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BIOCHEMISTRY BRANCH

KINETIC AND PHYSICAL EVIDENCE FOR TWO SALT INTERCONVERTIBLE FORMS OF CHYMOTRYPSIN, by C. C. Cuppett, H. Resnick, and W. S. Canady. Federation Proc., 1969, 28:845.

PHYSICAL EVIDENCE FOR THE EXISTENCE OF AT LEAST TWO SALT-DEPENDENT FORMS OF ALPHA-CHYMOTRYPSIN AT SLIGHTLY ACID pH, by C. C. Cuppett, H. Resnick, and W. J. Canady. J. Biol. Chem., 1971, 246:1135.

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S. EXPERIENCE, ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

EFFECTS OF HYDROXYL COMPOUNDS ON CONCANAVALIN A-POLYSACCHARIDE TYPE INTERACTIONS, by E. F. Plow and H. Resnick. Federation Proc., 1970, 29:916.

EFFECTS OF HYDROXYL COMPOUNDS ON THE INTERACTION OF CONCANAVALIN A WITH POLYSACCHARIDES, by E. F. Plow and H. Resnick. Biochem. Biophys. Acta., 1970, 221:657.

α_1 -ANTITRYPSIN DEFICIENCY AND EMPHYSEMA, by H. Resnick, N. L. Lapp, and W. K. C. Morgan. JAMA, 1970, 211:10.

SERUM TRYPSIN INHIBITOR CONCENTRATIONS IN COAL MINERS WITH RESPIRATORY SYMPTOMS, by H. Resnick, N. L. Lapp, and W. K. C. Morgan. JAMA, 1971, 215:1101-1105. The repeated demonstration of chronic obstructive airway disease in coal miners suggests the possible involvement of hereditary factors. Since the only known association between heredity and irreversible airway obstructive disease is related to alpha-1 antitrypsin inhibitors, the sera of a group of symptomatic coal miners were studied for antitryptic activity. No homozygous deficient subject was found in the group of coal miners studied. The distribution of trypsin inhibitor capacity suggests that a gaussian distribution provides a good fit to the data.

SERUM TRYPSIN INHIBITORS IN COAL MINERS, by H. Resnick, N. L. Lapp, and W. K. C. Morgan. JAMA, 1971, 216:885.

BIOCHEMISTRY

URINARY HYDROXYPROLINE EXCRETION IN COAL WORKERS'

PNEUMOCONIOSIS, by H. Resnick, N. L. Lapp, and W. K. C. Morgan. * Brit. J. Industr. Med., 1969, 26:135-138. As there is an increased formation of one or all the fibrous proteins in coal workers' pneumoconiosis, it was felt that a study of the turnover rate of these proteins might shed some light on the pathogenesis of the disease. Urinary hydroxyproline excretion was therefore studied in a group of miners, of whom 19 had simple pneumoconiosis and five had progressive massive fibrosis. No significant deviation from the normal was found.

HYDROXYPROLINE EXCRETION IN COMPLICATED PNEUMOCONIOSIS, by

H. Resnick and W. K. C. Morgan. * Am. Rev. Resp. Dis., 1971, 103:849. In 16 coal miners with extensive progressive massive fibrosis, the turnover rate of collagen was not sufficient to increase the urinary hydroxyproline excretion to abnormal values.

IMMUNOGLOBULIN CONCENTRATIONS IN BERYLLIOSIS, by H. Resnick

M. Roche, and W. K. C. Morgan. * Am. Rev. Resp. Dis., 1970, 101:504.

SPECTROPHOTOMETRIC AND KINETIC EVIDENCE FOR THE EXISTENCE OF AT LEAST TWO SALT-DEPENDENT CONFORMATIONS OF

α -CHYMOTRYPSIN AT pH VALUES NEAR NEUTRALITY, by G. Royer, C. C. Cuppett, E. Williams, H. Resnick, and W. J. Canady. Arch. Biochem. and Biophys., 1969, 134:253.

FIELD STUDIES BRANCH

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S.

EXPERIENCE, ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

HISTORY AND EPIDEMIOLOGY OF COALWORKERS' PNEUMOCONIOSIS,

by N. L. Lapp. Virginia Med. Monthly, 1969, 96:709-711. Coalworkers' pneumoconiosis is a pathologic entity, recognizable in life by a characteristic roentgenographic appearance coupled with a history of appropriate dust exposure. It is generally regarded as distinct from silicosis although controversy about this still exists. Studies of the prevalence of this condition in the Appalachian coal mining states reveal a marked variation from region to region. The prevalence among working miners ranges from 10 to 30 percent. Among retired and ex-miners the prevalence ranges from nearly 15 to 75 percent. An hypothesis relating the prevalence of coalworkers' pneumoconiosis to the rank of coal mined in that area may explain the regional variations.

