ASSOCIATION BETWEEN EXTENT OF MYOCARDIAL FIBOSIS ASSESSED BY NATIVE T1 MAPPING CARDIAC MAGNETIC RESONANCE AND BIOMARKERS AND THE LEVEL OF ESTIMATED GLOMERULAR FILTRATION RATE

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BACKGROUND AND OBJECTIVE

- Cardiac structural changes in patients with kidney disease (CKD) are often asymptomatic and portend poor prognosis.
- Non-invasive quantification of myocardial fibrosis is problematic in advanced CKD, as Gadolinium contrast agents used for cardiac magnetic resonance imaging (MRI) are contraindicated due to an association with nephrogenic systemic fibrosis.
- This study aims to evaluate the association between eGFR and myocardial fibrosis as assessed by native (non-contrast) T1 mapping MRI and circulating levels of cardiac biomarkers.

METHODS

- We performed native T1 mapping cardiac MRI in 22 incident patients with:eGFR > 90 ml/min/1.73m2 (n=5), 30-60 ml/min/1.73m2 (n=10), 15-29 ml/min/1.73m2 (n=6) and <15 ml/min/1.73m2 (n=1).
- Native T1 relaxation times as marker of cardiac fibrosis were analyzed across eGFR spectrum and correlated with cardiac biomarkers: Galectin 3 and ST2.

RESULTS

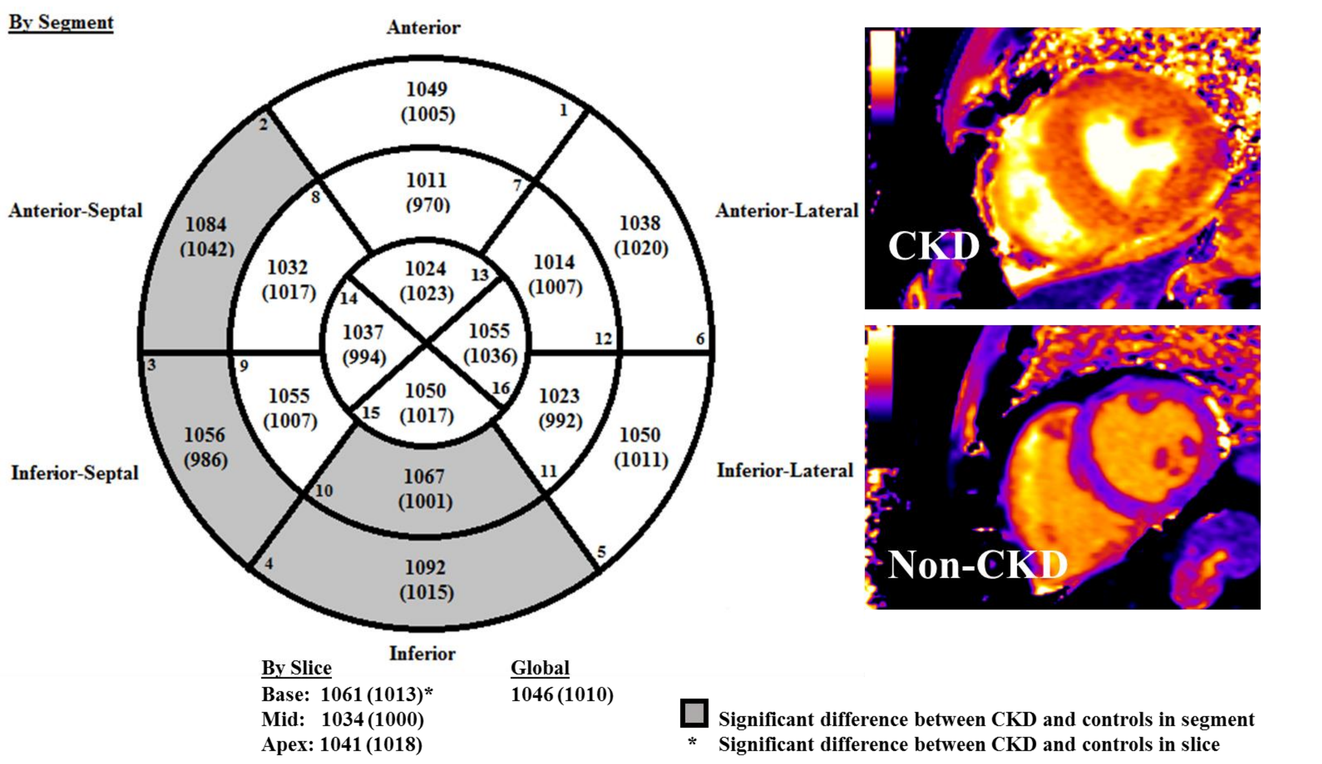
Table 1. Characteristics of the study cohort

Characteristic	eGFR > 90 ml/min/1.73m²	eGFR < 60 ml/min/1.73m²	p-value
N	5	17	
Women, n(%)	3(60.0)	7(41.2)	0.62
Caucasian, n(%)	5(100)	6(35.3)	0.04
Diabetes, n(%)	0(0)	11(64.7)	0.04
Hypertension, n(%)	0(0)	16(94.1)	<0.001
Systolic blood pressure	114.0 (14.9)	134.2(25.6)	0.11
Ejection fraction (%)	57.4 (6.7)	47.2(8.5)	0.02
Creatinine (mg/dL)	0.74 (0.1)	2.14(1.2)	0.02
eGFR (mL/min/1.73m²)	105.0(6.4)	32.7(10.2)	<0.001
Galectin 3 (ng/mL)	7.2(2.3)	19.8(5.3)	<0.001
ST2 (pg/mL)	13,299(6,290)	19,626(8,719)	0.15

