SERUM-CONDUCTIVITY IMPACTS BIOIMPEDANCE SPECTROSCOPY (BIS)

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Multifrequency-BIS is a well established method to measure electrical properties of tissues and to assess body composition and hydration status. This makes BIS of special interest for the dialysis community particularly for dry weight-estimation. Whole-body (WB) BIS is a well-established tool for the assessment of extracellular volume (ECV). Calculations of ECV are done according to equations provided by the manufacturer. Information concerning the impact of serum constituents on resistance (RE) is currently sparse. In this study we investigated the relationship of changes in serum electrolyte concentrations, conductivity and fluid balance on WB-RE and WB-ECV. WB-BIS was conducted before and after dialysis (Hydra 4200, Xitron Ca). Serum concentrations of Na^+, K^+, Ca^{2+} and serum conductivity (Cd) were measured before and after the treatment (Ionometer II, Fresenius).

We performed 80 measurements in 7 stable hemodialysis patients. Electrolyte concentrations showed a mean±SD intradialytic [ΔNa^+] of +1.62±1.82mmol/L, [ΔK^+] of -0.96±0.65 mmol/L, [ΔCa^{2+}] of -0.03±0.07 mmol/L and Δ Cd of-0.47±0.28 mS/cm.

N=80 *p<0.01	WB-ECV L	WB-RE Ohm	[Na^+] mmol/L	[K^+] mmol/L	[Ca^{2+}] mmol/L	Cd mS/cm
Pre	**16.72**	**615.04**	**140.76**	**4.43**	**1.02**	**11.74**
Post	**14.28**	**779.40**	**142.39**	**3.47**	**0.99**	**11.28**
Δ	-2.43*****	164.36*****	1.62*****	-0.96*****	-0.03*****	-0.47*****

ΔWB-RE (mean±SD 164.36±40.83Ω) was correlated with ΔCd (r=-0.679, p<0.01), ΔK^+ (r=-0.328, p<0.01) and only weakly with ΔNa^+ (r=0.223, p<0.05). The intradialytic change of WB-ECV correlated with ΔCd (r=-0.553, p<0.01) and with the intradialytic fluid removal (-2.75±0.71L; r=0.498, p<0.01), but not with changes in electrolyte concentrations. However, it is not excluded, that yet unknown electrolyte changes have impact on the measurement of ΔWB-ECV by WB-BIS. In conclusion, this study demonstrates that intra-dialytic changes in serum electrolyte concentrations relate to changes in whole body resistance.