

RENAL HANDLING OF AMINO ACIDS IN MYXINE GLUTINOSA (CYCLOSTOMATA)

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A peculiarity of the kidney in Myxine glutinosa is the segmental arrangement of the glomeruli. Moreover, a tubular apparatus is lacking apart from short neck segments in this species. The question is how tubular functions are fulfilled in Myxine by the archinephric duct (AND) which is partly similar in morphology to the first segment of the proximal tubule in teleost fish and mammals (Ericsson, Z. Zellforsch. 83,219-230,1967; Kühn et al. Cell Tiss. Res. 164,201-213,1975). The reabsorption of macromolecules and glucose by the cells of the AND has been demonstrated (Ericsson & Seljelid, Z. Zellforsch. 90,263-272,1968; Alt et al. J. exp. Biol. 91,323-330,1981; Flöge et al. J.comp. Physiol. B154,355-364,1984). Ammonia and urea are net reabsorbed or secreted depending on the experimental conditions (Alt et al. Bull. MDIBL 16,1-2,1976; Raguse-Degener et al. Contr. Nephrol. 19,1-8,1980). The net secretion of potassium has repeatedly been shown (Alt et al. 1981 *ibid.*; Raguse-Degener et al. Expl. Biol. Med. 7,129-130,1982). However, a significant transport of water, sodium and phenol red is lacking in the AND of Myxine glutinosa (Burger & Rall, Amer. J. Physiol. 212,354-356,1967; Fänge & Krogh, Nature 4894,713,1963; Alt et al. 1981 *ibid.*; Raguse-Degener et al. 1982 *ibid.*).

The aim of the present study was to investigate whether the capacity for amino acid transport is present in the archinephric duct of the Atlantic hagfish. The experiments were performed on anaesthetized animals (2 ml propylenephenoxetol/l seawater). The gills were rinsed with cold aerated sea water. Blood was taken from the caudal blood sinus as described by Germain and Gagnon (Comp. Biochem. Physiol. 26,371-375,1968) and centrifuged to obtain the plasma. Urine was collected by catheter (PE10 tubing, Portex) from the left and right AND near the cloaca. Since the urine flow rate is low in anaesthetized hagfish, urine samples of up to 7 animals were pooled for the analyses. Homogenates of the AND were hydrolyzed with 25% HCL for 12 hrs at 100 °C. The pH was adjusted to 7 by addition of 30% NaOH. Tissue proteins and plasma proteins were precipitated with 5% sulphosalicylic acid and centrifuged for 10 minutes.

The results are summarized in Table 1. The U/P ratios suggest net reabsorption of amino acids in the AND except for glycine. Net secretion of taurine is indicated by the U/P ratio of 5.47 ± 3.8 . Thus, taurine secretion is not only found in renal tubules of dogfish, little skate, winter flounder and toadfish (Schröck et al. Amer. J. Physiol. 242, R64-R69,1982; Wolff et al. Bull. MDIBL 25,90-93,1985) but also in the archinephric duct of the hagfish. First results indicate that the tissue taurine concentration in the AND is 1.29 ± 0.014 mM (n=5), which is in the same order of magnitude as the value measured in renal tubules of the toadfish (Wolff et al., *ibid.*). The plasma taurine concentration of 4.3 ± 2

Table 1. Amino acid concentrations in plasma and urine of Myxine glutinosa (means + S.D.).

	Plasma ($\mu\text{mol/l}$)	Urine ($\mu\text{mol/l}$)	U/ \bar{P}
TAU	4.3 \pm 2.8 (6)	29.0 \pm 5.1 (6)	5.47 \pm 3.80 (6)
ASP	16.3 \pm 5.5 (7)	6.3 \pm 0.8 (7)	0.39 \pm 0.12 (7)
THR	98.9 \pm 32.0 (11)	14.6 \pm 2.9 (7)	0.15 \pm 0.08 (7)
SER	28.5 \pm 9.2 (12)	14.6 \pm 2.9 (7)	0.84 \pm 1.21 (7)
PRO	88.6 \pm 16.4 (7)	19.2 \pm 3.4 (6)	0.22 \pm 0.09 (6)
GLY	17.0 \pm 9.5 (13)	22.3 \pm 3.6 (7)	1.30 \pm 0.56 (7)
CYS	11.0 \pm 4.0 (13)	10.3 \pm 2.9 (4)	0.94 \pm 0.53 (4)

2.8 μM is much lower than in other vertebrates (Schröck et al., *ibid.*; Seldin & Giebisch, *The kidney*, Raven Press New York 1985, p.1678).

This study demonstrated that the kidney of the hagfish retains amino acids as in higher vertebrates. The biological function of taurine and glycine secretion in the AND of Myxine glutinosa needs further investigation.

The authors thank Brigitte Weinreich and Beate Eberle for technical assistance. This research was supported by DFG grant SFB 146.