mal oxygen tensions ($P_{A_{O_2}}$ 110 torr), ventilation was unaffected by 0.2 per cent CO_2, increased 43 per cent with 2.3 per cent CO_2, and increased 151 per cent with 4.4 per cent CO_2. During the first minute of hypoxia, ventilation increased further on exposure to CO_2, with the increase being significantly greater at the highest level of CO_2 (4.4 per cent). At a normal alveolar oxygen tension hyperventilation secondary to CO_2 inhalation reached a steady state within three to four minutes, due entirely to an increase in tidal volume. During hypoxia, hyperventilation following exposure to CO_2 was brief, and it began to decrease during the second and third minutes in 24 of 30 studies. Decreases to below control ventilation values were subsequently evident in 14 of 30 studies. In one infant (11 days old) hyperventilation was sustained during hypoxia at both high and low levels of CO_2. One infant, aged 42 hours, was inadvertently studied at 29 C and found to have a 13 per cent decrease in ventilation during the first minutes of hypoxia with high CO_2; after warming of the box to 31.5 C the increase in ventilation with hypoxia was 57 per cent. In all studies there were small, but significant and sustained, increases in heart rate with hypoxia (from 3 to 5 per cent of control values). The findings suggest that in young newborns hypercapnia does potentiate the initial stimulant effect of hypoxia on ventilation. However, hyperventilation is not sustained and is abolished if the infant is placed in a cool environment. (*Brady, J. P., Chir, B., and Dunn, P. M.: Chemoreceptor Reflexes in the Newborn Infant: Effect of CO_2 on the Ventilatory Response to Hypoxia, Pediatrics 45: 206–215 (Feb.) 1970.*)

Kidney

RENAL FUNCTION The uremic patient does not tolerate the usual doses of anesthetics. Preoperative medications should be used with discretion. Passage of tubes into the larynx and trachea may be complicated by uremic changes in the mucous membranes, with friability and bleeding. Absorption of gaseous agents may be affected by the pulmonary changes of advanced renal disease. Even with preferred local or spinal anesthesia, caution must be exerted because of the increased risks of myocardial irritability with the myocarditis of uremia, a frequent accompaniment of pericardial changes. (*Takacs, F. J.: Surgery with Impaired Renal Function, Surg. Clin. N. Amer. 50: 719 (June) 1970.*)

Respiration

OXYGEN BREATHING A study was done to determine the effects of breathing 100 per cent oxygen for six to 12 hours in healthy adult volunteers. Alveolar–arterial oxygen gradient, physiologic pulmonary shunt, pulmonary arterial pressure, total pulmonary resistance, cardiac output, and pulmonary extravascular water volume were measured. No significant changes in any of these values were observed, throughout the period of breathing 100 per cent oxygen. The subjects were healthy volunteers, and application of these data to intensive-care patients must be made with caution. (*Van De Water, J. M., and others: Response of the Lung to Six to Twelve Hours of 100 Per Cent Oxygen Inhalation in Normal Man, New Engl. J. Med. 283: 621 (Sept. 17) 1970.*)

HEART DISEASE AND OXYHEMOGLOBIN DISSOCIATION By reducing the capacity to pump blood, heart disease limits the amount of oxygen available to tissues. Regional hypoxia results unless other mechanisms appear to compensate for the reduced blood flow. One possibility is a decrease in oxygen affinity of hemoglobin mediated by an increase in erythrocytic 2,3-diphosphoglyceric acid (2,3-DPG) (*i.e.*, shift of oxyhemoglobin dissociation to the right). The relation between degree of cardiac functional impairment and hemoglobin–oxygen affinity (*i.e.*, erythrocytic 2,3-DPC content) was studied in 39 patients with noncyanotic heart disease. A progressive decrease in hemoglobin–oxygen affinity was found with decreasing heart function when the latter was assessed by means of cardiac index, arteriovenous oxygen differences, and clinical symptoms. This alteration in hemoglobin–oxygen binding repre-

