Increase In Extracellular Water To Total Body Water Following Peritoneal Dialysis Initiation

Panorchan, K, Davenport, A.
UCL Centre for Nephrology, Royal Free Hospital, University College London Medical School, London

INTRODUCTION: Renal replacement therapy is designed to treat uraemic symptoms and correct hypervolaemia. We hypothesised that starting peritoneal dialysis (PD) should reduce overhydration by reducing the extracellular water (ECW) to total body water (TBW) ratio.

METHODS: We prospectively measured ECW/TBW using multi-frequency bio-electrical impedance (MF-BIA) in PD patients, prior to training, and then at their first peritoneal membrane assessment.

RESULTS: We studied 100 consecutive PD patients, mean age 54.7±17.1 years, 57% male, 25% diabetic, 43% Caucasoid, 60% treated by PD cyclers with a day exchange. ECW/TBW increased from 0.393±0.016 to 0.395±0.015 ($p < 0.05$), with no significant change in body weight. The change in ECW/TBW was associated with age (β 0.065,$p<0.001$), co-morbidity (β 1.107, $p=0.005$), peritoneal protein transport (β 1.84, $p<0.04$), and negatively with serum albumin (β -0.208, $p < 0.001$), and residual renal function (β -0.725, $p = 0.026$). Serum albumin fell after starting PD (39.0±5.6 to 37.5±5.0g/l) but there was no significant change in CRP (12.8±22 vs 10.3±24 mg/l). However patients who had an increase in ECW/TBW had higher CRP both before starting (16.8±24.1 vs 7.7±18.9 mg/l) and when established on PD (15.0±31.8 vs 4.6±5.1 mg/l),$p<0.05$.

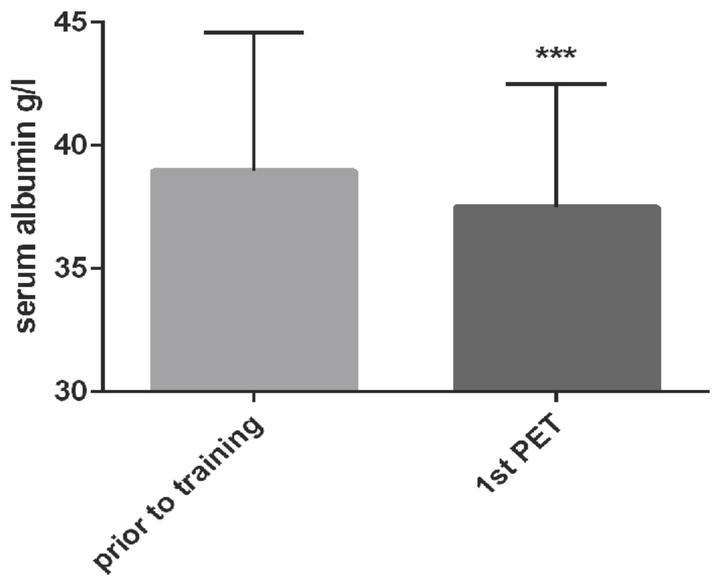

Figure 1. Serum albumin measured prior to peritoneal dialysis (PD) training and then at 1st attendance for peritoneal membrane assessment (PET). Mean ±SD, p=0.0002.

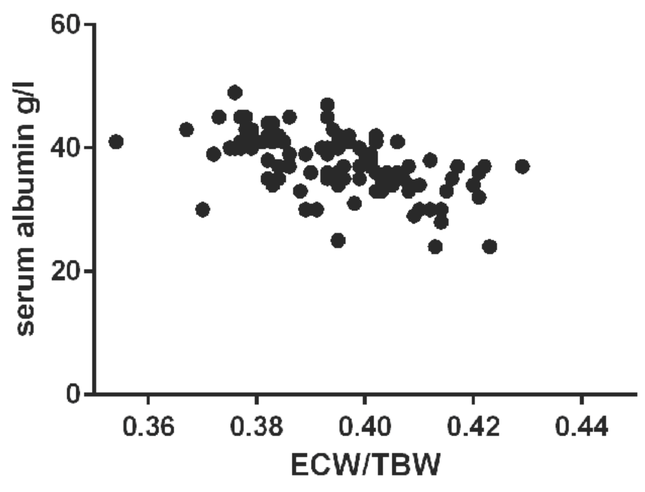

Figure 2. Serum albumin and extracellular water (ECW)/total boy water (TBW) ratio at time of first peritoneal membrane assessment. Pearson correlation r= -0.54, p<0.001.

