1965 #14

PERMEABILITY OF DOGFISH GILL TO SODIUM[1]

J. Farber,[2] B. Gerstein, and J. W. Boyland, State University of New York at Buffalo, N. Y.

Using the in vivo gill perfusion system previously described, the gills of eight dogfish were externally perfused for one hour with reconstituted sodium-free tris-buffered sea water in which choline chloride replaced sodium chloride (Total osmotic pressure 950 mosmols/kg).

At the conclusion of the experiment, the volume of perfusate was measured and its sodium concentration read using a Baird Atomic KY2 flame photometer. From the data the net sodium efflux from the gills was calculated and from this the permeabilty coefficient for Na^+.

By analysis the original perfusate contained from less than 1 mEq/L to 5 mEq/L. This presents a gradient of approximately 250 mEq/L favoring outward diffusion across the gill membrane.

Sodium efflux averaged 0.064 mEq/kg hr. (range 0.026 to .12 mEq/kg hr). Using our figure for surface area of the gill (3700 cm^2/kg. MDIBL Bull 1962) this yields a permeability coefficient of 1.87×10^{-8} cm sec^{-1}.

A comparable figure for toad bladder (serosa to mucosal surface) given by Leaf and Hays (J. Gen. Physiol. 45 no. 5. p. 921. 1962) is 2.8×10^{-7} cm sec^{-1}.

1965 #15

GILL PERMEABILITY TO UREA IN Squalus acanthias: EFFECT OF VARIOUS AGENTS[1]

J. Farber,[2] B. Gerstein, and J. W. Boylan, State University of New York at Buffalo, N. Y.

Studies at temperatures between 10 and 20°C. and during urea-loading show an effect on permeability of the dogfish gill to urea suggesting denaturation of the membrane or interference with an active transport system related to urea flux.

Ouabain and chloromerodrin were used to test the possibility that interference with an active transport system would change this outward flux of urea from the dogfish gill.

Ouabain was added to sea water perfusing the gills in vivo at concentration of 10^{-5} m; chloromerodrin was given intravenously in amounts sufficient to deliver 2 mgs Hg/kg BW to the fish. Urea in the gill perfusate during control and experimental periods was determined by the xanthydrol precepitation method of Lee and Widdowson.

Neither agent increased the rate of urea loss at the gill above that found in control periods.

---

1. Supported by NSF Grant No. GB-2580.

2. Supported in part by NIH Training Grant No. 2-TI-GM-341-06.