

differences in tissue binding for the three environments parallel the Na-K-ATPase activity, i.e., the ouabain appears to be bound specifically by this enzyme.

Autoradiographs from 1 μ m plastic sections of gills perfused with 3 μ M 3 H-ouabain (20 μ Ci/ml) exhibit adequate morphological preservation for light microscopy (Figures 1-3). In the three environments virtually all of the silver grains (above background) were localized to the chloride cells. Moreover the largest and most numerous chloride cells were observed in 2X SW fish which also possess the highest ouabain binding and Na-K-ATPase activity. These results and Kamiya's recent demonstration of Na-K-ATPase in chloride cells with cell fractionation techniques (Comp. Biochem. Physiol. 43B, 611, 1972) provide strong evidence for most of the enzyme being located in these cells. Although the question of the intracellular location of the enzyme cannot be definitively answered with the resolution of light microscope autoradiography the grain pattern follows closely the distribution of the tubular system (cell surface invaginations), i.e., both are uniformly distributed throughout the cell except for the nucleus and the area adjacent to the apical crypt (Figures 1-3).

Of final interest is the preliminary autoradiographic observation that when the outside of the gill in 2X and 1X SW fish is exposed to 3 H-ouabain via the irrigation fluid there is no heavy labelling of the apical crypt membrane of chloride cells. This finding does not support the view of Maetz (*op. cit.*) that sodium extrusion from the gill into sea water involves a Na-K-ATPase located at the chloride cell apical membrane.

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SINGLE NEPHRON FILTRATION RATE IN THE HAGFISH *Myxine glutinosa*

Hilmar Stolte and G.M. Eisenbach, Medizinische Hochschule, Hannover, Germany; and State University of New York at Buffalo

Because of its discrete anatomical structure the nephron of the hagfish lends itself to studies of pressure-flow relationships across the glomerular membrane. We have begun such a study and report here some basic parameters of the filtration process hoping that this simple model may eventually further our understanding of the more complex relationships of glomerular filtration in higher forms.

Hagfish (80 - 140 g) freshly caught in Frenchman Bay were prepared for kidney micropuncture as described in a previous report (Bull. MDIBL 11:11, 1971). Aortic and cardinal vein pressures were measured with a simple water column device attached to indwelling needles. Microperfusion of single glomeruli was performed by catheterization of afferent arterioles via segmental branches of the aorta. Perfusion pressure was monitored through an L-shaped glass tubing in parallel with the perfusion device. Quantitative collection of the perfused glomerular filtrate was accomplished by retrograde cannulation of the archinephric duct. The perfusion fluid contained (mM/L) sodium 530, potassium 9.0, calcium 6.0, magnesium sulfate 18 and 30 mg percent glucose. Inulin 14 C was added as a marker for fluid reabsorption.

The hydrostatic pressure in the aorta under control (non-perfused) conditions was 5.4 ± 0.11

cm H₂O (mean ± S.E.) in 12 measurements. Simultaneously measured cardinal vein pressure was approximately zero. The effect on filtration rate of varying filtration (perfusion) pressure and cardinal vein pressure is set out in the table.

TABLE 1

Afferent arteriolar Pressure (cm H ₂ O)	Single Nephron Filtration Rate (×10 ⁻⁶ ml·min ⁻¹)	
	CVP = 0	CVP = 4.8 - 5.3
5.0 - 6.2	23.0 + 6.6 (4)	306.3 + 49 (4)
8.0 - 9.5	120.9 + 17.6 (12)	484.6 + 39 (14)
12.0 - 12.5	139.1 + 11.1 (22)	---
14.5 - 17.0	159.0 + 13.6 (12)	---

CVP = Cardinal venous pressure (cm H₂O)

At normal cardinal vein pressure and at perfusion pressure corresponding to normal aortic pressure single nephron filtration rate was $23.0 \pm 5.65 \cdot 10^{-6} \text{ ml} \cdot \text{min}^{-1}$. The largest increment in filtration for a pressure increase is found in the initial elevation from normal to 8.0 - 9.5 cm H₂O. Lesser increments in flow attend subsequent increases in perfusion pressure. The system is most sensitive to pressure changes in the normal range at higher pressures arteriolar resistance effects a degree of autoregulation of filtration rate. This is demonstrated in the striking increase in filtration consequent to a modest elevation of the cardinal venous pressure (final column of table). Retrograde pressure is not subject to reduction by resistance through the afferent limb and effective filtration pressure is apparently distributed over a greater capillary surface. The inulin tubular fluid to perfusion fluid ratio remained near unity for all collection periods, showing no net reabsorption from capsule, neck segment or early duct during perfusion of single glomeruli. Supported by DFG-Sto 71-3 and NIH grant AM-14424 to J.W. Boylan. Dr. Eisenbach was a Fellow the the National Kidney Foundation.

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FLUID REABSORPTION IN THE NEPHRON OF THE SKATE *Raja erinacea* AND ITS POSSIBLE RELATIONSHIP TO PASSIVE UREA TRANSPORT

Hans R. von Baeyer and John W. Boylan; State University of New York at Buffalo

A model for passive urea reabsorption in the elasmobranch kidney has been proposed (Comp.