

# Bioelectrical impedance analysis as a tool for nutritional status evaluation in chronically ill patients

<sup>1</sup>Cvetka Krel, <sup>1</sup>Nejc Piko, <sup>1</sup>Jožica Tomažič, <sup>1</sup>Sebastjan Bevc

<sup>1</sup>University Medical Centre Maribor, Clinic for Internal Medicine, Department of Nephrology, Slovenia

## Background

Body mass index (BMI), serum albumin level and bioelectrical impedance analysis (BIA) are the tools most commonly used in assessing nutritional status of patients. Low phase angle (PhA) (men  $\leq 5^\circ$ , women  $\leq 4.6^\circ$ ) by BIA is associated with increased nutritional risk and higher morbidity. The aim of our study was to evaluate different methods of nutritional status analysis in patients with different chronic diseases, including chronic kidney disease (CKD).



Figure 1: Body composition analyzer Tanita, MC780®

## Methods

We included 30 patients (mean age  $70.8 \pm 17.2$  years, 67% men, 93% with CKD) that were hospitalized in the Department of Nephrology of University Clinical Centre Maribor from November 1<sup>st</sup> 2016 to January 31<sup>st</sup> 2017. The inclusion criteria were the presence of a chronic disease (including CKD) and increased nutritional risk ( $\geq 1$  fulfilled NRS 2002 criterion). We measured serum albumin level with standard laboratory method, calculated BMI and performed BIA analysis with body composition analyzer (Tanita, MC780®).

## Results

Mean serum albumin was  $33.6 \pm 5.7$  g/L, mean BMI was  $25.6 \pm 4.4$  kg/m<sup>2</sup> and mean PhA was  $4.4 \pm 1.2^\circ$ . Half of the patients (N=15) had serum albumin levels below 35 g/L, 73.3% of them (N=11) had low PhA (men  $\leq 5^\circ$ , women  $\leq 4.6^\circ$ ) and only one of them had BMI below 20.5 kg/m<sup>2</sup>.

No correlation between serum albumin and BMI was found. Lower PhA was associated with lower serum albumin ( $p=0.045$ ).

The nurses of our department performed a nutritional education for all the patients included in the study; those with low PhA received dietary supplements.

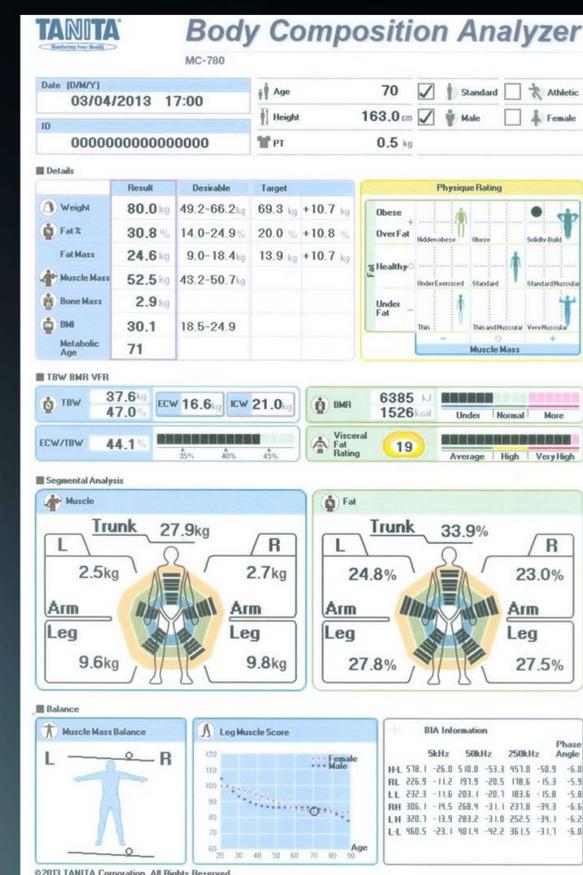


Figure 2: Sample Printout from Printer

Parameter	Minimum value	Maximum value	Mean value $\pm$ SD
Age (years)	31	94	$70.8 \pm 17.2$
NRS 2002	1	3	$1.1 \pm 0.4$
Serum creatinine ( $\mu\text{mol/L}$ )	62	763	$172.1 \pm 185.7$
eGFR (CKD-EPI equation; ml/min/1.73m <sup>2</sup> )	6	90	$53.4 \pm 26$
Serum albumin level (g/L)	17.8	44.4	$33.6 \pm 5.7$
Body mass index (kg/m <sup>2</sup> )	18	35	$25.6 \pm 4.4$
Phase angle ( $^\circ$ )	3	7	$4.4 \pm 1.2$

Table 1: Basic descriptive statistics of our included patients.  
Legend: SD – standard deviation; eGFR – estimated glomerular filtration rate;  
CKD-EPI equation - Chronic Kidney Disease Epidemiology equation

## Conclusions

According to our results, PhA is reliable nutritional status marker and BIA should be the method of choice for detecting nutritional status abnormalities in chronically ill patients, including those with CKD. In case of lower PhA, patients should undergo a nutritional education and/or receive a dietary supplement.