In conclusion, Diascan® is a useful tool to assess HDD without evidence of an increased sodium load related to the conductivity pulses during haemodialysis treatment.

Conflict of interest statement. None declared.

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Assessment and reduction of fluid overload using a body composition monitor

Sir,
Assessment and reduction of fluid overload is a major clinical problem in haemodialysis (HD) patients which should be assessed by objective methods [1]. Non-invasive bioimpedance spectroscopy with a body composition model has been validated against other methods to assess fluid status [2,3] and fluid changes accurately [4]. Our study investigated whether the application of a new bed-side bioimpedance spectroscopy device BCM (body composition monitor, Fresenius Medical Care, Germany) was feasible in a normal clinical setting. A single pre-dialytic measurement provides the body composition of the patient and quantifies his fluid overload.

The fluid status of HD patients from three centres was measured with BCM. The study consisted of a cross-sectional study (fluid status was assessed once) and a longitudinal study (fluid status was measured repeatedly, and potential fluid overload reduced following the target defined by BCM).

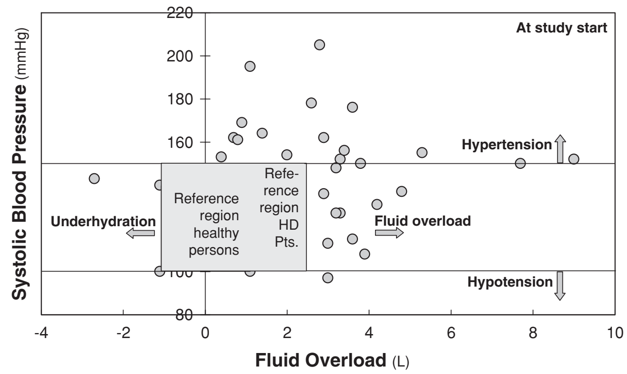

Fig. 1. Pre-dialytic systolic blood pressure and fluid overload in the 34 patients of the longitudinal study at the start of the study.

A total of 139 HD patients were investigated with BCM. The patients were grouped concerning their pre-dialytic fluid overload in quartiles with -0.14 ± 1.04 L in the lowest quartile (Q1) and 4.13 ± 1.50 L in the highest quartile (Q4).

In Q4 we found predominantly men (77% versus 43% in Q1, $P < 0.01$). The incidence of hypertension was at maximum in Q4 (94% versus lowest in Q2 with 76%, $P < 0.05$). The highest ultrafiltration volumes were observed in Q4 (3.1 ± 0.8 L versus the lowest in Q2 with 2.6 ± 0.8 L, $P < 0.02$). Patients with a high fluid overload had a lower body mass index (25.0 ± 4.3 kg/m^2 in Q4 versus 27.8 ± 4.5 kg/m^2 in Q1, $P < 0.01$).

For the longitudinal study, a sub-group of 34 patients was selected predominantly according to fluid overload and blood pressure values outside the reference region for healthy persons at the start of the study (fluid load <-1.1 L or >1.1 L and systolic blood pressure values <100 mmHg or >140 mmHg; see Figure 1); they were repeatedly investigated with BCM during 5.9 ± 1.7 months. The mean fluid overload was reduced by 0.62 L; in patients with fluid overload >1.1 L, it even was reduced by 0.81 L (see Table 1).

The observed mean pulse pressure decrease of 3 mmHg did not reach statistical significance ($P = 0.146$); pulse pressure has been associated with risk of death [5].

Changes in the prescription of antihypertensive medication were not significant either.

In the sub-group of fluid overloaded patients with high blood pressure, a non-significant reduction of blood pressure was observed (BP, pre-dialytic systolic/diastolic BP: $165 \pm 18/77 \pm 13$ mmHg at the start of the study versus $157 \pm 26/73 \pm 11$ mmHg at the end of the study, $P = 0.140/P = 0.286$). Moreover, a significantly higher UF volume was observed (2.5 ± 1.0 L at the start of the study versus 2.8 ± 0.9 L at the end of the study, $P = 0.013$).

Fluid overload is present in many HD patients, often unexpected. The analysis shows that special patient groups

Table 1. Longitudinal study data: fluid overload (FO) at the start and the end of the study

		Fluid overload (L)		
Patients	N	At the start of the study	At the end of the study	P (Wilcoxon's)
All	34	2.33 ± 1.82	1.71 ± 1.61	0.001
With fluid overload >1.1 L	24	3.14 ± 1.42	2.33 ± 1.40	0.001
With systolic blood pressure >140 mmHg	19	2.37 ± 2.09	1.70 ± 1.80	0.018
With FO >1.1 L and systolic BP >140 mmHg	14	3.19 ± 1.68	2.32 ± 1.61	0.013

N = number of patients; BP = blood pressure; values = mean ± standard deviation.

deserve particular attention (*male*, *hypertensive*, *high interdialytic weight gain*).

Bioimpedance spectroscopy allows detecting fluid overload easily, providing the basis to initiate the appropriate measures to normalize the fluid status. In our study, a reduction of fluid overload was successfully achieved. This technique should be applied more often in the normal clinical setting.

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