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Reply

Sir,

In a comparative study of two online haemodiafiltration techniques, published in *NDT* [1], we reported that, in mid-dilution HDF, impressive high hydraulic pressures were recorded in the first section of the blood dialyser compartment, where post-dilution takes place. Scepticism on the validity of these findings, recently expressed by Krieter and Canaud in *NDT* [2], lies on the feeling that insufficient anti-coagulation caused partial fibre clotting and compromised the efficiency of our experimental sessions. This may actually occur and, in fact, complete clotting of the blood circuit was reported in a mid-dilution HDF session of the study by Krieter *et al.* [3]. It was not the case in our study, in which the mean activated clotting time ranged between 210% of the basal value after the initial unfractionated heparin bolus and 150% under continuous heparin administration. Inspection of used-up MD-190 dialysers and blood circuits never revealed coagulation. Instead, progressive reduction of the initial infusion rate (10 l/h) was frequently requested to limit the increase in internal pressures and prevent technical accidents. As reported by Krieter *et al.* [3], the same manoeuvre was necessary in 6 out of 30 sessions of their study, due to achievement of the maximum transmembrane pressure (TMP) value (400 mmHg). However, pressures at the different sections of the dialyser were not recorded in this study, which consequently overlooked the inherent risk.

In our opinion, the more likely explanation of the high pressures recorded during mid-dilution HDF is the high re-

sistance to blood entering the post-dilution section of the dialyser, where the overall surface area of the capillaries is relatively low. Progressive haemoconcentration along the fibres and the infusion flow at the middle port of the filter further increase resistance in spite of the pressure drop, caused by ultrafiltration. Very high TMP is set by the machine's volumetric ultrafiltration control in an attempt to achieve the planned ultrafiltration. This hypothesis and our results have been recently confirmed by Santoro *et al.* [4], who reported a mean TMP of about 1000 mmHg in the first post-dilution section of the MD-190 dialysers, even in sessions performed with a substantially lower infusion rate than ours (6 l/h). In this study, the safety of the technique (lower pressures) was ameliorated by reversing the dialyser. The same expedient was used by Krieter and Canaud [2], who employed larger dialysers in addition, according to a suggestion already expressed in our paper. We are happy that our criticism was productive. However, in our opinion, the main remaining drawback of this technique is the absence of an effective feedback control system, as that working in mixed HDF, which limits the negative effects of the excessive TMP by modulating the infusion rate.

Conflict of interest statement. L.A.P. has a temporary consultancy agreement with Fresenius Medical Care, Bad Homburg, Germany.

Department of Nephrology and
Dialysis
Ospedale Bolognini
Seriata, Italy
Via Paderno 21
24068 Seriate

Annalisa Feliciani
Luciano A. Pedrini

E-mail: nefrologia.seriata@bolognini.bg.it

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