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EXTRACELLULAR SPACE AND INTRACELLULAR SODIUM OF SKELETAL MUSCLE IN
Squalus acanthias

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The inulin space (ECF) of dogfish skeletal muscle was measured by extracting the inulin content of a weighed muscle slice, from a fish, 5 hrs after the intravenous administration of inulin (400 mg/kg BW). The sodium concentration of the extract was read by flame photometry. From this, the sodium content of the slice was calculated and, using ECF x P_{Na} as Extracellular sodium, the intracellular sodium concentration was estimated by difference.

Skeletal muscle inulin space of five fish averaged 5.9% of muscle weight (range 3.8 - 7.1%). This is in marked contrast to the 15-18% generally reported for mammalian muscle.

Intracellular sodium concentration averaged 11.5 mEq/kg intracellular water (range 9 - 14 mEq).

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IONIC TRANSPORT IN MAMMALIAN VERSUS ELASMOBRANCH ERYTHROCYTES: I. EFFECTS OF STROPHANTHIN AND HIGH K⁺ RINGER'S ON APPARENT TRANSMEMBRANE POTENTIAL

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In a number of sodium transporting cell types, transmembrane potential (TMP) is related to cation diffusion and/or to electrogenic sodium transport. In erythrocytes, chloride is believed to be in thermodynamic equilibrium across the plasma membrane and the ratio of intracellular chloride (Cl_i) to extracellular chloride (Cl_e) is believed to provide a measure of TMP. The relationship of cationic transport to TMP has not been investigated systematically.

Studies were performed using human and dogfish (S. acanthias) erythrocytes. The ratio of intracellular to extracellular Cl⁻, Na⁺, and K⁺ was determined under the following conditions: 1) in Ringer's solutions appropriate for the species and at the appropriate temperatures; 2) in Ringer's in which K⁺ concentrations approximated intracellular values and with correspondingly low Na⁺ concentrations; 3) with and without 1 x 10⁻⁵ strophanthin. The results were as follows:

Cl_i/Cl_e remained approximately constant under all three conditions. In normal Ringer's Na_i/Na_e increased from 0.18 to 0.29 with strophanthin; in high K⁺ Ringer's values increased from 0.51 to 0.93. The corresponding changes in K_i/K_e were 25.0 to 18.1, and 0.99 to 0.96.

If chloride ratios accurately reflect TMP, the latter would appear to be independent both of potassium diffusion and active sodium transport in non-nucleated mammalian erythrocytes as well as nucleated elasmobranch erythrocytes. In future studies, attempts will be made to correlate Cl⁻ ratios with TMP measured directly with a microelectrode and to measure the effects of changes in chloride concentrations upon TMP and alkali metal transport.