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Multi-Frequency Bioelectrical Impedance Analysis and Cellular Health in Mobile CKD Patients L. Mason,¹ M. I. C. Kingsley,¹ J. K. Rees,¹ P. A. Ali,¹ E. Rees,¹ I. Hilldrup,² A. Mikhail.² ¹Swansea University; ²Morrison Hospital, Swansea, United Kingdom.

Large differences exist within CKD patients on haemodialysis, from relatively active transplant candidates (mobile CKD patients) to those who are sedentary and depend on healthcare support. Even the healthiest patients display frequent changes in hydration status and may show signs of cell membrane damage. Multi-frequency bioelectrical impedance analysis (BIA) measures impedance or resistance to currents at specified frequencies. Unlike high frequency current (200kHz), low frequency current (5kHz) cannot penetrate intact cell membranes. Consequently, impedance values at 5kHz should be high and the Illness Marker (the ratio of impedance values at 200 and 5kHz) should be low. The aim of this study was to compare impedance values and the Illness Marker in mobile CKD patients with healthy matched controls (Con).

Seven mobile CKD patients on haemodialysis (Age: 53.4±10.7years, Mass: 79.1±10.7kg, Height: 1.67±0.11m) and seven matched controls (Age: 50.3±9.8 years, Mass: 76.4±12.5kg, Height: 1.69±0.09m), volunteered. Anthropometric measurements were taken and BIA (Quadscan; Bodystat, Isle of Man, UK) was conducted at 5, 50, 100 and 200kHz. These data were used to calculate hydration status and the Illness Marker. All measurements were taken following an overnight fast and within 18 hours of receiving dialysis for CKD patients.

Wilcoxon signed ranks tests revealed that the Illness Marker was significantly higher in CKD patients compared with matched controls (CKD: 0.809±0.024, Con: 0.780±0.024, $P=0.046$). Total body water (CKD: 37.1±8.7 L, Con: 40.2±7.8L, $P=0.249$) extra-cellular water (CKD: 16.4±2.9L, Con: 17.6±2.3L, $P=0.237$), and impedance values at all individual frequencies ($P\geq 0.128$) were similar for both groups.

These findings show that, even when the healthiest group of CKD patients is considered, CKD patients have elevated Illness Markers, indicative of poor cellular health. Interestingly, this finding was independent of body composition, absolute impedance values, total body water and extra-cellular water. This simple measure may offer a novel approach to evaluating and tracking cellular health in the haemodialysis population.

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