Respiration

COMPUTERS AND LUNG FUNCTION The Respiratory Investigation Unit at the Winnipeg General Hospital has used a computer-based automated comprehensive respiratory information system (CRIS) since 1968 to perform the following functions: data retrieval and analysis; computation of pulmonary function studies; printing of patient reports; interpretation of functional disturbances. Details concerning the operation of the unit and the data-processing techniques were reported previously *(A. Naimark, and others: Am Rev Resp Dis 103: 229, 1971).* The current report discusses changes in the testing procedure, programs, and hardware, and presents a cost analysis of processing pulmonary function studies with and without computer assistance. Also presented are 40 equations used to predict normal respiratory functions in adult male and female patients.

For each patient entering the unit, background information, anthropometric data, and raw data from ventilatory function, gas exchange, exercise, and blood-gas tests are entered in a booklet of forms. At the end of each day, the computer department transfers this information to punch cards. These are fed to the computer, which prints out the final report, complete with predicted normal values (based on sex, age, and height) and a functional interpretation. Review of the results by a physician requires an average of 30 seconds per patient. An important improvement in the current system was the conversion from a large remote computer to a small computer (CDC 1700) on the site. It is hoped that this will provide on-line analysis in the future. Many advantages of the system are discussed in this report, including lessening of errors, sensitivity to abnormalities, and efficient use of personnel. A cost analysis comparing manual and computer-assisted processing of pulmonary function studies revealed a reduction in cost of 40 per cent per report prepared by computer. *(Protti, D.S., and others: Computer Assistance in the Clinical Investigation of Pulmonary Function Studies. Methods Inf Med 12: 102, 1973.)*

RUPTURES OF THE TRACHEOBRONCHIAL SYSTEM About 75 per cent of all ruptures in the tracheobronchial system are caused by traffic accidents. Other causes include falls from great heights and crush injuries. The decisive mechanism is a twisting or shearing force with a sudden, blunt, broad compression of the thorax. A tear or disruption of the airway occurs when reflex closure of the glottis occurs in the face of a sudden rise of intraluminal pressure. Rupture of lung tissue is seldom encountered in the presence of tracheobronchial tears, and *vice versa,* possibly because air escapes through the lung tear and prevents a build-up of high intraluminal pressures. Sagittal compression of the thorax may result in bronchial rupture (by changing the angle of the bifurcation), while lateral compression will change the bifurcation angle less and result in a tracheal tear. Symptoms and findings include: dyspnea, shock, hemoptysis, pneumothorax, mediastinal emphysema, subcutaneous emphysema. Pneumomediastinum is demonstrable radiologically as a sickle-shaped air space around the heart and may cause compression of the great veins and eventual cardiac tamponade. Unilateral (tension) pneumothorax will shift the mediastinum and compress the contralateral lung. If drainage of a pneumothorax is associated with continued loss of large amounts of air, a tracheobronchial rupture must be suspected. Type and location of a tear can and should be defined by bronchoscopy. Treatment includes pleural drainage by chest tubes and mediastinostomy, if necessary; if bronchoscopy should reveal a tear or severance of a bronchus, then surgical repair is mandatory. Only in case of infection is resection of a segment or a lobe indicated. Complete restoration of bronchial rupture is described in two case reports, and complete restoration of tracheal rupture in another. *(Gebhardt, C., and others: Intrathoracic Ruptures of the Tracheo-Bronchial System in Blunt Trauma of the Thorax. Dtsch Med Wochenschr 97: 1689, 1972.)* ABSTRACTER'S COMMENT: Of special interest to anesthesiologists is the description of a tracheal tear, from the neck to the

bifurcation, which resulted from an anesthetic explosion in an intubated patient and was reported in: *Lancet II: 1096, 1964.*

MARIHUANA AND BRONCHOMOTOR TONE Seventeen volunteers with previous histories of marihuana smoking inhaled known concentrations of marihuana. Nine received 84 μg/kg; eight received 32 μg/kg of delta-9-tetrahydrocannabinol. Pulmonary function tests were within normal range prior to the study. The high-dose group readily recognized the "good dope," but the low-dose group was certain that they had received "practically nothing." Following marihuana smoking, there was a 25 per cent increase in heart rate among the high-dose group but no significant change in the low-dose group. Functional residual capacity did not change significantly in either group. Average airway resistances in the high-dose group decreased from 1.90 ± 0.067 to 1.38 ± 0.42 cm H_2O/l/sec at 20 minutes; in the low-dose group, from 2.06 to 1.67 cm H_2O/l/sec. Mean expiratory flow rates at 25 per cent of vital capacity increased from 1.79 to 2.59 l/sec in the high-dose group and from 1.88 to 2.20 l/sec in the low-dose group. Ventilatory responses to increasing inspired carbon dioxide concentrations remained unchanged in both groups after inhalation of marihuana. (*Vachon, L., and others: Single Dose Effect of Marihuana Smoke. N Engl J Med 288: 985, 1973.*)