

## Proceedings of the Thoracic Society

The Spring Meeting of The Thoracic Society was held at the Royal College of Physicians, London, on 6-7 March, 1970. There were eight short papers and four symposia. Summaries follow.

### PRIMARY IMMUNITY DEFICIENCY SYNDROMES

#### Experimental Background to Immune Deficiency States

G. L. ASHERSON Immune deficiency states may affect antibody production, delayed type hypersensitivity or both types of reactions. Delayed type hypersensitivity refers to phenomena such as the Mantoux reactions, contact sensitivity, graft and tumour rejection and resistance to certain organisms which can be transferred from one animal to another by immune cells but not by immune serum. In contrast, other immunological skin reactions and resistance to organisms such as the pneumococcus and poliomyelitis virus can be transferred by immune serum. The existence of immune deficiency states which selectively affect antibody production or delayed type hypersensitivity suggests that there may be important differences in the physiology of these two types of reactions.

In the chicken, removal of the thymus early in life causes selective depression of delayed type hypersensitivity. In contrast, removal of the bursa of Fabricius leads to selective depression of antibody production and hypogammaglobulinaemia.

Similarly, in neonatal mammals, thymectomy depresses delayed type hypersensitivity and has less effect on antibody production. In mice there is a considerable reduction of the circulating lymphocytes and a larger reduction of the recirculating pool of long-lived lymphocytes which move from the blood stream through the lymph nodes and pass back to the blood stream through the thoracic duct. Neonatally thymectomized animals may waste (runt) as a result of bacterial infection. The findings in di Georgi's syndrome parallel those of thymectomized mice.

It is not certain which tissue in mammals is equivalent to the bursa of Fabricius in birds. Removal of the lymphoid tissue of the gut in neonatal rabbits causes some reduction of antibody response in the rabbit, and this tissue may be the bursal equivalent.

#### Primary Immunity Deficiency in Children

L. E. HILL Defects of the two fundamental immunological processes, *i.e.*, humoral and cellular immunity, are found in different combinations and degrees, and show themselves clinically in fairly well-defined disease states, such as the different degrees of antibody deficiency syndrome, di Georgi's disease and the combined immunity deficiency syndrome (Swiss type agammaglobulinaemia). Aetiological classification divides these states into those due to physiological causes (such as hypogammaglobulinaemia

of prematurity) or genetic, *e.g.*, the sex-linked or autosomal recessive immunity deficiency syndromes. Such syndromes as Aldrich's syndrome, ataxia telangiectasia and di Georgi's disease are also genetically controlled, as are those immune deficiency states with other familial immune defects of a different nature. In many cases, however, the aetiology is unknown.

The incidence of immune defects in the British Isles is discussed, as is the mortality of the different subgroups. The typical clinical history of the disease with repeated infections, most commonly of the respiratory tract, is described, and the unusual infecting organisms which may be found are mentioned. The complications of the immune deficiency states theoretically fall into two groups, which are not always easily distinguishable—those due to repeated infections, *e.g.*, bronchiectasis, and those due to some fundamental associated disease process. Of the latter, those particularly affecting children are mentioned, *e.g.*, arthritis, neutropenia and central nervous system disorders.

The question of protective immunizations and the dangers of live vaccines are discussed. Results of replacement therapy with human immunoglobulin are encouraging and, where indicated, thymus or marrow grafts should be considered. The possible disadvantages of replacement therapy are pointed out.

A brief survey of the differential diagnosis is given.

#### Primary Immunity Deficiency in Adults

K. M. CITRON Primary immunity deficiency in adults may be associated with hypogammaglobulinaemia, dysgammaglobulinaemia or deficiency of cellular immunity.

In 'acquired' hypogammaglobulinaemia, globulin deficiency is acquired in adult life, is occasionally transient and may be genetically determined in some patients. Bacterial infections are severe, recurrent and predominantly broncho-pulmonary, drug-resistant staphylococci being a special danger. Bronchiectasis commonly develops. About half the patients have generalized enlargement of lymph nodes with splenomegaly and some have haematological changes associated with hypersplenism. Histological features include reticuloendothelial hyperplasia and deficiency of plasma cells. Patients may also have malabsorption with steatorrhoea, polyarthritis and amyloid disease. After suffering from primary hypogammaglobulinaemia for many years, some patients develop lymphocytic malignancy.

Recurrent respiratory infection may be a feature of patients who have deficiency of humoral or antibody response to some respiratory pathogens and to some antibody challenge tests whilst maintaining apparently normal levels of immunoglobulins (dysgammaglobulin-aemia). Other patients may lack cellular immunity.

The conditions mentioned above are illustrated by reference to case histories.

