Pericardial- rather than intramyocardial fat is independently associated with systolic and diastolic left ventricular heart function in metabolically healthy humans

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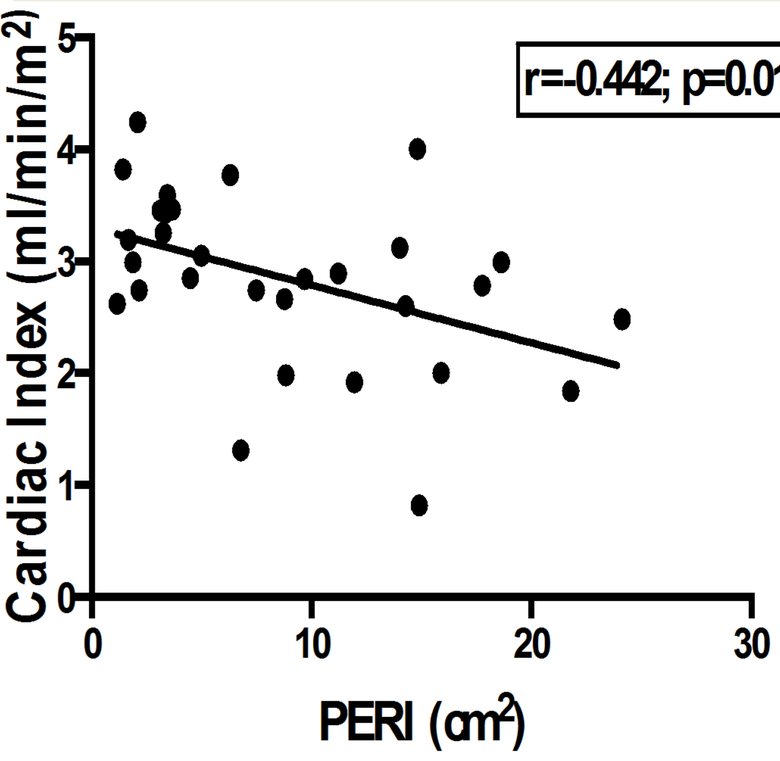
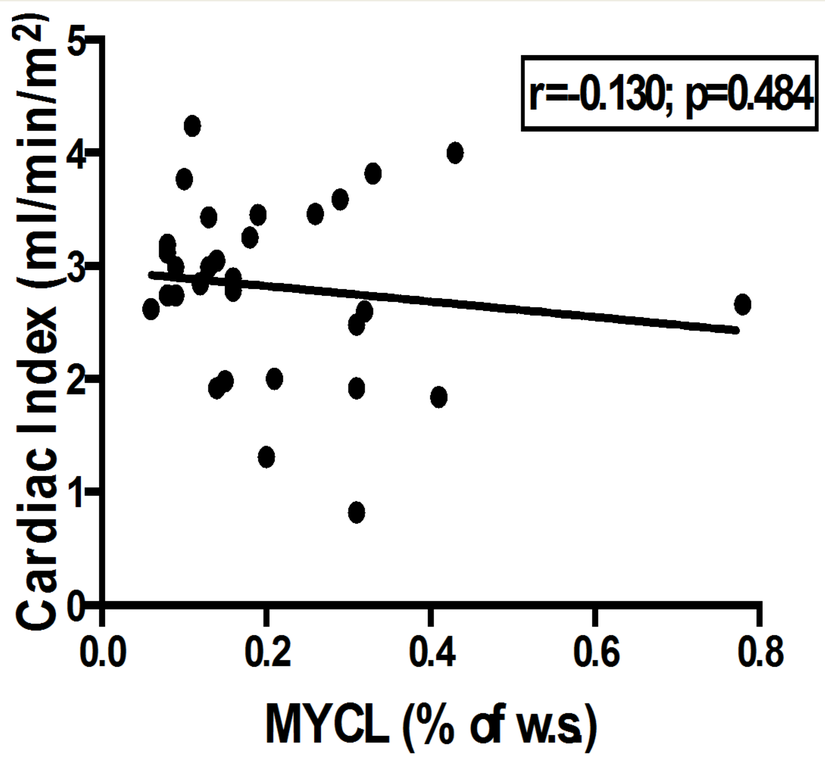
Background: Obesity is a major risk factor for heart failure, in part due to cardiac steatosis. Recent evidence suggests that ***intramyocardial lipids (MYCL)*** might be a highly dynamic source of energy, whereas ***pericardial fat (PERI)*** impairs heart function directly by mechanic and paracrine effects. Therefore, we hypothesized that PERI rather than MYCL is associated with myocardial function.

Methods: To avoid confounding of metabolic disease 31 healthy subjects (age: 29±10yrs; BMI:23±3kg/m^2) were investigated, to assess:

- MYCL, PERI, left ventricular heart function (^{1}H-magnetic resonance spectroscopy and imaging)
- parameters of glucose and lipid metabolism (basal blood tests)
- Anthropometric characteristics

Correlation analysis of PERI & MYCL with cardiac index:





Multiple regression analysis for cardiac index as depending variable:

Independent variables:	R	E	β	T	p-value
MYCL	0.508	0.856	0.098	0.594	0.558
PERI	*-0.061*	*0.022*	*-0.525*	*-2.804*	*0.010**
HOMA	*-0.313*	*0.112*	*-0.443*	*-2.809*	*0.010**
FFA	-0.001	0.001	-0.306	-1.880	0.072
BMI	-0.012	0.043	-0.051	-0.278	0.783

Conclusions: Cardiac fat depots impact heart function even in lean, healthy volunteers. Direct comparison of different lipid stores revealed that PERI is a more important predictor than MYCL for altered systolic function in a metabolically healthy population.

Baseline characteristics:

Parameters of glucose and lipid metabolism:	
Fasting glucose (mg/dl)	85 ± 9
Triglycerides (mg/dl)	106 ± 39
Total cholesterol (mg/dl)	183 ± 31
HDL cholesterol (mg/dl)	56 ± 13
LDL cholesterol (mg/dl)	106 ± 27
Free Fatty Acids (µmol/l)	413 ± 223
HOMA-IR	3.3 ± 1.2
HbA1c (%)	5.3 ± 0.3
GOT (U/l)	22 ± 5
GPT (U/l)	21 ± 9
GGT (U/l)	20 ± 7
BP systolic	123 ± 20
BP diastolic	80 ± 11
Cardiac fat depots:	
MYCL (%)	0.21 ± 0.15
PERI (cm^2)	8.79 ± 7
Parameters of left ventricular heart function:	
Heart rate (bpm)	64 ± 7
Ejection fraction (%)	67 ± 6
Enddiastolic volume (ml/m^2)	67 ± 18
Endsystolic volume (ml/m^2)	23 ± 8
Stroke Volume (ml/ m^2)	44 ± 12
Cardiac Index (ml/min/m^2)	2.8 ± 0.8
Peak E (ml/s)	303 ± 112
Peak A (ml/s)	138 ± 54
E/A ratio	1.84 ± 0.6
LV diastolic index s^{-1}	4.5 ± 1.7
Deceleration time (ms)	147 ± 50