been lacking, the dynamic adaptive properties of the monocyte surface membrane could be inferred from biological experiments demonstrating the ability of these cells to engulf particulates, fuse with other macrophages to form giant cells, process and transfer antigenic information to immunologically competent cells (*14*), and bind erythrocytes coated with immunoglobulin at specific receptor sites (*15*). It seems probable that the induction or unmasking of unique, highly specialized, structural complexes in these leukemic cells is relevant to the inherent properties of normal monocytes. Our findings may be related to neoplastic modifications of the plasma membrane or its extraneous coat (*10*). It is interesting that in contrast to these hematopoietic cells, neoplastic solid tissues generally lose contact inhibition (*5*) and specialized adhesion sites are diminished or absent.

Mechanisms of membrane bonding are little understood and the significance of the junctions in these cases, under these experimental conditions, is as yet unclear. Their existence in vivo must be considered, however, since there is a high incidence of infection with *Pseudomonas aeruginosa* or similar organisms in leukemia patients.

FRANCES T. SANEL
ARTHUR A. SERPICK
Baltimore Cancer Research Center, National Cancer Institute, U.S. Public Health Service Hospital, 3100 Wyman Park Drive, Baltimore, Maryland 21211

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16. We thank Dr. J. B. Block for helpful suggestions, Miss C. Tillman for technical assistance, and Dr. V. M. Young for supplying *Pseudomonas aeruginosa* cultures.

24 February 1970; revised 6 April 1970

Potassium–Adenosine Triphosphate Complex: Formation Constant Measured with Ion-Selective Electrodes

Abstract. *Valinomycin and glass electrodes were used to measure activity of potassium ions in equilibrium with adenosine triphosphate. The thermodynamic formation constant of the complex is approximately 25 times greater than indirect measurements predict.*

The development of valinomycin-based, potassium-selective membrane electrodes (*1*) makes possible the direct measurement of ion-association processes that involve the potassium ion in aqueous media and permits extension of our work (*2*) on sodium complexes of biological interest. The potassium–adenosine triphosphate (ATP) complex is of particular interest because of its role in energy exchange (*3*, *4*). Because of the lack of an appropriate analytical method, previous measurements of the stability of this complex have been carried out by indirect methods. Both Melchior (*5*) and Smith and Alberty (*6*) estimate the formation constant K_f for K^+–ATP as ~ 10 ($\mu \sim 0.20M$) with *p*H titration, whereas O'Sullivan and Perrin (*7*) arrive at $K_f \sim 14$ ($\mu \sim 0.1M$) from the effect of the potassium complex upon the stability of Mg–ATP^{2-}. Our experiments, in which ion-selective membrane electrodes are used to measure K^+ activity directly, show these values to be in error.

We used both the new valinomycin-type liquid-membrane electrode (*1*) and an NAS 27-4 cation-sensitive glass electrode (Corning model 476220) as indicator electrodes versus a double-junction reference electrode to measure potassium activity in various experiments carried out under conditions of varying ionic strength. Because the $pK_a = 6.95$ for the reaction

$$H\,ATP^{3-} \leftrightarrows ATP^{4-} + H^+$$

we conducted our experiments in solutions of *p*H 9.0 to 9.5 where we assume all of the ligand to be accounted for by the species ATP^{4-} and $KATP^{3-}$. Under these conditions both indicating electrodes gave excellent Nernstian calibration curves to K^+ concentrations of 10^{-1} to $< 10^{-5}M$. Formation constants were calculated by standard methods with the aid of a CDC 6400 computer from the potentiometric data.

On the basis of more than 100 determinations taken in 12 separate experiments with the valinomycin and glass electrodes we arrive at values of 219 ± 24 (standard deviation) and $218 \pm 20\,M^{-1}$, respectively, for K_f of the $KATP^{3-}$ complex at $25.0° \pm 0.1°C$. Thus, our values for the formation constant are about 25 times larger than the earlier estimates. Since the association of ATP with K^+ is usually neglected in biochemical calculations (*3*), the unexpectedly high value for K_f revealed by our direct measurements requires a reconsideration of the role of $KATP^{3-}$ in bioenergetics and ionic mobilities (*4*).

G. A. RECHNITZ
M. S. MOHAN
Department of Chemistry, State University of New York, Buffalo 14214

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11 March 1970; revised 23 April 1970