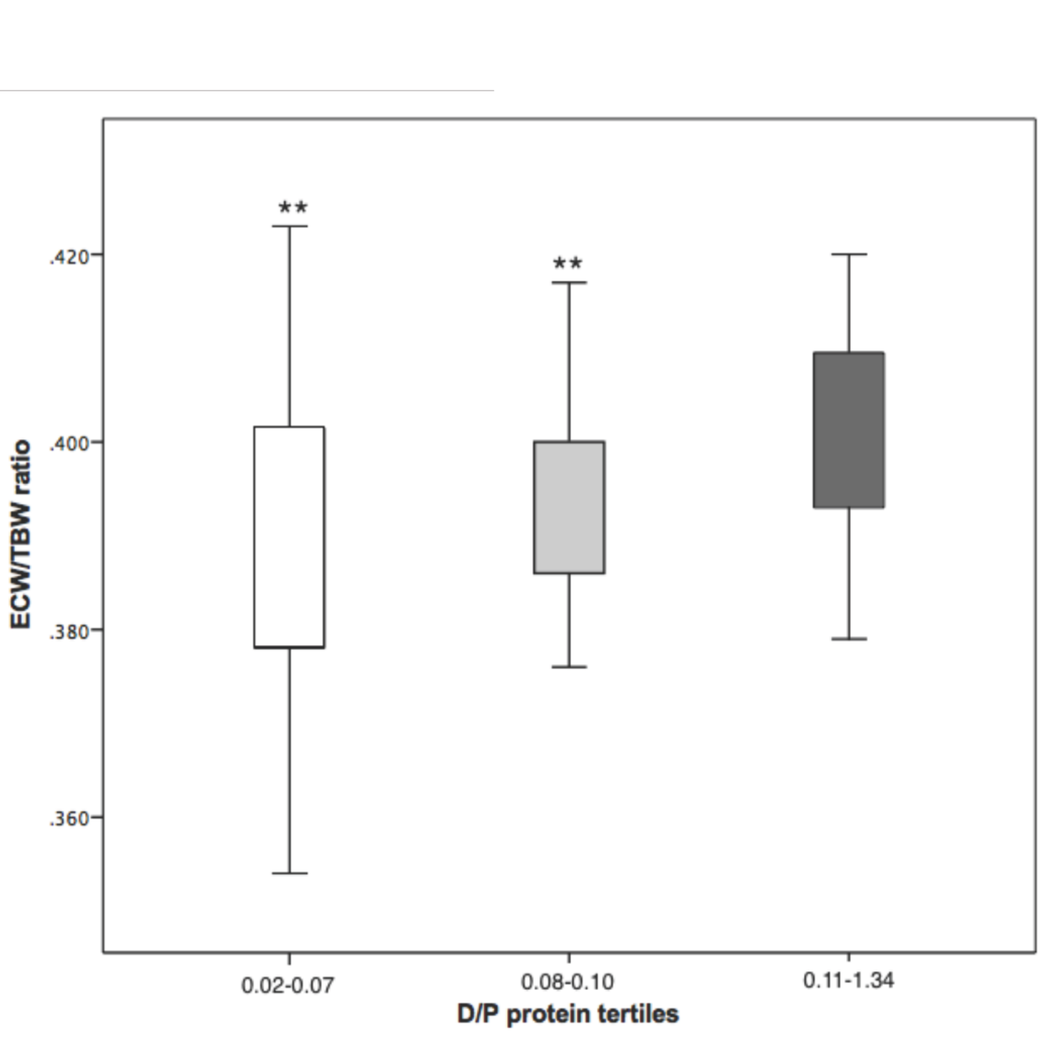

Figure 3: ECW/TBW ratio in each tertile of D/P protein. Mean ECW/TBW ratio was significant higher in the highest tertile of D/P protein. Two-sided test with Bonferroni correction found significant difference in ECW/TBW in the highest tertile when compare to the other two.

CONCLUSION: Unexpectedly the ECW/TBW ratio increased after starting PD, particularly for those patients with increased CRP. Increased ECW/TBW was associated with inflammation, faster peritoneal transport, and lower residual renal function. Exposure to standard PD dialysates may cause local inflammation and faster peritoneal transport leading to an increase in ECW/TBW.

Correspondence: kwanpeemai.panorchan@nhs.net

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