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## Pathophysiology measured with positron emission tomography is equally impaired in hypertrophic and non-hypertrophic regions in hypertrophic cardiomyopathy

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**Background:** Hypertrophic cardiomyopathy (HCM) is a heterogeneous disease with regard to clinical manifestations. It is characterized by an asymmetric pattern of hypertrophy of the left ventricle. However, less is known about pathophysiological distribution of the abnormalities. Positron emission tomography (PET) provides quantitative assessment of myocardial blood flow (MBF), oxidative metabolism, and sympathetic innervation using the following tracers: 15O-water, 11C-acetate, and 11C-HED.

**Purpose:** The purpose of the present study was to investigate if physiological parameters measured with PET are more impaired in hypertrophic regions compared to non-hypertrophic regions.

**Methods:** We examined 25 HCM patients using a Discovery MI PET/CT with 15O-water, 11C-acetate, and 11C-HED. Wall thickness (WT) was calculated from the 11C-acetate scan for basal and mid segments (n=12) in the 17-segment model and hypertrophic regions were defined as segments >15 mm. 15O-water PET was performed during rest and adenosine induced stress. Quantification of MBF, oxygen consumption (MVO<sub>2</sub>)

and retention index of 11C-HED (RI<sub>HED</sub>) was done in aQuant software. Comparison of parameters in hypertrophic regions to non-hypertrophic regions was done using Mann-Whitney U- test and Bland-Altman analysis with repeatability coefficient defined as 2 times the standard-deviation of differences.

**Results:** One patient had all segments >15mm and one patient had all segments <15mm and were therefore excluded from analysis. WT was 18.2±1.9 mm in hypertrophic regions and 12.2±1.5 mm in non-hypertrophic regions. None of the PET-parameters showed a significant difference between hypertrophic and non-hypertrophic regions, see table 1.

**Conclusion:** Pathophysiology in terms of myocardial blood flow at rest and stress, oxygen consumption and sympathetic innervation are not significantly different in hypertrophic segments compared to non-hypertrophic segments in patients with HCM. Thus, the disease is not confined to hypertrophied areas but spread throughout the left ventricle.

Table 1

	MBF <sub>REST</sub>	MBF <sub>STRESS</sub>	MVO <sub>2</sub>	RI <sub>HED</sub>
Hypertrophic segments (mm)	0.70±0.20	1.74±0.92	0.092±0.026	0.12±0.037
Non-hypertrophic segments (mm)	0.68±0.18	1.71±0.87	0.094±0.025	0.12±0.036
p-value	0.767	0.851	0.956	0.684
Repeatability coefficient (%)	25.4	35.4	13.3	16.2

Mean ± standard deviation for PET-parameters in hypertrophic and non-hypertrophic segments. Relative repeatability coefficient (%) between regions and p-value for Mann-Whitney U-test.