Fed. Proc. 16: 75, 1957, and J. Appl. Physiol. 12: 65, 1958*). More recently Kreuzer and Nessler utilized an inlying catheter-type pO_2 electrode *in vivo* in animals (*Physiologist 1: No. 4, 44, 1958*). The Clark electrode consists of a platinum cathode and a silver anode which are included in the same unit and connected by a NaCl bridge. A membrane of thin plastic material separates the electrode system from the blood, and the current flows only within the electrode unit. The membrane is not permeable to water or electrolytes, but the dissolved oxygen passes through the membrane, and undergoes reduction at the cathode which is maintained at 0.6 volts. The small polarographic current is measured through the polarographic circuit by a galvanometer and is proportional to the O_2 tension in the electrolyte solution. The electrode is recalibrated for the blood of each patient. Brachial artery blood samples were taken as part of our studies on subnormal risk patients receiving nitrous oxide-O_2-relaxant