Introduction: Bioimpedance spectroscopy (BIS), together with a whole-body model to distinguish excess fluid from the hydration of major body tissues, can provide an objective assessment of fluid status. This technology is integrated into the Body Composition Monitor (Fresenius AG, Bad Homburg) and has been well validated in adults. For children to benefit from use of the BCM, paediatric nephrologists need evidence of the applicability of the fluid and body models in their patients.

Aim: (1) To assess the agreement between total body water (TBW) measured using BCM and a gold standard technique in healthy children; (2) to compare TBW\_BCM with TBW measured using deuterium (D2O) dilution in children receiving haemodialysis (HD); and (3) to look for systematic deviation from zero in the measured excess fluid in healthy children across paediatric age range.

Method: TBW\_BCM and excess fluid was determined from a standard wrist-to-ankle BCM measurement. TBW\_D2O was determined from the decline in the concentration of deuterium in serial urine samples over 5 days following a drink containing 7% D2O in a cohort of healthy children. Urea Kinetic Modelling (UKM) was used to measure body water in children receiving HD. Agreement between methods was analysed using paired t-test and Bland-Altman method comparison.

Results: In 61 healthy children (6-14 years, 32 male), the mean TBW\_BCM and TBW\_D2O were 21.1±5.6L and 20.5±5.8L respectively. There was good agreement between TBW\_BCM and TBW\_D2O (R2=0.97). In 6 HD children (4-13 years, 4 male), 45 concomitant measurements over 8 months showed good agreement between TBW\_BCM and TBW\_UKM (mean difference -0.4L, 2SD = ±3.0L). In 634 healthy children (2-17 years, 300 male), BCM-measured overhydration (OH) was -0.1±0.7L (10th to 90th percentile: -0.8 to +0.6L). There was no correlation between age and OH (p=0.28)

Conclusion: These results suggest suggests that the BCM can be used in children as young as 2 years, for measurements of normally-hydrated weight and assessment of fluid status.