

Changes in the volume of urea distribution over time can be used to assess the lean body mass in stable chronic dialysis patients?

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OBJECTIVES

Disorders of nutritional status are common and progress over time in chronic hemodialysis patients. The objective of the work was to evaluate the relationship between the changes of volume of urea distribution and nutritional parameters in patients on chronic hemodialysis after 12 months follow up.

RESULTS

Baseline end-dialysis body weight after 12 months follow-up decreased non-significantly from 71.21±14.64 kg to 70.99±14.25 kg, p=0.600. Dry weight and body mass index also not declined significantly. There was a significant reduction of Vurea from 48.05±9.29 to 45.15±9.5L, -2.91±6.93L, or 6.93%, p=0.002. It is estimated that patients lost an average 3.98 kg of their lean body mass (-2.91L of Vurea divided by 0.73), possibly replaced by increased mass of adipose tissue (no changes in total body mass) (Table 1). Other nutritional parameters after one year also decreased: serum creatinine (Scr) from 844±154 to 813±167 µmol/L, -30.58±104.20 µmol/L or 3.63%, p=0.027; UNA (urea nitrogen appearance) from 6.43±1.96 to 5.74±1.77 mg/min, -0.685±1.35 mg/min, p=0.000; TACurea (time average urea concentration) from 13.3±3.09 to 11.51±2.84 mmol/L, -1.79±2.57 mmol/L, p=0.000; nPNA from 0.978±0.19 to 0.884±0.17 g/kg/d, p=0.000. spKt/V and eqKt/V did not change during the follow-up (p=0.385).

Simple linear regression showed a significant inverse correlation between V (% of dry weight) values and patients age (B coefficient -0.300, R=0.285, p=0.027) (Figure 1). Also there was significant inverse correlation between Scr and age (B coefficient -7.462, R=0.526, p=0.000). There was a significant direct correlation between Vurea and Scr (B coefficient 0.020, R=0.446, p=0.000).

Multiple linear regression showed that the only predictors related to the change in Vurea after 1 year were gender (male vs female p=0.001) and high baseline V values (p=0.000).

METHODS

The study included 60 from total 110 patients (53.3% men) who met the following criteria: clinically stable patients on chronic hemodialysis for at least 3 months, absent or minimal residual renal function, the minimum duration of dialysis sessions (dt) 4 to 5 hours without recent hospitalization or surgery, blood access-native arteriovenous fistula with recirculation under 10%. Dialyses were performed with high-flux polyetersulfone membrane sterilized with gamma rays, bicarbonate dialysate with individualized concentrations of sodium. Dialyzer clearance for urea (Kd) was determined in the 30th minute of the start of the dialysis session and was used for the dialysis session as a whole. Dialysis dose was determined by a single-pool, variable-volume urea kinetic model. The volume of distribution of urea (Vurea) was determined by a simplified kinetic formula $V = (Kd \times dt) / Kt / V$. The rate of protein catabolism was determined by protein equivalent of nitrogen appearance normalized to body weight (nPNA). The following hematological and biochemical parameters were also monitored: monthly hemoglobin concentration, serum iron, TIBC, serum urea (pre-and post-dialysis), creatinine, plasma electrolytes, C-reactive protein and every three months were measured ferritin level, albumin and total cholesterol.



Table 1.

	Baseline	After 1 year	Paired Differences	95% CI		t	p-value
				Lower	Upper		
Weight	71.2 ± 14.64	70.99 ± 14.4	-0.22 ± 3.06	-1.04	0.6	-0.53	.600
Vurea	48.05 ± 9.29	45.15 ± 9.5	-2.9 ± 6.93	-4.69	-1.12	-3.25	.002
Scr	843.97 ± 153.83	813.38 ± 167.13	-30.6 ± 104.16	-57.49	-3.68	-2.27	.027
UNA	6.43 ± 1.95	5.74 ± 1.77	-0.68 ± 1.35	-1.03	-0.34	-3.92	.000
TAC	13.29 ± 3.09	11.51 ± 2.84	-1.78 ± 2.57	-2.45	-1.13	-5.4	.000
PCR	0.98 ± 0.19	0.88 ± 0.16	-0.09 ± 0.19	-0.14	-0.04	-3.74	.000

CONCLUSIONS

The results of the study clearly showed a reduction in all parameters that explore protein nutritional status including urea volume distribution after one year follow-up. Relationship between Vurea and lean body mass need further investigations.

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