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Evaluation of Polyvinylpyrrolidone Elution from Polysulfone Dialyzer in an Experimental Circulation Simulating Hemodialysis Therapy

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Objectives : Polyvinylpyrrolidone (PVP) acts as a hydrophilic and pore-opening agent in the polysulfone membrane. However, it is easily eluted from the membrane because it is water soluble. All existing studies evaluated the elution of PVP from dialyzers in experimental models without dialysate flow. Therefore, the objective of this study was to evaluate PVP elution from polysulfone membrane dialyzers in a dialysate-perfused circulation model.

Methods : The study compared a conventional model, in which only the blood side of the dialyzer was circulated (non-dialysis model), with a model in which the blood side was circulated and the dialysate side was perfused (dialysis model). First, each dialyzer was washed with 1 L of dialysate on the blood side and 2.5 L of dialysate on the dialysate side. Then, in both models, 0.5 L of dialysate was circulated in the dialyzer for 4 hours, and in the dialysis model, 0.5 L of dialysate was simultaneously perfused through the dialysate side in a single-pass system. The amount of eluted PVP was measured in both models.

Results : The median amount of PVP eluted in the non-dialysis model was 1.92 (interquartile range, 0.41-2.26) mg/L, but no PVP was detected in the dialysis model. The difference between the two models was significant ($p=0.028$).

Conclusions : We found that during extracorporeal circulation, perfusion of dialysate through the dialysate side suppresses PVP elution on the blood side.