platelet granular contents pointing to membrane–platelet adhesion and/or aggregation. We confirmed reports [4,5] that this protein was elevated before dialysis and rose further during haemodialysis when cuprophan membranes were used. Seyfert et al. [6] showed higher β-TG levels for cuprophan as compared to PAN (AN69). In this study plasma TxB2, the stable metabolite of TxA2, was quantified in blood entering and leaving the dialysers to assess TxA2 generation during platelet–dialyser membrane interaction. Plasma TxB2 levels rose during haemodialysis, indicating generation of TxA2. We demonstrated significant transient thrombocytopenia during haemodialysis with cuprophan membranes associated with a rise in plasma TxB2 levels. The time course mirrored the decrease in platelet counts. Moreover, the interaction of blood with cuprophan leads to a rapid and massive complement activation with leukopenia [7]. In the present study WBC count declined significantly at 15 min and this fall in WBC did coincide with the change in C3 and C4 levels. The changes in 6-keto PGF1α levels indicate that the cuprophan membrane induces alterations in blood components that lead to stimulation of PGE2 production by patient vascular endothelial cells that occurred during haemodialysis.

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**Tacrolimus can resolve cyclosporin-induced gingival hyperplasia**

Sir,

Gingival hyperplasia is a well recognized potentially serious side-effect of cyclosporin therapy occurring in up to 30% of kidney transplant recipients treated with cyclosporin-based immunosuppressive regimens [1]. Poor oral hygiene, dental appliances and concomitant administration of dihydropropyridine calcium channel antagonists or phenytoin augment the hyperplastic reaction to cyclosporin [2]. The macrolide antibiotic azithromycin has been shown to partially reverse cyclosporin-induced gingival hyperplasia [3]. Tacrolimus is an alternative immunosuppressive agent to cyclosporin, having a similar mode of action on T-cell function. Gingival hyperplasia has been described rarely in patients treated with primary tacrolimus therapy [4]. A switch of immunosuppres-

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**Fig. 1.** Marked gingival hyperplasia (Patient A) before conversion from cyclosporin to tacrolimus.

**Fig. 2.** Moderate reversal of gingival hyperplasia 3 months after conversion to tacrolimus.
solone, azathioprine and cyclosporin (Sandimmune: Sandoz) with conversion to cyclosporin (Neoral: Novartis) in April 1996. Worsening gum hyperplasia was recognized in 1997 and total dental clearance combined with gingivectomy was advocated. Conversion from cyclosporin to tacrolimus was performed in January 1998; there has been a progressive regression of the gum hyperplasia over the ensuing months avert the necessity for dental surgery. Allograft function remained unchanged during the 12 month period following conversion to tacrolimus in both cases.

Severe cyclosporin-induced gingival hyperplasia causes significant morbidity and a vicious spiral of worsening dental hygiene accelerating the hyperplasia. The resultant adverse cosmetic appearance may compromise further compliance with cyclosporin therapy and risk the development of chronic graft failure. Tacrolimus is a suitable alternative to cyclosporin and is not associated with gingival hyperplasia in our experience. Conversion from cyclosporin to tacrolimus is clinically safe in patients with stable allograft function and can lead to progressive improvement in the degree of gingival hyperplasia. Our experience would suggest that improvement in gingival hyperplasia can continue for at least 12 months after conversion and may culminate in complete resolution (Patient A). Consequently tacrolimus conversion should be considered in patients with severe gingival hyperplasia requiring recurrent or drastic dental surgery and possibly in patients suspected of non-compliance with cyclosporin for oral cosmetic reasons.

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Clinical appearance of a post-transplant lymphoma following G-CSF therapy

Sir,

Post-transplant lymphoproliferative disorder (PTLD) complicates approximately 1% of renal transplants and commonly manifests either as an infectious mononucleosis-type illness or as a febrile illness with leukopenia or focal organ involvement (gastrointestinal, central nervous system or allograft) [1]. The diagnosis, which can be problematic at times, relies on histologic or cytologic demonstration of an abnormal lymphoid proliferation in biopsy material. We report a case of a renal transplant recipient who experienced prolonged neutropenia without localizing symptoms, signs or radiology and with an initially negative bone marrow examination. The principal clue to an underlying lymphoma was an exaggerated, reversible elevation of plasma lactate dehydrogenase (LDH) following administration of granulocyte-colony stimulating factor (G-CSF).

Case. A 51-year-old woman was incidentally noted at a routine monthly clinic visit to be neutropenic on full blood examination (white cell count $3 \times 10^9/l$, neutrophil count $1.98 \times 10^9/l$, haemoglobin $137 g/l$, platelet count $185 \times 10^9/l$). Fifteen years previously, she underwent cadaveric renal transplantation for end-stage renal failure secondary to reflux nephropathy. Her immunosuppression consisted of prednisolone 5 mg daily and azathioprine 50 mg daily. Physical examination was normal with no evidence of fever, lymphadenopathy, hepatosplenomegaly or other organomegaly. Her plasma creatinine was stable at $0.11 \text{mmol/l}$ and the remainder of her biochemistry (including liver function tests and LDH) was normal. Bone marrow examination revealed adequate granulocytic precursors with occasional mild dysplastic changes, which were attributed to her azathioprine therapy. Following cessation of azathioprine, she remained clinically well over the next 2 months, although her total white cell and neutrophil counts steadily fell to $1.5 \times 10^9/l$ and $0.15 \times 10^9/l$, respectively. She was commenced on G-CSF ($5 \mu g/kg$ body weight by subcutaneous injection 2-3 times a week), which resulted in a modest neutrophil response to an average level of $1.8 \times 10^9/l$. However, her G-CSF injections were closely followed by dramatic increases in LDH, which partially fell following reduction in the frequency and dosage of G-CSF (Figure 1). The changes in LDH concentration were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$). Evaluation of LDH isoenzymes revealed a predominant elevation of LDH-5. Gamma-glutamyl transpeptidase, alkaline phosphatase and creatine kinase concentrations were poorly correlated with changes in WCC ($r^2=0.14$).