



**PEER-REVIEW REPORT**

**Name of journal:** World Journal of Radiology

**Manuscript NO:** 39330

**Title:** An Optimized Cardiac MRI Inversion Recovery Sequence for Metal Artifact Reduction and Accurate Myocardial Scar Assessment in Patients with Cardiac Implantable Electronic Devices

**Reviewer’s code:** 03699990

**Reviewer’s country:** China

**Science editor:** Li-Jun Cui

**Date sent for review:** 2018-04-26

**Date reviewed:** 2018-05-02

**Review time:** 6 Days

SCIENTIFIC QUALITY	LANGUAGE QUALITY	CONCLUSION	PEER-REVIEWER STATEMENTS
<input type="checkbox"/> Grade A: Excellent	<input type="checkbox"/> Grade A: Priority publishing	<input checked="" type="checkbox"/> Accept	Peer-Review:
<input checked="" type="checkbox"/> Grade B: Very good	<input checked="" type="checkbox"/> Grade B: Minor language	(High priority)	<input checked="" type="checkbox"/> Anonymous
<input type="checkbox"/> Grade C: Good	polishing	<input type="checkbox"/> Accept	<input type="checkbox"/> Onymous
<input type="checkbox"/> Grade D: Fair	<input type="checkbox"/> Grade C: A great deal of	(General priority)	Peer-reviewer’s expertise on the
<input type="checkbox"/> Grade E: Do not	language polishing	<input type="checkbox"/> Minor revision	topic of the manuscript:
publish	<input type="checkbox"/> Grade D: Rejection	<input type="checkbox"/> Major revision	<input checked="" type="checkbox"/> Advanced
		<input type="checkbox"/> Rejection	<input type="checkbox"/> General
			<input type="checkbox"/> No expertise
			Conflicts-of-Interest:
			<input type="checkbox"/> Yes
			<input checked="" type="checkbox"/> No

**SPECIFIC COMMENTS TO AUTHORS**

The authors developed a modified IR technique to alleviate the CIED-induced metal artifacts and improve the diagnostic image quality of LGE images in patients with CIEDs



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without increasing scan time or requiring additional hardware. Good work, Referral publication. The reference format is not uniform.

**Reply to Reviewer:** Thanks for the comments.

References format has been revised. Thanks.

#### INITIAL REVIEW OF THE MANUSCRIPT

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**PEER-REVIEW REPORT**

**Name of journal:** World Journal of Radiology

**Manuscript NO:** 39330

**Title:** An Optimized Cardiac MRI Inversion Recovery Sequence for Metal Artifact Reduction and Accurate Myocardial Scar Assessment in Patients with Cardiac Implantable Electronic Devices

**Reviewer’s code:** 02325110

**Reviewer’s country:** Germany

**Science editor:** Li-Jun Cui

**Date sent for review:** 2018-04-26

**Date reviewed:** 2018-05-05

**Review time:** 9 Days

SCIENTIFIC QUALITY	LANGUAGE QUALITY	CONCLUSION	PEER-REVIEWER STATEMENTS
<input type="checkbox"/> Grade A: Excellent	<input type="checkbox"/> Grade A: Priority publishing	<input type="checkbox"/> Accept	Peer-Review:
<input checked="" type="checkbox"/> Grade B: Very good	<input checked="" type="checkbox"/> Grade B: Minor language polishing	(High priority)	<input checked="" type="checkbox"/> Anonymous
<input type="checkbox"/> Grade C: Good		<input type="checkbox"/> Accept	<input type="checkbox"/> Onymous
<input type="checkbox"/> Grade D: Fair	<input type="checkbox"/> Grade C: A great deal of language polishing	(General priority)	Peer-reviewer’s expertise on the topic of the manuscript:
<input type="checkbox"/> Grade E: Do not publish	<input type="checkbox"/> Grade D: Rejection	<input checked="" type="checkbox"/> Minor revision	<input type="checkbox"/> Advanced
		<input type="checkbox"/> Major revision	<input checked="" type="checkbox"/> General
		<input type="checkbox"/> Rejection	<input type="checkbox"/> No expertise
			Conflicts-of-Interest:
			<input type="checkbox"/> Yes
			<input checked="" type="checkbox"/> No

**SPECIFIC COMMENTS TO AUTHORS**

The authors developed a modified inversion recovery (IR) technique to alleviate the metal artifacts that are induced by cardiac implantable electronic devices (CIED). By this



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Approach, the diagnostic image quality of LGE images is improved in patients with CIEDs without increasing scan time or requiring additional hardware. The authors tested the newly developed technique in phantom experiments as well as in vivo scans. The results of this study are of great interest. The authors showed the capability of their technique for suppressing the hyperintensity artifacts without compromising myocardium nulling in the resulting LGE images. The manuscript adequately describes the background and significance of the study. In the discussion the authors summarize appropriately and self-critically the relevance to clinical practice as well as the limitations of their study. One concern is the small number of subjects that were enrolled in the study. As the authors say themselves future studies are needed to test the developed technique "on a large number of VT patients with inter- and intra-observer variability analysis using an image quality scoring System". Another concern is that the manuscript needs to be adjusted to the specifications as designated by the World Journal of Radiology (e.g. typeface, references).

