Thymine dimers were not detected when zygotes were irradiated even at 100% lethal dose levels. However, they were found when E. parma DNA was exposed in vitro. This unexpected finding cannot be precisely explained at present but the following are possibilities. (1) Thymine dimers may not be formed in vivo. (2) Relative to the biological activity manifested, dimer activity may be too low to be detectable with present methods. (3) Repair and/or preparation methods may monomerize formed dimers. It is hoped that future experiments will distinguish between these possibilities.

This research was supported in part by a grant from The American Cancer Society, Milwaukee Division, Inc.

1967 #35

THE ENERGETICS OF Na^+ AND K^+ TRANSPORT IN THE DOGFISH RED CELL (Squalus acanthias)

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The relationship between energy generation and the work involved in the active transport of Na^+ and K^+ has been extensively investigated in the mammalian erythrocyte. Simple thermodynamic considerations permit a calculation of the minimal work required for these processes. No comparable studies are available for the red cells of nucleated O_2 consuming poikilothermic species. Previous work in this laboratory has indicated the desirability of such studies. In particular, the presence of a very high rate of ouabain-sensitive Na^+ efflux suggested that the energetics of this cell with respect to cation transport would be of particular interest.

In the present studies, measurements of K^+ influx have been performed on dogfish erythrocytes so that the net minimal work required to transport both Na^+ and K^+ could be estimated. K^+ influxes were measured at 13°C and 23°C under control circumstances and in the presence of 10^{-4}M ouabain. Despite the high rate of Na^+ transport total K^+ influx at 13° averaged approximately 1.6 mEq/Kg red cells/hr and at 23° averaged about 4.3 mEq/Kg red cells/hr. The ouabain sensitive fraction of these fluxes averaged 1.0 mEq/Kg red cells/hr and 2.1 mEq/Kg red cells/hr respectively. The rate of "active" Na^+ efflux (ouabain-sensitive) has previously been shown to be 8.1 mEq/Kg red cells/hr at 13° and 13.9 mEq/Kg red cells/hr at 30° (Bull. M.D.I. B.L. 5-2:39, 1965). Lactate production averaged approximately 1 mM lactate/Kg red cells/hr. Thus approximately a minimum of 60% of total anaerobic energy generation is used for Na^+ and K^+ transport. This value is substantially the same in the shark erythrocyte as in the mammalian erythrocyte. The apparent coupling of Na^+ to K^+ transport in this cell is substantially different from that found in human red cells. It appears that this cell is an unusually appropriate model for study of energetics in a unit with a high transport rate and for studies of coupled Na^+ and K^+ active transport.