

# Body Composition Monitoring (BCM) and Fluid Assessment in PD Patients

## Variables Determining Overhydration and Blood Pressure

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### Background and Objectives

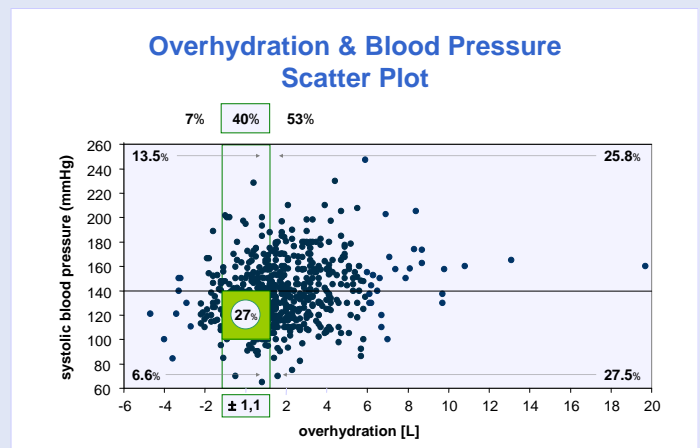
Adequate management of fluid status is a pivotal factor for long term outcomes of peritoneal dialysis (PD) patients. Despite its importance, body composition is rarely determined by objective methods. With the Body Composition Monitor (BCM, Fresenius Medical Care) a precise direct measurement has been developed for every day practice. The purpose of this cross-sectional study was to evaluate body composition and to identify relevant variables for optimized fluid balance and patient outcomes.

### Methods

We screened 973 and included 639 PD patients from 28 centers in 6 European countries. Body composition, blood pressure (BP), dialysis modality and prescription, comorbidities, laboratory parameters and antihypertensive medication were documented and analyzed. Normohydration was defined as being within the 10th and 90th percentile of the healthy reference population, i.e. between -1.1 and +1.1L. Overhydration and underhydration was defined as being above or below these values.

### Results

Less than half of the patients were normohydrated (40%). Overhydration (OH) >1.1 Liter was seen in 53% of the PD patients. Mean OH was 1.67±2.3 liters. Mean BP was 137±25.6 mmHg systolic and 80±14.3 mmHg diastolic with 85.4% of the patients being on antihypertensive medication. Regarding OH and BP 27% were in the optimal range, 26% with OH and high BP, 28% with OH and normal BP, 14% with high BP but without OH. Patients on biocompatible glucose alone or polyglucose solutions had a significantly better outcome regarding OH than standard glucose or aminoacid solutions. Further age, sex, modality, PD solution, glucose concentration, transport status, hemoglobin, NYHA stage, diabetes, and body mass index had significant beneficial or adverse influence on OH in the multivariate analysis. PD modality and prescribed PD solutions were significantly related with nutritional outcome in univariate and multivariate analysis. Patients on glucose alone had a significantly better outcome than polyglucose or aminoacids in regard to lean tissue index and fat tissue index. Hydration status was related to urine output. However, none of the analyzed univariate or multivariate models showed any correlation between hydration status and ultrafiltration.



Blood pressure & Overhydration	Mean	SD	25 <sup>th</sup> perc	75 <sup>th</sup> perc
Systolic mmHg	137	± 25.6	120	153
Diastolic mmHg	80	± 14.3	70	90
Overhydration L	1.67	± 2.34	0.2	2.9

Body composition	Mean	SD	25 <sup>th</sup> perc	75 <sup>th</sup> perc	Ref
Weight kg	72.2	±15.4	61.9	81	
Height cm	166	± 9.5	159	173	
BMI kg/m <sup>2</sup>	26.3	± 5.1	22.7	29.0	18.5-25 <sup>*</sup>
Lean tissue index kg/m <sup>2</sup>	13.4	± 3.4	10.9	15.6	11 - 20 <sup>**</sup>
Fat tissue index kg/m <sup>2</sup>	12.6	± 5.9	8.3	15.9	3 - 10 <sup>**</sup>
Total body water L	35.8	± 7.7	30.2	41.0	
Extra/Intracellular water	0.95	± 0.15	0.8	1.0	

<sup>\*</sup>WHO, <sup>\*\*</sup>BCM combined 10th - 90th percentile for male/female, 59 years

Patient characteristics	Mean	SD	25 <sup>th</sup> perc	75 <sup>th</sup> perc
Age years	58.8	± 14.8	50.2	69.7
Gender m/w %	54.6 / 45.4			
GFR ml/min	6.64	± 7.2	2.9	8.9
Urine ml/24h				
≤ 100	19.1 %			
>100 - 500	21.9 %			
>500 - 1000	23.5 %			
>1000	32.6 %			
UF ml/24h	940	± 580	530	1200
High transporter	19.7 %			
High average transporter	39.6 %			
Low average transporter	33.6 %			
Low transporter	7.1 %			

### Conclusions

Common clinical assessment of parameters such as weight, BP, and ultrafiltration does not give a reliable estimate for the patient's fluid status. The BCM measurement provides essential information to identify patients at risk, supporting clinicians to optimize PD therapy and patient outcomes.