Dual energy CT for the assessment of reperfused chronic infarction - a feasibility study in a porcine model.

Abstract:
BACKROUND: Detection of myocardial infarction has been the focus of considerable research over the past few decades. Recently developed dual source computed tomography (DSCT) scanners with dual energy mode have been used to detect myocardial infarction, but the studies on this topic are few. To evaluate the feasibility and performance of dual energy CT (DECT) during arterial phase in coronary CT angiography for the detection of chronic infarction compared with late enhancement MRI (LE-MRI) and histopathology in a porcine model of reperfused myocardial infarction. Myocardial infarctions were induced by 30 min occlusion of the proximal left anterior descending coronary artery in eight minipigs. DECT, post-contrast LE-MRI and histopathology were performed 60 days after infarct induction. The CT scan was performed in dual energy mode using a dedicated protocol. Myocardial iodine distribution was superimposed as color maps on grey scale multiplanar reformats of the heart. Two radiologists in consensus interpreted all imaging studies for presence of gadolinium uptake at LE-MRI reduced iodine content at DECT and hypoenhanced areas in the initial 100 kV coronary CT angiography images that were acquired during the DECT-acquisition. Results were compared with histopathology. Based on evaluable
segments, DECT showed a sensitivity and specificity of 0.72 and 0.88; LE-MRI showed a sensitivity and specificity of 0.78 and 0.92; and the 100 kV data-set of the DECT scan showed a sensitivity and specificity of 0.60 and 0.93, respectively, for the detection of histological proved ischemia. DECT during arterial phase coronary CT angiography, which is ordinarily used for coronary artery evaluation, is feasible for the detection of a chronic reperfused myocardial infarction.