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OPTIMAL DWELL TIME FOR MAXIMAL SMALL SOLUTE CLEARANCES IN PERITONEAL DIALYSIS PATIENTS.

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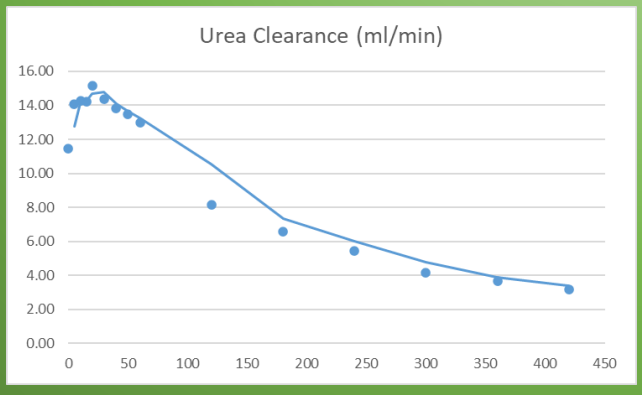
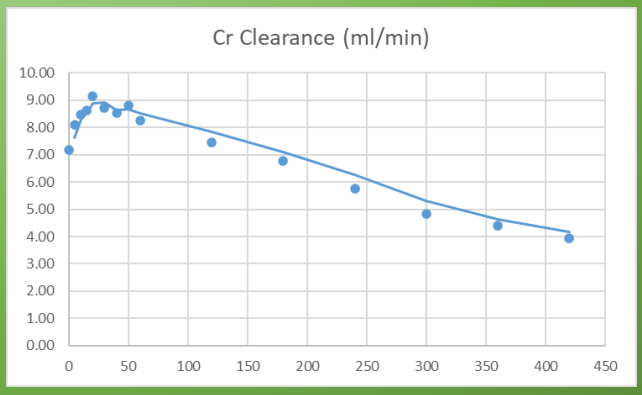
INTRODUCTION: The small solute clearances in peritoneal dialysis (PD) depend on dwell time and daily dialysate volume. The objective of our study was to identify the optimal dwell time that reflects the dialysate flow rate producing maximal small solute clearances and solute removal rates in peritoneal dialysis.

METHODS: A cohort study was conducted on 36 chronic PD patients. The ultrafiltration, solute clearance and removal rates of urea, creatinine, sodium, potassium, phosphorus and uric acid were studied in 24 patients for 9 dwell time points (0, 5, 10, 15 [Day1], 20, 30, 40 [Day2], 50, and 60 minutes [Day3]) with two consecutive cycles for each dwell time. Twelve other patients were studied for six dwell time points, 2, 3, 4, 5, 6, and 7 hours, over six consecutive days with three consecutive cycles for each dwell time. Two L of 1.5% dextrose(D) solution was used for each cycle. After the end of each day's study, 2-3 cycles of 1.5% or 2.5%D solution were done, depending on the patient's volume status. Blood was drawn at the midpoint of each two dwell times for dwell time points of 0 to 60 minutes and alternate days for dwell time points of 2 to 7 hours. Small solute clearances and solute removal rates were calculated from the averages of each dwell time point and used for comparison. A standard peritoneal equilibration test was conducted one day before starting the study.

RESULTS: Urea and creatinine clearances (ml/min) were highest at a dwell time of 20 minutes (0min: 12.0/7.17, 5min: 20.2/8.09, 10min: 20.5/8.48, 15min: 20.4/8.63, 20min: 21.8/9.14, 30min: 20.6/8.72, 40min: 19.8/8.54, 50min: 19.4/8.80, 60min: 18.7/8.25, 2hr: 12.1/7.45, 3hr: 9.7/6.77, 4hr: 8.3/5.76, 5hr: 6.1/4.84, 6hr: 5.5/4.39, 7hr: 4.7/3.94, respectively, $p<0.05$). Maximal sodium removal occurred at 0 minutes (394.56 mEq/day; p 0.005). Potassium, phosphorus, and uric acid trended to be highest removed at a dwell time of 20 minutes, while the ultrafiltration rate trended to be highest at dwell times of 10 and 15 minutes. Solute removals were not associated with peritoneal membrane transport types.





Time (min)	0	5	10	15	20	30	40	50	60	120	180	240	300	360	420
Curea (ml/min)	11.48	14.05	14.27	14.20	15.17	14.36	13.80	13.50	12.99	8.13	6.58	5.43	4.16	3.65	3.17

Time (min)	0	5	10	15	20	30	40	50	60	120	180	240	300	360	420
CCr (ml/min)	7.17	8.09	8.48	8.63	9.14	8.72	8.54	8.80	8.25	7.45	6.77	5.76	4.84	4.39	3.94

CONCLUSIONS: A 20-minute dwell time, representing a daily dialysate flow rate of 28 L, demonstrated the highest small solute clearances in chronic peritoneal dialysis patients.