

ANTIDIURETIC HORMONE (ADH) MODULATES THE EXPRESSION OF THE
AQUAPORIN-TB WATER CHANNEL PROTEIN IN SELECTED TISSUES OF
BOTH ANURANS (BUFO MARINUS) AND URODELES (AMBYSTOMA
TIGRINUM)

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In previous work, we have cloned an aquaporin water channel protein called Aquaporin-toad bladder (AQP-TB) from Bufo marinus. AQP-TB shares a 40% overall nucleotide homology with AQP-2 which is believed to be the ADH water channel in mammalian collecting duct. In Bufo marinus, AQP-TB is expressed in skin, urinary bladder, lung and brain. Previous reports have demonstrated that the water permeability (P_f) of skins of anurans (Eggena, P. J. Gen. Physiol. 60:665, 1972) and urodeles (Spight, T. Com. Biochem. Physiol. 20:767, 1967) increases after animals are dehydrated. These studies reported here tested whether: 1) P_f increases induced by dehydration and chronic ADH stimulation produce increases in AQP-TB expression and 2) if AQP-TB is present in urodeles .

Dehydration increased the serum osmolality of toads from 208 ± 6.5 (mean \pm S.D.) mOsm to 241 ± 17 mOsm (n=6). Northern analysis revealed that dehydration increased AQP-TB mRNA content in bladder (1.38 ± 0.17 (n=6)) as compared to control. Six intramuscular injections of 10 IU of ADH at 12 hr. intervals also increased AQP-TB mRNA content of both toad bladder (1.66 ± 0.48 (n=6)) and lung (1.30 ± 0.23 (n=6)). These data suggest that increases in AQP-TB may account for augmentation of P_f observed in selected Bufo marinus tissues after intervals of dehydration or chronic ADH stimulation.

Surveys of Ambystoma tissues under high stringency conditions showed that AQP-TB is expressed in urinary bladder, lung, skin and kidney. Dehydration increased the AQP-TB content of both bladder (1.24 ± 0.11 (n=4)) and skin (1.62 ± 0.39 (n=4)) as compared to control. Six 10 IU ADH intramuscular injections at 12 hr intervals also increased AQP-TB mRNA content in skin, kidney, and bladder (1.31 ± 0.26 ; 1.44 ± 0.12 ; 1.61 ± 0.34 ; all n=6 respectively). These data suggest that increases in AQP-TB mRNA content may also account for P_f increases observed in Ambystoma after intervals of dehydration.

These studies were funded by EPSCor fellowship and NIH RO1 38874 grants.