

Meeting abstract

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## I03 I Renal dysfunction, in association with myocardial fibrosis leads to worse survival in patients with severe left ventricular dysfunction: a delayed hyperenhancement MRI study

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### Introduction

Renal dysfunction in patients with severe left ventricular (LV) dysfunction is an independent risk factor for mortality. Delayed hyperenhancement magnetic resonance imaging (DHE-MRI) accurately detects myocardial fibrosis (scar), seen commonly in this group.

### Purpose

We sought to determine the association of myocardial scar and renal dysfunction on survival in this group.

### Methods

We studied 176 consecutive patients ( $61 \pm 13$  years, 73% men) with severe LV systolic dysfunction (mean ejection fraction ( $24 \pm 8\%$ )) who underwent DHE-MRI on 1.5 T MR scanners (Siemens, Erlangen, Germany) from 2005–6. DHE-MR images were obtained in standard long and short axis orientations (covering the entire LV), after injection of Gadolinium dimethylglumine using an inversion recovery spoiled gradient echo sequence: TE 4 msec, TR 8 msec, flip angle  $30^\circ$ , bandwidth 140 Hz/pixel, 23 k-space lines acquired every other RR-interval, field of view (varied from 228–330 in the x-direction and 260–330 in the y-direction) and matrix size (varied from 140–180 in the x-direction and 256 in the y-direction). For DHE-MRI analysis, a custom analysis package (VPT software, Siemens, Erlangen, Germany) was used to manually delineate endocardial and epicardial myocardial edges. Scar was defined as having intensity  $>2$  SD above viable myocardium

(identified by a user-specified region of interest). Glomerular filtration rate (GFR, ml/min/1.73 m<sup>2</sup>) was calculated using the following formula:  $186 \times (\text{serum creatinine}^{-1.154}) \times (\text{age}^{-0.203}) \times 1.212$  (if black)  $\times 0.742$  (if female). We divided patients into 4 groups: 1) GFR  $> 60$ , no scar (n = 28) 2) GFR  $> 60$  with scar (n = 85) 3) GFR  $\leq 60$ , no scar (n = 9) and 4) GFR  $\leq 60$  with scar (n = 53).

### Results

Overall, there were 24 deaths and of these, 14 patients (65%) had myocardial scar. The incidence of deaths was highest in group 4 – there were no deaths in group 1, 7 in group 2, 3 in group 3 and 14 in group 4 ( $p < 0.001$ ). Mean GFR was  $70 \pm 29$  and 62 (35%) patients had at-least moderate renal dysfunction (GFR  $< 60$ ). The frequency of myocardial scar was higher in patients with GFR  $> 60$  vs. those with GFR  $\leq 60$  (92% VS. 79%,  $p = 0.02$ ). On multiple regression (including GFR, myocardial scar, coronary artery disease, hypertension, diabetes and coronary bypass), GFR and myocardial scar were associated with mortality (both  $p$  value  $< 0.05$ , overall model  $p$  value  $< 0.001$ ). One year survival was significantly worse for groups 2, 3 and 4, compared to group 1 (log rank  $p$  value  $< 0.001$ ).

### Conclusion

Renal dysfunction is associated with a higher frequency of myocardial fibrosis in patients with severe LV dysfunction. Presence of renal dysfunction, myocardial fibrosis or

both is associated with worse survival in such patients. The mechanistic association between renal dysfunction and myocardial fibrosis needs to be further defined.

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