

deadspace to tidal volume. The results indicate that from the ventilatory functions measured there is no apparent adverse effect associated with ventilation with 100 per cent oxygen for 24–48 hours. The adverse pulmonary effect(s) of ventilating patients with high inspired oxygen concentrations for brief periods remain unclear. The potential therapeutic value of using high oxygen concentrations when the dangers of hypoxemia are present outweighs any disadvantage thus far postulated. (Singer, M. M., et al.: *Oxygen Toxicity in Man: Prospective Study in Patients after Open-heart Surgery*, *New Eng. J. Med.* 283: 1473, 1970.)

OXYGEN TOXICITY IN MAN: A PROSPECTIVE STUDY The combination of long-term artificial respiration and a high oxygen concentration in the inspired gas mixture can be responsible for various degrees of pulmonary damage, manifested as hyaline membrane formation and extensive fibrosis. Such damage, in turn, may diminish the efficiency of oxygenation through an increase in intrapulmonary right-to-left shunt. The acute effects of high inspired oxygen concentrations were studied in 20 patients who had undergone heart-valve replacement. All were ventilated mechanically for more than 24 hours postoperatively. The ventilator was set to deliver a tidal volume of 15 ml/kg at a rate that produced an arterial P_{CO_2} of 37 to 43 mm Hg. End-inspiratory pressures varied between 18 and 30 cm H_2O , and the average respiratory frequency was 8 breaths/min. In one group of nine patients the ventilator was set to deliver 83 per cent oxygen; another group of patients was given an oxygen/nitrogen mixture of 40/60 per cent. Patients in the two groups were comparable in age, sex, severity of heart disease, and surgical procedures. The authors calculated the right-to-left shunt by taking arterial and mixed venous (pulmonary

artery catheter) samples following brief periods (20 minutes) of breathing of pure oxygen in the two groups. O_2 content was calculated, when necessary, from measured values of P_{O_2} , pH, and O_2 saturation. The authors conclude that even a brief period (24 hours) of ventilation with a high oxygen concentration is sufficient to impair the efficiency of oxygenation. This they attribute to the deleterious effects of oxygen on the pulmonary parenchyma. In the group ventilated with 83 per cent oxygen, the intrapulmonary right-to-left shunt rose from an initial average of 8 per cent to an average of 17 per cent of cardiac output during the first 24 hours; in the group ventilated with 40 per cent O_2 , the shunt did not change. Since 40 per cent inspired oxygen usually produces nearly complete O_2 saturation of arterial blood, high concentrations of inspired oxygen are considered not only unnecessary but probably undesirable. It is the authors' impression that pulmonary complications, including bronchopneumonias, have been encountered less frequently since oxygen has been used in concentrations high enough to produce an arterial P_{O_2} of 100 mm Hg. (Wolff, G., et al.: *The Effect of Inspiratory Oxygen Concentrations on the Degree of Intrapulmonary Right to Left Shunt*, *Thoraxchirurgie* 18: 356, 1970.) EDITOR'S COMMENT: The studies by Singer et al. and Wolff et al. seem extraordinarily similar, yet their results are diametrically opposite. A full appreciation of this discrepancy can be obtained only by reading the original articles. Perhaps the levels of sedation, the degrees of muscle tonus, and the finer nuances between controlled ventilation in the paralyzed patient and assisted ventilation in the fully-awake individual may resolve the difference. At best, the cause of the difference is obscure, but it points to the danger of formulating conclusions about oxygen toxicity from clinical studies of patients with abnormal lung function.