Societates

Conference on Leukocytic Functions

Held under the auspices of the New York Academy of Sciences,
May 27–29, 1954.

The main topics of the conference which was attended by more than 300 scientists were under the headings of **Techniques in the Study of Leukocytic Functions; Factors influencing Numbers, Distribution and Fate of Leukocytes; Defense Functions of Leukocytes and Chemical and Metabolic Aspects of Leukocytic Activity.** There were several introductory speeches. *R. Dorothy Sundberg* (Minneapolis, Minn.) discussed the relations between lymphocytes and plasma cells. Lymphocytes are capable of transformation to many cell types including macrophages and granulocytes as well as plasma cells. Much of the evidence suggests that the large basophilic cells with reticular nuclear characteristics are more important in the production of antibodies than are their derivatives. – *J. C. Sieracki* (Detroit, Mich.) reviewed the neutrophilic leukocytes and their functions, with particular reference to their participation in the inflammatory reaction. He described a simple technique for studying the degenerative and reactive changes in the cells in in vivo skin-window preparations. – *R. S. Speirs* (Bar Harbor, Me.) spoke on eosinophilic and basophilic leukocytes and described a technique for harvesting large numbers of eosinophils, mast- and other cells for chemical, physiological, and tissue culture studies by repeated intraperitoneal injections of sensitizing materials. – The monocyte was discussed by *E. H. Tompkins* (Boston, Mass.). Monocytes are capable of multiplication by amitosis, or of growth and maturation. They are motile and phagocytic. The phagocytic vacuoles enlarge in infections and in lipoid storage diseases. – *J. W. Rebuck* (Detroit, Mich.) described an interesting method for studying leukocytic functions in vivo; the leukocytes of the exudate in acute inflammation could be studied in serial samples from a single lesion. – The various techniques for tissue culture in the study of leukocytic functions were discussed by *E. E. Osgood* (Portland, Oreg.). A suspension culture in vaccine vial capped cultures will probably remain the best method for quantitative short-term studies of the effects of various therapeutic agents on living human cells. – *E. P. Cronkite* (Bethesda, Md.) discussed leukocytes in radiation injury. He described a method for aseptic preparation of combined leukocytes and platelets for experimental transfusions. Preliminary studies show that these leukocytes which circulate in the leukopenic dog with aplastic bone marrow, do not produce constitutional reactions, and migrate to sites of infection. – *M. B. Visscher* and *F. Halberg* (Minneapolis, Minn.) reported interesting studies on the diurnal variations of white blood cells in man, rats and mice. Within the 24-hour period the cyclic eosinophile variation is synchronized with physical and sociological environmental factors. In mice lighting is ordinarily the dominant synchronizer of cyclic eosinopenia. Lighting reverses the eosinophile rhythm within 9 days. Observations after adrenalectomy on man, on the dog, on the rat and on the mouse support the assumption that the adrenals are part of intrinsic mechanism not only of daily eosinophile variation but also of 24-hour periodicity in

