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AD843830

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SMUFD D/A ltr, 4 Feb 1972

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AD843830

TRANSLATION NO. 772

DATE: July 1968

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NOV 27 1968

DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

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Leukocyte Alkaline Phosphatase Activity in Hematopoietic Disorders. A Correlative Study by Biochemical and Cytochemical Techniques, Meislin, Aaron C., Lee, Stanley L., and Wasserman, Louis R.

Four hundred thirteen simultaneous biochemical and cytochemical leukocyte alkaline phosphatase activity (APA) determinations were done on 34 normal controls and 129 patients with hematopoietic disorders. The disorders studied were chronic myelocytic leukemia, acute blastic leukemia, polycythemia vera and myeloid metaplasia (including myelofibrosis with myeloid metaplasia, agnogenic myeloid metaplasia and the "spent" stage of polycythemia). Modifications of previously described methods for cytochemical and biochemical APA determination were employed and are described.

Normal subjects and patients with chronic myelocytic leukemia showed consistently low values by both methods; while those with the other disorders studied, showed broad distributions of values. Moderate positive correlation existed between the two techniques in all groups except in the normals where correlation was not significant. Mean biochemical APA values in acute blastic leukemia and chronic lymphocytic leukemia were substantially higher than those previously reported; and were appreciably higher than the simultaneously determined cytochemical values, which were generally low. Possible explanations for this discrepancy include the following: 1) Additional enzyme may be present in small quantities in lymphocytes and blast cells detectable by biochemical technique because of the large number of these cells, but not by cytochemical technique due to minute quantity per cell, 2) Evidence favors the existance of several alkaline phosphatases, which may be measured differentially by the two methods, although more recent evidence supports the homogeneity of WBC alkaline phosphatase.

Values in polycythemia vera and myeloid metaplasia varied from very high to very low enzyme activity, however multiple determinations performed at different times on the same subject tended to remain within a fairly narrow range. This was most apparent in myeloid metaplasia.

The principal diagnostic value of this determination in the hematopoietic disorders studied is in the exclusion of chronic myelocytic leukemia. If the alkaline phosphatase activity is high, the diagnosis of chronic myelocytic leukemia would seem unlikely. The cytochemical technique appeared to be more reliable in this exclusion.