Supplementary Online Content

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eTable. Quantitative PET/MRI Analysis

eFigure. Distribution of Late Gadolinium Enhancement (LGE) and 18F-fluorodeoxyglucose (18F-FDG) Uptake in a 17-Segment Model.

eMethods.

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable: Quantitative PET/MRI Analysis

Patient	PET/MRI Designation	FDG Distribution	SUVmax	AHA segment of max FDG uptake (based on SUVmax)	TBRmax	TNMR	TBRmean (average of 17 segments)	Scar Burden (LGE %)	AHA segment with max LGE
Complex Ventricular Arrhythmia									
1	PET+/MRI+	Focal	3.2	basal anteroseptal	2.0	1.5	1.0	12.2%	basal inferolateral
2	PET+/MRI+	Focal-on-diffuse	2.2	basal inferolateral	1.2	1.5	1.0	9.2%	basal inferolateral
3	PET+/MRI+	Focal-on-diffuse	6.3	apex	4.2	3.1	1.6	8.5%	mid inferolateral
5	PET+/MRI+	Focal	3.8	mid inferolateral	3.2	2.3	1.4	3.8%	basal inferior
8	PET+/MRI+	Focal	-*	mid inferoseptal	1.5	1.4	1.0	4.9%	mid inferolateral
9	PET-/MRI-	Diffuse	1.1	n/a	1.1	1.2	0.7	0%	n/a
10	PET+/MRI+	Focal-on-diffuse	3.7	apex	2.2	1.6	1.4	3.2%	mid anteroseptal
11	PET+/MRI+	Focal-on-diffuse	3.5	basal inferolateral	1.8	1.8	1.2	4.1	basal inferolateral
12	PET+/MRI+	Focal	2.3	basal inferoseptal	1.3	1.7	0.7	11.1%	basal inferolateral
13	PET+/MRI-	Focal-on-diffuse	4.1	basal inferolateral	3.1	1.8	1.9	0%	n/a
18	PET+/MRI+	Focal	2.4	mid inferolateral	1.6	1.6	1.1	1.4	basal inferolateral
19	PET+/MRI+	Focal	3.9	apical anterior	1.9	2.1	1.2	1.2%	basal inferoseptal
Mean ± SD			3.5 ± 1.2			1.8 ± 0.4	2.1 ± 0.9	5.9 ± 3.9	
Minor Ventricular Arrhythmia									
4	PET+/MRI+	Focal	3.0	basal inferolateral	1.9	1.6	1.0	3.2%	mid inferolateral
6	PET+/MRI+	Focal-on-diffuse	11.4	apex	5.4	1.9	3.1	2.2%	mid inferior

7	PET+/MRI+	Focal-on-diffuse	6.7	basal inferoseptal	3.9	2.4	1.8	7.9%	basal inferoseptal
14	PET-/MRI+	Diffuse	1.6	basal inferoseptal	1.1	1.1	0.8	3.2%	basal inferolateral
15	FMS/MRI+	Diffuse	9.6	mid anteroseptal	4.2	1.3	3.0	2.2%	basal inferolateral
16	PET+/MRI+	Focal-on-diffuse	12.4	apical inferior	8.2	2.4	3.3	1.5%	basal inferior
17	PET+/MRI-	Focal	2.1	mid inferolateral	1.7	1.9	1.0	0%	n/a
20	PET+/MRI-	Focal-on-diffuse	5.8	mid inferolateral	2.9	2.6	1.6	0%	n/a
Mean ± SD			6.9 ± 4.2			2.1 ± 0.3	4.0 ± 2.4	3.3 ± 2.3	

PET+/MRI+ implies increased focal 18F-FDG uptake coexisted with a pattern of LGE; 2) PET+/MRI- implies increased 18F-FDG uptake in the absence of underlying LGE; 3) PET-/MRI+ implies presence of LGE but no increased 18F-FDG uptake; 4) PET-/MRI- implies neither the presence of LGE nor increased 18F-FDG uptake. FMS = failed myocardial suppression. SUV = standard uptake value; TBR = target-to-blood pool ratio; TNMR = target-to-normal-myocardium ratio; AHA = American Heart Association.