Among coal miners there is an excess mortality for diseases of the respiratory system. Miners and their wives suffer from respiratory symptoms more frequently than the rest of the adult population in the United States. Miners generally have lower ventilatory capacity than adult males in other occupations.

EVALUATION OF LUNG MECHANICS IN EPIDEMIOLOGIC STUDIES, by

N. L. Lapp and R. E. Hyatt. Bull. de Physio-Path. Resp. (Nancy), 1970, 6:595-604. Recent developments in the field of lung mechanics, with special reference to epidemiologic studies, are reviewed. The relative inability of standard ventilatory tests to detect alterations in the behavior of small intrathoracic airways is noted. Resistance measurements reflect predominantly the pressure-flow behavior of the large intrathoracic and extrathoracic airways in their resting, noncompressed state. Maximal expiratory flows developed during the FVC maneuver reflect a complex interplay among airway geometry, airway compressibility, and lung elastic recoil.

Because of the potential dissociation between measurements of resistance and maximal expiratory flow, we recommend

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that tests involving both aspects be utilized in epidemiologic studies of obstructive pulmonary disease. Two feasible techniques for measuring the behavior of airways in the noncompressed state are the body plethysmograph and the oscillation method of obtaining respiratory resistance. Flow-volume curves of the FVC maneuver provide the simplest and best current method for evaluating the compressed airway state. Several techniques that give promise of providing important information about the peripheral airways are the behavior of the terminal part of the flow-volume curves, resistance at lung volumes below functional residual capacity, and nitrogen-washout curves.

NATIONAL STUDY OF COAL WORKERS' PNEUMOCONIOSIS, by

E. P. Shoub. Pres. Conf. Underground Mining Environment, Oct. 27, 1971, University of Missouri, Rolla, Mo., 8pp. This paper reviews the joint Public Health Service, Bureau of Mines study of coal workers' pneumoconiosis. The study was designed to provide (1) a prevalence study using x-rays classified by the UICC/Cincinnati system, (2) simple pulmonary function tests, (3) a detailed medical and occupational history, (4) in-depth environmental data on the mines, and (5) the basis for a long-range study of the progression of the disease in men whose exposure to coal mine dust over the same period would be reasonably well known. Preliminary results and conclusions are presented.

INFECTIOUS DISEASES BRANCH

LONG-TERM PRESERVATION OF BORDETELLA PERTUSSIS, by H. L.

Eckert and D. M. Flaherty. Appl. Microbiol., Jan. 1972, in press. Viability of B. pertussis was preserved when glycerol broth suspensions were quick frozen and stored at -70°C for as long as 45 months.

DEEP ENTOMOPHTHORA PHYCOMYCOSIS IN A CAUCASIAN INFANT, by

H. L. Eckert, G. H. Khoury, R. S. Poré, E. F. Gilbert, and J. R. Gaskell. Chest, 1972, in press. A mediastinal phycomycotic infection in a Caucasian infant caused by Entomophthora was confirmed by culture and histologic examination of biopsy material. The patient had heart failure resulting from the invasive mediastinal mass, eosinophilia, and hyperglobulinemia. Unlike other cases of Entomophthora disease, usually confined to subcutaneous areas and limited to the Tropics, this present case involved a deep infection in a patient who lived in a temperate zone. The disease was amenable to amphotericin B therapy.

FREQUENCY OF CARCINOMA OF THE CERVIX IN A WEST VIRGINIA

COUNTY, by H. L. Eckert and J. M. Krall. West Virginia Med. J. in press. Estimates on the frequency of cancer of the cervix in a West Virginia county were determined to be 46/100,000 (incidence rate) and 123/100,000 (period prevalence rate). The seemingly high rate of cervical cancer based on crude estimates implies that the study county represents a high-risk population which would benefit from an intensive Pap-smear program.

ANTI-IgG HEMAGGLUTINATION-INHIBITION TEST FOR INFLUENZA, by

N. Hahn, J. A. Booth, and H. L. Eckert. Infect. and Immun., 1971, 4(4): 508-510. The sensitivity of the hemagglutination-inhibition test for influenza was significantly increased by the addition of species-specific anti-immunoglobulin G serum.

