Zusammenfassung der Master-Thesis von
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Estimating phosphate removal in haemodialysis: an additional tool to quantify dialysis dose

Background. Half of the dialysis population suffers from hyperphosphataemia, which is now recognized as a major factor of haemodialysis (HD) morbidity and mortality. Current control is focussed on reducing dietary phosphate intake and diminishing absorption using phosphate binders, whereas control and quantification of phosphate removal by HD is undervalued. The aim of this prospective study was to develop a simple, bedside formula to estimate dialytic phosphate removal in stable HD patients.

Methods. This was a prospective, randomized trial. Phosphate and urea elimination were assessed in a representative group of patients at two dialysis centres using randomly different dialysers (1.3-2.4 m(2)). Quantification was performed by partial dialysate collection, concentration measurements in blood and effluent dialysate spot samples, and Kt/V-urea during standard high-flux HD. Multiple linear regression analyses were used in 77% of all data sets to generate an equation to predict phosphate removal. The formula was validated in the remaining 23% of data sets, in the same group of patients using a large capillary filter, and in diabetic patients treated with a small dialyser at different blood flows (200, 250, and 300 ml/min).

Results. A formula allowing quantification of phosphate removal within one HD session was developed in 18 of 74 patients during 41 treatments (137 out of 177 data sets) and was determined as: M-PO4pred = 0.1t -17 + 50C(ds60) + 11c(b60), where t is treatment time in min, C-ds60 and C-b60 are phosphate concentrations in dialysate and plasma measured 60 min into HD in mmol/l, and M-PO4pred is estimated phosphate removed in mmol. The precision was remarkable (r(2) = 0.92-0.94). The comparison of phosphate and Kt/V-urea showed a significant association (r(2) = 0.28), albeit with remarkable scatter.

Conclusions. We present the first approach to quantify phosphate removal during high-flux HD by a bedside formula. Only 28% of the variation in phosphate removal was explained by Kt/V-urea. It appears that other factors not adequately accounted for by Kt/V-urea affect phosphate removal. Therefore, we propose an individual control and quantification of phosphate removal in HD.