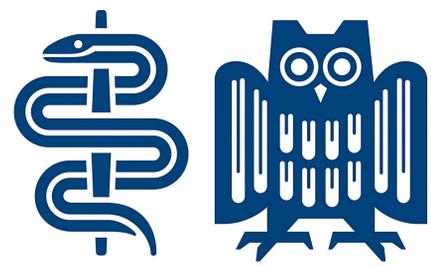# NT-proBNP versus Echocardiographic Markers as Predictors of Cardiovascular Events in CKD G2 – G4

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Introduction

➢ Chronic kidney disease (CKD) patients have high cardiovascular morbidity and mortality.

➢ Echocardiographic and laboratory parameters have been suggested as predictors of cardiovascular events.

➢ We aimed to analyze whether echocardiographic and laboratory parameters yield additive or redundant information on cardiovascular outcome in CKD patients.

Methods

➢ Subanalysis of CARE FOR HOMe

➢ 402 patients with CKD G2 – G4 (estimated glomerular filtration rate (eGFR) 15 – 89 ml / min / m²)

➢ Echocardiograph measurement of left atrial volume index (LAVI) and left ventricular mass index (LVMI)
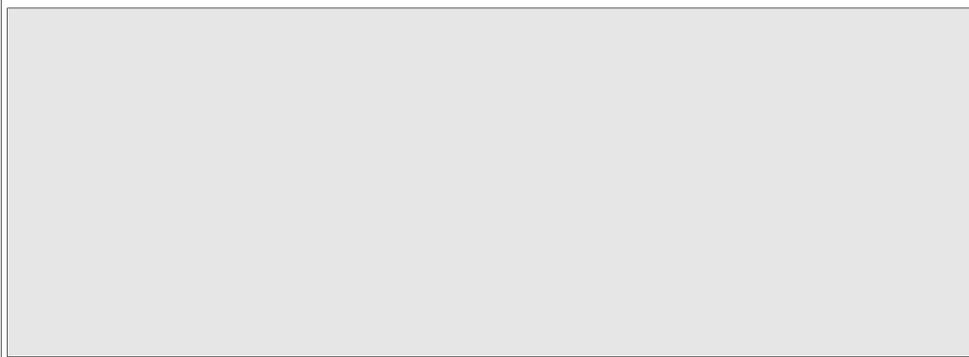

Fig. 1: Measurement of LAVI (representative example)

$$LAVI = 8/3\pi \, [(A1) \times (A2) / (L)]/ BSA$$

$$LVMI = (0.8 \times \{1.04 \, [(EDD + PWT + SWT)^3 - (EDD)^3]\} + 0.6 \, g) / BSA$$

EDD: end diastolic diameter; P / SWT: posterior / septal wall thickness (diastolic);
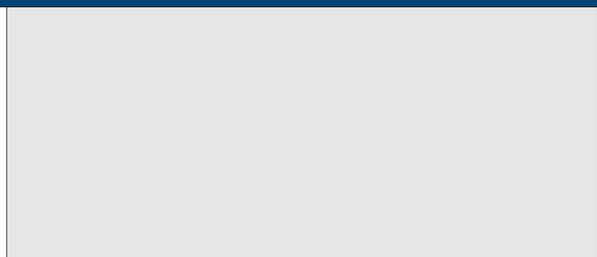BSA: body surface area

Fig. 2: Measurement of LVMI (representative example)

➢ Laboratory measurement of plasma aminoterminal pro brain natriuretic peptide (NT-proBNP)

➢ Primary endpoint: first occurrence of a cardiovascular event (CVE), defined as acute myocardial infarction, coronary / cerebrovascular / peripheral arterial revascularization / stroke, or death of any causes

➢ Median follow up: 2.9 ± 1.3 years

➢ Statistical analyses: univariate Kaplan Meier analysis / multivariate Cox regression analysis