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S. EXPERIENCE,

ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

INFECTIOUS DISEASES BRANCH

QUANTITATION OF SECRETORY IMMUNOGLOBULIN A IN CHRONIC PULMONARY DISEASE, by D. M. Lewis, N. L. Lapp, and R. Burrell. Am. Rev. Resp. Dis., 1970, 101:55-61. The occurrence of secretory immunoglobulin A (IgA) in chronic pulmonary disease was investigated. The quantitative aspects of the problem were studied by means of a new procedure, electroimmunodiffusion, which was found to be a rapid and efficient method of estimating IgA concentration in saliva and was used to establish normal values for salivary IgA. In patients with chronic pulmonary disease, high serum IgA concentrations were found to correlate with high salivary IgA concentrations. Cigarette smoking was found to have a suppressive action on secretory IgA production in normal subjects, but not in subjects with chronic respiratory disorders. Lung-reactive antibodies were detected in a number of serum specimens, but the occurrence of lung-reactive antibodies did not correlate with the concentration of either serum or secretory IgA in subjects with pulmonary diseases. Specific antibody activity to influenza PR-8 virus was demonstrated in saliva, confirming that the secretory IgA in these patients was a functional antibody.

MEDICAL RESEARCH BRANCH

CLINICAL SECTION

TIME-PULSE GENERATOR FOR FLOW-VOLUME CURVES, by J. L.

Hankinson and N. L. Lapp. J. Appl. Physiol., 1970, 29:109-110. A relatively simple, inexpensive time-pulse generator for superimposing accurately timed pulses onto the flow-volume curve of a forced vital capacity (FVC) maneuver is described. The generator can be incorporated into a system that provides a fast, accurate method of obtaining flow-volume curves and the timed forced expiratory volumes in the field.

ALLERGIC ALVEOLITIS DUE TO PITUITARY SNUFF, by L. O. Harper,

R. G. Burrell, N. L. Lapp, and W. K. C. Morgan. Ann. Int. Med., 1970, 73:581-584. A patient had allergic alveolitis due to pituitary snuff. Specific precipitating antibodies to the snuff were demonstrated. The condition is characterized initially by an alveolitis but in many instances progresses to irreversible pulmonary fibrosis. The patient's pulmonary function and chest film became normal. Improvement may have been related to the use of steroids.

THE FRANK VECTORCARDIOGRAM IN COAL MINERS' PNEUMOCONIOSIS,

by M. R. Hunsaker, K. Kaplan, J. Donnelly, and N. L. Lapp. J. Electrocardiology, 1970, 3:155-160. The relationship of the Frank vectorcardiogram to right ventricular hypertrophy in 22 coal miners with simple pneumoconiosis was investigated. Assessment of subjects without overt evidence of right ventricular enlargement was performed to delineate initial hemodynamic changes in the right ventricle as reflected in the vectorcardiogram.

The parameters chosen failed to show evidence of right ventricular hypertrophy when right ventricular peak systolic pressures ranged from 20 to 39 mm Hg. The results indicate that anatomic right ventricular enlargement is detected in the vectorcardiogram after pressure overloading of the right ventricle and not after the earlier stage of volume overloading.

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S. EXPERIENCE,

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background, clinical characteristics, treatment and control in 12 individually authored chapters.

MANAGEMENT OF RESPIRATORY FAILURE, by J. A. Kibelstis.
Am. Family Physician/GP, 1970, 2:90.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE: DIAGNOSIS AND NATURAL HISTORY, by N. L. Lapp. West Virginia Med. J., 1969, 65:131-134. Chronic obstructive pulmonary disease is a general term for chronic bronchitis, asthma and anatomic emphysema; conditions which have in common airway obstruction. Tests of ventilatory function that are useful in diagnosing and judging the severity of chronic obstructive pulmonary disease are reviewed. The clinical picture, roentgenographic changes, and natural history of chronic bronchitis, asthma, and emphysema are presented briefly. Abnormalities in ventilatory tests produced by these conditions are mentioned. It should be emphasized that the ventilatory tests commonly used measure the degree of airway obstruction and are not necessarily specific for any one of the three major causes of airway obstruction. Precise diagnosis of the underlying cause of obstructive airway disease requires a history, physical examination, roentgenographic examinations, and tests of ventilatory capacity.

HISTORY AND EPIDEMIOLOGY OF COALWORKERS' PNEUMOCONIOSIS, by N. L. Lapp. Virginia Med. Monthly, 1969, 96:709-711. Coalworkers' pneumoconiosis is a pathologic entity, recognizable in life by a characteristic roentgenographic appearance coupled with a history of appropriate dust exposure. It is generally regarded as distinct from silicosis although controversy about this still exists. Studies of the prevalence of this condition in the Appalachian coal mining states reveal a marked variation from region to region. The prevalence among working miners ranges from 10 to 30 percent. Among retired and ex-miners the prevalence ranges from nearly 15 to 75 percent. An hypothesis relating the prevalence of coalworkers' pneumoconiosis to the rank of coal mined in that area may explain the regional variations. Among coal miners there is an excess mortality for diseases of the respiratory system. Miners and their wives

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suffer from respiratory symptoms more frequently than the rest of the adult population in the United States. Miners generally have lower ventilatory capacity than adult males in other occupations.

