Clinical Monitoring of Protein-Energy Wasting in Chronic Kidney Disease: Moving From Body Size to Body Composition

REGULAR ASSESSMENT OF nutritional status in patients with chronic kidney disease (CKD) is needed to appropriately detect individuals at risk or suffering from protein-energy wasting who may benefit from adequate nutritional and therapeutic management. In the absence of dedicated renal dietitians, most clinics are left to base their clinical monitoring on easily accessible nutritional indicators. In this issue of the journal, 4 interesting studies highlight the importance of body composition over body size and the role that bioimpedance techniques are playing in this regard.

Evaluating body weight (i.e., body mass index [BMI] or weight change—primarily weight loss) throughout the course of a clinical condition has been a traditional end point for the assessment of nutrition status in these patients. Although a powerful outcome predictor, change in weight may only indicate deterioration in health and represents an approximate screening indicator that requires further evaluation. The limitations of BMI as a nutritional assessment tool in CKD are well known by nephrologists and renal dietitians and include the inability of BMI to differentiate between body composition compartments (fat, muscle, and bone) or body fat distribution (abdominal vs. peripheral) and to account for differences related to age, gender, ethnicity, and physical fitness. Of significance in most settings, BMI is importantly confounded by fluid retention.

In this issue of the journal, Rodrigues et al. evaluate the “sensitivity and specificity of BMI as a marker of obesity in elderly patients on hemodialysis” from Brazil. This is straightforward, given the large proportion of elderly patients suffering from CKD. In their study, they show that BMI cutoffs of obesity had a moderate-to-low discrimination capacity in individuals with excess adiposity as assessed by percentage body fat. BMI alone misclassified patients, and the explanation lies both in the natural body composition changes that accompany the aging process and the presence of an underlying protein-energy wasting process that would result in muscle mass loss. The paradigm is elegantly addressed by Marcelli et al. when analyzing the “longitudinal changes in body composition in patients after initiation of hemodialysis therapy”. Using a powerful multinational cohort of incident dialysis patients undergoing routine bioimpedance spectroscopy (BIS) assessments, the authors report on the body compositional changes that occur during 2 years of hemodialysis therapy. Patients presented with distinctive changes in body composition, reflected by increases in body fat mass and progressive decrease in lean body mass. BMI, however, did not fully reflect these changes. In fact, individuals presented with weight stability or even with a slight increase while gaining fat and losing lean mass. Altogether, these studies illustrate the magnitude of the problem and reinforce the notion that many features of body composition are masked by considering body weight as a whole.

Assessing body composition is fundamental for an in-depth evaluation of nutrition status in CKD. A variety of techniques exist to assess body composition, and each of them has advantages and limitations. At the end of the day, the choice of method will depend on practicality, availability, purpose, and need of trained personnel. Among tools available, bioelectric impedance devices have become increasingly available for routine patient monitoring and appear as promising, noninvasive, portable, and easy-to-operate tools. Although debate still exists regarding the validity of different devices, empirical equations, and model assumptions, the scientific literature is reflecting the incorporation of these techniques in routine clinical practice. The study conducted by Caetano et al. evaluates the association between “body composition and mortality in hemodialysis patients” in Portugal. From a prognostic point of view, this study illustrates the obesity paradox of dialysis patients, whereby overweight, obesity, and adiposity (fat tissue index) are associated with better survival. The most likely explanation is that adiposity confers energy reserves to be able to stand up longer to the process of wasting. In this sense, it is (muscle) wasting that must be identified and therapeutically approached. The study also evidences the strong prognostic association of low muscle mass BIS estimations and fluid overload.

Also in this issue of the journal, Rymarzt et al. study the associations of the BIS estimate of “body cell mass (BCM)
with nutritional and inflammatory markers in patients with non-dialysis CKD” from Poland. The authors argue that BCM may be a better reflection of muscle mass than lean tissue index, given the potential confounding of extracellular water accumulation. The study presents an etiological overview of conditions/biomarkers associated with muscle wasting (as reflected by BCM) in CKD patients: (1) creatinine, as a strong reflection of muscle stores,17,18 (2) inflammation, an important driver of protein degradation,19 and (3) handgrip strength, as an illustration of the complementary contribution of both dimensions of musculoskeletal health (mass and function). Musculoskeletal health is the critical component in maintaining physical function, mobility, vitality, and health and as the basis to the dimensions of sarcopenia and frailty.20–22 Quoting Prado & Heymsfield,23 “if the medical fields have evolved to using sophisticated techniques, we can also advocate for the use of body-composition methodology for assessment of nutritional status of patients beyond simple measurement of body weight”. We hope you enjoy reading these interesting articles.

Juan Jesús Carrero, Pharm, PhD
Division of Renal Medicine
Karolinska Institutet
Stockholm, Sweden

Christoph Wanner, MD
Division of Renal Medicine
University Hospital of Würzburg
Würzburg, Germany

References