TEXTURE ANALYSIS OF DIFFUSE MYOCARDIAL FIBROSIS FROM LATE GADOLINIUM ENHANCED MAGNETIC RESONANCE IMAGING IN AGING RATS

Poster Contributions

Hall C
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Background: Diffuse myocardial fibrosis is challenging to detect with standard methods in late gadolinium enhanced cardiac magnetic resonance (LGE CMR) imaging. We hypothesize that texture analysis from LGE CMR images may detect diffuse fibrosis in the aged rat heart.

Methods: LGE CMR of ex-vivo rat hearts was performed on 6-week and 2-year old rats (n=24). Picrosirius red staining was used as the histology reference. 3D pixel-wise contrast and variance texture maps were computed from Haralick’s grey level co-occurrence matrix derived from the LGE images. Fibrosis was identified with a 2 standard deviation (SD) method for signal enhancement in the LGE CMR and with a 6 SD method for the texture maps.

Results: There was a significant increase of collagen fibers in the aged compared to the young rat histology slices (2.05±0.53 %LV vs. 0.83±0.25 %LV). Fibrosis in both 3D texture maps correlated well with the histology without systematic errors (r=0.78, y=1.00x+0.00 for contrast; r=0.76, y=1.00x+0.00 for variance). Fibrosis in LGE CMR also correlated well with the histology but showed a trend of overestimation (r=0.75, y=1.43x+0.05).

Conclusions: Texture analysis is a robust approach for detecting the diffuse myocardial fibrosis content in LGE CMR images. A clinical study is needed to evaluate this method for diffuse fibrosis detection in patients with LGE CMR imaging.