#### THE HISTOCHEMISTRY AND FINE STRUCTURE OF EPITHELIOID CELLS IN SARCOIDOSIS

W. JONES WILLIAMS, D. ERASMUS, E. M. VALERIE JAMES and D. WILLIAMS Epithelioid cells in the granulomas of sarcoidosis, Kveim tests, tuberculosis, chronic beryllium disease, Crohn's disease and farmer's lung on light microscopy show similar histochemical features. They are rich in lysosomal enzymes and residual bodies (end products of lysosomal digestion) and show high pentose cycle, biosynthetic, enzyme activity. We considered that the biosynthetic activity is concerned with the production of lysosomal enzymes and that the cells were therefore primarily phagocytic.

On electron microscopy, epithelioid cells in sarcoidosis, Kveim tests and tuberculosis appear as two probably related cell types, A and B. Both A and B cells show very scanty pinocytotic vesicles and occasional 'dense' (residual) bodies, which suggests that they are not primarily phagocytic. However, both types show morphological features suggesting active biosynthesis. A cells may be producing protein and B cells lipo- and mucoproteins.

We are currently attempting to characterize these cells further by electron microscope histochemistry.

#### PULMONARY MECHANICS AND SURFACTANT FOLLOWING RE-IMPLANTATION OF DOG'S LUNG

J. C. R. LINCOLN, N. BARNES, T. GOULD and E. O. REYNOLDS Eighteen dogs were studied before, during and immediately after autotransplantation of the left lung; 13 survivors were studied at intervals. Total pulmonary compliance, and that of the left lung after removal, pulmonary surfactant and lung stability were measured.

Pulmonary surfactant was normal in all cases studied from 3 days to 22 weeks. There was considerable reduction in *total* lung compliance with the chest closed after autotransplantation; this value returned to normal within 14 days. Composite pressure volume curves showed a reduction in volume of the autotransplanted lung at any time from 8 days to 22 weeks.

Pulmonary surfactant and lung stability remained unchanged in the autotransplanted lung when studied 3 days to 22 weeks after operation. There was an immediate fall in *total* lung compliance during the operative procedure which returned to normal within 14 days. Since there was a 33% reduction in volume in the autotransplanted lung from 1 to 22 weeks after the procedure, despite normal values for surfactant, it is suggested that early changes in compliance are due to acute interstitial oedema. The long-term reduction in volume with normal pulmonary surfactant is probably due to permanent interstitial changes.

#### PATTERNS OF BREATHING IN HEALTH AND DISEASE

A. R. TANSER An impedance pneumograph provides a method of recording breathing from electrodes on the chest wall. Under suitable conditions the record is quantitative, and recording may be continued for long periods without interference to the patient.

There is a wide variation in the pattern of breathing of normal subjects. Disease of the central nervous system, cardiovascular system or respiratory system may be associated with a pattern of breathing which can be recognized as abnormal, although some patients with gross disease have patterns of breathing indistinguishable from normal.

Continuous records of breathing may be useful in indicating a change in a patient's condition, as in developing carbon dioxide narcosis. Arterial puncture may be associated with a gross change in the pattern of breathing, and such recordings confirm the need for waiting until a stable state returns before withdrawing a blood sample.

#### BREATH SOUNDS

P. FORGACS The white noise of breathing heard at a distance with the unaided ear is often abnormally loud in patients with diffuse airways obstruction. Measurement of the mid-inspiratory breath sound, recorded through a microphone close to the mouth and correlated with instantaneous flow rate, confirms this clinical observation. The rise in the intensity of this sound for equal increments of flow rate is much greater in chronic bronchitis and asthma than in healthy subjects. Exercise, hyperventilation and cigarette smoke often intensify the breath sounds, while atropine and isoprenaline aerosol usually quietens them. The white noise of breathing is generated by turbulent flow in the mouth, larynx, and the first few generations of the airways. Variations in the loudness of the inspiratory sound reflect calibre changes in the large bronchi.

#### THE LYMPHATICS OF THE THORAX

##### The Anatomy of the Lymphatics of the Lungs and Chest Wall

DAVID H. TRAPNELL There are three main groups of pulmonary lymphatics in man, distinguished not only by their site but also by their origin. Some lymphatics begin at the periphery of the lung lobules, many of them thus lying in the pleura or interlobular septa. The pleural channels drain into the interlobular lymphatics, which join to give rise to the perivenous lymphatics.

A second group originates as blind-ended tubes in the centre of acini around the alveolar ducts. (There are no lymphatics in the walls of alveoli.) These vessels give rise to the peribronchial lymphatics which form a network around the broncho-arterial bundle to reach the hilum.

The third group of pulmonary lymphatics, lying in the interlobular septa of the depth of the lung, are anastomotic and join the peribronchial and perivenous groups together.