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Because of the potential dissociation between measurements of resistance and maximal expiratory flow, we recommend that tests involving both aspects be utilized in epidemiologic studies of obstructive pulmonary disease. Two feasible techniques for measuring the behavior of airways in the non-compressed state are the body plethysmograph and the oscillation method of obtaining respiratory resistance. Flow-volume curves of the FVC maneuver provide the simplest and best current method for evaluating the compressed airway state. Several techniques that give promise of providing important information about the peripheral airways are the behavior of the terminal part of the flow-volume curves, resistance at lung volumes below functional residual capacity, and nitrogen-washout curves.

PULMONARY HEMODYNAMICS IN SYMPTOMATIC COAL MINERS, by N. L. Lapp, A. Seaton, K. C. Kaplan, M. R. Hunsaker, and W. K. C. Morgan. Amer. Rev. Resp. Dis., 1971, 104:418-426. Forty-seven coal miners, selected because they were symptomatic, underwent studies of pulmonary hemodynamics at rest and during exercise. They were divided into two groups depending on the absence or presence of airway obstruction. Of the 23 in the group without airway obstruction, one had a high mean pulmonary artery pressure at rest and another

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three showed increase of this pressure during exercise. All four had the pinpoint type of simple pneumoconiosis. Of the subjects with obstruction, seven of 24 had pulmonary arterial hypertension that could be accounted for by airway obstruction or complicated pneumoconiosis whereas one with less severe obstruction had pinpoint opacities on his chest radiograph.

Abnormalities of alveolar-arterial oxygen gradient, arterial oxygen tension, and dead space ventilation were common in both groups, but were only significantly related to pulmonary artery pressure in the group with obstruction. These results indicate that pulmonary arterial hypertension can occur in the pinpoint type of simple coal workers' pneumoconiosis in the absence of obstructive airway disease, although its infrequency in this selected group of symptomatic miners suggests that it is very common.

QUANTITATION OF SECRETORY IMMUNOGLOBULIN A IN CHRONIC PULMONARY DISEASE, by D. M. Lewis, N. L. Lapp, and R. Burrell. Amer. Rev. Resp. Dis., 1970, 101:55-61. The occurrence of secretory immunoglobulin A (IgA) in chronic pulmonary disease was investigated. The quantitative aspects of the problem were studied by means of a new procedure, electroimmunodiffusion, which was found to be a rapid and efficient method of estimating IgA concentration in saliva and was used to establish normal values for salivary IgA. In patients with chronic pulmonary disease, high serum IgA concentrations were found to correlate with high salivary IgA concentrations. Cigarette smoking was found to have a suppressive action on secretory IgA production in normal subjects, but not in subjects with chronic respiratory disorders. Lung-reactive antibodies were detected in a number of serum specimens, but the occurrence of lung-reactive antibodies did not correlate with the concentration of either serum or secretory IgA in subjects with pulmonary diseases. Specific antibody activity to influenza PR-8 virus was demonstrated in saliva, confirming that the secretory IgA in these patients was a functional antibody.

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COAL WORKERS' PNEUMOCONIOSIS, by W. K. C. Morgan. Am. Indust. Hyg. Assoc. J., 1971, 32(Jan.):29-34. The medical indications of a specific pneumoconiosis resulting from inhalation of coal dust are presented. The characteristics of simple pneumoconiosis and of progressive massive fibrosis are discussed. The effects of cigarette smoking obscure and complicate the respiratory change induced by coal workers' pneumoconiosis. The etiology of the disease is certainly associated with the inhalation of coal dust, therefore, prevention of the disease can be achieved by control of such dust exposures.

COALWORKERS' PNEUMOCONIOSIS, THE CLINICAL FEATURES, by W. K. C. Morgan. Virginia Med. Monthly, 1969, 96:712-716. This article presents a brief discussion of the history of coalworkers' pneumoconiosis diagnosis and a description of its clinical features.

IRREVERSIBLE OBSTRUCTIVE AIRWAY DISEASE: DEFINITION, PATHOLOGY AND ETIOLOGY, by W. K. C. Morgan. West Virginia Med. J., 1968, 64:288.

THE PREVALENCE OF COAL WORKERS' PNEUMOCONIOSIS, by W. K. C. Morgan. Am. Rev. Resp. Dis., 1968, 98:306.

THE PULMONARY MANIFESTATIONS OF SYSTEMIC DISEASE, by W. K. C. Morgan. Clin. Notes Resp. Dis., 1969, 8:3.

