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Perimatrial inflammation measured by fluoioine-18-fluorodeoxyglucose-positron emission tomography/computed tomography to predict new-onset atrial fibrillation

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Background: Fluoioine-18-fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) is a useful modality of inflammatory disease. Epicardial adipose tissue (EAT) contains abundant ganglionated plexi, therefore EAT inflammation may cause atrial arrhythmia, such as atrial premature contraction (APC) and atrial fibrillation (AF). Previous studies have shown that inflammatory activity of EAT has relation to the presence of AF. However, it is unknown whether EAT inflammation contributes to the occurrence of AF.

Methods: Out of 20720 examinees who underwent FDG-PET/CT for screening of cancer in the years 2012–2018, 151 (aged 65.6±12.0 years old, 62 females) had ambulatory electrocardiographic monitoring (Holter ECG) within a year and non-detection of AF. Standardized uptake value (SUV) was measured in fat adjacent to roof of left atrium (ROOF), atrioventricular groove (AV), left main coronary artery (LMT), and right ventricular blood pool (RV). In order to correct for blood pool activity, SUV of ROOF, AV, and LMT were divided by SUV of RV respectively, yielding target-to-background ratio (TBR). As regards to arterial inflammation, measurements were performed with SUV in ascending aorta (A-Ao) and

in superior vena cava (SVC) as blood pool. In the same way, SUV of A-Ao was divided by SUV of SVC, yielding TBR.

Results: According to Holter ECG, APC≥100 beats per day was seen in 60 patients (Group A), but not in the other 91 (Group B). In Group A, TBR of ROOF, AV, and LMT were all significantly higher than Group B (p<0.001, p=0.004, and p=0.008, respectively). During a median follow-up of 179 days, new-onset AF was diagnosed in 7 patients (4 in Group A (6.7%), 3 in Group B (3.3%), p=0.046). There was significant difference in TBR of ROOF between patients with and without new-onset AF (p<0.001), but not in TBR of AV and LMT. In addition, no significant difference was observed in TBR of A-Ao between these two groups. In the Cox proportional hazard analysis, TBR of ROOF was found to be an independent predictor of new-onset AF (odds ratio 40.1, 95% confidence interval 6.05 to 265.9, p<0.001).

Conclusions: Although EAT inflammation evaluated by SUV is related to frequent APCs, only in fat adjacent to roof of left atrium is associated with and predicts future occurrence of AF. Arterial inflammation measured by SUV has no relation to atrial arrhythmia.

Univariate and multivariate cox proportional hazard analysis for new-onset atrial fibrillation

	Univariate		Multivariate	
	OR (95% CI)	p value	OR (95% CI)	p value
Age	1.06 (0.93-1.20)	0.404		
Female	0.37 (0.03-5.27)	0.463		
Body weight	0.90 (0.78-1.05)	0.176		
APC100	1.30 (0.17-9.81)	0.799		
TBR of ROOF	15.6 (1.57-155.5)	0.019	40.1 (6.05-265.9)	<0.001
TBR of A-Ao	1.82 (0.07-48.6)	0.720		

OR = odds ratio; CI = confidence interval; APC = atrial premature contraction; APC100 = APC≥100 beats per day; TBR = target-to-background ratio; ROOF = roof of left atrium; A-Ao = ascending aorta