eventually found). Arterial plasma NA was 6.4 ± 2.3 nmol/l; the arterial AD was 1.03 ± 0.46 nmol/l. In the arterial vein, these concentrations were greater by 7.1 ± 3.4 nmol/l and 45.3 ± 12.2 nmol/l respectively. Hepatic and renal venous AD concentrations were much lower, by 0.61 ± 0.23 nmol/l and 0.67 ± 0.12 nmol/l; for NA, the hepatic a–v difference was 5.3 ± 1.9 nmol/l, but the renal a–v difference was only 0.52 ± 0.31 nmol/l. The NA and AD differences across the forearm were both small: 1.1 ± 0.52 nmol/l and 0.23 ± 0.21 nmol/l.

These results suggest that arterial medullary secretion makes little contribution to plasma NA. In contrast, a significant renal contribution may be masked by high renal clearance. In the forearm, plasma NA appears to be little affected by local clearance or release.

59. COMPARISON OF RENIN RESPONSE TO ORTHOSTASIS AND SUBMAXIMAL EXERCISE IN MAN

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Increased renin release in response to orthostasis and physical exercise in man is well documented, but the mechanisms of this response are poorly understood. Increased renin sympathetic nerve activity and the fall of plasma volume under these circumstances are probably the two main mechanisms mediating this response. However, their relative physiological importance and indeed their specificity remain uncertain. The purpose of this preliminary study was to investigate the response of plasma renin activity (PRA) to head-up tilt and physical exercise, which had been shown previously to induce a similar change of plasma volume. Five healthy male subjects (aged 18–27 years) volunteered for the study. The subjects were studied during recumbency (60 min), head-up tilt (90 min), post-tilt recumbency (60 min), exercise (30 min) and post-exercise recumbency (30 min). Exercise was performed on a bicycle ergometer at a constant work-load (mean 770 ± 44 kpm). Blood samples were obtained for estimation of PRA, venous packed cell volume, plasma sodium and plasma potassium concentrations at frequent intervals. Heart rate (HR) and blood pressure (BP) were monitored every 5 min.

After 60 min of tilt PRA rose significantly (P < 0.001) from a mean of 1.33 ± 0.07 pmol h⁻¹ ml⁻¹ to a mean maximum of 2.7 ± 0.31 pmol h⁻¹ ml⁻¹ or 103% (range 74–154%) and then declined slightly to 2.54 ± 0.19 pmol h⁻¹ ml⁻¹ and 2.44 ± 0.17 pmol h⁻¹ ml⁻¹ at 75 and 90 min respectively. At these times the mean change of plasma volume (PV) was −12 ± 3%, −15 ± 4% and −16 ± 3% respectively. Although the change of PV had normalized (−2 ± 2%) at the end of the post-tilt recumbency period, mean PRA, 1.95 ± 0.2 pmol h⁻¹ ml⁻¹, was still significantly greater (P < 0.05) than the pre-tilt value. At the end of exercise mean PRA increased to a maximum of 4.81 ± 0.45 pmol h⁻¹ ml⁻¹ when PV fell by 19 ± 5%. In the post-exercise recumbency period PRA fell to 3.87 ± 0.54 pmol h⁻¹ ml⁻¹ and to 2.99 ± 0.36 pmol h⁻¹ ml⁻¹ at 15 and 30 min respectively, but this was still significantly greater (P < 0.05) than the pre-exercise value. Despite a similar change of PRA during the tilt and exercise studies, maximum PRA response to exercise (+263 ± 31%) was significantly greater (P < 0.005) than that achieved during the tilt (+103 ± 13%). During exercise mean systolic blood pressure rose from 114 ± 4 mmHg to 144 ± 8 mmHg and the diastolic blood pressure fell from 75 ± 3 mmHg to 54 ± 6 mmHg, but there was no significant change of either pressure during the tilt. Mean arterial pressure (diastolic pressure + 1/3 pulse pressure) did not change significantly in the two studies. The other relevant variable that changed during exercise was mean plasma potassium concentration, which increased slightly but insignificantly from 4.3 ± 0.23 mmol/l to a maximum of 4.8 ± 0.35 mmol/l. This change, if anything, would be expected to decrease rather than increase renin secretion. The results of this study suggest that the exaggerated PRA response to exercise, as compared with orthostasis, may be mediated by mechanisms additional to the well-documented fall of plasma volume.

60. INCREASED RENAL FUNCTION ASSOCIATED WITH HYPERVOLAEMIA

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Measurements of left atrial pressure (LAP), systemic blood pressure (BP), urine volume, sodium excretion and glomerular filtration rate (GFR) were made in ten anaesthetized adult beagle dogs. Up to 700 ml of blood was removed from each dog during the 2 weeks before the experiment. After a control period, the descending aorta was constricted to reduce the mean BP to approximately 110 mmHg, and subsequently to 90 mmHg, when urine volume fell by a significant amount. After a further control period, the blood was infused at such a rate to produce a controlled rise in left atrial pressure. After the infusion the aortic constriction was reapplied in a similar fashion.

As left atrial pressure rose from 2 to 6 mmHg, a significant rise (P < 0.01) occurred in GFR from 62 ± 6 to 95 ± 15 ml/min. This coincided with a significant increase in sodium excretion from 16 ± 3 to 62 ± 13 mmol/min (P < 0.01), and in urinary volume from 0.16 ± 0.02 to 0.45 ± 0.08 ml/min (P < 0.01). As the LAP further rose to 11 ± 1 mmHg, no further increase in GFR occurred, although a further significant increase (P > 0.01) in sodium excretion to 206 ± 33 mmol/min, and in urinary volume (P > 0.01) to 1.2 ± 0.2 ml/min, was seen. In five dogs a further increase in LAP to 16 ± 1.3 mmHg produced no further significant changes in renal function.

The reappearance of moderate aortic constriction also produced no further significant change in renal function. However, severe aortic constriction reduced the GFR to below control values, although sodium excretion remained six times higher, and urine volume more than three times higher.

It is concluded that acute elevation of left atrial pressure is associated with a rapid increase in GFR, presumably secondary to an increase in renal blood flow. Subsequently, a large rise in sodium excretion occurs, which is partially maintained when GFR is reduced. This latter finding is compatible with the presence of a natriuretic hormone. It seems that the changes in GFR and sodium excretion are independent.

61. MONOCYTES OR POLYMORPHONUCLEAR LEUCOCYTES: WHICH ARE THE MORE DAMAGING IN GLOMERULONEPHRITIS?

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Human polymorphonuclear (PMN) leucocytes and human peripheral monocytes both contain neutral proteinase activity. While the PMN leucocyte proteinases have been well characterized and shown largely to consist of elastase and cathespins G, little is known about the properties of the monocyte neutral proteinase(s). In view of the increasing literature on a role for monocyte/macrophages in the pathogenesis of glomerulonephritis (GNP), as well as their participation in other renal diseases, we have investigated the properties of the neutral proteinases found in human peripheral blood monocytes. Also we have compared the ability of monocyte lysates with that of PMN leucocyte granules to degrade glomerular basement membrane (GBM).

Monocytes were isolated by the method of Summers et al. (1975, *British Journal of Haematology*, 30, 425) and lysates prepared by sonication in a salt/detergent mixture. Monocytes on a cell to cell basis have a much lower total neutral proteinase content as measured against azocasein (monocyte/PMN