CHANGES IN COAGULATION FACTORS AND INHIBITORS DURING SIMULATED HD WITH THE NOVEL MEDIUM CUT-OFF HIGH FLUX MEMBRANE

Abstract #SP426

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Background and Introduction

Dialysis membranes and treatment modalities progress towards greater removal of middle to large molecular weight substances. At the same time, retention of functional proteins is of vital importance in the clinical setting. Within that context, we investigated a set of coagulation factors and inhibitors (molecular weight 50 to 71.6 kDa) during in-vitro dialysis with highly permeable dialysis membranes.

Methods

Changes of a set of clotting factors and inhibitors were evaluated for a high-flux dialyzer (PES; Polyflux 210H; 2.1 m^2; Gambro) in HD and high volume HDF treatment, a hemodiafilter (PSu; FX CorDiax 800; 2.0 m^2; Fresenius Medical Care) in high volume HDF, and two high-flux membranes designed to optimize middle molecule removal, slightly different in terms of permeability (MCO 1 and MCO 2; 2.0 m^2; Gambro) in HD (see table 1). In each experiment (n=3), 3.5 L uniform human citrate plasma (octaplas LG, protein conc. 60 g/L) were run for 240 min under simulated treatment at 37°C. Ultrafiltrate volume was substituted with calcium-free dialysate fluid (post-dilution). Samples were taken from the plasma pool at 0, 30, 60, 120, 180, and 240 min., and analyzed for activity (%) of coagulation factors II, VII, and X by electromechanical clot detection, and of inhibitors antithrombin III (AT III) and protein C by colorimetry.

Table 1: Characteristics of the investigated dialyzers as provided by the manufacturer

Devices	Surface area [m^2]	UFC [mL/h*mmHg]
MCO 1	2.0	59
MCO 2	2.0	57
PES	2.1	85
PSu	2.0	62

Results

As depicted in Figures 1 to 5, coagulation factor and inhibitor activities during simulated high volume HDF with PES and PSu showed no or only slight decrease versus start values, and were slightly below those obtained during simulated HD with PES.

Coagulation factor and inhibitor activities during simulated HD with the MCO dialyzers were in the same range as in simulated HDF with PES and PSu. No differences between the two MCO versions were observed.

All values remained well above lower limit of normal ranges (F II: 70-120%; F VII: 50-200%; F X: 70-150%; AT III: 80-120%; Protein C: 70-150%).

Figure 1: Factor II activity (MW 71.6 kDa)

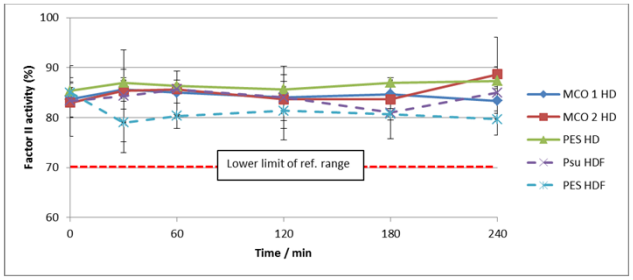


Figure 2: Factor VII activity (MW 50 kDa)

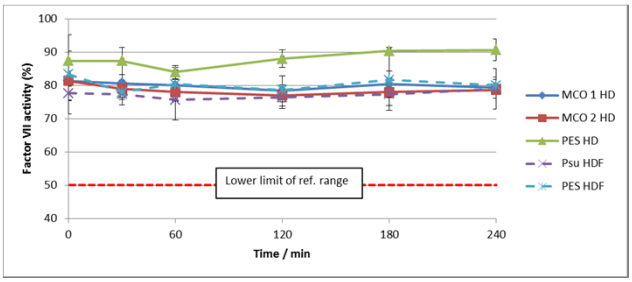


Figure 3: Factor X activity (MW 58.8 kDa)

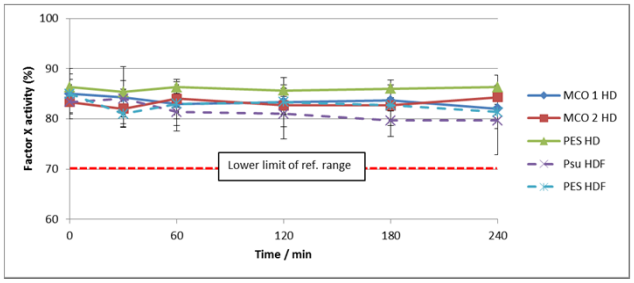


Figure 4: Protein C activity (MW 62 kDa)

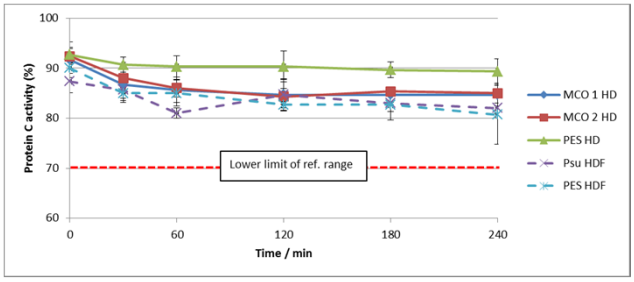
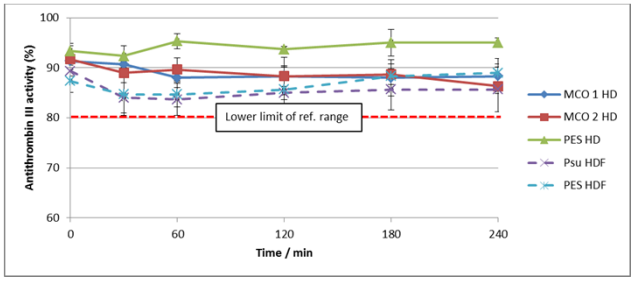


Figure 5: Antithrombin III activity (MW 58 kDa)



Conclusions

During simulated HDF treatments, activity levels of coagulation factors and inhibitors were well preserved. Similarly, the levels during HD treatment with the MCO dialyzers remained within the same range as the HDF treatments. These findings, when combined with the superior performance characteristics found earlier[1], clearly point to enhanced selectivity of the MCO membranes. Based on this, improved HD efficiency, comparable to HDF, is anticipated with clinical use of dialyzers containing the MCO membrane, with no indication that the anticoagulation protocol needs adjustment.

References

1 Boschetti-de-Fierro, A. et al.; Abstract #FP489, 52nd ERA-EDTA Congress, May 28-31, 2015, London

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