



N-TERMINAL PROHORMONE OF BRAIN NATRIURETIC PEPTIDE BUT NOT C-TERMINAL PRE-PRO VASOPRESSIN (COPEPTIN) LEVEL IS ASSOCIATED WITH THE RESPONSE TO ANTIHYPERTENSIVE THERAPY IN HEMODIALYSIS PATIENTS

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Introduction and objectives: Volume overload, frequently clinically asymptomatic is considered as a causative factor limiting the effectiveness of antihypertensive therapy in hemodialysis (HD) patients. Therefore, the aim of this study was to assess plasma levels of NT-proBNP and CT-proAVP, surrogate markers of volume overload in HD patients in relation to the number of antihypertensive drugs used in the hypertension treatment.

Methods: One hundred and fifty adult HD patients (92 males) were enrolled into this study. Clinical data concerning blood pressure (BP) measurements prior hemodialysis session and pharmacotherapy were collected from all patients. In addition to routine laboratory parameters, plasma levels of NT-proBNP and CT-proAVP were measured, and daily sodium and water consumption were estimated with a portion-size food frequency questionnaire.

Results: Among 145 (96.7%) hypertensive HD patients, 131 were receiving antihypertensive medication. Despite antihypertensive therapy, 31.0% had inadequately BP control. Plasma concentration of NT-proBNP was associated with systolic (R=0.19; p=0.02) but not diastolic BP values and with the number of received antihypertensive drugs (R=0.21; p=0.01). The highest NT-proBNP values were observed in patients receiving 3 or more antihypertensive drugs. In contrast, no significant correlation was found between plasma CT-proAVP concentrations and BP values as well as and the number of antihypertensive drugs. Receiver operator curve analysis showed that NT-proBNP values over 13,184 pg/mL predicted the use of at least 3 antihypertensive drugs in maximal doses in the therapy of hypertension, similar analyses performed for CT-proAVP showed much less specificity.

Table 1. Biochemical characteristics and the study parameters

	[(mean & SD or *median (25 – 75 percentile)].
Haemoglobin (g/dL) [^]	10.8 ± 1.3
Total cholesterol (mg/dL)	169 ± 53
LDL cholesterol (mg/dL)	90 ± 35
HDL cholesterol (mg/dL)	28 ± 9
Triglycerides (mg/dL)	169 ± 108
Calcium (mg/dL) [^]	5.77 ± 1.13
Phosphorous (mmol/L) [^]	8.57 (8.44 – 8.70)
Parathyroid hormone (pg/mL)	449 ± 228
Hs-CRP (mg/L) [*]	4.82 (2.33 – 11.60)
NT-proBNP (pg/mL) [*]	6424 (2425 – 29306)
CT-proAVP (pg/mL) [*]	2797 (2073 – 4289)
Water intake (L/day) [*]	2.16 ± 1.70
Sodium intake (g/day) [*]	2.86 ± 1.55

[^]data for 107 patients

Table 2. Mean NT-proBNP, CT-proAVP, residual diuresis, ultrafiltration and sodium intake in normotensive and hypertensive HD patients in accordance with the number of antihypertensive drugs [(mean & 95% CI or *median (25 – 75 percentile)].

	Normotensives		Hypertension			
	0	0	<1	≥1 <2	≥2 <3	≥3
Number of patients	5	14	45	43	24	19
Systolic BP (mmHg)	120.8 (91.8-149.7)	127.5 (116.6-138.3)	131.0 (126.0-135.9)	136.1 (131.3-140.9)	130.3 (124.1-136.6)	140.8 (134.8 – 146.8)
Diastolic BP (mmHg)	77.3 (64.1-90.6)	75.4 (70.7-80.0)	76.1 (73.2 – 78.9)	75.5 (72.6 – 78.5)	73.5 (70.6-76.4)	76.4 (71.7-81.0)
NT-proBNP (pg/mL) [*]	2132 (2108-22320)	3812 (2425-8436)	5145 (2506-20470)	4684 (2146-30595)	6424 (2037-32205)	19609 (7886-35000)
CT-proAVP (pg/mL) [*]	2812 (2377-8173)	2642 (2166-3512)	2832 (2230-4289)	2935 (2078-4905)	2837 (1916-3829)	2455 (1860-4386)
Residual diuresis (L)	0.15 (0-0.40)	0.45 (0.14-0.76)	0.56 (0.41-0.71)	0.37 (0.25-0.50)	0.23 (0.08-0.38)	0.54 (0.33-0.76)
Ultrafiltration (L)	3.48 (2.60-4.36)	2.69 (2.07-3.32)	2.54 (2.30-2.77)	2.27 (1.96-2.58)	2.34 (1.93-2.74)	2.35 (1.86-2.84)
Sodium intake (g/day) [*]	2.38 (1.29-3.45)	3.89 (2.41-5.37)	2.86 (2.22-3.16)	2.50 (2.20-3.14)	3.10 (2.09-4.34)	3.34 (2.54-4.55)