Results

	Total (n= 402)	G 2 (n = 80)	G 3a (n = 129)	G 3b (n = 115)	G 4 (n = 78)	p value
Age (years)	65 ± 13	58 ± 12	64 ± 13	68 ± 11	68 ± 12	**p < 0.001**
Gender (female)	163 (41%)	25 (31%)	57 (44%)	50 (44%)	31 (40%)	p = 0.261
Diabetes Mellitus	152 (38%)	25 (31%)	51 (40%)	44 (38%)	32 (41%)	p = 0.577
Prevalent CVD	125 (31%)	9 (11%)	41 (32%)	50 (44%)	25 (32%)	**p < 0.001**
Current Nicotine	42 (10%)	13 (16%)	12 (9%)	11 (10%)	6 (8%)	p = 0.285
Albuminuria (g/g Crea)	37 (7 – 197)	26 (7 – 114)	19 (5 – 73)	46 (10 – 163)	158 (42 – 689)	**p < 0.001**

Tab. 1: Baseline characteristics of patients stratified by GFR categories.

➢ Lower eGFR was associated with NT-proBNP (r = -0.564; p < 0.001) as well as with LAVI (r = -0.233; p < 0.001) and LVMI (r = -0.160; p = 0.001) at study initiation.
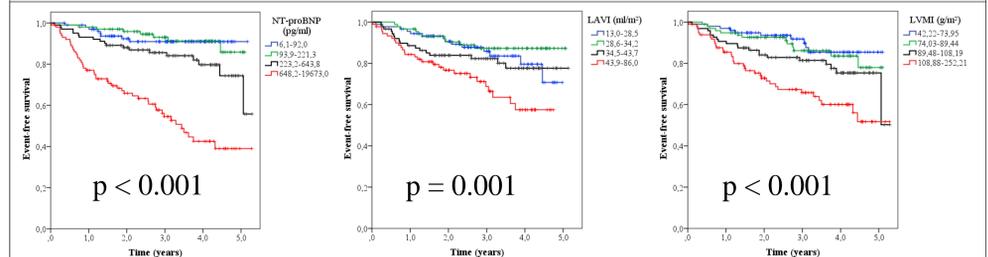

Fig. 3: Kaplan Meier analysis: Patients were stratified into quartiles by plasma NT-proBNP, LAVI or LVMI.

➢ In a Cox-regression analysis which included classical cardiovascular risk factors, eGFR, NT-proBNP and either LVMI or LAVI, only NT-pro-BNP remained an independent predictor for CVE (HR 4th *vs* 1st quartile: 3.60; p = 0.006), whereas LAVI (HR 4th *vs* 1st quartile: 0.64; p = 0.290) and LVMI (HR 4th *vs* 1st quartile: 1.70; p = 0.181) were no independent outcome predictors.
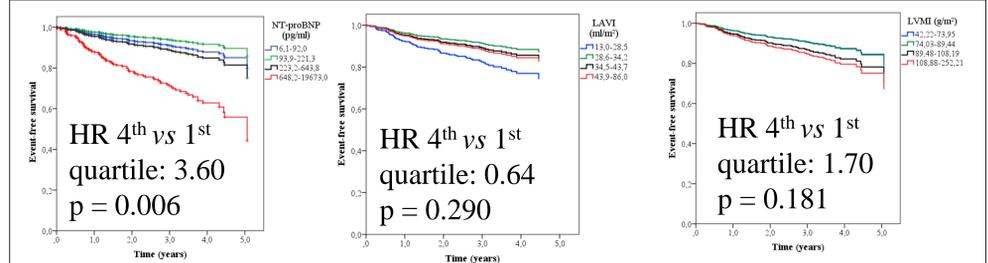

Fig. 4: Multivariate Cox regression analysis: Patients were stratified into quartiles by plasma NT-proBNP, LAVI or LVMI.

Conclusions

➢ NT-proBNP, LAVI and LVMI are strong univariate predictors of CVE.

➢ In multivariate Cox regression analysis, NT-proBNP outperformes echocardiographic parameters as prediction marker for future CVE.

➢ Thus, the routine echocardiography does not yield further prognostic information beyond NT-proBNP.