AVP-Sensitive Intracellular Solute Regulation in Renal Papillary Collecting Tubule Cells in *Rattus norvegicus*

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Renal papillary collecting tubule cells (RPCT) in culture in this laboratory have been shown to maintain a lower intracellular urea concentration (mM/l) than that in the medium (Ferraris *et al.*, 1986. MDIBL Bulletin 25:20-23). This suggests that, in addition to its passive movements across the cell membrane, urea is actively transported out of the RPCT. In contrast, renal papillary interstitial cells (RPIC) examined at the same time do not. Antidiuretic hormone is an important effector in the increase of urea, sodium and water flux in the papillary collecting ducts (Hays, R.M. 1976. New Eng. J. Med. 295:659-665). Specifically, arginine vasopressin (AVP) increases urea permeability in rat papillary collecting ducts *in vitro*; it does not appear to affect Na permeability (Morgan, T. & R.W. Berliner, 1968. Am. J. Physiol. 215: 108-115). Hence, we examined the effect of AVP on intracellular solute concentrations in the RPCT. Renal papillary collecting tubule cells and interstitial cells were isolated and grown as previously described (Ferraris *et al.* 1986). Cells were acclimated to a growth medium containing 280 Na, 5 K, and 330 urea (mM/l). Cells were then exposed, in culture, to AVP (10^{-6} M) for 14 h. In the RPIC, exposure to AVP did not affect intracellular Na, K, or urea concentrations (mM/l). In the RPCT, AVP also did not significantly affect intracellular Na or K (mM/l; Fig. 1). However, in the RPCT, exposure to AVP eliminated the urea gradient across the cell membrane and resulted in a significant increase in intracellular urea concentration ($P < 0.05$; Fig. 1). These results indicate that the RPCT in culture retain the capacity to respond to hormonal stimulation. They may also indicate that AVP increases urea permeability in the RPCT as it is known to do in rat papillary collecting ducts *in vitro* (Morgan & Berliner, 1968).

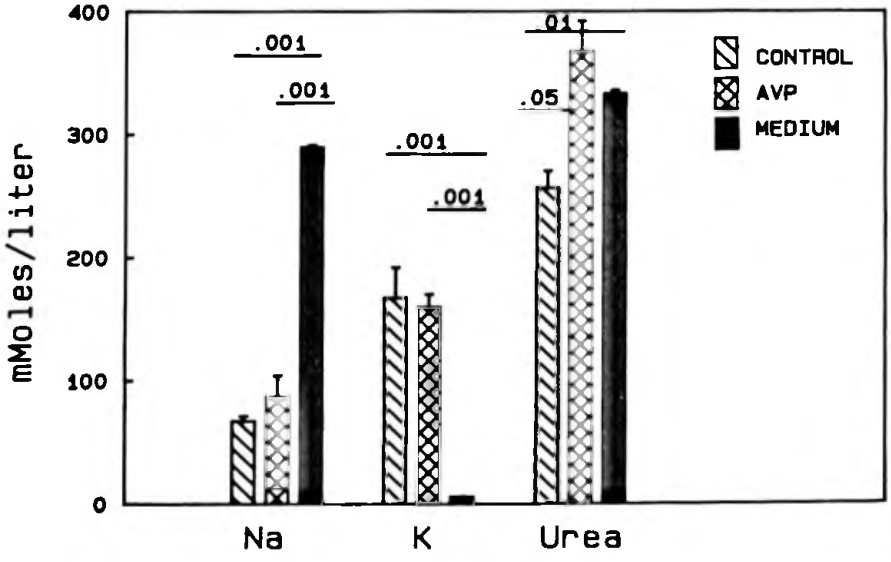

Figure 1. Steady state solute concentrations (Mean + S.E.; n = 4) in RPCT acclimated to a high Na - high urea medium (Control), in RPCT subsequently exposed to arginine vasopressin at 10^{-6} M (AVP), and in the acclimation medium (Medium). Significance bars begin and end at values significantly different from each other ($P < 0.05 - 0.001$).