Role of Prostaglandins in the Autoregulation of GFR during Postural Stress

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Dear Sir,

It is believed that renal prostaglandins serve to mitigate the increase in renal vascular resistance produced by enhanced angiotensin II production when the blood pressure and effective arterial blood volume are threatened, e.g. anaesthesia, volume depletion, haemorrhage and low-output heart failure. Inhibition of prostaglandin synthesis in normal (unanaesthetised) animals and humans does not induce any significant decline in renal function [1]. The present study reveals a marked decrease in creatinine clearance after indomethacin administration in human subjects exposed to postural stress.

In twenty young, healthy adult males, aged 25–30 years, with no evidence of renal or cardiovascular disease, three 1-hour clearance studies were made with the subjects assuming the supine posture during the first and the third clearance periods and the standing posture during the second. While standing, the subjects were allowed to walk about within the laboratory if they wished to. Plasma and urinary creatinine were estimated by the Jaffe reaction. The procedure was repeated after administration of indomethacin, 75 mg/day for 10 days. The data were analysed by the paired t test.

The change from the supine to the erect posture produced about a 10% decline ($p < 0.001$) in creatinine clearance under basal conditions and a 40% reduction after indomethacin administration (fig. 1). Even in supine posture, creatinine clearance value after indomethacin administration was 16% less ($p < 0.001$) than the basal value.

Forty percent reduction in creatinine clearance in indomethacin-administered normal subjects during postural stress demonstrates the involvement of renal prostaglandins in the autoregulation of GFR even under physiological conditions. Assumption of erect posture results in increased renin production as well as a widespread vasomotor discharge leading to vasoconstriction in the splanchnic region including renal vessels. Under

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Fig. 1. Creatinine clearance during supine (S) and erect (E) posture before and after administration of indomethacin. · = Basal; O = after indomethacin.

these conditions, maintenance of normal GFR may be due to the protective vasodilator action of renal prostaglandins. It has been shown that renal nerve stimulation or injection of angiotensin II or norepinephrine causes minimal renal vasoconstriction when prostaglandin synthesis is intact but produces marked renal ischemia when a prostaglandin synthesis inhibitor is administered concurrently [2].

References

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