Microcalorimetry Techniques: Applications to Cellular Systems

Techniques and results of microcalorimetric investigations of cellular systems were discussed at a meeting held 9 through 11 July 1973, at the Chemical Center, Lund University, Sweden. Special emphasis was given to clinical applications. It was attended by 40 scientists with widely varying backgrounds and specialties. Chemists, microbiologists, cell biologists, biochemists, clinical chemists, physicians, and makers of calorimeters were present.

The application of thermal measurements to the study of cellular systems and to clinical applications is a relatively new and expanding field whose development has been made possible by the availability of simply constructed, sensitive, and reliable microcalorimeters.

Of the most immediate clinical application was the report of a calorimetric method for the diagnosis of systemic lupus erythematosus. By means of a test based on increased heat production during leukocyte phagocytosis accompanying this disease, 14 out of 15 positive cases and the majority of subjects in the probable and possible diagnostic categories were identified.

A calorimetric procedure for the rapid identification and typing of bacteria in urine was described. This fall the procedure will become part of a hospital's routine testing program.

The greatest number of investigators are working with human erythrocytes. The rate of heat production during the resting state of the red cell has been determined in three different laboratories with good agreement among them. The possibility of using microcalorimetry for the diagnosis of various forms of anemia, including sickle cell disease, is being explored. There was considerable discussion about the effects of the methods of storage and handling of blood cells upon thermal measurements of those cells. It appears that significant studies on the aging of cells might be made calorimetrically.

The calorimetric technique is very well suited for the study of reactions occurring at cell surfaces. Investigations of the binding of lectins to lymphocytes and the action of thrombin on human blood platelets were described. The thermal phenomena accompanying the release of histamine from sensitized mast cells has been utilized to quantitatively determine the inhibitory effect of various drugs.

The very general nature of the measurement of heat makes calorimetry applicable to a wide variety of experimental situations. Thus, work on samples of skin, biopsy material, muscle, and cells grown in tissue culture was reported. An interesting reference was made to an in vivo study of the rate of heat production accompanying human muscle contraction in which significant differences were found between normal and hypothyroid subjects.

As indicated by this brief report, the range of subjects suitable for microcalorimetric measurements is vast. The technique is definitely in its early stages of development, but already appears to be capable of producing significant results, both in fundamental science and in useful practical applications for clinical medicine.

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Forthcoming Events

February

13–14. **Industrial Solvents** Symp., Industrial Health Foundation, Pittsburgh, Pa. (IHF, 5231 Centre Ave., Pittsburgh 15232)

13–15. Conference on **Biological Effects of Electromagnetic Radiation**, New York Acad. of Sciences, New York, N.Y. (G. R. Gruber, NYAS, 2 E. 63 St., New York 10021)

13–15. Society of **Photographic Scientists and Engineers**, Houston, Tex. (R. H. Wood, SPSE, 1330 Massachusetts Ave., NW, Washington, D.C. 20005)

13–15. International **Solid State Circuits** Conf., Inst. of Electrical and Electronic Engineers, Philadelphia, Pa. (Office of Technical Activities Board, IEEE, 345 E. 47 St., New York 10017)

13–16. American Acad. of **Forensic Sciences**, Dallas, Tex. (H. L. Kimball, P.O. Box 302, New Hartford, Conn. 06057)

13–16. National Assoc. of **Medical Examiners**, Dallas, Tex. (W. G. Ecker, Laboratory, St. Francis Hospital, Wichita, Kan. 67214)

14–16. Society of **University Surgeons**, St. Louis, Mo. (E. W. Fonkalsrud, Dept. of Surgery, Univ. of California Medical Center, Los Angeles 90024)

14–18. American **Group Psychotherapy** Assoc., New York, N.Y. (M. Keefe, AGPA, 1865 Broadway, New York 10023)

15–20. **Biofeedback Research** Soc., 5th annual mtg., Colorado Springs, Colo. (F. Butler, Dept. of Psychiatry, #202, Univ.