New Method of Predicting Dry Weight Using the Relationship between Ultrafiltration amount and Percentage Changes in Extracellular Fluid to Total Body Water Ratio in Maintenance Hemodialysis Patients

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Background : Differences in the slopes of the ultrafiltration (UF) amount removed during hemodialysis (HD) sessions versus percent change in extracellular fluid/total body water ratio plot for right lower extremities (ECF/TBW at right leg) in the normohydrated (NH) and overhydrated (OH) states might enable dry weight (DW) to be predicted.

Method : We hypothesized that for OH patients to become NH, the slope of the UF amount versus ECF/TBW at right leg ratio plot should be similar to that of NH patients. Accordingly, we developed a new method for predicting DW based on previously published data. To validate the accuracy of this method, ECF/TBW at right leg ratios were measured by eight- point tactile- electrode bioelectrical impedance analysis (BIA) before and after HD in 17 newly enrolled NH patients. NH was determined by clinical assessment and BIA. Using current DW (cDW) of subjects as reference, we compared the accuracies of pDW1 (DW predicted using our devised method) and pDW2 (predicted using the normovolemia/hypervolemia slope method on the plot between ECF and BW).

Results : Mean cDW, pDW1, and pDW2 values were 56.8+/- 7.9, 56.4+/- 7.7, and 56.3+/- 8.0 kg, respectively. Differences between cDW and pDW1 or pDW2 were - 0.4+/- 1.1 and - 0.6+/- 1.6 kg, respectively, and no significant differences were found between cDW, pDW1, and pDW2 by one way ANOVA. Moreover, cDW was found to be highly correlated with pDW1 ($R=0.985$, $p<0.001$) and pDW2 ($R=0.954$, $p< 0.001$). However, pDW1 had a lower root mean square error than pDW2 (1.12 vs. 1.69). On Bland- Altman plot, mean differences between pDW1 and cDW were closer to zero than between pDW2 and cDW

Conclusion : Based on 8- polar BIA measurements, we developed a new method of predicting DW using the relationship between UF amount and percentage change in ECF/TBW ratio at right lower extremities after HD. The devised method appears to be as accurate as the normovolemia/hypervolemia method.

Key Words : 혈액투석, 건체중, 생체임피던스
Hemodialysis, electric impedance, body fluids