

attached to endotracheal tubes. Despite use of the air-mix control, expired oxygen concentrations ranged from 83 to 91 per cent. The patients developed diffuse, patchy infiltrates in the lung fields. All had abundant tracheal secretions. Atelectasis, pulmonary infections, and anemia were frequent complications. The alveolar-to-arterial oxygen gradients (A-aD_{O₂}) were markedly elevated. Although one patient died, the other four patients were weaned from the ventilators within two to five days after decreasing the mean expired oxygen concentration from 87 to 40 per cent. Pulmonary infiltrates decreased in one to four weeks and disappeared in three to seven weeks. Diffusing capacity, spirometry, and A-aD_{O₂} were normal in one patient studied 11 weeks later. The oxygen-induced pneumonitis gradually resolved once the expired oxygen concentration was reduced to levels of 45 per cent or lower. Inspired or expired oxygen concentrations should be measured frequently during administration of supplementary oxygen. (Hyde, R. W., and Rowson, A. J.: *Unintentional Iatrogenic Oxygen Pneumonitis—Response to Therapy*, *Ann. Int. Med.* 71: 517 (Sept.) 1969.)

ACCIDENTAL NARCOSIS To prevent the development of pulmonary oxygen toxicity in patients whose ventilation is being continuously assisted with positive-pressure cycled ventilators, the ventilators may be driven by compressed air from a centralized compressor. A patient appeared to be more responsive when he ventilated spontaneously than when his ventilation was assisted with the respirator. The maintenance department of the hospital subsequently reported that accidental contamination by an organic solvent was present in the compressed air lines throughout the hospital. Investigations revealed the contaminant to be tetrachloroethylene (perchloroethylene), CCl₂ = CCl₂. Despite the established policy of discarding and replacing air filters when they become dirty, a maintenance employee had removed the filter on the air intake vent of the central air compressor, soaked the filter in tetrachloroethylene, and replaced the filter without allowing it to dry. The solvent was then vaporized into the air which passed

through the filter into the compressor. (Lackore, L. K., and Perkins, H. M.: *Accidental Narcosis: Contamination of Compressed Air System*, *J.A.M.A.* 211: 1846 (March) 1970.)

NITROGEN NARCOSIS Bangham has proposed that narcosis represents a transient reversible increase in membrane permeability to cations. The effects on blood and urine chemistry of breathing air, oxygen, or a 20/80 oxygen-helium mixture at pressures as high as 10 atmospheres absolute for 30 to 60 minutes were studied in man during deep-sea diving. Marked decreases in the excretion of sodium and calcium were found at depth on air dives but not during the dives when oxygen-helium or pure oxygen was breathed. The alterations in electrolyte distribution in human breathing air under pressure resemble the changes found with various anesthetic agents and implicate the narcotic properties of the nitrogen component of air. (Radomski, M. W., and Bennett, P. B.: *Metabolic Changes in Man during Short Exposure to High Pressures, Aerospace Med.* 41: 309 (March) 1970.)

FLUOROCARBON VENTILATION Ventilation of the lungs of dogs with oxygenated fluorocarbon liquids neither washed out nor altered the surface tension properties of pulmonary surfactant. This was attributed to the fact that pulmonary surfactant is insoluble in the nonpolar inert fluorocarbon liquid. Since unaltered surface tension characteristics at the air-liquid interface of the alveolus are necessary to permit readaptation to gas breathing these studies further support the potential promise of oxygenated fluorocarbon ventilation for bilateral lung lavage. (Modell, J. H., and others: *Effect of Fluorocarbon Liquid on Surface Tension Properties of Pulmonary Surfactant*, *Dis. Chest* 57: 263 (March) 1970.)

