Adequacy of Dialysis Estimated by Urea Kinetics in Children: Is There a Benefit from a Larger Dialysis Dosis?

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Dear Sir,

The National Cooperative Dialysis Study first brought the importance of urea kinetic modelling (UKM) to the attention of the nephrological community. UKM is now widely used in adults to manage patients on maintenance hemodialysis. Measurements of PCR, the protein catabolic rate, KT/V , the normalized whole body urea clearance, and TAC_{UEa} , the time averaged blood urea concentration, have allowed assessment of the adequacy of dialysis [1]. However, the correlation between KT/V and PCR on the one hand and the exact level of KT/V required to improve dialysis morbidity on the other are matter of some debate [2]. In addition, large pediatric series on adequacy of dialysis dosis, analyzed by UKM (KT/V , TAC^a , PCR) are missing or few [3]. Therefore, we have conducted a collaborative study including all the children dialyzed in the 21 French pediatric hemodialysis units in February 1994.

The data were collected from a midweek session carried out in accordance with local practice. Plasma urea estimations were performed before, immediately and 30 min after the end of the session, and before the next session. Dialysis parameters were noted: duration, blood flow (controlled by the bubble method or by Doppler) and body weight. Dietary protein intake (DPI) and energy intake were assessed over a 2 day dietary protocol performed by dieticians. Only children < 35 kg body weight and with residual clearance < 3ml/min/1.73m^2 (anuria) were included ($n = 78$ children, exhaustivity 97%). KT/V levels estimated from the percentage of reduction of urea either by the Daugirdas formula [4] or the Jindall index [5], using the plasma urea level at the beginning of the session (c_0) and 30 min after the end of dialysis (C_2) thus taking into account the postdialysis urea rebound (30 min postdialysis session), were calculated according to standard practice [6]. PCR mechanistic was evaluated by Garred's formula [7]. The results are presented in table 1.

In our multicenter survey, the percentage of postdialysis urea rebound was low, $7.2 \pm 5\%$, in contrast to other published pediatric values, $17 \pm 5\%$ [3], perhaps because the rebound was estimated at 30 min postdialysis and not at 60 min [3] and/or perhaps because durations of the sessions were longer (range 3-4 h) in our study compared with shorter (2-3 h) session time in other studies [3]. KT/V levels were in the high range (table 1). Taking into account the Daugirdas index, the amount of ultrafiltration versus body weight, the lowest levels were obtained, 1.39 ± 0.3 . Even then, KT/V realized in this large pediatric population were in a range

often desired but rarely obtained in a whole population [1], KT/V was negatively correlated with TAC_{urea} ($r = 0.5$, $p < 0.0001$). Conversely, no correlation was found between

Table 1. KT/V (Daugirdas or Jindall calculations), TAC_{urea} lyzed French pediatric population (n = 78)

PCR, DPI and calorie intake values in the hemodia-

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DPI and TAC_{urea} suggesting that KT/V was adjusted according to DPI in order to maintain correct TAC_{urea}. No correlation was found between KT/V and DPI in contrast with the relatively high positive correlation between KT/V and calorie intake ($r = 0.42$, $p < 0.00001$). These results could be considered as a beneficial effect of a 'larger' dialysis dosis in the better dialyzed children, who, when feeling better, will eat more. This assumption could be matter of some debate if only protein intakes [2] were considered. In fact, the correlations between KT/V and PCR or DPI are not necessarily the reasons. But the positive correlation between KT/V and calorie intake suggests that the efficacy of a larger dialysis dosis enhances appetite, at least in our hemodialyzed pediatric population. The apparent discrepancy between DPI and PCR may be related to the anabolic

state of this group [2] or to the nonurea metabolism of a part of the protein intake [3].

In France, few children are on peritoneal dialysis, perhaps because the clinical results obtained by hemodialysis are felt acceptable, even good. In fact, our multicenter survey has demonstrated that realized dialysis dosis was in a high range 1.39 ± 0.31 (Jindall index) or 1.68 ± 0.34 (Daugirdas index) in this large pediatric population (n = 78) allowing a low TAC_{urea} 16.7 ± 4.8 mmol/l without severe diet restriction, DPI 1.6 ± 0.6 g/kg/day or PCR 1.23 ± 0.26 g/kg/day. In addition, the positive correlation between KT/V and calorie intake allows us to speculate that dialysis dosis could more or less influence appetite: the larger the dialysis dosis will be, the better the children will feel and the more they should eat.

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