DETERMINATION OF LUNG VOLUMES FROM CHEST FILMS, by J. O'Shea, N. L. Lapp, A. D. Russakoff, R. Reger and W. K. C. Morgan. Thorax, 1970, 25:544-549. The results obtained from two radiological methods of determining total lung capacity (TLC) (Kovach's paraboloid and Barnhard ellipsoid) were compared with those obtained with the body plethysmograph. Determinations of TLC were made in four groups of subjects: group 1 consisted of 26 miners most of whom had simple pneumoconiosis; group 2 consisted of 12 normal subjects; group 3 consisted of eight subjects who had a variety of chest disease, but with no demonstrable parenchymal or pleural opacification; and group 4 consisted of 19 subjects with miscellaneous diseases, all showing demonstrable infiltration or opacification.

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The values obtained by the method of Kovach and his colleagues often differed markedly from the plethysmographic determinations, and it became apparent that this method was not sufficiently accurate. On the other hand, the technique of Barnhard and his colleagues gave results that were essentially similar to, and as far as we can say interchangeable with, those obtained by the body plethysmograph in groups 1, 2, and 3. In subjects with marked pulmonary opacification or infiltration, the disparity between Barnhard's method and the plethysmograph tended to be more sizeable. It was concluded that Barnhard's method for determining total lung capacity is accurate and could be applied to epidemiological surveys.

AN ACCURATE AND RAPID RADIOGRAPHIC METHOD OF DETERMINING TOTAL LUNG CAPACITY, by R. B. Reger, A. Young, and W. K. C. Morgan. Thorax, 1972, in press. The accuracy and reliability of Barnhard's radiographic method (1960) of determining total lung capacity have been confirmed by several groups of investigators. Despite its simplicity and general reliability, it has several shortcomings especially when used in large scale epidemiological surveys. Of these, the most serious is related to film technique; thus, when the cardiac and diaphragmatic shadows are poorly defined, the appropriate measurements cannot be made accurately. A further drawback involves the time needed to measure the segments and perform the necessary calculations.

We, therefore, set out to attempt to develop an abbreviated and simpler radiographic method for determining total lung capacity. This utilizes a step-wise multiple regression model which allows total lung capacity to be derived as follows: posteroanterior and lateral films are divided into the standard sections as described in the text, the width, depth and height of sections 1 and 4 are measured in centimeters, finally the necessary derivations and substitutions are made and applied to the formula $\hat{Y} = -1.42148 + (0.00479 X_1) + (.00097 X_4)$, where \hat{Y} is the total lung capacity. In our hands this method has provided a simple, rapid, and acceptable method of determining total lung capacity.

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ANALYSIS OF COMPONENTS OF VARIATION IN A RADIOLOGICAL METHOD FOR DETERMINING TOTAL LUNG CAPACITY, by R. B. Reger and A. C. Jacobs. Arch. Environmental Health, 1970, 21(Dec.):778-783. An attempt was made to characterize quantitatively the several components of variation existing in the determination of total lung capacity (TLC) by a radiological method. An analysis of variance indicated that over 94 percent of the total variation could be attributed to film differences, the remaining 6 percent being a consequence of interobserver and intraobserver variation and the inherent random variability. It was shown that a relative error of about 5.8 percent could be expected with one observer making one determination for each set of films. An error of this magnitude compares favorably with other methods for determining TLC. It was, therefore, concluded that TLC determined by this method is repeatable and consequently can be used in large-scale epidemiological studies.

ON THE FACTORS INFLUENCING CONSISTENCY IN THE RADIOLOGIC DIAGNOSIS OF PNEUMOCONIOSIS, by R. B. Reger and W. K. C. Morgan. Am. Rev. Resp. Dis., 1970, 102:905-915. The reliability and precision that experienced readers can achieve in the categorization of chest radiographs with demonstrable coal workers pneumoconiosis were investigated and quantified. An attempt was also made to assess the effect of film quality on variability of categorization. Despite the use of experienced readers, there was often a marked divergence of opinion in the assessment of both simple and complicated pneumoconiosis. Furthermore, certain observers either consistently over-read or under-read as compared with the remainder of their colleagues. In only slightly more than 50 percent of the films was interpretation unanimous.

Divergence of opinion concerning the qualities that constitute a technically satisfactory film was almost as great as that which arose from the classification of radiographs.

An initial impression that the more substandard the film quality ratings given, the greater the likelihood of a disparity in diagnostic classification, was not borne out. Poor quality films had only a trivial effect on observer consistency.

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α - ANTITRYPSIN DEFICIENCY AND EMPHYSEMA, by H. Resnick, N. L. Lapp, and W. K. C. Morgan. JAMA, 1970, 211:10.

