Characterization of disease hot-phases using 18f-fluorodeoxyglucose positron emission tomography in arrhythmogenic cardiomyopathy caused by desmosomal gene mutations

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Myocardial Disease – Clinical: Arrhythmogenic Right Ventricular Cardiomyopathy

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Introduction: Mutations in the genes encoding for desmosomal proteins are associated with Arrhythmogenic Cardiomyopathy (AC), a condition in which "hot-phases" reminiscent of myocarditis can develop and which represent active disease progression. Detection of hot-phase disease can offer novel treatment opportunities.

Purpose: We used 18F-fluorodeoxyglucose positron emission tomography (FDG-PET) to determine the prevalence of myocardial inflammation during clinical hot phases in AC.

Methods: Nineteen (12 male; age 38 ±14 years) symptomatic desmosomal gene mutation carriers (PKP-2, n=6; DSG-2, n=3; DSC-2, n=1; DSP, n=9) underwent FDG-PET and cardiac magnetic resonance (CMR). AC was diagnosed according to the 2010 Task Force diagnostic criteria. The indication for FDG-PET was presentation with clinically suspected myocarditis in 10 (53%), increase in arrhythmic burden in 4 (21%), deteriorating left ventricular (LV) systolic function in 3 (16%) and as part of a diagnostic workup in 2. We compared regional distribution of FDG uptake and late gadolinium enhancement (LGE) on CMR using a standard 16-segment model. Concordance between the two tests was defined as > 50% of segment overlap and partial concordance as 1- 50%. Cohen's <i>?</i> was used to evaluate the inter-method agreement between FDG and LGE.

Results: Nine (47%) patients (5 male) had LV heterogeneous FDG uptake. RV uptake was never observed. Eight of these cases had a definite and 1 had a borderline diagnosis of AC. FDG uptake associated with the presence of DSP gene mutations (7/9, 78% vs 2/10, 20%, p=0.02) and older age (44±12 vs 33±15 years, p=0.05). Concurrent CMR study was available in 15 patients, including all nine with a positive FDG-PET. RV LGE was present in 6 (40%) and LV LGE in 14 cases (93%). All nine (100%) patients with FDG uptake had LV LGE. The commonest segments with FDG-uptake were the basal-anterior, mid-inferolateral and mid-anterolateral (5 cases, 56%), whereas LGE was most commonly present in the mid-anteroseptal (8 cases, 89%) followed by the basal- and mid-inferior segments (6 cases, 67%). Concordance of FDG uptake and LGE was present in 2 cases (22%). There was no concordance in 1 case (11%). Partial concordance was present in 6 (67%). There was poor inter-method topographical agreement between FDG-PET and CMR, <i>?</i> = 0.04, p=0.64.

Conclusion: Up to 50% of desmosomal gene positive AC patients, and especially those with DSP mutations, and clinical ‘hot phases’ have evidence for myocarditis on FDG-PET. The topographical variation between PET and CMR highlight the underlying pathophysiological stage of disease (inflammation versus scar).
Abstract: 1174
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Conclusion: Up to 50% of desmosomal gene positive AC patients, and especially those with DSP mutations, and clinical ‘hot phases’ have evidence for myocarditis on FDG-PET. The topographical variation between PET and CMR highlight the underlying pathophysiological stage of disease (inflammation versus scar) and suggest that the imaging modalities provide complementary information on tissue characterisation in AC.