RESULTS - CONT

- T1 times were measured throughout 3 short axis slices: basal, mid and apical (**Figure 1**)
- Global T1 times progressively increased with eGFR decline (**Figure 2**, p=0.03 between groups, and correlated with galectin-3 (**Figure 3,** R=0.425)
- eGFR inversely correlated with Galectin 3 and ST2 (**Figures 3 and 4**)

Figure 1. Myocardial Non-contrast T1 Mapping in CKD Patients vs. non-CKD



All native T1 times are in miliseconds. Data presented as CKD T1 times (control T1 times). Panels on the right show T1 images at mid myocardium.

Figure 2. T1 mapping by CKD level

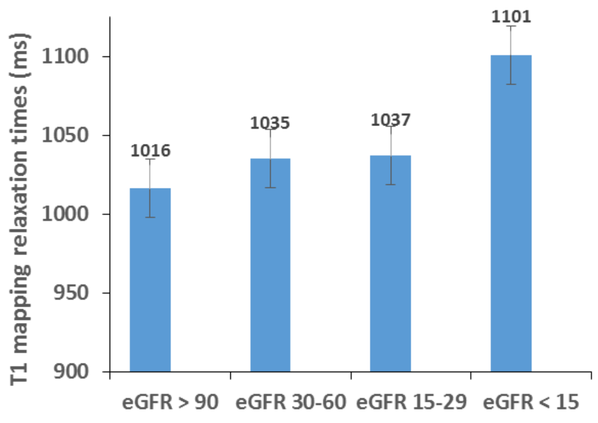


Figure 3. Correlation between Galectin 3 and T1 mapping

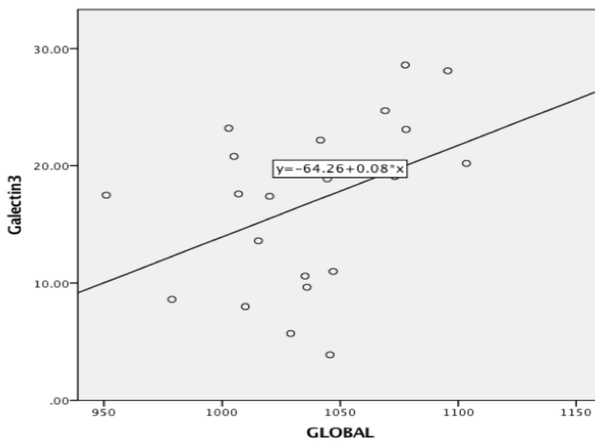


Figure 4. Correlation between Galectin 3 and eGFR

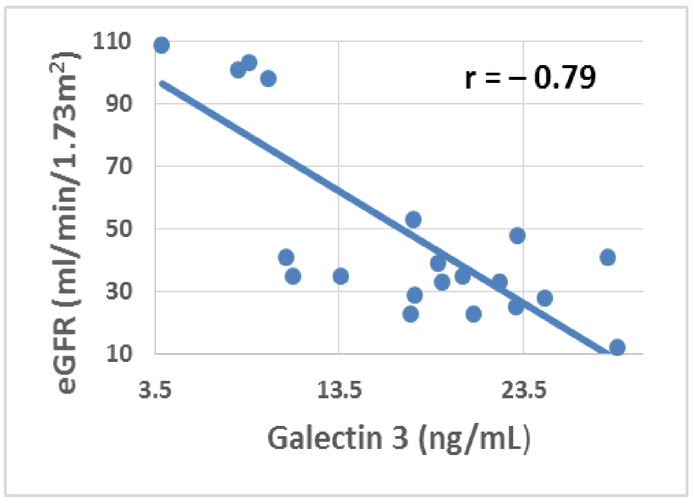
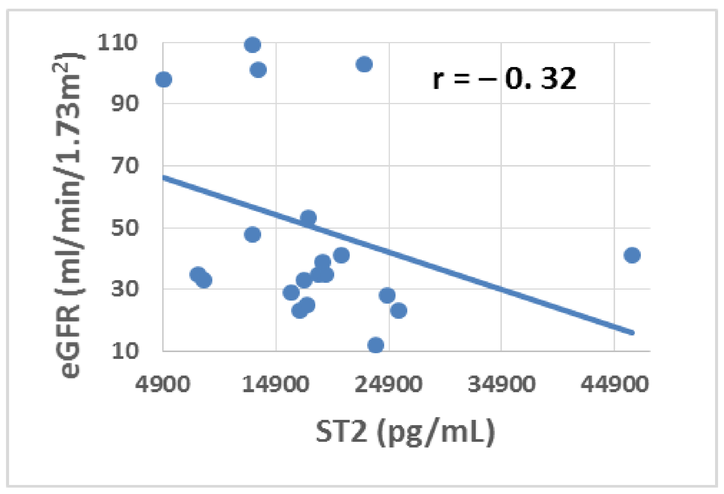


Figure 5. Correlation between ST2 and eGFR



CONCLUSION

- There is a graded association between eGFR and myocardial fibrosis, with higher indices of fibrosis found at lower levels of eGFR.
- Noninvasive quantification of myocardial fibrosis can assist in diagnosis and risk stratification of CKD patients with subclinical heart disease.

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