EDITORIAL

KIDNEY—AN ENDOCRINE ORGAN

To the long list of homeostatic and metabolic functions of the kidney may now be added certain attributes which qualify this organ for the status of an endocrine gland. The relationship between the kidney and endocrinology has long been recognised primarily in the role of the former in metabolism of hormones. However, with the availability of radioimmunoassay methods for the measurement of various hormones, the kidney itself has become firmly established as the source of certain clinically important hormones, an endocrine gland complete with feedback regulation. and checks.

A recent striking finding, in this respect, is the discovery that the kidney produces the active principle that mediates the biological actions of vitamin D. This substance, 1,25-dihydroxy-chole-calciferol, is actually derived from native vitamin D (after the latter has been converted to 25-hydroxycholecalciferol in the liver). This discovery has revolutionised our concept on the vitamin D "resistant" state in uraemia. The inability of the severely and diffusely diseased kidney to produce sufficient 1,25-dihyroxy-cholecalciferol is not difficult to see and the therapeutic implications are clear, although it must be added that this does not seem to apply with equal force to the vitamin D resistance of renal tubular disorders. Hypocalcaemia stimulates and hypercalcaemia suppresses the production of this renal hormone, a mode of regulation very similar to that of the parathyroid glands.

In the domain of salt and water metabolism and hypertension, the kidney produces two important hormones: renin and prostaglandin. The story of renin is as old as the study of hypertension itself. The control of renin production by the juxtaglomerular apparatus, renin's intimate involvement in the pathogenesis of hypertension of renal origin and its central regulatory role in salt and water balance—all these have been subjects of intensive clinical and laboratory research yield-

ing useful clinical information, and advancing our diagnostic and therapeutic capabilities, especially in the management of renovascular hypertension. True to endocrinology, hypersecretion by a tumour of the 'gland' has been documented—tumour of the juxtaglomerular apparatus producing excessive renin and presenting as hypertension, while hyperplasia with increased secretion is well-established in the condition known as Bartter's syndrome.

Prostaglandin is a relatively new comer. The renal medulla appears to be the site of production of two prostaglandins, A_2 and E_2 (PGA_2 and PGE_2) which were initially known as "medullin". These "hormones" have antihypertensive properties, acting directly on smooth muscles and causing arteriolar dilatation, especially of the splanchnic vasculature. They have also been shown to increase urinary salt and water excretion, to reduce sympathetic tone and to diminish the activity of the renin-angiotensin system. It is little wonder that catecholamines and angiotensin I and II stimulate the production of the prostaglandins in the kidney. The precise role of these prostaglandins in the pathogenesis of hypertension is yet to be established. PGA_2, unlike PGE_2 does not become degraded in the lung and could thus circulate as an anti-hypertensive hormone. Low salt diet has been shown to cause a rise in PGA_2, which would partly account for the benefit of the diet in hypertension. A case has been described in which PGA_2-secreting renal tumour was associated with a rise in plasma PGA_2 and a fall in blood pressure in a previously hypertension patient. Removal of the tumour resulted in a return of blood pressure to elevated levels and a concomitant fall in PGA_2. Clearly the therapeutic application of the anti-hypertensive property of PGA_2 is an exciting possibility and this deserves to be actively pursued.

The kidney by producing erythropoietin in response to hypoxaemia exerts a specific stimu-

latory influence on erythropoiesis. It is the body's chief source of this important hormone. The exact location of the "hypoxic sensor" in the kidney is still to be defined but any condition that compromises the supply of oxygen to the kidney can give rise to excessive erythropoietin production leading to polycythaemia. As expected, ischaemic renal lesions with polycythaemia have been reported. Renal neoplasms, cysts, hydronephrosis and incipient renal transplant rejection may induce renal hypoxia by virtue of increased tissue pressure, and instances of association with polycythaemia have been documented. On the other hand, with diffuse severe disease of the renal parenchyma, diminished production of erythropoietin is to be expected and this largely accounts for the severe anaemia characteristically found in chronic uraemia.

The kidney of course exerts enormous influence on a host of other endocrine glands. This becomes obvious when the organ fails. Derangement of the parathyroid, the thyroid, the adrenal cortex and B cells of the pancreas are features of uraemia. The kidney indeed occupies an important place in endocrinology and much research remains to be done in renal endocrinology.