in close connection with epithelial cells[7]. The present results suggest that VIP immunoreactive fibers in the gut lamina propria are sensitive to membrane depolarization induced by VER and BTX and not sensitive to K^+ depolarization. This is different from what has been reported for the release of various neuropeptides in the CNS. In the case of VIP for instance, K^+, VER and BTX have been shown to induce the release of VIP from nerve endings of the cortex and amygdala[5]. The present data suggest that the release of a neuropeptide such as VIP, found both in the CNS and in the gut may by regulated by different mechanisms possibly involving various ionic channels. In the gut, it seems that VIP release is more sensitive to sodium than calcium ions since the effects of VER and BTX are known to act through sodium channels[5,9], whereas potassium involves calcium-dependent channels[5,10,11]. Further experiments are necessary to test whether VIP can be released under different physiological conditions in the CNS and in the gut.

1 This work was supported by INSERM CRL 79.5.236.4.
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0014-4754/83/070732-02$1.50 + 0.20/0

Location of dopamine stores in rat kidney[1]

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Summary. In normotensive and genetically hypertensive Wistar rats, chronic renal denervation reduces renal cortical levels of noradrenaline and dopamine by more than 90%. Non-neural stores of renal dopamine are therefore small or absent.

Dopamine (DA) is known to increase renal blood flow and to produce natriuresis, through actions on intrarenal DA receptors[2], and there is currently considerable interest in the possibility that endogenous DA of renal origin may play a physiological role in the kidney[3-5].

A major difficulty in determining the status of DA as a regulator of renal function is the discrimination between DA released from intrarenal sites and DA synthesized or deconjugated from plasma sources during its passage through the kidney. One prerequisite for such distinction is knowing the quantity and location of intrarenal DA stores. The present investigation is concerned with determination of whether, in the rat, non-neuronal stores of DA exist in the renal cortex. In view of recent proposals that renal activity of catecholamines may be implicated in the development of high blood pressure in rats with genetic hypertension[6-9] the results have been compared for a strain of normotensive and a closely related strain of genetically hypertensive animals.

Materials and methods. The rats used were F8-F9 adult male descendants of breeding stock obtained from the Otago Medical School, and which represented pure Wistar lines of normotensive and genetically related spontaneously hypertensive animals[10]. Both strains were maintained by sibling matings within each generation. They were fed a proprietary rat chow diet (quoted Na content 0.5%) and allowed access to water ad libitum.

Renal denervation was accomplished via a flank incision under sodium pentobarbitone anesthesia (30 mg/kg i.p.) by swabbing the left renal artery and vein with 3% phenol in absolute alcohol. Antibiotic powder was dusted into the abdominal cavity, and the incision was closed with muscle sutures and skin Michel clips. 6-7 days was allowed after operation for full neural degeneration to occur. No histological examinations were performed, but on macroscopic inspection both the denervated and the contralateral control kidneys appeared similar in size, texture and vascularity.

Kidneys were removed from animals killed by cervical dislocation, and the cortical tissue was quickly dissected away from the medulla and chilled. After blotting on filter paper, the samples were weighed, minced and placed in ice-cold 0.1 M perchloric acid containing 3×10^{-5} M EDTA, 10^{-4} M sodium metabisulphite and α-methyl dopamine as internal standard. Catecholamines were extracted with alumina, separated using high pressure liquid chromatography on cation-exchange resin and assayed by oxidative electrochemistry. The details of these procedures and the sensitivity and reproducibility of the assay have been reported previously[11,12].

Results and discussion. Renal cortical contents of catecholamines in normotensive rats were: NA 148 ± 13 ng/g (mean $\pm$ SEM), DA 7.6 ± 2.0 ng/g ($n = 14$), values which were very similar to those reported previously for a Sprague-Dawley strain[11]. Adrenaline was usually below the limits of detectibility (100-150 pg/g).

