Reduced Albumin Function is associated with increased Mortality in End Stage Renal Disease

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Introduction

- Unbound fraction of albumin bound uremic toxins like indoxyl sulfate or p-cresyl-sulfate are associated with complication of end stage renal disease
- Impaired albumin binding capacity might be the cause for such elevated unbound fractions
- Impaired albumin binding function in patients with different stages of chronic kidney disease has been reported previously

Methods

- Albumin Binding Capacity (ABiC) test was used to characterize site specific albumin binding for binding site II where uremic toxins like named above are bound (Klammt et al., Nephrol. Dial. Transplant (2012) 27: 2377)
- To assess the binding site II specific Albumin Binding Capacity in dialysis patients a one year observational cohort trial with an optional follow up period was initiated
- Laboratory values as well as clinical status and dialysis specific parameters were obtained at 3 different time points and were analyzed with respect to ABiC and uremic toxins
- 199 dialysis patients at 5 centers in in Mecklenburg-Westernpommerania were enrolled in July 2013

Results

- 27 patients (13,5 %) died during the one year observation period (cause of death: cardiovascular n=14, infection n=7, other n=6)
- Albumin Binding Capacity (ABiC) was significantly impaired in these patients (66±8,9 % vs. 69,9±9,0 %, p=0,041),
- Albumin and total protein levels are not significantly different between both groups (39,0±4,6 g/l vs. 40,3±4,4 g/l and 65,7±8,2 g/l vs. 65,2±5,4 g/l)
- ABiC was correlated inversly with indoxyl sulfate (r=0,483, p<0,001) and p-cresyl-sulfate (r=0,417, p<0,001) respectively
- Higher levels of ß-2-microglobulin were found in nonsurvivers indicative for impaired elimination of middle molecules. However, only for a subgroup of patients were data available
- Lower Kt/V values were found in nonsurvivors indicative of impaired dialysis effectivity compared to survivors

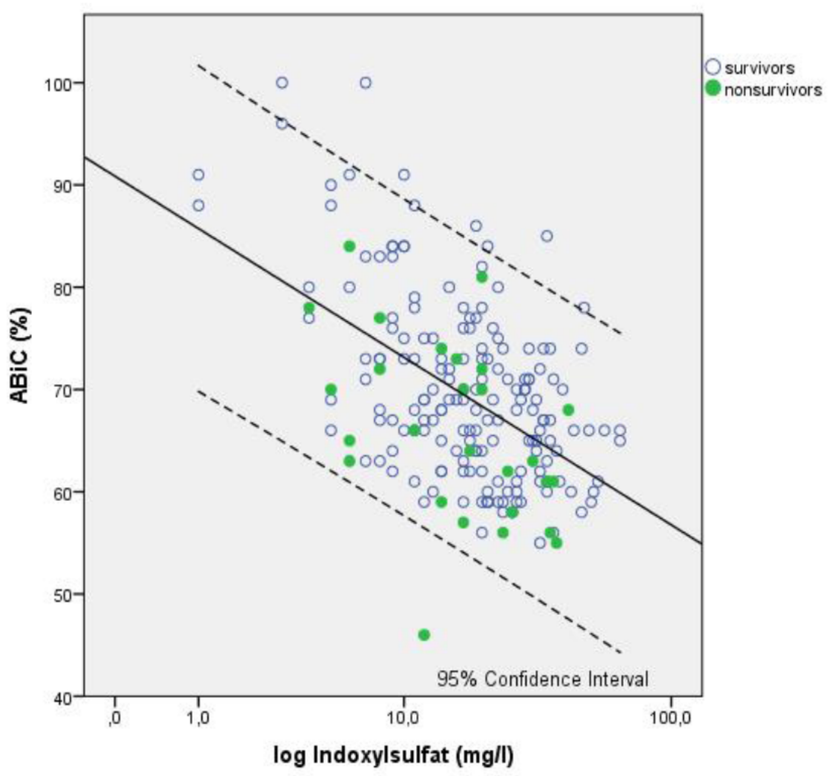
	survivors			death during observation period			
	N	mean	standard deviation	N	mean	standard deviation	Sig. (2-sided T-Test)
age (years)	172	66	13	27	73	11	,003
BMI (kg/m²)	172	26,23	5,61	27	25,84	3,80	,651
Kt_over_V	155	1,53	,30	24	1,38	,22	,006
Hämoglobin (mmol/l)	172	7,39	,75	26	7,29	,67	,502
Hämatokrit	172	,36	,04	26	,35	,04	,427
Leukocytes (WBC GPT/l)	172	6,88	2,11	26	6,86	2,11	,961
CRP (mg/l)	100	8,75	14,05	9	9,44	8,19	,824
Protein, total (g/l)	172	65,24	5,45	25	65,69	8,21	,792
Albumin (g/l)	171	40,33	4,43	26	38,95	4,61	,164
b2-Microglobulin	84	25,74	9,48	9	35,57	8,89	,011
ABiC (%)	**172**	**69,87**	**9,02**	**27**	**65,96**	**8,89**	**,041**
Indoxylsulfat (mg/l)	172	21,21	12,64	27	19,11	11,38	,386
p-Cresylsulfat (mg/l)	172	44,80	27,83	27	55,07	42,16	,230

Participating Dialysis Centres

- Department for Dialysis/Nephrology of the University of Rostock
- Medical Office for Dialysis and Apheresis, Rostock
- Dialysis Centre in the Medical Care Centre Hagenow
- Dialysis Centre in the Medical Care Centre Schwerin-West
- Dialysis Centre in the Medical Care Centre Schwerin-Lankow

Time Point 1: V0 1st of July 2012 +/- 2 weeks → 1st Follow Up: V1 1st of January 2013 +/- 2 weeks → 2nd Follow Up: V2 1st of July 2013 +/- 2 weeks

Parameters	V0	V1	V2
Laboratory diagnostics	Blood count, C-reactive protein, Creatinine, Urea, Uric acid, Albumin, Total protein, Electrolytes, b2-Microglobulin, Kt/V among others	Blood count, C-reactive protein, Creatinine, Urea, Uric acid,,Albumin, Total protein, Electrolytes, b2-Microglobulin, Kt/V among others	Blood count, C-reactive protein, Creatinine, Urea, Uric acid,,Albumin, Total protein, Electrolytes, b2-Microglobulin, Kt/V among others
Special analytics	Albumin binding capacity, Uremic toxins	Albumin binding capacity, Uremic toxins	Albumin binding capacity, Uremic toxins
Dialysis parameters	Duration of dialysis therapy, Duration of one treatment	Duration of one treatment	Duration of one treatment
Technical parameters	Type of treatment (hemodialysis, hemodiafiltration, hemofiltration), Permeability	Type of treatment (hemodialysis, hemidiafiltration, hemifiltration), Permeability	Type of treatment (hemodialysis, hemidiafiltration, hemifiltration), Permeability



Conclusions

- **Reduced physiological albumin binding capacity by occupation of albumin binding sites by uremic toxins and therefore increased unbound fractions might have an influence on complication in dialysis patients**
- **Albumin function assessed by Albumin Binding Capacity (ABiC) might be a useful biomarker not only for assessment of uremic toxin load but also for characterization of dialysis adequacy and probably also as a prognostic marker**

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