Comment on the Letter to the Editor by C.Basile Urea Distribution Volume Is Practically Constant in Hemodialysis Patients

F.	Maduell
----	---------

Department of Nephrology, Hospital 'Lluís Alcanyis', Xàtiva, Spain

Francisco Maduell, MD, Servicio de Nefrología, Hospital 'Lluís Alcanyis', Ctra Xàtiva-Silla, Km 2, E-46800 Xàtiva (Spain)

In the current issue of the Journal, Basile [1] reports his findings regarding urea distribution volume (V) in patients on chronic hemodialysis. He points out two discrepancies with results previously reported by us [2].

The urea distribution volume is similar to that of body water [3-5]. It is known that body water ranges from 35 to 75% of body weight, depending on individual variants (sex, adipose tissue content, hydration condition or body surface area) [6-8]. Accordingly, V is relatively constant for every patient and it does not change from dialysis to dialysis. This may not be the case during dialysis sessions.

We observed that the V value gradually increased throughout the dialysis [2]. In the first hour, the mean V was $42.18 \pm 6.98\%$ of body weight, in the second hour it was $50.78 \pm 7.48\%$, and at the end of the dialysis session it was $55.68 \pm 7.88\%$. These findings suggest that the transcellular urea transport is lower than the dialytic clearance and support a role for a two-pool urea kinetic model. In a 3-hour hemodialysis period, the V value ranged from 43 to 72% of body weight (mean $55.68 \pm 7.87\%$). Nevertheless, this V value was similar in 6 determinations for the same patient.

The difference in V and the high range of V values reported by Basile [1] – in 7 of 12 patients the V value changed more than 20% of body weight – may be explained by methodological aspects. For instance, dialysis time was varied and it ranged between 90 and 270 min. Careful attention to the blood and dialysate sampling technique is critical. In our study, like others [9, 10], postdialysis

blood sampling was obtained after decreasing the blood pump rate to 50 ml/min and waiting for 30-60 s to prevent access recirculation. Also, to prevent infection by microorganisms which decrease urea we have added a sterile agent (2 ml of bleach) in the graduated tank in each experiment.

Finally, we cannot forget that considering the urea rebound effect as an expression of intercompartmental reequilibrium [11], the V value would be slightly higher than the one calculated. Recent studies in our hospital support the hypothesis that, once the reequilibrium has been achieved, the urea distribution volume is a constant parameter [12].

In conclusion, the V value is a practically constant parameter, it has an individual variability and it may range from 35 to 75% of body weight. The gradual increase in the V value throughout the dialysis time is not real, and it suggests a bi- or multicompartmental model.

Any error in the calculation of the V value can be corrected if urea rebound is taken into consideration and final urea is obtained 45 min after dialysis [12].

References

- Basile C: Urea distribution volume is not constant in hemodialysis patients. *Nephron* 1995; 70:133-134.
- Maduell F, Sigüenza F, Caridad A, Miralles F, Serrato F: Analysis of urea distribution volume in hemodialysis. *Nephron* 1994;66:312-316.
- Steffenson KA: Some determinations of the total body water in man by means of intravenous injections of urea. *Acta Physiol Scand* 1947;13:282-286.
- Sargent JA: Control of dialysis by a single-pool model: The National Cooperative Dialysis Study. *Kidney Int* 1983;23(suppl 13):S19-S23.
- Ilstrup K, Hanson G, Shapiro W, Keshaviah P: Examining the foundations of urea kinetics. *Trans Am Soc Artif Organs* 1985;31:164-168.
- Hume R: Prediction of lean body mass from height and weight. *J Clin Pathol* 1966; 19:389-391.
- Hume R, Weyers E: Relationship between total body water and surface area in normal and obese subjects. *J Clin Pathol* 1971;24:234-238.
- Watson PE, Watson ID, Batt RD: Total body water volumes for adult males and females estimated from simple anthropometric measurements. *Am J Clin Nutr* 1980;33:27-39.
- Depner TA: Prescribing Hemodialysis: A Guide to Urea Modeling. Boston, Kluwer, 1991.
- Depner TA: Assessing adequacy of hemodialysis: Urea modeling. *Kidney Int* 1994;45:1522-1535.
- Pedrini LA, Zereik S, Rasmey S: Causes kinetics and clinical implications of post-hemodialysis urea rebound. *Kidney Int* 1988;34:817-824.
- Maduell F, Sigüenza F, Caridad A, López-Menchero R, Miralles F, Serrato F: Urea rebound: Influence of dialysis time, urea distribution volume and dialyzer clearance. *Nephron*, submitted.