CILIA AND BRONCHIAL CLEARANCE An understanding of the functional anatomy of cilia is important to the study of bronchial clearance mechanisms. Endogenous pharmacologic agents may act as stimulators of ciliary motion, but their effects vary among species and, in some cases, they must be in concentrations that are unphysiologically high. In

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general, the exogenous pharmacologic agents inhibit ciliary motion, although local anesthetics can stimulate ciliary motion at low concentrations. Various diseases that affect the bronchial tract also affect ciliary motion and mucus production and transport. Necrosis and cell destruction, viral infections, vitamin A deficiency, and chronic bronchitis all inhibit ciliary motion to some degree. (Okeson, G. C., and Divertie, M. B.: *Cilia and Bronchial Clearance: The Effects of Pharmacologic Agents and Disease*, *Mayo Clin. Proc.* 45: 361 (May) 1970.)

COLLATERAL VENTILATION The superior segmental bronchi of the right lower lobes of anesthetized dogs were ligated and divided, and the distal bronchi cannulated. The cannulae were connected to an underwater seal and a spirometer to measure the volume of collateral ventilation. Transducers were used to measure the pressure changes in the trachea and in the bronchi that had been cannulated. In one group of dogs each lung was ventilated separately through a tracheal divider to measure effects of varying tidal volumes. In another group of dogs, ventilation was done through an ordinary endotracheal tube to measure effects of changes in tracheal pressure. Epinephrine given intravenously (0.01 mg/kg) produced a 66 to 160 per cent increase in collateral gas flow with no change in peak tracheal pressure, while intravenous methacholine (0.1 mg/kg) resulted in a 50 to 170 per cent increase in peak tracheal pressure and a reduction in gas flow to zero. Hypoxia (10 per cent O₂ and 90 per cent N₂) and hyperoxia (pure O₂) did not appreciably change the amount of collateral ventilation. Hypercapnia (15 per cent CO₂) produced marked increases in collateral ventilation and reduced the pressure gradient between the trachea and the cannulated bronchus. These results show that the principal pathways for intersegmental collateral ventilation contain smooth muscle fibers. (Chen, C., Sealy, W. C., and Scaber, A. V.: *The Dynamic Nature of Collateral Ventilation*, *J. Thorac. Cardiovasc. Surg.* 59: 518 (April) 1970.)

PULMONARY FUNCTION Airway resistance, compliance, alveolar-arterial oxygen gradients breathing pure oxygen, and dead-

space-to-tidal volume ratios were determined in adults and children early and late in anesthesia. Operations performed included cardiopulmonary bypass and thoracic, abdominal, and surface procedures. Airway resistance increased when the pleura was opened. However, when the pleura was intact, even cardiopulmonary bypass had no adverse effect on pulmonary function. The deleterious effects of pleurotomy were abolished by humidification of the inspired gas mixture and by providing intermittent deep breaths during cardiopulmonary bypass. Pleurotomy impaired pulmonary function primarily through retraction of the lungs and through retention of secretions. (Ghia, J., and Andersen, N. B.: *Pulmonary Function and Cardiopulmonary Bypass*, *J.A.M.A.* 212: 593 (April) 1970.)

PULMONARY DISEASE Chronic obstructive pulmonary disease in 25 patients was classified according to whether the predominant changes were loss of lung elastic recoil suggesting primarily emphysema, or increased airway resistance, suggesting primarily chronic bronchitis. Emphysema predominated in six, seven had primarily chronic bronchitis; 12 had functionally combined disease. Impairment of steady-state exercise carbon monoxide transfer related linearly to loss of lung elastic recoil. From clinical, laboratory, and radiographic findings, the combined-disease group had the greatest sputum production, the most severe hypoxemia and hypercapnia, and the most numerous histories of respiratory insufficiency with heart failure. Maximal expiratory flow rates were limited in patients with emphysema or bronchitis, but less than in patients with combined disease. In patients with emphysema, limitation in expiratory flow was directly proportional to magnitude of lung elastic recoil, whereas in patients with bronchitis limitation of expiratory flow rates was proportional to increase in airway resistance. (Duffell, M., Marcus, J. H., and Ingram, R. H., Jr.: *Limitation of Expiratory Flow in Chronic Obstructive Pulmonary Disease. Relation of Clinical Characteristics, Pathophysiological Type, and Mechanisms*, *Ann. Intern. Med.* 72: 362 (March) 1970.)