Novel Equation Based on Serum Creatinine to Estimate Lean Body Mass in Maintenance Hemodialysis Patients

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INTRODUCTION

- Protein energy wasting (PEW) is among the strongest risk factors for poor outcomes in hemodialysis (HD) patients.
- Reduced lean body mass (LBM) and muscle mass are the main components of PEW.
- Accurate assessment of LBM is the key to reliable evaluation of the nutritional status in CKD patients.
- Pre-HD treatment serum creatinine (SCr) in long-term HD patients is a surrogate of muscle mass and nutritional status.
- We developed and tested an equation to estimate LBM using SCr in long-term HD patients.

METHODOLOGY

- In a 5-year cohort of 725 long-term HD patients from 8 DaVita dialysis clinics in Southern California, who all underwent near-infrared (NIR) LBM assessment, 118 subjects additionally underwent LBM measurement via dual energy X-ray absorptiometry (DEXA).
- We developed and examined the accuracy of a regression equation to predict LBM in HD patients.

RESULTS

- DEXA measured LBM correlated with 3-month averaged SCr but not with other nutritional markers including serum albumin, nPCR (nPNA), and TIBC (transferrin).
- Using regression analyses, a parsimonious equation to estimate LBM was developed based on SCr and relevant demographic and clinical variables including gender, height, weight, age and URR) in 118 subjects against DEXA measured LBM.

RESULTS

- The following regression equation was developed to estimate LBM based on SCr and gender, height, weight, age and urea reduction ratio (URR) in 118 subjects against DEXA measured LBM:

$$\mathbf{LBM_{SCr} = 0.34*SCr(mg/dL) + 5.58*gender + 0.30*weight(kg) + 0.67*height(inch) - 0.23*URR - 5.75}$$

($R=0.90$, $p<0001$)

- The SCr based regression was then validated in the main cohort against NIR measured LBM using modified Bland-Altman test and correlation studies (see Figure):

CONCLUSIONS

- The equation, derived from SCr and demographics and created based on DEXA-measured LBM in 118 HD patients, can accurately estimate LBM in long-term HD patients.
- Additional studies are needed to verify the validation the accuracy and precision of the equation.

KEY LEARNINGS

✓ In long-term HD patients pre-HD-treatment SCr, in combination with demographics, can be used to estimate LBM.

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