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CHANGES OF BIOIMPEDENCE AND SEGMENTAL BODY COMPOSITION MEASUREMENT VALUE BEFORE AND AFTER HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS

Hyunsuk KIM¹, Eun mi YI², Kwang eon SHIM¹, Jin eop KIM¹, Myung jin CHOI¹, Jong woo YOON¹, *Yun kyu OH³

¹Internal Medicine, Hallym University Medical center, Chuncheon Sacred Heart Hospital, Chuncheon-si, Gangwon-do, Korea, Korea, South, ²internal medicine, Seoul national university hospital, Korea, South, ³internal medicine, Seoul National University Boramae Medical Center, Korea, South

Objectives : The utilization of bioimpedance has increased in end stage renal disease patients for calculation of dry weight and for nutritional assessment. In case of hemodialysis patients, changes in bioimpedance parameters are inevitable due to the periodic changes in the volume of body fluid before and after dialysis, but the information available to clinicians is insufficient. Therefore, this study intends to measure changes in the measured values of body composition before and after dialysis using two bioimpedance measuring machines and particularly to confirm if the two machines accurately detect the weight loss during dialysis.

Methods : Body composition was measured by two bioimpedance spectroscopies (BCM, Fresenius Medical Care, Germany and S10, Inbody, Korea) in patients undergoing hemodialysis in July 2015. In all enrolled patients, bioimpedance was measured a total of four times in the supine position within 30 minutes before and after dialysis. Whether the weight loss during dialysis measured by a weight scale coincided with the differences of overhydration before and after dialysis measured by the two machines was checked, and the differences between pre and post bioimpedance parameters were confirmed in the two machines. Relative overhydration (%) was defined as overhydration (L) /extra cellular water (L) x 100.

Results : A total of 149 patients were enrolled (mean age: 62; male: 79 (53%); diabetes: 80 (54%). The mean (SD) vintage (year) of hemodialysis was 4.4 (3.0) and mean (SD) weight loss (kg) during dialysis was 1.8 (1.2). It was confirmed that bioimpedance parameters including total body water ($\approx 6\%$), extracellular water ($\approx 9\%$), intracellular water ($\approx 3\%$), body cell mass ($\approx 4\%$), and lean tissue index ($\approx 3\%$) significantly decreased when there was about 3% weight loss on average after dialysis compared to before dialysis. However, fat tissue index was not changed in both BCM and S10. The weight loss during dialysis and the

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differences of overhydration measured in the two machines before and after dialysis did not statistically coincide by bland–Altman test. However, two values tend to coincide in most patients, and as overhydration was more severe, the agreement of the values decreased (β coefficient of linear regression model: BCM, -0.149 ; inbody, -0.206). The mean (SD) of relative overhydration was approximately twice higher in BCM (13.1(6.6)) than in S10 (6.6(3.9)). In the estimated parameters that could be additionally seen in S10, WHR increased (pre HD, 0.88; post HD, 0.91), segmental total water, bone mineral content (kg, pre HD, 2.54; post HD, 2.41) and visceral fat area (cm², pre HD, 80.4; post HD, 79.0) also statistically significantly decreased after hemodialysis.

Conclusions : With regard to the body composition after dialysis measured by bioimpedance, most parameters were confirmed to be decreased except for fat tissue index, and the weight loss during dialysis did not coincide with the differences of overhydration measured by the machines. Since there was a difference in the reference of relative overhydration between BCM and S10, the outcomes need to be carefully interpreted.

Keywords : Bioimpedance, BIA, BCM, fat tissue index, dry weight