several other functions in some mammals. – *H. R. Bierman* (U. of Calif.) spoke on sequestration and visceral circulation of leukocytes in man; he reported investigations on patients by means of catheterization of the different parts of the heart, lungs and other organs. Despite interesting results it is questionable whether this type of experimental procedure in man, particularly in very sick patients, is permissible. This reviewer (and many others) definitely disapproves of such methods. – Leukocytic secretory activity was discussed by *K. M. Richter* (Oklahoma City, Okla.). The different types of secretory activity by living neutrophiles, eosinophiles and monocytes of human peripheral blood in vitro were recorded cinematographically with phase optics. – The depressive influences on leukocytic numbers were tabulated and discussed by *F. J. Heck* (Rochester, Minn.). Most of the drug compounds cause leukopenia as the result of specific sensitivity to a drug-protein combination. Compounds such as benzene exert their effect through a toxic action, while nitrogen mustard produces a radiomimetic effect by which mitosis is delayed. – Hormonal influences upon the numbers, distribution and fate of leukocytes were reviewed by *A. S. Gordon* (New York, N.Y.). He analyzed the factors responsible for the peripheral eosinopenia resulting from administration of ACTH or subjection to stress. Quantitative studies show that the eosinopenic state during chronic administration of cortical steroids is associated with reduced total numbers of marrow eosinophiles. New studies demonstrating a synergistic action between epinephrine and cortical factors upon the numbers of circulating eosinophiles were reported and a new method was described for determining the total volume and cellular numbers in the marrow of long bones. – *M. McCutcheon* (Philadelphia, Penna.) described his studies on chemotaxis and locomotion of leukocytes. Certain aluminium silicates are powerful repelling agents for leukocytes in vitro, whereas bacteria and collodion attract them. Other particles, such as carbon, have no chemotactic effect. When a minute clump of chemotactically active particles is placed on a glass slide, and a suspension of leukocytes in blood or plasma is superimposed and spread beneath a coverslip, a chemotactic field of microscopic size is set up. The properties of this field have been explored. – *J. Victor* (Frederick, Md.) discussed the reactions between leukocytes and infectious agents in normal and diseased animals. Films and physiological studies during phagocytosis show how contact between bacteria and leukocytes enhances phagocytosis of the bacteria. Leukocytes also secrete a bacterial sensitizing substance which enhances phagocytosis. This substance differs from opsonin. – According to the report of *A. H. Coons* (Boston, Mass.), recent evidence indicates that a large proportion of antibody is synthesized by multiplying and differentiating cells, the mature form of which is the plasma cell. – Leukocytic phagocytosis was reviewed by *C. S. Wright* (Columbus, Ohio). The phagocytic defense mechanism of leukocytes consists of three phases, chemotaxis, phagocytes per se, and digestion of the ingested material. The theoretical mechanisms involved in phagocytosis have been classically ascribed to phenomena associated with surface tension and electrostatic charge. Some modification of these concepts seems to be necessary to explain recent observations. – *V. Menkin* (Philadelphia, Penna.) reviewed factors concerned in the mobilization of leukocytes in inflammation with particular reference to several biochemical features, such as leukotaxine-like material, the leukocytosis-promoting factor and the leukopenin, all of which were recovered from exudates. – Studies on the metabolism of human leukocytes were reported by *S. P. Martin, R. Green* and *G. R. McKinney* (Durham, North Carol., and Morganton, West Virg.). The mature polymorphonuclear leukocyte has a high aerobic lactic acid production which is not increased by anaerobiasis. Since leukocytes contain an abundant quantity of glyoxylase and glutathione it is suggested that this may be the source of the aerobic production

of lactic acid. The aerobic lactate production is increased by cell injury and is reduced by adrenal steroids. – Studies on enzymes and biochemical constituents of leukocytes in health and disease were reported by *W. N. Valentine* (Los Angeles, Calif.). Leukocytes produce lactic acid, consume oxygen and utilize glucose with a primarily aerobic glycolytic metabolism, as studied by manometric techniques. All these activities are substantially lower in chronic leukemia than in normal cells. The glycogen content is extremely low (if present at all) in blast cells and lymphocytes. Glycogen also tends to be low in chronic myelocytic leukemias and high in polycythemia vera. Data were presented suggesting that leukocyte phosphatase activity is related to "stress" and to pituitary and/or adrenal cortical activity. – Peptidases in human leukocytes were discussed by *G. A. Fleisher* (Rochester, Minn.). With blood leukocytes cobalt is a rather specific activator of the dipeptidase. Lymphocyte dipeptidase behaves similarly, but is more active. The tripeptidase of lymphocytes is much less active than that of blood leukocytes. Therefore, the polymorphonuclear leukocytes appear to contain more of this enzyme than is present is lymphocytes. The enzyme activities in the leukocytes from different individuals show variations which are of the order of magnitude commonly found with enzyme activities of biologic materials; no correlation can be made with the differential counts. – The oxidase and lipase of the leukocytes were studied by *P. Seabra* (Rio de Janeiro, Brazil). He demonstrated the enzymatic nature of the Loele staining process and, by a modification of this process, was able to establish the oxidase index, a numeric expression of the leukocytic oxidase. This index was found to be higher than normal in syphilitic patients. The use of a lipase titre as a diagnostic test to detect TB has shown results which are in striking agreement with the clinical and radiological findings. – *M. Wachstein* (Brooklyn, N.Y.), in a report on the histochemistry of leukocytes, reviewed the histochemical methods applicable to leukocytes. Lipids can be demonstrated in most blood cells. Glycogen is also demonstrable in leukocytes increasing in quantity as the cells mature. In white blood cells non-specific alkaline phosphatase can be demonstrated. The increased staining reaction of polymononuclear leukocytes in patients with infectious diseases and the decreased staining intensity in those of patients with chronic myeloid leukemia is noteworthy. Esterase activity can be demonstrated in many leukocytes when chloroacyl esters are used as substrates. Histochemical methods reveal not only cytochrome but also dehydrogenase activity in many white blood cells. – Highlights of the conference were the films taken by *M. Bessis* (Paris) by means of phase microscopy. The excellent cinephotomicrographic pictures of certain leukocytic functions, such as phagocytosis and agglutination, were greatly applauded.

G. Rosenow, New York.