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CLINICAL SECTION

LUNG PERFUSION SCANNING IN COAL WORKERS' PNEUMOCONIOSIS, by A. Seaton, N. L. Lapp and C. H. (Joseph) Chang. Amer. Rev. Resp. Dis., 1971, 103:338-349. Thirty-seven miners and ex-miners were studied clinically, physiologically, and by lung perfusion scanning. All 14 with complicated pneumoconiosis had avascular zones in relation to conglomerate masses and bullae. A fissure sign related to nodules and emphysematous bullae was present in one. There were several reasons for assuming that avascular zones were due to vascular obliteration rather than intrapulmonary shunting. Among 21 miners with simple pneumoconiosis, only two had avascular zones related to nodules rather than to other causes of hypoperfusion. The results of these studies accord well with previous pathologic studies of the pulmonary vasculature in pneumoconiosis.

NATIONAL STUDY OF COAL WORKERS' PNEUMOCONIOSIS, by E. P. Shoub. Pres. Conf. Underground Mining Environment, Oct. 27, 1971, University of Missouri, Rolla, Mo., 8 pp. This paper reviews the joint Public Health Service, Bureau of Mines study of coal workers' pneumoconiosis. The study was designed to provide (1) a prevalence study using x-rays classified by the UICC/Cincinnati system, (2) simple pulmonary function tests, (3) a detailed medical and occupational history, (4) in-depth environmental data on the mines, and (5) the basis for a long-range study of the progression of the disease in men whose exposure to coal mine dust over the same period would be reasonably well known. Preliminary results and conclusions are presented.

CHRONIC PULMONARY SPOROTRICHOSIS: REPORT OF A CASE, INCLUDING MORPHOLOGIC AND MYCOLOGIC STUDIES, by A. G. Smith, W. K. C. Morgan, R. S. Hornick, and A. M. Funk. Am. J. Clin. Path., 1970, 54:3.

MEDICAL RESEARCH BRANCH

MEDICAL INSTRUMENTATION SECTION

TIME-PULSE GENERATOR FOR FLOW-VOLUME CURVES, by J. L. Hankinson. J. Appl. Physiol., 1970, 29:109-110.

A relatively simple, inexpensive time-pulse generator for superimposing accurately timed pulses onto the flow-volume curve of a forced vital capacity (FVC) maneuver is described. The generator can be incorporated into a system that provides a fast, accurate method of obtaining flow-volume curves and the timed forced expiratory volumes in the field.

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MEDICAL RESEARCH BRANCH

PATHOLOGY SECTION

EVALUATION OF A NEW DIFFERENTIAL TEST FOR ENTEROCOCCI IN THE CLINICAL LABORATORY, by A. von Graevenitz, J. J. Redys, and E. P. Cassidy. *J. Med. Microbiol.*, 1970, 3:227-232.

NATIONAL COAL WORKERS' AUTOPSY STUDY, by E. P. Cassidy, pres. ASCP-CAP Joint Fall Meeting, Oct. 27, 1971, Boston, Mass., 11 pp. The origin, purposes, and protocol for the National Coal Workers' Autopsy Study are explained in this paper.

NATIONAL MAILING TO ALL PATHOLOGISTS ON NATIONAL COAL WORKERS' AUTOPSY STUDY, from E. P. Cassidy (Chief, Pathology, A.L.F.O.R.D.). June 1, 1971. This letter contained a full explanation of the study, the Federal Register Protocol, and instructions on participation in the program.

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S. EXPERIENCE, ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

IRREVERSIBLE OBSTRUCTIVE AIRWAY DISEASE: DEFINITION, PATHOLOGY AND ETIOLOGY, by W. K. C. Morgan. West Virginia Med. J., 1968, 69:288.

CHRONIC PULMONARY SPOROTRICHOSIS: REPORT OF A CASE, INCLUDING MORPHOLOGIC AND MYCOLOGIC STUDIES, by A. G. Smith, W. K. C. Morgan, R. B. Hornick, and A. M. Funk. Am. J. Clin. Path., 1970, 54:3.

MEDICAL RESEARCH BRANCH

PHYSIOLOGY SECTION

DETERMINATION OF ALVEOLAR SURFACE AREA AND SURFACE TENSION

AS A FUNCTION OF VOLUME IN THE CAT LUNG FROM IN SITU PRESSURE-VOLUME (P_{1,v_1}) MEASUREMENTS, by M. J. Fisher, K. C. Weber, and M. F. Wilson. The Physiologist, 1969, 226 (Aug.). Cats were anesthetized with Na Pentobarbital and the trachea cannulated with a U-shaped glass cannula. The chest was then opened widely, and the animal was placed in a whole body plethysmograph and ventilated with oxygen. A differential pressure transducer measured transpulmonary pressure and a spirometer was used to measure volume. Zero volume for both air (O_2) and liquid (saline) was determined by allowing the vascular system to absorb the O_2 in the lung after the trachea was clamped. The results show that surface tension approaches zero at low lung volumes and was always lower during deflation than during inflation at a given alveolar surface area.

