82

4498

CORRECTION OF BLUNTED RENAL INTERSTITIAL HYDROSTATIC PRESSURE INCREASE DURING VOLUME EXPANSION RESTORES THE NATRIURETIC RESPONSE IN THE PIGLET. Michael J. Solhaug, Michele Wallace and [1]Joey P. Granger. Departments of Pediatrics and Physiology, Eastern Virginia Medical School, Norfolk, Va and [1]University of Mississippi Medical Center, Jackson, MS.

We previously reported the blunted natriuretic response to an acute saline volume expansion (VE) in the developing piglet (P) was associated with an attenuated renal hydrostatic pressure response (RIHP) as compared to the adult pig (A). To determine the quantitative role of RIHP in mediating the blunted natriuresis of VE in P, the attenuated RIHP response in P was corrected by intrarenal infusion of acetylcholine (ACh) at a rate to increase RIHP to A response levels during VE. 5% VE in A resulted in significant increases in sodium excretion, Δ5.0±1.4 mEq/min/gkv, and in RIHP, Δ3.3±81 mmHg. In comparison in P the natriuretic, Δ1.3±0.3 mEq/kg/gkv and RIHP, Δ1.3±0.6 mmHg, responses to VE were significantly attenuated. Correction of the RIHP response, Δ6.0±.9 mmHg, to VE in P by intrarenal infusion of acetylcholine restored the natriuretic response, Δ4.5±.9 mEq/min/gkv. Summary: The blunted natriuresis to VE in the the P is associated with an attenuated increase in RIHP. Correction of this abnormal RIHP response by intrarenal infusion of acetylcholine restores the natriuretic effect of VE in the the P. Conclusion: The blunted RIHP increase during VE plays an important role in mediating the abnormal natriuretic response to VE in the developing piglet.

4499

HYPOTHALAMIC ENDOTHELIN: PRESENCE AND SITE OF ACTION. V.K. Hansen, K.D. Skala and P.-L.S.Huang. Univ. of MO. Sch. of Med., Columbia, MO 65212.

Endothelin-3-like immunoreactivity (ET-3ir) was detected by RIA in extracts of rat median eminence (20.8±3.3 ng/mg prot, n=7), neurointermediate lobe (5.6±1.8), anterior pituitary gland (4.1±0.9), and abdominal aorta (0.35±0.04) but not caudate nucleus or cerebral cortex. Dose response RIA curves parallel to those using synthetic ET-3 could be constructed and ET-3ir comigrated on C-8 HPLC with synthetic peptide. ET-1 ir was less abundant in all but aortic extracts, not detectable in pituitary extracts, yet present in extracts of hypothalamus, cerebral cortex and caudate nucleus. ETir-positive neurons were localized by immunohistochemistry in the anterior commissural nuclei, magnocellular paraventricular and supraoptic nuclei, and arcuate nucleus. ETir-positive cells were present in the pituitary gland (anterior and intermediate lobes) and fibers observed in the SFO, ME and neural lobe. Central administration of ET-3 (11.4 and 22.8 pmole) resulted in dose-related inhibition of stimulated water drinking and pretreatment of rats with antiET antiserum resulted in a significant, exaggerated drinking response to central administration of 25 pmole A II. Significant, dose-related increases in plasma AVP and OT concentrations were also observed. Food intake was not affected by these doses of ET-3. These results suggest that ET-3 is not only present in the brain but also exerts effects within the CNS to modulate the central control of fluid and electrolyte homeostasis.

4500

VASCULAR UPTAKE OF REHYDRATION FLUIDS IN RESTING HYPOHYDRATED MEN. J. E. GREENLEAF, G. GEELEN, J.-L. SAUMET, L.T. JUHOS, J.C. KEIL, D. FEGAN MEYER AND J.H. WHITTAM. Laboratory for Human Environmental Physiology, Life Science Division, NASA,Ames Research Center, Moffett Field, CA 94035-1000.

