

COMMENTS AND RESPONSES

Serum Levels of Adipokine Retinol- Binding Protein-4 in Relation to Renal Function

Response to Ziegelmeier et al.

In their recent study, Ziegelmeier et al. (1) showed that remnant kidney function and C-reactive protein are independently associated with elevated serum levels of retinol-binding protein (sRBP)-4 in hemodialysis patients. Markers of kidney function were levels of serum creatinine and glomerular filtration rate estimated by the Cockcroft-Gault formula. However, since creatinine can be removed both by dialysis and remnant kidney function, levels of serum creatinine and glomerular filtration rate estimated by the Cockcroft-Gault formula do not exactly reflect renal function in hemodialysis patients (2). Additionally, serum creatinine, mainly produced from skeletal muscle creatine, correlates with lean body mass (LBM) (3). Thus, in hemodialysis, levels of serum creatinine depend on dialytic and renal removal but may also be an index of nutritional status (3,4), facts not taken into account by Ziegelmeier et al. (1).

We conducted a cross-sectional study in hemodialysis patients ($n = 36$; 14 female of mean \pm SD age 54 ± 18 years) and healthy control subjects ($n = 26$; 10 female; aged 51 ± 15 years) to investigate the relationship of treatment adequacy

and nutrition with sRBP-4 (micrograms per milliliter, based on enzyme-linked immunosorbent assay). Serum creatinine, adequacy (urea kinetic modeling [Kt/V_{urea}]), and surrogates of nutrition (kilograms of LBM and protein catabolic rate [PCR] [grams per kilogram], calculated using urea kinetic modeling) were determined. Levels of sRBP-4, increased in hemodialysis compared with those of control subjects (41.0 ± 7.2 vs. 26.1 ± 5.9 $\mu\text{g/ml}$, $P < 0.01$), correlated with levels of serum creatinine ($r = 0.342$, $P = 0.041$) and Kt/V_{urea} ($r = -0.308$, $P = 0.042$). On multivariate linear regression, after adjustment for Kt/V_{urea} ($R^2 = 0.176$, $P = 0.045$), the relationship between sRBP-4 and serum creatinine (β -coefficient = 0.666 , $P = 0.086$) was not maintained. However, when surrogates of nutrition (LBM and PCR) were added to the model, both serum creatinine (β -coefficient = 1.299 , $P = 0.004$) and PCR (β -coefficient = -12.163 , $P = 0.020$) independently predicted sRBP-4.

Our study implies that in hemodialysis, elevated sRBP-4 is associated with treatment inadequacy and protein malnutrition. This finding is of considerable interest because malnutrition has been closely related to inflammation and mortality in this patient group (4–6). Taking into account that sRBP-4 correlated with C-reactive protein (1), one may readily assume that there is some relationship between protein malnutrition, sRBP-4, and inflammation in hemodialysis that is yet to be clarified.

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