PROTEOMIC EVALUATION OF LOW- AND HIGH-FLUX HEMODIALYSIS

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INTRODUCTION:

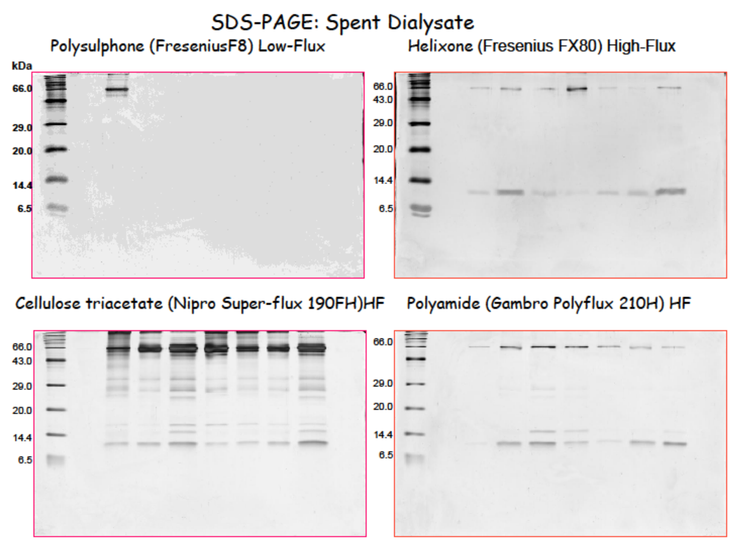
Bicarbonate hemodialysis (HD) is often performed using low flux membranes, while on line hemodiafiltration (HDF) with high flux membranes is used to remove B2 microglobulin (B2M) and middle molecules, using sophisticated dialysis monitors.

METHODS:

A.HD with HF vs LF membranes. Nine patients in HD treatment with LF polysulphone (F8) were treated in comparison with three HF dialyzers (Triacetate: Nipro N190 FH; Helixone: Fresenius FX 80; Polyamid: Gambro Polyflux 210 H) for 1 week with each dialyzer, after an equilibration period of 2 weeks with LF membrane.

B. HD with HF membranes vs HDF. Eight patients in stable HDF treatment were treated using three HF membranes (N190 FH; FX1000; Polyflux 210 H) in standard HD in comparison with on line HDF technique for two weeks.

C. Proteomic analysis. At 30 min after the beginning of the dialysis session a sample of ultrafiltrate fluid was drawn and analyzed by means of biochemical and proteomic techniques. At the end of the dialysis session of 4 hours we assessed the adsorption of proteins on the different dialytic membranes. The proteins in the ultrafiltrates and those eluted from the membranes were analyzed through SDS PAGE, 2DE, and MALDI-TOF.



AIMS of the this study were:

A. To assess the efficiency of HD with high flux membranes (HF) in comparison with standard HD with a low flux (LF) membrane;
B. To evaluate the efficiency of HD with HF membranes in comparison with on-line HDF technique;
C. To assess, by means of proteomics, the convection and the adsorption of proteins with the different membranes.

RESULTS:

A.HD with HF vs LF membranes. The removal of small molecules in the HD technique was similar with HF and LF membranes, while the removal of B2M was high with HF membranes (B2M RR 60-69%) and insignificant with LF membrane. The removal of bigger molecules (myoglobin and BNP) was higher with N190 FH than with the other HF membranes.

B. HD with HF dialyzers vs HDF. A very high removal of small molecules was demonstrated (urea RR 76.2-78.8%), which was similar with all the membranes in both HD and HDF techniques. The removal of B2M was also very high (62-75%) in HDF and similar (60-68%) in HD. B2M removal was significantly higher in HDF vs HD only with Poly210 H. A significant removal of myoglobin, homocysteine and BNP was found with all membranes in HD and HDF.

C. Proteomic analysis. No convection of small proteins (LMWP) was found through LF polysulfone membrane. Polyamid and helixone allowed the convection of B2M and other LMWP. In the ultrafiltrate of triacetate a higher amount of different LMWP was demonstrated. Different concentration of proteins, with different MW, were found in the eluates from the different membranes. In particular, albumin and different LMWP were demonstrated on the inner part and inside the triacetate membrane. Much more than with the other membranes.

CONCLUSIONS:

HD with HF dialyzers could be a cost effective and efficient alternative treatment, simpler and cheaper than HDF on line. Proteomic technology allows a better understanding of clearance through convection and adsorption mechanisms.

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