The purpose was to provide baseline data for the formulation of optimal hyperhydration and rehydration fluids for astronauts prior to reentry and extravehicular activity (EVA). Changes in plasma volume (PV), and electrolyte protein concentrations and contents were measured in 5 men (23-41 yr, 178 ± SE 2 cm, 78.00 ± 3.64 kg, 1.95 ± 0.05 m^2 and dehydrated for 24 hr) while sitting for 70 min after consuming each of 6 fluids (12 ml/kg). The fluids were (a) tap water + aspartame (30 mOsm/kg), (b) 19.6 mEq/l NaCl + asp. (70 mOsm/kg), (c) 157 mEq/l NaCl-NaCitrate + asp. (320 mOsm/kg), (d) 19.6 mEq/l NaCl + 9.7 % glucose (650 mOsm/kg), and two commercial drinks - (e) P (380 mOsm/kg) and (f) PS (390 mOsm/kg) - containing various carbohydrates and electrolytes. Plasma volume change after drinking ranged from -3.8% (P<0.05) at 3 min to +7.6% (P<0.05) at 70 min. Plasma volume decreased (P<0.05) during the initial 9 min with drinks b, d, and e and was unchanged with a, c and f. At 70 min PV changed by +1.1% to 1.5% (NS, like water) with drinks a, b, and d; and increased (P<0.05) by 3.1% (drink f), by 4.6% (drink e), and by +7.6% (drink c). Thus, fluids containing sodium compounds near isotonic concentrations seem better than more dilute solutions for restoring and increasing plasma volume in resting hypohydrated men. Supported by NASA Task 199-18-12-07.

4501

HORMONAL CHANGES DURING THE LONG-TERM (48 hour) RENAL RESPONSE TO AN ACUTE SALINE INFUSION IN MAN.
C. Drummer, M. Heer, P. Norsk, L. Rocker, F. Strollo and R. Gerzer (SPON: K.L. Goetz). Med. Klin. Univ. Munchen, FRG; DLR, Cologne, FRG; DAMEC, Copenhagen, DK; Physiol. Inst. Univ. Berlin, FRG; INRCA, Rome, Italy.

We studied water and sodium homeostasis in six healthy men who remained recumbent during 9 days. Urinary excretion of water and electrolytes and plasma levels of volume-regulating hormones (vasopressin, atrial natriuretic peptide, renin-aldosterone, catecholamines, steroids) were determined under resting conditions (circadian rhythms). In addition, these variables along with urodilatin, a newly described kidney-derived natriuretic peptide, were measured during a 48 hour period following an isotonic saline infusion (2 liters within 25 minutes) and during a control experiment without infusion. *RESULTS:* Urine flow and urinary electrolyte excretion increased significantly during the two days after infusion. Maximal elevations of excretion rates occurred between 3 and 14 hours post-infusion. Body weights as well as water and sodium balances confirmed that the volunteers required about two days to excrete the infused salt and water. Plasma vasopressin and atrial natriuretic peptide levels were almost unaffected following infusion. A long-term suppression of plasma catecholamines and of the renin-aldosterone system was observed. Urinary excretion of urodilatin increased more than three-fold; its pattern of excretion closely paralleled that of sodium excretion. Regression analysis suggests that urodilatin and to a minor degree the renin-aldosterone system and cortisol participate in the long-term natriuretic response to an acute saline infusion. Other hormones were not correlated with water and electrolyte excretion. *Supported by ESA and BMFT*

4502

BENEFITS OF PUMP-DRIVEN HEMOFILTRATION FOR ACUTE RENAL FAILURE. A COMPARATIVE STUDY.
M. Storck, W.H. Hartl, B. Kirchdorfer, D. Inthorn (SPON: R.R.Wolfe) Dept. of Surgery, LM University Munich, FRG

Postoperative acute renal failure (ARF) combined with multiple organ failure (MOF) is associated with a high mortality rate. Several modalities of hemofiltration therapy are available today, including spontaneous (CAVH) or pump-driven (PDHF) hemofiltration. The objective of this study was to compare CAVH and PDHF to evaluate the therapeutic potential of these modalities. 116 patients (mean age 58±1.8 years) with postoperative ARF in combination with multiple organ failure were included in this study and were treated either by CAVH or PDHF. There were no significant differences in both groups regarding age, MOF degree or cause of ARF. (*=p<0.05 CAVH vs. PDHF)

Results:	n	daily ultrafiltrate (l/d)	survival rate (%)
CAVH	48	7.0±0.4 *	12.5 *
PDHF	68	15.6±1.9	29.4

The use of PDHF allows the production of larger ultrafiltrate volumes and is associated with an improved survival rate. This effect may be due to better fluid management and accelerated elimination of toxic mediators of organ failure.

THE FASEB JOURNAL

Official Publication of the Federation of American Societies for Experimental Biology

APS ASBMB ASPET AAP AIN AAI ASCB

75th Annual Meeting Atlanta, Georgia
April 21–25, 1991

ABSTRACTS

PART II

Abstracts 3172–6298

Volume 5, Number 5