

## The Copenhagen chronic kidney disease echo study (COInCYDE)

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**Funding Acknowledgement:** Type of funding source: Public hospital(s). Main funding source(s): The Capital Region of Denmark

**Background:** The cardiovascular mortality of patients with chronic kidney disease (CKD) is 2–10 times higher than in the average population.

**Purpose:** To estimate the prevalence of abnormal cardiac function or structure across the stages CKD 1 to 5 nonD.

**Method:** Prospective cohort study. Patients with CKD stage 1 to 5 not on dialysis, aged 30 to 75 (n=875) and age-/sex-matched controls (n=173) were enrolled consecutively. All participants underwent a health questionnaire, ECG, morphometric and blood pressure measurements. Blood and urine were analyzed. Echocardiography was performed. Left ventricle (LV) hypertrophy, dilatation, diastolic and systolic dysfunction were defined according to current ESC guidelines.

**Results:** 63% of participants were men. Mean age was 58 years (SD 12.6 years). Mean eGFR was 46.7 mL/min/1.73 m (SD 25.8) for patients and 82.3 mL/min/1.73 m (SD 13.4) for controls. The prevalence of elevated

blood pressure at physical exam was 89% in patients vs. 53% in controls. Patients were more often smokers and obese.

Left ventricular mass index (LVMI) was slightly, albeit insignificantly elevated at CKD stages 1 & 2 vs. in controls: 3.1 g/m<sup>2</sup>, CI: -0.4 to 6.75, p-value 0.08. There was no significant difference in LV-dilatation between patients and controls.

Decreasing diastolic and systolic function was observed at CKD stage 3a and later: LVEF decreased 0.95% (CI: -1.5 to -0.2), GLS increased 0.5 (CI: 0.3 to 0.8), and OR for diastolic dysfunction increased 3.2 (CI 1.4 to 7.3) pr. increment CKD stage group.

**Conclusion:** In accordance to previous studies, we observe in the CPHCKD cohort study signs of early increase of LVMI in patients with CKD stage 1 & 2. Significant decline in systolic and diastolic cardiac function is apparent already at stage 3 CKD.

	Patients (n=827)	Controls (n=173)	p-value	CKD Stage 1 & 2 (n=212)	CKD Stage 3a & 3b (n=385)	CKD Stage 4 & 5 nonD (n=228)	p-value for trend
Age, Years, mean (SD)	57.9 (12.7)	59.5 (12.0)	0.12	48.8 (12.3)	59.9 (11.7)	62.9 (10.5)	<0.001
Male Gender, n (%)	519 (62.8%)	106 (61.3%)	0.71	128 (60.4%)	243 (63.1%)	146 (64.0%)	0.85
LVMI, g/m <sup>2</sup> , median (IQR)	76.2 (63.8, 90.0)	69.0 (57.9, 80.8)	0.001*	70.2 (60.7, 82.1)	76.1 (64.1, 90.1)	82.1 (66.7, 96.6)	0.003*
LV hypertrophy, n (%)	77 (9.3%)	3 (1.7%)	0.01*	5 (2.4%)	40 (10.4%)	32 (14.0%)	0.02*
LV dilatation, n (%)	20 (2.4%)	3 (1.8%)	0.68*	3 (1.4%)	11 (2.9%)	6 (2.7%)	0.76*
LVEF, %, median (IQR)	59.5 (55.2, 62.7)	60.8 (57.7, 64.1)	0.03*	60.8 (57.5, 63.1)	59.2 (55.4, 62.9)	57.8 (53.2, 61.9)	0.01*
DDF grade 2 or 3	21 (2.8%)	0 (0.0%)	0.002*	0 (0.0%)	8 (2.3%)	13 (6.8%)	0.007*
GLS, %, mean (SD)	-17.9 (2.9)	-19.3 (2.2)	<0.001*	-19.0 (2.2)	-17.7 (2.8)	-17.4 (3.5)	<0.001*

\*Results from multivariable regression. DDF, diastolic dysfunction; GLS, global longitudinal strain; IQR, interquartile range; LV, Left ventricle; LVEF, left ventricle ejection fraction; LVMI, left ventricle mass index; SD, standard deviation.

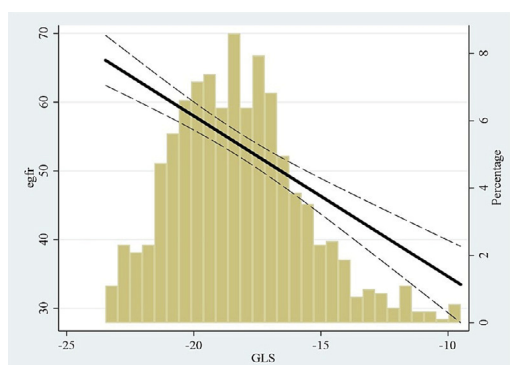


Figure 1. Estimated GFR vs. GLS & histogram of GLS