Occurring During Anesthesia. ROY D. WILSON, M.D., RAY JANNEY NICHOLS, JR., M.D., TOMMY E. DENT, M.D., and CHARLES R. ALLEN, M.D. *Department of Anesthesiology, The University of Texas Medical Branch, Galveston, Texas.* In a recent paper by Saidman (J.A.M.A. *190:* 1029, 1964) attention was directed to the effects of hyperthermia under general anesthesia. Two cases were reported. From additional sources we have collected 7 other similar cases as well as 6 of our own as yet unreported. Careful study failed to reveal a common denominator. The most constant observation was that 12 of 15 cases involved the use of a halogenated hydrocarbon. Our observations of clinical cases of this malignant and usually fatal hyperthermia have a striking similarity to the hyperthermia induced experimentally in dogs by the uncoupling of oxidative phosphorylation with 2,4-dinitrophenol. *Method:* Fifteen healthy adult mongrel dogs unselected as to sex and weighing from 12 to 25 kg., unpremedicated, and fasted, were the subject of this experiment. Each animal in a randomized order and time sequence was anesthetized twice with sodium pentabarbital 30 mg./kg. intravenously and oxygen in a nonrebreathing system, and twice with halothane and oxygen in a nonrebreathing system. Complete cardiovascular, respiratory and blood gas parimeters were measured as well as core temperatures under environmental temperature control. All dogs were challanged with 5 mg./kg. of a buffered solution of D.N.P. Responses of the two groups were compared principally in overall temperature rise. The differences in the two control pentobarbital groups were not significant ($P = > 0.4$). In comparing the halothane series with the pentobarbital series a marked difference was observed ($P = < 0.001$). Of interest is the fact that 4 animals died from the hyperthermia during the halothane series, including one animal on the first exposure. *Conclusion:* These preliminary observations suggest the possibility of an infrequent but potential circumstance of a patient liability to a "triggering substance" uncoupling oxidative phosphorylation and a malignant hyperthermia resulting. Other anesthetic agents are being tested for confirmation of these data.

New Formulas for Ventilation of the Anesthetized Patient. JAMES A. WYNN, M.D., D. C. GROSSKREUTZ, M.D., and JAMES D. O'KEEFE, M.D., *Department of Anesthesiology, University of Texas, South Texas Medical School and Robert B. Green Memorial Hospital, San Antonio, Texas.* Mechanical ventilators are becoming useful in the administration of anesthetics. To avoid the adverse effects of both hypercarbia and hypocarbia it is essential to have some guide to optimal ventilation. In 1954 Radford devised a nomogram for predicting tidal volume (New Engl. J. Med. *22:* 977, 1954). Except for the work of Cain (Canad. Anaesth. Soc. J. *10:* 491, 1963) very little investigation has been done on its application to anesthetized patients. The present study was undertaken to evaluate this nomogram as a reliable guide to ventilation for anesthetized adults. *Method:* Class I or II adult patients for extrathoracic procedures were selected. Arterial blood was drawn before premedication and at periods of 15 to 60 minutes after steady states of anesthesia and ventilation were obtained. Induction was with 2½ per cent thiamylal and maintenance with 1 per cent halothane in a 50 per cent nitrous oxide-oxygen mixture via an endotracheal tube and semiclosed system. Relaxation was kept at a maximum with a 0.2 per cent succinylcholine drip. A Wright respirometer was connected to the endotracheal tube and the patient automatically ventilated by an Air Shields ventimeter-ventilator at a rate of 16 per minute using positive pressure only. The first series of 10 patients was ventilated according to the Radford nomogram; the second series of 10 was ventilated according to the Radford nomogram plus 20 per cent of estimated tidal volume; and the third series of 44 patients was ventilated as the second group, but estimation of tidal volume was made on ideal weight for height and body build instead of actual weight. *Results:* Unpremedicated patients before operation had P_{CO_2} values of 34 to 47 (mean = 39.3 ± 3.2 mm. of mercury). In the first series ventilated according to the Radford nomogram. P_{CO_2} ranged from 37 to 62 mm. of mercury (mean = 46.6 ± 6.8); 80 per cent were considered underventilated and changes in P_{CO_2} were highly significant ($t =$

4.757, $P < 0.001$). In the second series ventilated according to Radford nomogram plus 20 per cent, P_{CO_2} ranged from 38 to 55 mm. of mercury (mean = 45.8 ± 6.0); 40 per cent were underventilated and changes in P_{CO_2} were significant ($t = 3.113$, $P < 0.01$). In the third series consisting of 44 patients ventilated according to ideal weight plus 20 per cent, all had normal P_{CO_2} values except 3, or 6.8 per cent. The mean P_{CO_2} was 39.6 ± 4.5 and there was no change of statistical significance ($t = 0.920$, $P > 0.05$). Satisfactory ventilation appeared to be related more to height and body build than to weight. It was found that at a respiratory rate of 16, tidal volume = height in inches × 6.1 for endomorphic women, 6.5 for ectomorphic and mesomorphic women, 7.1 for endomorphic and mesomorphic men, and 7.5 for ectomorphic men. *Conclusion:* In order to maintain normocarbia under anesthesia, the Radford nomogram is not a reliable indicator of optimal tidal volume. Ventilation appears to be more closely related to height and body build than to weight. Optimal ventilatory volumes can be estimated by employing a factor of 6.5 × height in inches for normal or large women, subtracting 6 per cent for the thin and a factor of 7.5 for muscular and obese men, or subtracting 5 per cent for those normal or thin. Further studies during intra-abdominal and extrathoracic procedures are underway.

ADRENAL CORTEX An adrenalectomized dog deprived of all hormone support is unable to maintain circulatory plasma volume and arterial blood pressure following exposure to a small hemorrhage or operative trauma. The administration of either hydrocortisone or prednisolone to an adrenalectomized animal results in a gradual rise in both plasma volume and arterial pressure. The nature of the plasma-volume drop in adrenal insufficiency induced by stress may be related both to sequestration and trapping of plasma in the peripheral vessels and to inability of the animal to replace fluid loss. (*Marks, L. J., and others: Physiologic Role of the Adrenal Cortex in the Maintenance of Plasma Volume Following Hemorrhage or Surgical Operation, Surgery 58: 510 (Sept.) 1965.*)

DEXTRAN Alterations in viscosity induced by intravenous administration of high (HVD) and low (LVD) viscosity dextrans were studied in rats. Dilatation of the hepatic sinusoids with cellular aggregates were observed after HVD by *in vivo* microscopy. The hepatic microcirculatory alteration was corrected by LVD administration. HVD also produced a decreased hematocrit, an increased sedimentation rate, and an increased whole-blood viscosity. LVD produced a further decrease in hematocrit, a decrease in sedimentation rate, and a lowering of the whole-blood viscosity. (*Shoemaker, W. C., and others: Hemodynamic and Microcirculatory Effects of High and Low Viscosity Dextrans, Surgery 58: 518 (Sept.) 1965.*)