Activation of the Sympathetic Nervous System in Hemodialyzed Patients Treated with Erythropoietin

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Table 1. Mean blood pressure values and vasoactive substances levels in 9 patients with chronic renal failure before and after treatment with erythropoietin

Mean $\pm$ SE. * $p < 0.01$, 90 days vs. basal. Normal values were obtained from 10-age-matched normal subjects. MBP = Mean blood pressure; ET = plasma endothelin; PRA = plasma renin activity; DE = free dopamine; NE = free norepinephrine; E = free epinephrine.

Dear Sir,

An increase in systemic vascular resistance occurs in all patients with renal failure treated with erythropoietin, whether blood pressure increases or not. This is largely due to increased blood viscosity and reversal of hypoxic vasodilatation, but other factors, such as activation of effector neurohumoral systems, may also contribute [1]. We have studied the effect of erythropoietin on the sympathetic nervous system based on serial determinations of plasma free catecholamines.

Nine non-nephrectomized patients undergoing long-term maintenance hemodialysis and treated with erythropoietin were studied. We have measured mean blood pressure, hematocrit, plasma endothelin, plasma renin activity, free dopamine, free norepinephrine and free epinephrine before and at 7, 14, 30 and 90 days during treatment with erythropoietin. Erythropoietin was administered intravenously after dialysis; the starting dose was 40 U/kg body weight.

Hematocrit increased significantly at 15 days of treatment (basal hematocrit 23.6 ± 0.5 vs. $25.8 \pm 0.8\%$ at 15 days; $p < 0.05$). Hematocrit was $29.7 \pm 0.5\%$ at 90 days of treatment with erythropoietin. Mean blood pressure values and levels of vasoactive substances are given in table 1. All our patients had undetectable basal free dopamine concentrations. Basal free norepinephrine levels were elevated. We have detected an increase in free dopamine levels and in free norepinephrine levels associated with treatment with erythropoietin.

Our results suggest that treatment with erythropoietin was associated with dopaminergic and noradrenergic sympathetic activation. Dopamine has vasodilating properties (direct dopaminomimetic and indirect norepinephrine release suppressing activity). In essential hypertension, it has been proposed that the initially increased dopaminergic activity in borderline hypertensive patients may represent an early antihypertensive 'defense' response opposing the actions of vasoconstrictors such as norepinephrine and others [2]. Further

studies are needed to elucidate whether dopaminergic and noradrenergic responses in hemodialysis patients treated with erythropoietin are pathophysiologically related and their role as factors influencing systemic vascular resistance.

References

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