DETERMINATION OF ALVEOLAR SURFACE AREA AND TENSION FROM

IN SITU PRESSURE-VOLUME DATA, by M. J. Fisher, M. F. Wilson, and K. C. Weber. Resp. Physiol., 1970, 10:159-171. Cats were anesthetized and placed, with the chest opened, inside a whole-body plethysmograph. In recording gas and liquid pressure-volume (PV) curves, 100 percent oxygen (2.9ml/sec) and Ringer-Locke solution (1 ml/sec) were used. Gas and liquid flows were varied from 2.9-6.0 ml/sec and 0.5-5.0 ml/sec respectively, with no change in either the hysteresis or the shape of the PV curve. Surface tension was calculated during inflation and deflation. The results indicate that surface tension approaches zero at low lung volumes or areas and is always lower during deflation than during inflation at a given volume or area.

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S.

EXPERIENCE, ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

PHYSIOLOGY SECTION

MEAN AND PULSATILE OPTICAL DENSITY (O.D.) CHANGES IN BONE

by D. D. Upthegrove, G. N. Franz, and K. C. Weber. Introduction by J. C. Stickney. The Physiologist, 1970, 388(Aug.). Circuitry which linearizes the output of a photocell was developed and tested so that total and accurate pulsatile O.D. changes could be measured over a wide range of O.D. In an in vitro setup, the system was checked using non-rigid and rigid tubing. The O.D. of intact tibias of dogs was examined and the results showed pulsatile O.D. changes with the same basic frequency as the heart rate. The bone was successively perfused at a constant rate (set to maintain equivalent blood pressure) through the femoral artery with blood, saline and indocyanine green dye. It is concluded that the volume of the vascular system within bone can change appreciably.

HEMODYNAMIC EFFECTS OF IMBALANCING RIGHT AND LEFT HEART

OUTPUTS, by K. C. Weber, P. Chevalier, J. Engle, D. Gerasch, and I. J. Fox. The Physiologist, 1969, 387 (Aug.). During head-up tilts, right heart and left heart outputs decreased to mean values of 72 ± 4.3 and 57 ± 3.6 of their control values respectively, while pulmonary blood volume (PBV) increased 120 ± 46 ml over the 20-second test period. In head-down tilts RH and LH outputs and PBV were virtually unchanged. In the "Valsalva-like" maneuvers RH and LH outputs decreased to mean values of 23 ± 3.9 and 38 ± 3.9 of their control values respectively, while the PBV decreased 135 ± 48 ml over the 20-second test period. These studies support a significant role for the PBV in buffering differences in outputs of the RH and LH.

METABOLISM OF THE ISOLATED CANINE LUNG, by K. C. Weber and M. G.

Visser. Am. J. Physiol., 1969, 217(4):1044-1052. Oxygen consumption, CO_2 production, glucose utilization, lactic acid production, glycogen deposition, and plasma free fatty acid levels were measured on isolated perfused canine lungs respired with 5 percent CO_2 in air under conditions of normal and elevated plasma glucose levels and under the influence of insulin. The first four measurements were also made under respiratory conditions of 0 and 5 percent CO_2 in air.

PHYSIOLOGY SECTION

INTRAESOPHAGEAL PRESSURE IN THE ISOLATED CANINE ESOPHAGUS
by K. C. Weber, R. Wangelin, and R. J. Marshall.
Federation Proc., 1970, 29(April):594. Simultaneous intra-
esophageal pressure measurements from a balloon and open-
ended lumen were made using a Dotter-Lukas #9F catheter.
The esophagus was suspended in a chamber in which two
conditions were used: (1) no pressure gradient outside,
and (2) a pressure gradient of 1 cm H₂O per cm distance
for 7 cm and no gradient for the rest of the length.
It is concluded that the isolated esophagus is a poor model
for predicting in vivo intraesophageal pressure measurements.

STATISTICAL BRANCH

PULMONARY REACTIONS TO COAL DUST, A REVIEW OF U. S. EXPERIENCE, ed. by M. M. Key, L. E. Kerr, and M. Bundy. Academic Press, 1971, New York, 215 pp. This book presents an extensive discussion of coal workers' pneumoconiosis, its background, clinical characteristics, treatment and control in 12 individually authored chapters.