In renal cortices of a series of genetically hypertensive rats, contents were NA 177 ± 10 ng/g, DA 7.0 ± 2.9 ng/g ($n = 10$). Neither the absolute concentration of amines or the ratio between them were significantly different when normotensive and hypertensive populations were compared using a 2-tailed Student's t-test ($0.05 > p < 0.1$). Several recent studies have reported that renal denervation delays the development of high blood pressure in both the Kyoto and the Otago strains of genetically hypertensive rat[6-8], while a further study has presented evidence for increased numbers

of dopamine receptors in kidneys of the Kyoto rats relative to those of normotensive animals[9]. Such observations could be related to changes in renal responses to catecholamines, or to changes of catecholamine release or turnover. The present results do not provide information on the kinetics of the situation, but they do indicate that, at least in the Otago strain, there is no obvious abnormality of tissue storage for either NA or DA.

Cuche and Liard[6] reported that bilateral denervation of the kidneys in juvenile SHR rats caused substantial reduction in tissue levels of all catecholamines, although precise values for DA were not given. In the present experiments, unilateral renal denervation in a 2nd series of 6 normotensive and 3 hypertensive adult rats affected tissue contents of NA and DA to very similar extents, the mean amounts remaining after denervation being respectively $8.1 \pm 1.9\%$ (NA) and $8.1 \pm 2.0\%$ (DA) of the amounts in the contralateral control kidneys. In 1 additional normotensive animal, NA content was reduced by 87% but DA remained similar to that in the control kidney. Amine levels in the control kidneys of this series were similar to those of unoperated animals.

The correlations observed in both man and animals between sodium balance and renal clearance of DA have led to suggestions that DA may constitute an intrarenal natriuretic factor[3,13,14]. Several recent studies have been concerned with differentiation between DA extracted by the kidney from arterial plasma and that produced within the kidney[14,18]. Intrarenally produced DA could represent the local metabolism of l-DOPA[15,16], or release from intrarenal chromaffin cells[21]. Such multiple possible sources for urinary and venous effluent DA complicate any analysis of intrarenal DA handling. The present results indicate that in the rat kidney virtually all of the endogenous DA is associated with the extrinsic renal nerve supply. Significant DA release from intrarenal chromaffin cells is therefore unlikely, and any DA of intrarenal origin which is not due to tubular metabolism of l-DOPA is likely to be due to release from the renal nerves. While this study was being prepared for publication, another report appeared in the literature in which similar results were obtained following surgical denervation in normotensive, Sprague-Dawley rats[22].

1 This work was supported by the National Heart Foundation of Australia, the National Health and Medical Research Council of Australia and the University of Melbourne. I wish to thank K. Mather and T. Harris for able technical assistance.

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0014-4754/83/070733-02$1.50 + 0.20/0

Parallel increase of ascorbic acid and glutathione contents in brown adipose tissue during chronic cold exposure

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Summary. Spontaneous lipid peroxidation rate was found unchanged in the brown adipose tissue of rats chronically exposed to cold, although oxidative metabolism, ascorbic acid and poly-unsaturated phospholipid amounts increased. It is suggested that the concomitant increase in glutathione concentration may protect the tissue from a possible peroxidative process.

Brown adipose tissue (BAT) is a tissue specialized for thermogenesis. In rats, chronic cold exposure induces several metabolic and biochemical changes in BAT (review in Barnard et al.[1]). Some of these suggest a role for glutathione in BAT response to cold: the increase of the oxidative metabolism in order to produce heat, the development of the tissue which requires an intense protein synthesis and the increase of unsaturation in the fatty acids of its total and mitochondrial phospholipids.

Glutathione is a component of the aminoacid transport system across membranes[2]. This peptide, through the activation of the glutathione peroxidase, also protects cells against the peroxidation of unsaturated lipids which can occur in tissue exhibiting an active oxidative metabolism[3]. It is known that a decrease of the glutathione level in a tissue leads to an increase of lipid peroxidation and thus to membrane damage and cell lysis[4,5].

Furthermore, the ascorbic acid concentration is increased