Dear Sir,

Microbially contaminated dialysate is a well-known risk in patients undergoing he-modialysis but today seems very infrequent. On the contrary, more attention is to take into consideration for the dialysate pyrogenic substances, or endotoxins, with the introduction of high-flux dialysis (hydraulic and molecular highly permeable membranes, dialysate retrofiltration phenomenon) and especially during hemodiafiltration with on-line dialysate filtration (production from the dialysate of substitution fluid or infusate for hemofiltration) [1].

Many authors have tested the permeability of highly permeable polysulfone membranes for pyrogens, mostly with highly sensitive methods (Limulus amebocyte lysate assay, LAL, or interleukin 1, IL-1) [2-4].

Recently, Frinak et al. [5] have demonstrated the effectiveness of the on-line polysulfone filtration system for the removal of pyrogenic substances from dialysate with high microbial burden. But we feel that this dialysate purification method is only a reduction factor of contamination.

In this way, we have performed a study in vitro with on-line dialysate filtration (fig. 1). The dialysate, in recirculation use, is contaminated by high rates of free endotoxins (lipopolysaccharide preparation, LPS, Escherichia coli 0111 B4 L 4130, Sigma France) to reach a 5,000-ng/ml concentration. On-line hemodiafiltration (infusate for hemofiltration flow rate 100 ml/min) is conducted during 180 min with samples on sites 1 and 2. Each sample (0, 10, 30, 90, 180 min) is analyzed (double determination) by two methods: firstly, the LAL test (sensitivity 0.03 ng/ml; Pyrotel, Ami-labo), secondly, the polyacrylamide electrophoresis technique (sensitivity 25 ng/ml) described by Hitchcock [6].

Dialysate

Fig. 1. In vitro on-line hemodiafiltration. Patient: pyrogen-free physiological serum bag (1,000 ml), flow rate 150 ml/min. Dialysate: recirculation 5,000 ml, flow rate 600 ml/min. \(\text{1,2} = \) Dialysate samples after 1 or 2 polysulfone membrane ultrafiltrations. 

at each time of the study, but a crossing through the membrane was identified by an LAL test at 10 min.
Our results are in contrast to the results of Frinak’s [5] study in which never crossing over for endotoxins was demonstrated in on-line dialysate filtration (double polysulfone filtration). One explanation for these differences could be the type (bacterial contamination of the dialysate with endotoxin release) and the concentration (30-300 ng/ml) of the endotoxin. Our results (Table 1) demonstrate the crossing over 1 polysulfone membrane for endotoxins (site 1) with a highly sensitive method (LAL test) and with a highly specific method (electrophoresis). One filtration allows a progressive reduction in endotoxin concentration. In the same way, a double polysulfone filtration (site 2) achieves a high percentage reduction in the concentration of endotoxins; the samples were below the limit of sensitivity of the electrophoresis technique.

References


Fischbach/Heinrich/Desprez/Düringer On-Line Dialysate Filtration: Endotoxin Removal or Reduction?