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## Non Invasive Imaging (Echocardiography, Nuclear, PET, MR and CT)

## IRON-SENSITIVE CARDIAC MAGNETIC RESONANCE IMAGING FOR IMPROVED PREDICTION OF MALIGNANT VENTRICULAR ARRHYTHMIAS IN PATIENTS WITH CHRONIC MYOCARDIAL INFARCTION

Oral Contributions

Room 2

Monday, March 16, 2015, 11:45 a.m.-11:57 a.m.

Session Title: Highlighted Original Research: Non Invasive Imaging and the Year in Review

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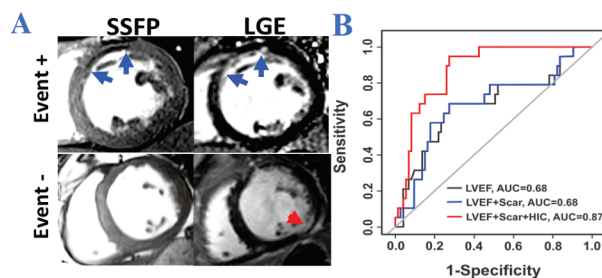
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**Background:** To date, the link between post-infarction iron depositions and malignant ventricular arrhythmias (mVA) in patients with chronic myocardial infarction (CMI) is unknown. The aim of this study was to determine the incremental prognostic value of hypointense cores (HIC) within CMI using iron-sensitive cardiac magnetic resonance imaging (CMR) at 3.0T for the prediction of mVA.

**Methods:** CMI patients (n=94) who underwent routine LGE-CMR imaging at 3.0T prior to ICD implantation for primary and secondary prevention were retrospectively analyzed. The predictive values of HIC in bSSFP images and conventional CMR and ECG arrhythmic risk indices for the prediction of primary combined outcome (appropriate ICD therapy, survived cardiac arrest, SCD) were compared. HIC within CMI on bSSFP as a marker of iron deposition was validated in dogs.

**Results:** Primary endpoint was met in 18 patients with HIC (HIC+) and 1 subject without HIC present (HIC-) while 28 HIC+ and 47 HIC- patients didn't meet the study endpoint (Fig. 1A). ROC analysis (Fig. 1B) demonstrated an additive prognostic value of HIC for mVAs by increasing the AUC to 0.87 when added to LVEF (LVEF alone 0.68), while adding scar size to LVEF failed to change AUC. Both CMR and histological validation studies in dogs demonstrated that HIC regions in bSSFP images within CMI likely result from iron depositions.

**Conclusion:** Presence of HIC within CMI in bSSFP CMR at 3T is a marker of iron deposition and yields important prognostic information for mVA.



**Figure 1.** Presence of HIC within MI territories on SSFP images (A) and Predictive value of HIC on SSFP images for primary endpoint (B). A: Representative SSFP and LGE images from two patients receiving ICD therapy; one who met the primary endpoint (Event+) and one who did not meet the primary endpoint (Event-). For the Event+ patient, blue arrows denote the MI region on Late Gadolinium Enhancement (LGE) imaging and the Hypo-Intense Core (HIC) region on SSFP imaging. In the Event- patient, no HIC were observed by SSFP within the MI region, indicated by the red arrow on LGE imaging. B: Corresponding ROC curves for LVEF, LVEF + Scar Volume, and LVEF + Scar Volume + HIC for the prediction of the primary endpoint. While the addition of Total Scar Volume alone did not improve the predictive accuracy over LVEF, the addition of HIC improved the AUC from 0.68 to 0.87, suggesting additional prognostic value of HIC.