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NOVEL HRO (HIGH RETENTION ONSET) MEMBRANES IN LARGER MEDIUM MOLECULES REMOVAL, HOW FAR CAN WE GO?

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INTRODUCTION

Dialysis with high retention onset membranes (HRO) are growing fast during the last years thanks to the availability of an always increasing number of membranes capable of reaching elevated clearance levels of medium molecules without significative loss of albumin. These achievements made HRO membranes an appropriate alternative to mixed diffusive-convective techniques which are frequently limited by clinical (low-performance vascular accesses) or social reasons (costs, availability). However, the term "medium molecules" includes a wide spectrum of molecules with major differences in molecular weight (MW - from 0.5 to 60 KDa). Considering the human serum albumin's (HSA) MW of 64,5 KDa as the insuperable cut-off for avoiding unwanted protein loss, whereas there are many studies about clearance of medium molecules with dimensions below 25-30 KDa, less data are available about those with MW from 40 to up 60 KDa. In this study we evaluated the clearance proprieties of a new HRO membrane (Asahi Kasei's ViE-21X®), compared to hemodiafiltration and to hemodialysis (HD) with a well-known medium cut-off membrane (Baxter's Theranova 400® - Th400), of three medium molecules with increasing MW: free kappa chains (K-FLC 22.5 KDa), free lambda chains (L-FLC 45 KDa) and alpha-1 antitrypsin (A1AT 52-54 KDa) and measured albumin loss amount.

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METHODS

We evaluated twelve patients chronically dialyzed three times a week in our Centre with mixed or post-dilutional hemodiafiltration (HDF) with various membranes. We collected blood samples before and after a common HDF session after short interdialytic period for K-FLC, L-FLC, A1AT and HSA. Then we collected the same data for two more sessions after short interdialytic period conducted only with diffusive techniques, one using Th 400 and another with ViE-21X. For all molecules we evaluated reduction ratio ± standard deviation (RR±SD) while statistical significance ($p<0.05$) was examined with Student's t-test. All data were adjusted by dialysis length, membranes surface area, blood flow rate and ultrafiltration rate avoiding any significant difference.

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RESULTS

ViE-21X demonstrated an increased RR of K and L-FLC compared to HDF and Th 400 even without reaching a statistical significance (38.82±14.53% for K-FLC *vs* 32.36±22.62% and 30.58±24.10% respectively for HDF and Th400; *p=0.10 vs* HDF*, p=0,13 vs* Th 400. 35.63±14.30% for L-FLC *vs* 30.48±22.51% and 29.36±24.91% respectively of HDF and Th 400; *p=0.19 vs* HDF*, p=0,18 vs* Th 400). Both ViE-21X and Th 400 showed higher RR for the largest molecule, A1AT, compared to HDF, reaching statistical significance (24.66±19.98% for ViE-12X and 24.67%±20.15% for Th 400 *vs* 18.46%±21.73% for HDF, *p<0.05* for both). None of the techniques showed a significant loss of albumin, even if Th 400 showed a slightly greater loss compared to HDF and ViE-21X (2.59%±5.40% for HDF, 6.31%±23.61% for Th 400, 2.58%±24.24% for ViE-21X *p=NS*). (Fig.1)

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RESULTS

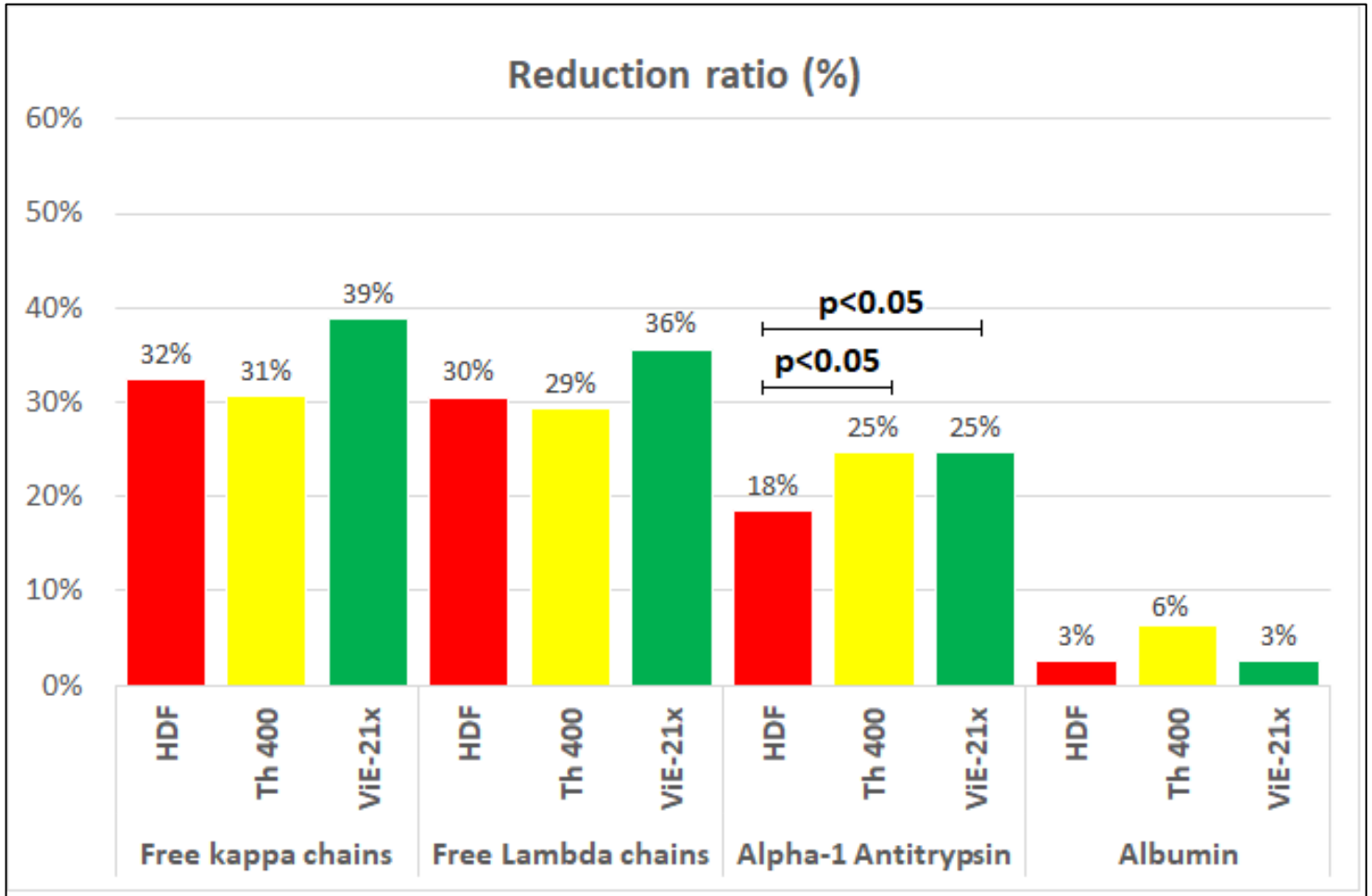

Figure 1

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DISCUSSION

Our data confirm that studied HRO membranes can be an effective alternative to HDF in clearance of medium molecules without any remarkable loss of albumin. Indeed, compared to HDF, they showed non-inferiority clearance levels for K and L-LFC and a statistically significant benefit in clearance of the studied largest one, A1AT, which has a close MW to HSA. Furthermore, according to our data, novel HRO membrane ViE-21X seems to show further benefits compared to other membranes. More studies with larger populations need to be conducted to confirm these data.