eFigure 1: Distribution of Late Gadolinium Enhancement (LGE) and 18F-fluorodeoxyglucose (18F-FDG) Uptake in a 17-Segment Model.
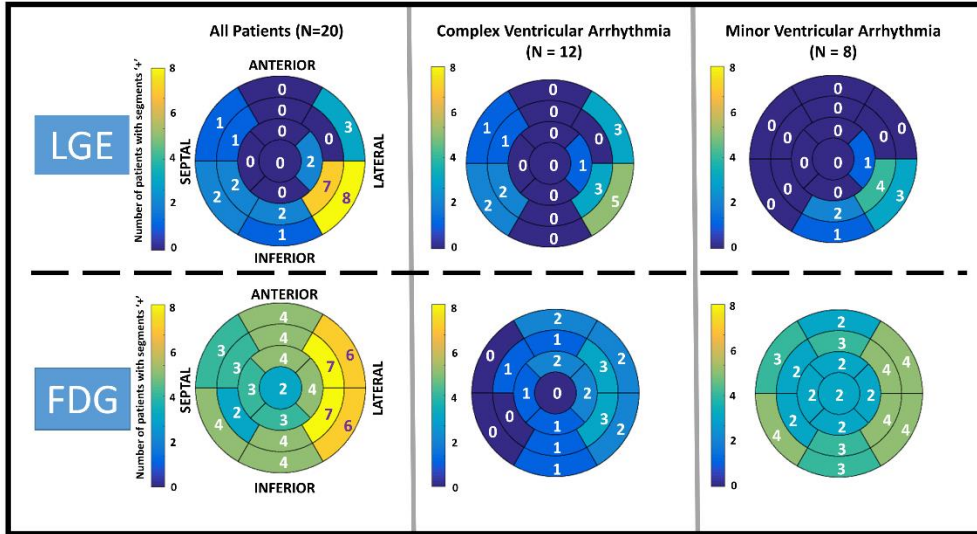
The total number of positive segments in all patients in each group are shown on each polar plot. A segment is positive for LGE if LGE is identified anywhere in that segment, and positive for FDG uptake if the TBRmean in the segment is greater than 1.75. Color scale of each plot shows the number of positive segments normalized to the number of patients in the respective groups. The polar plots for FDG uptake exclude the patient with failed myocardial suppression (FMS). TBRmean=the mean value of target to background ratio (TBR) in the segment, LGE = late gadolinium enhancement, FDG= fluorodeoxyglucose.

eMethods

Hybrid PET-MRI Protocol

Patients were administered 5 MBq/kg 18F-FDG prior to imaging. Patients were required to follow a low-carbohydrate and high fat diet (starting at least 24 hours prior to the examination), and to have fasted for at least 4 hours with a blood glucose < 200 mmol/dl prior to the scan. Data acquired 30-90 min post-injection were reconstructed for analysis. Standard late gadolinium enhancement (LGE) MRI was performed approximately 10 min post injection of 30 ml gadolinium-based contrast agent [MultiHance (gadobenate dimeglumine) injection, 529 mg/mL; Bracco Diagnostics Inc. Monroe Twp, NJ, U.S.A). Co-registered short axis hybrid 18F-FDG PET and MRI LGE images were then assessed.

The average Standard uptake values (SUVmean) in each segment was recorded as well as target to background ratio (TBRmean) by normalization of the SUV values to the mean blood pool activity (SUVmean) in a neighboring region in the ventricle. The maximum TBR anywhere in the myocardium (TBRmax) was also recorded. Target-to-normal-myocardium ratio (TNMR) was the ratio of TBRmax with the TBRmean in a normal appearing segment with no LGE present. The LGE images were blindly analyzed by two operators (MGT and SL) and quantitated as previously described using a threshold of > 5 standard-deviations above reference myocardium.[1] Each segment was evaluated as PET+ if TBRmean was greater than 1.75, a cut-off determined previously to separate PET+ from PET- in cardiac sarcoidosis. The location and value of the maximum SUVmax and TBRmax in the myocardium were recorded. 18F-FDG activity was assessed quantitatively in the standard 17 segment AHA model. Each AHA segment was designated LGE+ if contrast enhancement was observed.

References:

1. Mikami Y, Kolman L, Joncas SX, et al. Accuracy and reproducibility of semi-automated late gadolinium enhancement quantification techniques in patients with hypertrophic cardiomyopathy. J Cardiovasc Magn Reson 2014;16:85.