examined in that study that might reconcile in some way these results with those from other studies reporting a favourable effect after switching to high-flux dialyzers [2]. It is well known that high-flux dialyzers such as polysulfone and PMMA membranes are more biocompatible and induce less activation of the coagulation cascade and less platelet aggregation in the extracorporeal circuit. So, the incidence of complete dialyzer clotting or even minor blood loss in the dialyzer fibres during the HD sessions is reduced. This may result in less blood loss and subsequently in lesser degree of iron deficiency.

It is noteworthy that in the study by Locatelli et al. the percentage of patients who received iron therapy in the conventional group was higher than in the experimental group not only at baseline, but also during the whole study period [1]. In addition median serum ferritin levels tended to increase in the conventional group (from 222 to 246 ng/ml), but to decrease in the experimental group (from 255 to 226 ng/ml). Although this difference apparently was not statistically significant it might be due to the more intensive iron administration in the conventional group.

We think that if iron administration were equal in both group, there would be a clearer difference of haemoglobin levels in favour of the study group that could not be attributed to the high-flux dialysis per se but to a lesser degree of blood loss with these dialyzers. The same might also apply for the study by Ifudu et al. [2], as these authors also switched the patients from less to more biocompatible dialyzers (polysulfone, Fresenius®), although they also increased delivered dialysis dose. However, in that study no extensive information regarding iron status and iron supplementation was provided.

We agree with Locatelli et al. that there is no direct effect of high-flux dialysis on the anaemia of haemodialysis patients as far as the dialysis dose is adequate in most patients. However, we think that the slight increases of haemoglobin that may be observed after switching from low-flux to high-flux and usually more biocompatible membranes may be due to significantly lower blood losses during the dialysis process with the more biocompatible dialyzers and not due to increased erythropoiesis.

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Reply

Sir,
We were interested in the observations by Fourtoumas et al. about our study ‘Effect of high-flux dialysis on the anaemia of haemodialysis patients’ that showed no difference in the haemoglobin level increase between patients treated with a high-flux biocompatible membrane and those treated with a standard low-flux membrane for 3 months. The suggestion that there may be a beneficial effect of high-flux dialysers on anaemia through less activation of the coagulation cascade and less platelet aggregation in the extra-corporeal circuit (and thus, via minor blood loss in the dialyser fibres during

The impact of dialyzers on the anaemia of haemodialysis patients

Sir,
We have read with interest the study of Locatelli et al. [1] reporting no difference in haemoglobin levels after switching haemodialysis (HD) patients from cellulose low-flux membranes to high-flux dialyzers equipped with synthetic membranes. However, we would like to raise an issue not
the haemodialysis sessions) is interesting, although the primary aim of our study was to investigate whether high-molecular weight erythroid inhibitors, which can only be cleared by means of highly porous membranes and have been found in uraemic serum, might play a role in the anaemia of haemodialysis patients. For this reason, to increase the likelihood that the enrolled patients had high levels of this ‘supposed’ high-molecular weight erythroid inhibitors, we selected only haemodialysis patients with a marked degree of anaemia at baseline (Ht < 30%) and no clinical or laboratory evidence of iron, vitamin B₁₂ or folic acid depletion. Thus, the enrolled patients had high levels of serum ferritin and transferrin saturation at baseline that did not change significantly during the study. Fourtounas et al. attributed clinical relevance to the non-significant variation trend of the median ferritin levels in the two groups (decreasing from 255 to 226 ng/ml in the experimental high-flux membrane group and increasing from 222 to 246 ng/ml in the conventional low-flux cellulose membrane group, \( P = 0.164 \)), although the direction of this change was opposite in direction to the hypothesis made by Fourtounas et al. Given that iron and rHuEpo administration did not change during follow-up, in case of less blood losses with dialysis one would expect follow-up ferritin values to increase in the experimental group (but to decrease in the conventional group). Moreover, percentage transferrin saturation did not show the same pattern as ferritin, increasing significantly during follow-up \( (P = 0.016) \) in a similar fashion in both groups (from 25 to 28% in the conventional treatment group; from 24 to 28% in the high-flux membrane group; \( P = 0.757 \)). This makes the hypothesis of higher blood losses in patients undergoing standard haemodialysis unlikely. Moreover, the conventional group received no more intensive iron administration than the experimental group (median i.v. iron dosages were the same in the two groups, i.e. 62 ng/week); only a higher percentage of patients were treated with i.v. iron \( (77\% \text{ vs } 54\%, \ P = 0.051) \), with similar baseline levels of serum ferritin and percent transferrin saturation.

In conclusion, although the hypothesis suggested by Fourtounas et al. is interesting, we think it can not account for the results of our study.

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