^{*}maximal doses, [^]data for 107 patients, BP - blood pressure

Figure 1. Receiver operator curve analysis showing the threshold for CT-pro AVP (below 3.185 pg/mL) as a predictor of the use of at least 3 antihypertensive drugs in maximal doses in the therapy of hypertension.

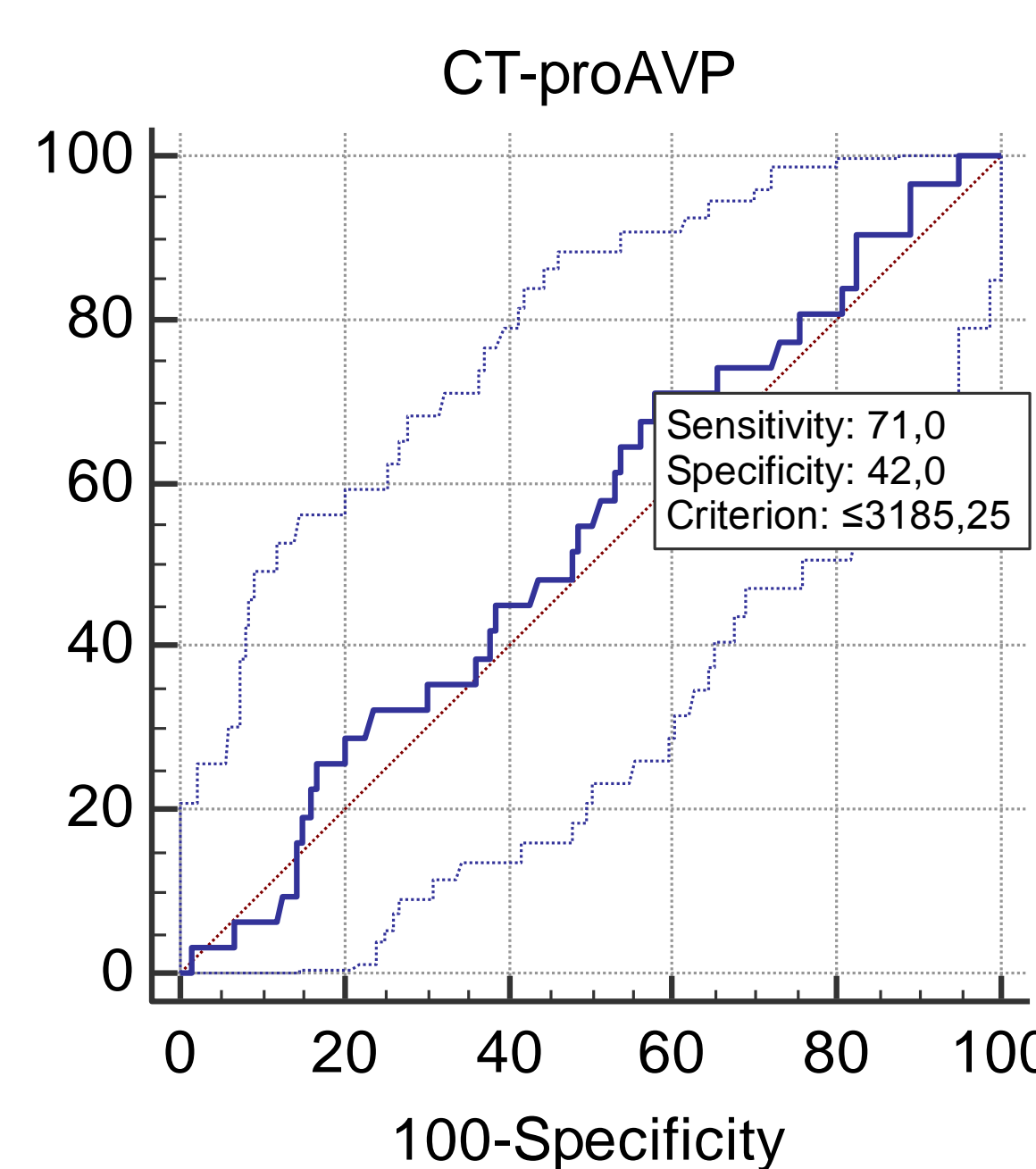
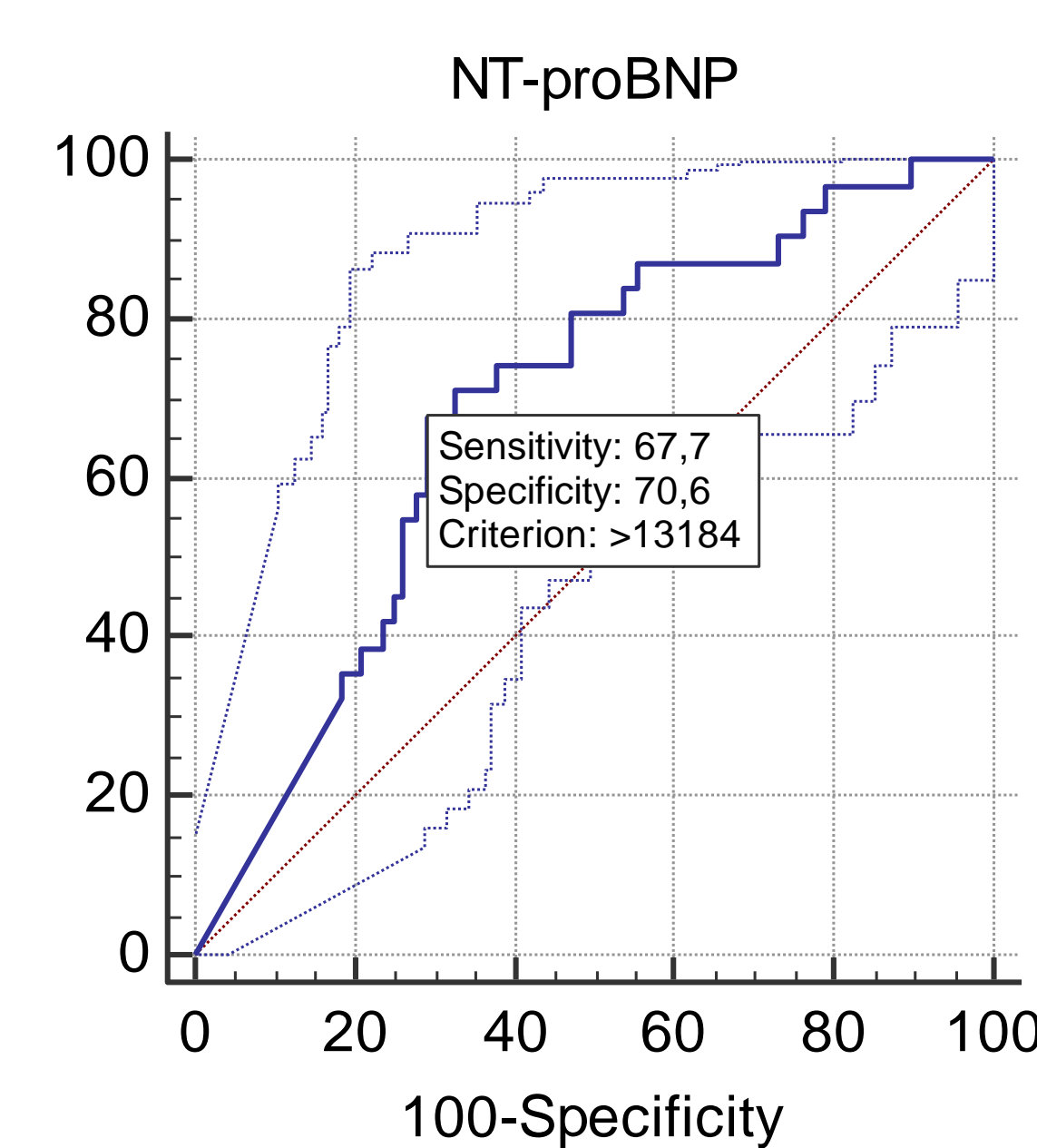


Figure 2. Receiver operator curve analysis showing the threshold for NT-pro BNP value (over 13.184 pg/mL) as a predictor of the use of at least 3 antihypertensive drugs in maximal doses in the therapy of hypertension.



Conclusion: 1. Increased levels of N-terminal prohormone of brain natriuretic peptide seems to be a better biomarker of multidrug antihypertensive therapy requirement than C-terminal pre-pro vasopressin (copeptin). 2. Whether estimation of N-terminal prohormone of BNP in these patients will be also better biomarker than copeptin in the prediction of CV complications related to hypertension needs further investigations.