Impaired global myocardial flow reserve (MFR) may be associated with increased risk for cardiac events and coronary artery disease progression. Chronic kidney disease (CKD) is also considered a risk factor for cardiovascular disease. We sought to investigate the effect of CKD on the myocardial microcirculation in patients referred for clinical (82)Rb PET/CT, who had normal left ventricular (LV) function and no flow-limiting coronary artery disease. Estimated glomerular filtration rate (eGFR) was available for 230 patients who had undergone rest and pharmacologic stress (82)Rb PET/CT for suspected coronary artery disease. CKD was defined as an eGFR less than 60 mL/min/1.73 m(2). After patients with hemodialysis, a renal transplant, abnormal regional perfusion (summed stress score> 4), or reduced LV function (LV ejection fraction< 45%) were excluded, 40 CKD patients remained. Those were compared with a control group without CKD, which was matched for age, sex, coronary risk factors, and systemic hemodynamics (n = 42). List-mode acquisition of PET enabled quantification of myocardial blood flow (MBF) and MFR using a previously validated retention model with correction for (82)Rb extraction. Rest MBF was normalized to rate-pressure product. Mean eGFR in the CKD group was reduced (44 ± 14 vs. 99 ± 28...
mL/min/1.73 m(2); P< 0.0001), and creatinine was significantly elevated, compared with controls (1.9 ± 1.1 vs. 0.8 ± 0.2 mg/dL; P< 0.0001). MFR was significantly reduced in CKD (2.2 ± 1.0 vs. 3.0 ± 1.2 for controls; P = 0.027). This reduction was mainly due to increased rest MBF (1.1 ± 0.4 in CKD vs. 0.8 ± 0.2 mL/min/g in controls; P = 0.007). Stress myocardial flow was comparable between both groups (2.3 ± 0.9 vs. 2.3 ± 0.8 mL/min/g; P = 0.08). Overall, MFR was significantly correlated with eGFR (r = 0.41; P = 0.0005). Stress MBF did not correlate with eGFR (r = 0.002; P = 0.45), but rest MBF showed an inverse correlation (r = -0.49; P< 0.0001). Rest MBF was also inversely correlated with hemoglobin (r = -0.28; P = 0.014), but only eGFR was an independent correlate at multivariate analysis. MFR is impaired in patients with renal insufficiency with normal regional perfusion and LV function, mostly because of elevated rest flow. Absolute quantification of flow may be useful to identify microvascular dysfunction as a precursor of clinically overt coronary disease in this specific risk group.