DETERMINATION OF LUNG VOLUMES FROM CHEST FILMS, by J. O'Shea, N. L. Lapp, A. D. Russakoff, R. Reger, and W. K. C. Morgan. Thorax, 1970, 25:544-549. The results obtained from two radiological methods of determining total lung capacity (TLC) (Kovach's paraboloid and Barnhard's ellipsoid) were compared with those obtained with the body plethysmograph. Determinations of TLC were made in four groups of subjects: group 1 consisted of 26 miners most of whom had simple pneumoconiosis; group 2 consisted of 12 normal subjects; group 3 consisted of eight subjects who had a variety of chest disease, but with no demonstrable parenchymal or pleural opacification; and group 4 consisted of 19 subjects with miscellaneous diseases, all showing demonstrable infiltration or opacification.

ANALYSIS OF COMPONENTS OF VARIATION IN A RADIOLOGICAL METHOD FOR DETERMINING TOTAL LUNG CAPACITY, by R. B. Reger and A. C. Jacobs. Arch. Environmental Health, 1970, 21(Dec.):778-783. An attempt was made to characterize quantitatively the several components of variation existing in the determination of total lung capacity (TLC) by a radiological method. An analysis of variance indicated that over 94 percent of the total variation could be attributed to film differences, the remaining 6 percent being a consequence of interobserver and intraobserver variation and the inherent random variability. It was shown that a relative error of about 5.8 percent could be expected with one observer making one determination for each set of films. An error of this magnitude compares favorably with other methods for determining TLC. It was, therefore, concluded that TLC determined by this method is repeatable and consequently can be used in large-scale epidemiological studies.

ON THE FACTORS INFLUENCING CONSISTENCY IN THE RADIOLOGIC DIAGNOSIS OF PNEUMOCONIOSIS, by R. B. Reger and W. K. C. Morgan. Am. Rev. Resp. Dis., 1970, 102:905-915. The reliability and precision that experienced readers can achieve in the categorization of chest radiographs with demonstrable

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coal workers' pneumoconiosis were investigated and quantified. An attempt was also made to assess the effect of film quality on variability of categorization. Despite the use of experienced readers, there was often a marked divergence of opinion in the assessment of both simple and complicated pneumoconiosis. Furthermore, certain observers either consistently over-read or under-read as compared with the remainder of their colleagues. In only slightly more than 50 percent of the films was interpretation unanimous.

Divergence of opinion concerning the qualities that constitute a technically satisfactory film was almost as great as that which arose from the classification of radiographs.

An initial impression that the more substandard the film quality ratings given, the greater the likelihood of a disparity in diagnostic classification, was not borne out. Poor quality films had only a trivial effect on observer consistency.

-AN ACCURATE AND RAPID RADIOGRAPHIC METHOD OF DETERMINING TOTAL LUNG CAPACITY, by R. B. Reger, A. Young, and W. K. C. Morgan. Thorax, 1972, (in press). The accuracy and reliability of Barnhard's radiographic method (1960) of determining total lung capacity have been confirmed by several groups of investigators. Despite its simplicity and general reliability, it has several shortcomings especially when used in large scale epidemiological surveys. Of these, the most serious is related to film technique; thus, when the cardiac and diaphragmatic shadows are poorly defined, the appropriate measurements cannot be made accurately. A further drawback involves the time needed to measure the segments and perform the necessary calculations.

We, therefore, set out to attempt to develop an abbreviated and simpler radiographic method for determining total lung capacity. This utilizes a step-wise multiple regression model which allows total lung capacity to be derived as follows: posteroanterior and lateral films are divided into the standard sections as described in the text, the width, depth and height of sections 1 and 4 are measured in centimeters, finally the necessary derivations and substitutions are made and applied to the formula :

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$\hat{V} = -1.41148 + (0.00479 X_1) + (.00097 X_4)$, where \hat{V} is the total lung capacity. In our hands this method has provided a simple, rapid, and acceptable method of determining total lung capacity.

NATIONAL STUDY OF COAL WORKERS' PNEUMOCONIOSIS, by E. P. Shoub. Pres. Conf. Underground Mining Environment, Oct. 27, 1971, University of Missouri, Rolla, Mo., 8 pp. This paper reviews the joint Public Health Service, Bureau of Mines study of coal workers' pneumoconiosis. The study was designed to provide (1) a prevalence study using x-rays classified by the UICC/Cincinnati system, (2) simple pulmonary function tests, (3) a detailed medical and occupational history, (4) in-depth environmental data on the mines, and (5) the basis for a long-range study of the progression of the disease in men whose exposure to coal mine dust over the same period would be reasonably well know. Preliminary results and conclusions are presented.