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Impact of Enlarged Hollow Fiber Inner Diameter on Serum Albumin Levels in Hemodiafiltration

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Objectives : The inner diameter of hollow fibers during hemodialysis represents a blood-contact microenvironment that may trigger platelet activation and inflammation. Serum albumin (ALB) levels are influenced by inflammation and dialysis-related factors. We conducted this study to investigate whether switching to a hemodiafilter with an enlarged hollow fiber inner diameter (ID) might affect the ALB levels.

Methods : A total of 76 patients at 4 affiliated institutions were switched from MFX-Seco (200 μ m ID) to MFX-SWeco (215 μ m ID) (ID-Expanded group), while 51 patients without membrane switching served as the Control group. Period-specific estimated marginal means and intergroup differences in the ALB (1–12 months) were analyzed using a linear mixed-effects model, using baseline ALB as a covariate. Serum CRP, nPCR, and BMI were compared by analysis of covariance. Albumin loss was measured in 8 patients. The study protocol was approved by the institutional Ethics Review Committee.

Results : The baseline mean ALB levels during the 12 months prior to switching were comparable between the two groups (3.57 vs. 3.58 g/dL, $p=0.74$). A linear mixed-effects model adjusted for the baseline ALB revealed significantly higher serum ALB levels at 1–3 months ($\beta=0.083$, $p<0.001$) and 4–6 months ($\beta=0.052$, $p=0.03$) post switching in the ID-Expanded group, with no significant differences thereafter. No intergroup differences were observed in the serum CRP, nPCR, BMI, or albumin loss. These findings suggest that the early increase in the ALB in the ID-Expanded group was independent of the baseline ALB level and may reflect reduced inflammatory or mechanical stress related to intradialytic hemodynamic changes.

Conclusions : Switching to a hemodiafilter with a larger hollow fiber ID was independently associated with higher ALB levels during the early period after switching, suggesting a potential role of intradialytic hemodynamic modulation.