



New insights in swine model of ventricular tachycardia using quantitative myocardial tissue characterization

Citation

Roujol, Sébastien, Tamer A Basha, Cory M Tschabrunn, Kraig V Kissinger, Mark E Josephson, Warren J Manning, Elad Anter, and Reza Nezafat. 2015. "New insights in swine model of ventricular tachycardia using quantitative myocardial tissue characterization." Journal of Cardiovascular Magnetic Resonance 17 (1): Q132. doi:10.1186/1532-429X-17-S1-Q132. http://dx.doi.org/10.1186/1532-429X-17-S1-Q132.

Published Version

doi:10.1186/1532-429X-17-S1-Q132

Permanent link

http://nrs.harvard.edu/urn-3:HUL.InstRepos:14065496

Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA

Share Your Story

The Harvard community has made this article openly available. Please share how this access benefits you. <u>Submit a story</u>.

Accessibility



WALKING POSTER PRESENTATION

Open Access

New insights in swine model of ventricular tachycardia using quantitative myocardial tissue characterization

Sébastien Roujol^{1*}, Tamer A Basha¹, Cory M Tschabrunn¹, Kraig V Kissinger¹, Mark E Josephson¹, Warren J Manning^{1,2}, Elad Anter¹, Reza Nezafat¹

From 18th Annual SCMR Scientific Sessions Nice, France. 4-7 February 2015

Background

Ventricular tachycardia (VT) is often responsible for sudden cardiac death and is generally triggers by the presence of reentry circuits related to a chronic myocardial scar. We have recently developed a novel swine model of VT, where sustained monomorphic reentrant VT can be induced in all animals. This new model offers exciting opportunities for better understanding the underlying substrate of VT, as well as for the development of new mapping and ablation strategies. In this study, we sought to provide in-vivo tissue characterization of this model using myocardial tissue characterization techniques of T_1 , T_2 and high-resolution LGE.

Methods

A novel swine model of reentrant VT was induced in 11 Yorkshire swine by 180 min balloon occlusion of the mid left anterior coronary artery. Each animal underwent an in-vivo CMR exam using a 1.5 T Philips scanner at 52 ±13 days after infarction, followed by an electrophysiology study with programmed stimulation to assess for VT inducibility. During imaging, each animal was sedated, intubated and mechanically ventilated. Native T₁ mapping using MOLLI (1) and T₂ mapping (2) were performed and followed by bolus injection of 0.2 mmol/kg of gadobenate dimeglumine and post-contrast T1 mapping using MOLLI. All these parametric sequences used ECG-triggered single shot acquisitions with balanced-SSFP imaging readout and the following parameters: $(TR/TE=4.3/2.1ms, flip angle=35^{\circ}(T_1 mapping)/85^{\circ}(T_2 mapp$ mapping), FOV=360×276 mm², voxel size=2×2 mm², slice thickness=8 mm, 10 slices $(T_1 \text{ mapping})/5 \text{ slices}(T_2$ mapping), SENSE factor=2). Finally, high resolution LGE (3) was performed using a free breathing navigator-gated inversion recovery gradient echo sequence with the folparameters $(TR/TE/\alpha = 6.5/3.0 \text{ms}/25^{\circ})$, lowing FOV=270×270×112 mm³, voxel size=1×1×1 mm³, compressed sensing factor=4). All imaging was performed in the short axis orientation. Analysis was performed offline using an in-house platform. The areas of enhancement in LGE data was used to visually guide a manual segmentation of the corresponding areas in all T₁ and T₂ maps. A similar approach was used to delineate an area of healthy myocardium all T_1 and T_2 maps. T_1/T_2 maps with artifacts were discarded from the analysis. Native T₁ times and T₂ times are reported for both "remote area" and "area of enhancement".

Results

Sustained reentrant VT could be induced in all animals. In-vivo CMR revealed that areas with elevated native T_1 times and T_2 times were in good agreement with areas depicting reduced post-contrast T_1 times and enhancement in LGE (Figure 1). Over all animals, area with enhancement as defined by LGE had higher native T_1 times (1276±45 vs. 1047±29, p<0.001) and higher T_2 times (85±6 vs. 52±4, p<0.001) than remote area (Figure 2).

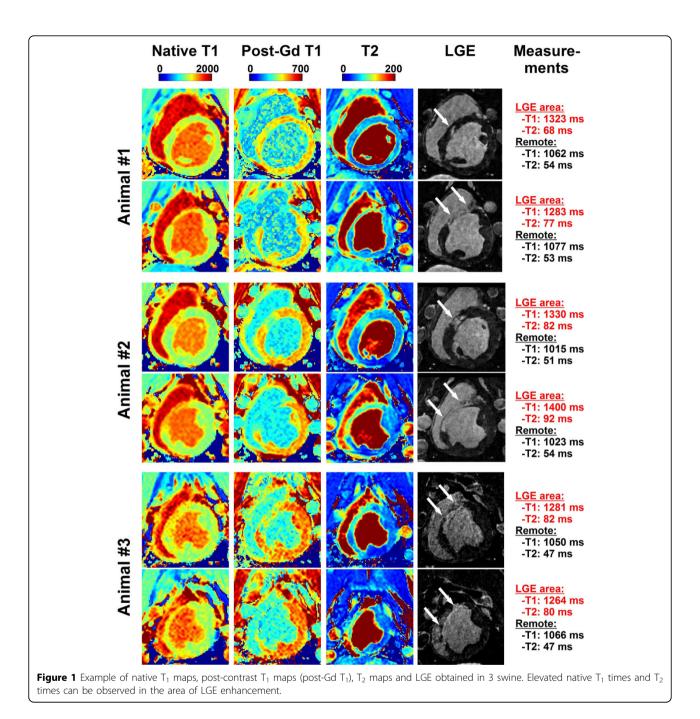
Conclusions

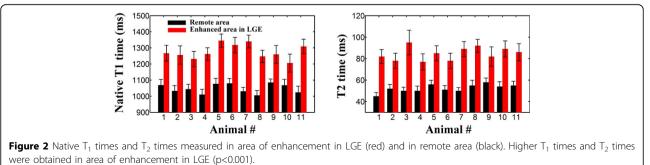
In this swine model of reentrant VT, areas of LGE hyperenhancement are associated with elevated native T_1 times and T_2 times.

¹Department of Medicine, BIDMC / Harvard Medical School, Boston, MA, USA Full list of author information is available at the end of the article



© 2015 Roujol et al; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The Creative Commons Public Domain Dedication waiver (http:// creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.





Authors' details

¹Department of Medicine, BIDMC / Harvard Medical School, Boston, MA, USA. ²Radiology, BIDMC / Harvard Medical School, Boston, MA, USA.

Published: 3 February 2015

References

- 1. Messroghli : MRM 2004.
- 2. Akçakaya : MRM 2014.
- 3. Akçakaya : Radiology 2014.

doi:10.1186/1532-429X-17-S1-Q132 Cite this article as: Roujol *et al*:: New insights in swine model of ventricular tachycardia using quantitative myocardial tissue characterization. *Journal of Cardiovascular Magnetic Resonance* 2015 17 (Suppl 1):Q132.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

BioMed Central

Submit your manuscript at www.biomedcentral.com/submit