

OXYGEN UPTAKE Oxygen-15 is a positron-emitting isotope with a half-life of two minutes. Its properties make it particularly suitable for the investigation of pulmonary physiology in man. A single breath of air labeled with this isotope is taken and held for 10 to 15 seconds. Two pairs of scintillation counters, placed in front of and behind the chest, detect the initial rise of the activity in the lung between them and its subsequent fall during the breath-holding period. The initial activity is a measure of the ventilation of the defined volume, and the rate of fall during breath-holding is determined chiefly by the regional blood flow. Oxygen-15 uptake, expressed as a fraction of the initial concentration, always exceeded oxygen-16 uptake. The apparent discrepancy between the uptake of oxygen-15 and oxygen-16 results from their unequal back pressures in the blood entering the pulmonary capillary. (Dyson, N. A., and others: *Comparison of Uptakes of Oxygen-15 and Oxygen-16 in Lung*, *J. Physiol.* 152: 325 (July) 1960.)

PULMONARY DIFFUSION The pulmonary diffusing capacity in normal subjects increases with exercise mainly because the pulmonary capillary blood volume rises. Individual differences in diffusing capacity also seem mainly attributable to variations in this component. Hyperventilation and hypoxia could not be shown to exert much influence on the pulmonary diffusing capacity. Removal of one lung appears to result in a halving of the membrane component. High-flow conditions in the lesser circulation are not associated with any increase in the pulmonary capillary blood volume. Mitral stenosis may lead to a considerable increase in pulmonary capillary blood volume and a concomitant reduction in membrane component. The main defect in patients with pulmonary fibrosis was found to be in the membrane diffusion component, the pulmonary capillary blood volume being either normal or reduced. (Bates, D. V., and others: *Variations in Pulmonary Capillary Blood Volume and Membrane Diffusion Component in Health and Disease*, *J. Clin. Invest.* 39: 1401 (Sept.) 1960.)

LUNG BLOOD FLOW Carbon monoxide labeled with O^{15} was administered as a single breath of the radioactive gas. The rate of fall of activity during apnea was measured by external counting in different regions of the lungs of normal subjects in the sitting position. The highest gradient of diffusion per unit volume was found in the basal regions of the lung. Much lower values appeared toward the apex. On exercise the clearance rate in the upper zone increased to a value similar to that in the lower zone at rest. Apparently in the resting state all the basal capillaries are open but the proportion of patent capillaries diminishes toward the apex. (Dollery, C. T., and others: *Regional Variations in Uptake of Radioactive CO in Normal Lung*, *J. Appl. Physiol.* 15: 411 (May) 1960.)

CHRONIC HYPOXIA Observations carried out on Peruvian Indians at an altitude of 14,900 feet and an average barometric pressure of 444 mm. of mercury indicate natural acclimatization to low grade hypoxia. Moderate pulmonary hypertension, and low mean systemic pressure is consistently present. Increased blood volumes in the lungs may be the etiology. Right ventricular hypertrophy is a constant electrocardiographic finding. Arteriosclerosis, myocardial infarction, and hypertension are rare. Peptic ulcer, gall bladder disease, and patent ductus arteriosus are frequent compared to sea level populations. Occasionally for unknown reasons natives lose the natural acclimatization and show signs of "chronic mountain sickness" characterized by increased circulating blood volume from elevation of cell components. Hematocrit, red cell count and hemoglobin are increased markedly, as well as increased pigment excretion in urine and feces. Pulmonary hypertension is accentuated and vital capacity is decreased, with hypoventilation evidenced by lowered pH and elevated carbon dioxide. General study of high altitude population should be valuable to delineate mechanisms of adaption to hypoxic environment. (Hurtado, A.: *Some Clinical Aspects of Life at High Altitudes*, *Ann. Int. Med.* 53: 247 (Aug.) 1960.)