Short summary:

Background: High cardiovascular risk in patients with chronic kidney disease is partly due to mineral dysbalance, microinflammation and oxidative stress. CKD patients accumulate traditional and non-traditional CV risk factors. FGF23, MMPs and PlGF belong among these non-traditional biomarkers of CV risk. FGF23 is a phosphaturic hormone and inhibitor of calcitriol synthesis. It is associated with vascular calcifications. Matrix-metalloproteinases (e.g. MMP-2, MMP-9) are proteolytic, proinflammatory enzymes, contributing to myocardial remodelation. Placental growth factor (PlGF) is a proangiogenic cytokine that is associated with LV hypertrophy in animal model. Plasmatic FGF23, MMPs and PlGF are elevated in CKD.
Aim: We aimed to describe dynamic changes between several novel biomarkers of CV risk (FGF23, MMP-2, MMP-9 and PlGF) in CKD stages 1-5, to describe their mutual correlations and possible association with traditional CV risk markers. We studied possible association of laboratory and echocardiographic parameters in patients with CKD stages 2-4.
Methods: In a cross-sectional study we evaluated 80 patiens with CKD 1-5 and 44 healthy controls. In a prospective study we evaluated echocardiographic and laboratory parameters in 62 patients with CKD 2–4 for an average study period of 36±10 months. FGF23, MMP-2, MMP-9 and PlGF serum levels were assessed by ELISA method. Multivariate regression analysis was used to detect independent correlations.
Results: In a cross-sectional study, plasmatic FGF23 and MMP-2 were higher in CKD patients versus controls. We detected following independent correlations: plasmatic FGF23 with MMP-2, plasmatic FGF23 with parathormone and inversely with calcitriol; MMP-2 with phosphate levels. Plasmatic FGF23 was higher in patients with CV disease history. In the prospective study, basic versus final measurement showed the following: increased left ventricular mass index (LVMI) in 29% versus 37,1% patients, LV diastolic dysfunction in 74,1% versus 75,8% patients. We detected the following independent correlations: LVMI was associated with PlGF levels, total cholesterol, BNP levels, systolic BP and serum creatinine levels. EN-RAGE was associated with left atrial diameter and inversely with E/A ratio.
Conclusions: Our data show an association of metabolic and bone disease with inflammation and CV risk in CKD patients. However, no data exist so far to prove causality of these associations. There is insufficient data about possible positive effect of therapeutic modulation of these biomarkers on CV risk in CKD population.