**Reply to Reviewer:** Thanks for the comments.

The limited number of studied subjects is illustrated in the discussion (page 11) as one of the study limitations, as well as in the Article Highlights section (page 13) as a direction for future research. Also, the references are revised as advised.

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**Manuscript NO:** 39330

**Title:** An Optimized Cardiac MRI Inversion Recovery Sequence for Metal Artifact Reduction and Accurate Myocardial Scar Assessment in Patients with Cardiac Implantable Electronic Devices

**Reviewer’s code:** 02714390

**Reviewer’s country:** United States

**Science editor:** Li-Jun Cui

**Date sent for review:** 2018-04-26

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SCIENTIFIC QUALITY	LANGUAGE QUALITY	CONCLUSION	PEER-REVIEWER STATEMENTS
<input type="checkbox"/> Grade A: Excellent	<input checked="" type="checkbox"/> Grade A: Priority publishing	<input type="checkbox"/> Accept	Peer-Review:
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<input checked="" type="checkbox"/> Grade C: Good		<input type="checkbox"/> Accept	<input type="checkbox"/> Onymous
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		<input type="checkbox"/> Major revision	<input type="checkbox"/> General
		<input type="checkbox"/> Rejection	<input type="checkbox"/> No expertise
			Conflicts-of-Interest:
			<input type="checkbox"/> Yes
			<input checked="" type="checkbox"/> No

**SPECIFIC COMMENTS TO AUTHORS**

This manuscript proposes the use of a modified inversion recovery sequence to mitigate effects of cardiac implantable electronic devices on MR images of the heart evaluating



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delayed gadolinium enhancement. Scans were first performed in phantoms and then tested in vivo. The methodology was capable of suppressing hyper intensities on images caused by the metal implants without compromising myocardial signal. The current proposal appears similar to modified wide-band pulses as described in reference 20 (Rashid et al) and it is unclear what the improvements in the current study are compared to the previous work except it appears to be on the Philips platform compared to the Siemens platform. The authors should emphasize these differences to make the manuscript more appealing to the audience. A lot of the language and structure of the manuscript is also very similar in scope to the manuscript by Rashid et al. (PMID: 25772155). Manuscripts is also limited by a small sample size. Specific comments: 1. The authors should also address how geometric distortions caused by CIEDs will be handled. 2. This manuscript will benefit from a direct comparison with an established approach such as MAVRICK or SEMAC metal artifact reduction acquisitions. 3. An independent verification of scar should be used to determine if the wide-band IR is truly effective in better quantifying LGE images. 4. please discuss implications for acceptability of wideband techniques at higher field strengths.

**Reply to Reviewer:** Thanks for the comments.

- The paragraph in pages 10 and 11 was updated to address comments # 1 and 4, as follows: *"It should be noted that although the wideband IR sequence removed the hyperintensity artifacts, it did not correct for geometric distortions or signal voids caused by off-resonance, which were typically resolved using localized shimming. Otherwise, a spin-echo or an ultrashort echo time (UTE) sequence could be used to correct for strong intra-voxel dephasing signal voids, although this is more of a problem in musculoskeletal applications due to metal implants. It should be noted that while such techniques minimize the metal artifacts effect on surrounding tissues, the place of the CIED will still*



*show signal void or geometric artifacts, which become worse at higher field strengths. However, for safety purposes, imaging patients with CIEDs is typically limited to 1.5T scanners; therefore, accentuated metal artifacts at higher field strengths is not a concern in this group of patients."*

- Figure 2 and accompanying text were updated to address comment #3: Part (c) was added to the figure, which shows an electroanatomic map of the septal aspect of the right ventricle including the outflow tract. The map is a bipolar voltage map showing low voltage (<1.5 mV) in the right ventricular outflow tract. The low voltage area (red color) corresponds nicely with the delayed enhancement localized in the septal aspect of the right ventricular outflow tract shown in (b).
- The paragraph in page 6 addresses the limitations of other techniques (MAVRIC and SEMAC) compared to the developed technique. The main advantage of the developed technique is that it corrects for the metal artifact without increasing the scan time, which was emphasized in the Discussion section. The MAVRIC and SEMAC techniques were not used during the study due to their long scan time and safety concerns when imaging patients with CIEDs, which necessitate shortening scan time as possible.

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