The numerator of the equation initially changes rapidly in a non-linear fashion with time presumably because of:

a) exchange diffusion; and

b) high rate of Na^+ efflux.

However, between the second and fourth hour, the change in specific activity becomes more or less linear so that the mean of specific activities at 2 hours and 4 hours may be used as an acceptable approximation for calculating specific activity. Under these circumstances, back diffusion of Na^{22} (Na influx) may be fairly substantial so that efflux measurements represent net efflux and the measured transport must be considered as an estimate of the minimum flux rate.

It is clear that studies involving metabolism and cation transport in this erythrocyte must be performed under carefully controlled and specified conditions and that an absolute flux rate cannot be determined.

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1966 #12

REGULATION OF VENTRICULAR FLUID POTASSIUM CONCENTRATION IN *Squalus acanthias*

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Potassium concentration, $[K^+]$, of mammalian cerebrospinal fluid is regulated at 2.8 ± 0.2 meq/L, independent of plasma $[K^+]$, by active transport systems located in membranes separating cerebrospinal fluid and blood (Cserr, Am. J. Physiol. 209:1219-26, 1965). Considerably higher values than 2.8 meq/L have recently been obtained for $[K^+]$ of ventricular fluid (VF) in three species of elasmobranchii. Mean $[K^+]$ (in meq/L) reported for VF and plasma, respectively, were 7.8 and 6.6 in the spiny dogfish (Maren, Comp. Biochem. Physiol. 5:193-200, 1962), 5.2 and 5.5 in the lemon shark, and 5.5 and 4.2 in the nurse shark (Oppelt, Adamson, Subrod and Rall, Comp. Biochem. Physiol. 17:857-66, 1966). Similarity between $[K^+]$ of VF and plasma in each of the three species suggests that elasmobranchii may lack active transport systems for regulating K^+ exchange between VF and plasma. Our experiments were designed to test this hypothesis. Results indicate that $[K^+]$ obtained previously for dogfish VF were in error and that VF $[K^+]$ is regulated close to 3 me[/L in the dogfish as it is in mammals.

Mean (±SE) normal $[K^+]$ (in meq/kg H_2O) of dogfish plasma, VF and extradural fluid (EDF) were 4.1 ± .12 (N = 23), 3.5 ± .08 (N = 5) and 3.4 ± .12 (N = 6), respectively. Only samples obtained within two to three minutes after removal of the fish from water were used in determining mean values. In contrast, mean $[K^+]$ (in meq/kg H_2O) of plasma, VF and EDF obtained from fish kept out of water for seven to fifteen minutes before sampling were 6.0 ± .11 (N = 4), 5.8 (4.8, 6.8) (N = 2), and 3.2 ± .09 (N = 3), respectively. Mean $[K^+]$ of control plasma, drawn before the fish were taken out of water, was normal, 4.1 ± .09 (N = 4). These results illustrate the importance of rapid sampling and suggest that failure to collect samples immediately after fish were removed from the water may explain high potassium concentrations of VF and plasma obtained by Maren and Oppelt et al. Murdaugh et al. (this Bulletin 5(1):14-15, 1962) also reported a low value (3.3 meq/kg H_2O) for plasma $[K^+]$.

EFFECT OF HYPERKALEMIA ON $[K^+]$ OF VENTRICULAR AND EXTRADURAL FLUIDS

Animal	Time after beginning KCl infusion, hr	$[K^+]$, meg/kg H_2O		
		PL	Vf	EDF
#9	0 3	4.4 10.0	 3.9	
#22	0 3	5.4 13.0	 3.9	 3.9
#18	0 2 4 8	3.7 8.2 8.0 5.4	 3.5	 4.5
#23	0 8	3.9 8.7	 3.8	 5.5

Hyperkalemia was produced in four fish by infusing 3% KCl into a caudal vessel. Results, shown in the table, demonstrate regulation of VF $[K^+]$ in the dogfish. Large increases in plasma $[K^+]$ produced only small increases in VF concentration. However, $[K^+]$ of EDF rose significantly after eight hours of hyperkalemia suggesting that $[K^+]$ of this fluid is not regulated. The delayed increase in EDF $[K^+]$ is consistent with results of other studies (Zubrod and Rall, J. Pharm. Exptl. Therap. 125:194-97, 1959) in indicating a slow rate of material exchange between plasma and EDF.

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1966 #13

FINE STRUCTURE AND SALT REGULATION

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A potassium antimoniate reagent has recently been introduced for electron microscopic localization of sodium. Despite theoretical limitations there is an enhanced precipitation at certain membrane sites following ouabain poisoning of tissues normally active in sodium transport.

A series of experiments has been carried out with Fundulus heteroclitus and Squalus acanthias to explore this reaction and tissues have been prepared for subsequent electron microscopic study.

Fundulus were carefully and slowly adapted to fresh water for comparison with sea water conditions in the gill. Specimens in both conditions were prepared as normal and ouabain poisoned specimens for examination of fine structure.

Squalus rectal gland was prepared as dissected from intact normal and ouabain poisoned fish and also as prepared from tissue slices which had been incubated in chilled, gassed Hogbens solution with and without added ouabain.

In each case control samples fixed in glutaraldehyde and osmium fixatives were taken for