sents a significant mechanism for adaptation to the lowered oxygen supply imposed by the cardiac lesion. A significant correlation between oxygen saturation of mixed venous blood, 2,3-DPG concentration, and P_{50} (*i.e.*, P_{O_2} at 50 per cent saturation and *p*H 7.4) was found. The authors imply that the level of deoxygenated hemoglobin is an important *in-vivo* determinant of 2,3-DPG synthesis and hemoglobin–oxygen affinity. (*Woodson, R. D., Torrance, J. D., Shappell, S. D., and Lenfant, C.: The Effect of Cardiac Disease on Hemoglobin–Oxygen Binding, J. Clin. Invest. 49: 1349 (July) 1970.*)

PULMONARY HYPERTENSION An acute increase of hydrogen-ion activity produced by infusion of hydrochloric acid was not associated with an increase in pulmonary vascular resistance in patients with mild bronchitis or patients with more severe bronchitis with attendant hypoxemia. A chronic increase in blood hydrogen-ion activity produced by ingestion of ammonium chloride produced no change in pulmonary vascular resistance in patients with mild bronchitis. A small increase in pulmonary vascular resistance occurred in the group with severe bronchitis when inspired O_2 was decreased from 21 to 12–13 per cent. The increase in blood hydrogen-ion activity of the degree found does not appear to be a significant factor in the genesis of pulmonary hypertension, whether or not the patient is chronically hypoxic. (*Hansley, E., Clarke, S. W., Hedworth-Whitty, R. B., and Bishop, J. M.: Effect of Acute and Chronic Acidaemia and Associated Hypoxia on the Pulmonary Circulation of Patients with Chronic Bronchitis, Cardiovasc. Res. 4: 482 (Oct.) 1970.*) EDITOR'S COMMENT: It is possible that pulmonary hypertension becomes fixed and vascular reactivity to changes in hydrogen ion activity, though once present, may no longer be apparent.

HYPOXIA Mice were subjected to subatmospheric pressure for continuous periods as long as 33 days. After different durations of exposure, nine mice were selected randomly from an initial group of 125 and weight, hematocrit, blood hemoglobin concentration, erythrocyte and reticulocyte counts, and blood volume were measured. Each animal was used for only one set of determinations. Total circulating hemoglobin, total circulating erythrocyte volume, total plasma volume, total blood volume, and the erythrocytic indexes were calculated. Data were obtained at air pressures of 510, 440, and 360 mm Hg, corresponding to altitudes of 10,500, 14,500, and 19,000 feet, respectively. At least two runs were made at each pressure. During the first few days of exposure, plasma volumes decreased 9, 15, and 19 per cent below control values at these pressures. At the same pressures, total circulating erythrocyte volumes increased to steady-state values of 23, 43 and 135 per cent above control. Mean corpuscular volume increased at all three pressures, with most of the increases occurring during the first few days of exposure. (*Mylrea, K. C., and Abbrecht, P. H.: Hematologic Responses of Mice Subjected to Continuous Hypoxia, Amer. J. Physiol. 218: 1145 (April) 1970.*)

ISUPREL Pulmonary mechanics were investigated in eight healthy men. Flow–volume, pressure–volume, resistance–volume, and pressure–flow curves, in addition to forced expiratory volume (FEV_1), were measured. Isoproterenol produced a considerable decrease in airway resistance but only small changes in maximum expiratory flow. Measurements of static pressure–volume curves showed isoproterenol caused temporary decreases in the elastic pressure of the lungs. Five of the men had a mean decrease in recoil pressure of 4.1 cm H_2O at 50 per cent TLC. The relatively small increments in maximum expiratory flow after isoproterenol may be primarily due to the fact that the effects of airway dilatation are negated by the reduction in lung recoil pressure, which results in a decrease in the maximum effective driving force for expiratory air flow. In addition, there is probably an increase in the compliance of the flow-limiting airways. These studies emphasize that tests of maximum flow and of airway resistance should not be regarded as being invariably inter-