The Clinical Significance of Mediastinal Fat Index (MFI) Newly Devised in Maintenance Hemodialysis Patients

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OBJECTIVES

- Maintenance hemodialysis patients are at an increased risk of death from cardiovascular disease. *(Iseki K et al. Clin Exp Nephrol 2011, Levey AS et al. Am J kidney Dis 1998)*
- Visceral fat accumulation is considered to be upstream of the metabolic syndrome of obesity, impaired glucose tolerance, hypertension, dyslipidemia and atherosclerosis. *(Goodpaster BH et al. Diab care 2003, Gataldelli A et al. J Clin Endocrinl Metab 2002)*
- A strong association between visceral fat accumulation and atherosclerosis has been demonstrated in the general population and HD patients. *(Yurugi T et al. Clin Exp Nephrol 2012, Hubert HB et al. Circulation 1983, Kaizu Y et al. Clin Nephrol 1998)*
- Recent studies focused on epicardial fat and it has been identified as an important source of pro-inflammatory mediators worsening endothelial dysfunction, eventually leading to coronary artery disease. *(Matiloch Z et al. Physiol Res 2016)*
- This time, we focused on mediastinal fat. The aim of this study is to clarify the clinical siginificance of mediastinal fat using mediastinal fat index newly devised in maintenance hemodialysis patients.

METHODS

- 112 hemodialysis patients (age: 64.6 ± 10.7 years, Male:67%, BMI: 21.9 ± 3.3 kg/m^2) and 112 subjects with normal renal function as a control group (age: 55.7 ± 9.8 years, Male:75%, BMI: 23.3 ± 3.1 kg/m^2), who had undergone multi detecter computed tomography (MDCT), were enrolled in this study.
- The distribution of mediastinal fat was determined at a level of tracheal bifurcation using MDCT scans.
- We defined mediastinal fat area in cm^2/ body weight in kg as mediastinal fat index (MFI).
- We analyzed the difference of MFI between hemodialysis patients and normal kidney subjects.
- ***In hemodialysis patients,***
  we evaluated relationship between MFI and vesceral fat, aortic calcification including aortic arch, thoracic, abdominal aorta or coronary artery, atherosclerosis or related factors, such as BMI, blood pressure value, hemoglobin (Hb) levels, albumin levels, low-density lipoprotein-cholesterol (LDL-C) levels, high-density lipoprotein-cholesterol (HDL-C) levels, triglyceride (TG) levels, pulse wave velocity (PWV) and ankle-brachial index (ABI).

BASIC PATIENTS' CHARACTERISTICS in HD patinets

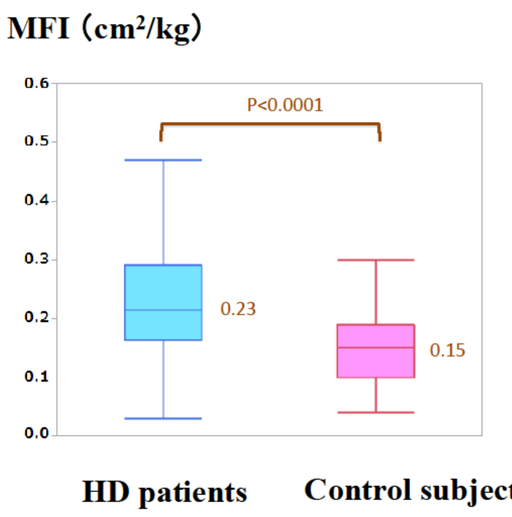
(n=112)

Age	(years)	64.6 ± 10.7
Gender	(M : F)	75 : 37
BMI	(kg/m^2)	21.9 ± 3.3
SBP	(mmHg)	150.0 ± 19.0
DBP	(mmHg)	73.8 ± 11.6
Ht	(%)	33.9 ± 2.2
TP	(g/dl)	6.6 ± 0.4
ALB	(g/dl)	3.7 ± 0.3
K	(mEq/L)	5.0 ± 0.5
Ca	(mg/dl)	8.7 ± 0.5
P	(mg/dl)	5.2 ± 0.9
Mg	(mg/dl)	2.6 ± 0.3
i-PTH	(pg/ml)	197.3 ± 101.1
TG	(mg/dl)	110.8 ± 61.3
LDL	(mg/dl)	83.8 ± 20.4
HDL	(mg/dl)	43.8 ± 13.1
PWV	(cm/s)	1810.4 ± 434.9
ABI		1.16 ± 0.16
VFA	(cm^2)	108.3 ± 70.4
MF	(cm^2)	13.5 ± 7.1
MFI	(cm^2 /kg)	0.23 ± 0.1

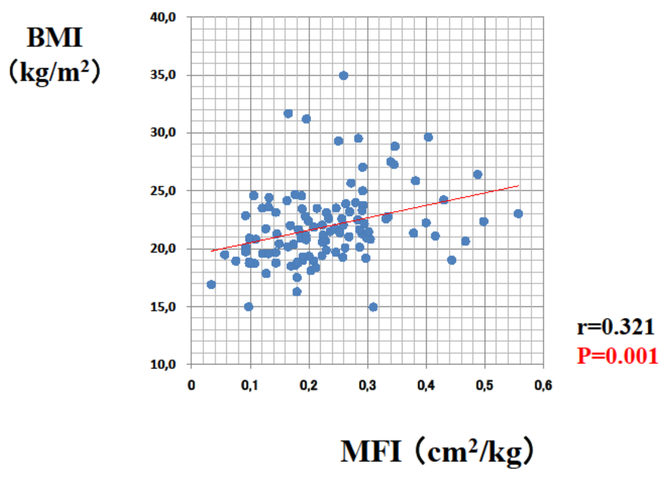
VFA: vesceral fat area, MFA: mediastinal fat area,
MFI: mediastinal fat aea index

RESULTS

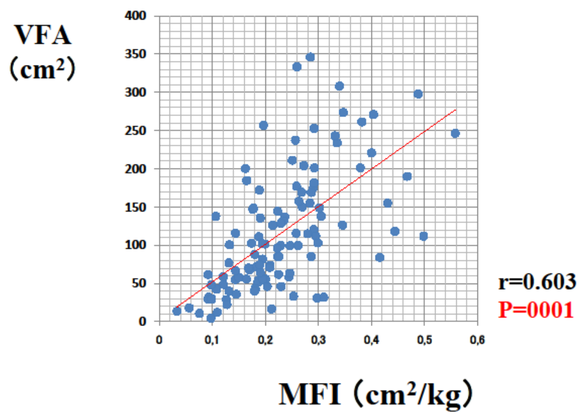
MFI in HD patinets and control subjects



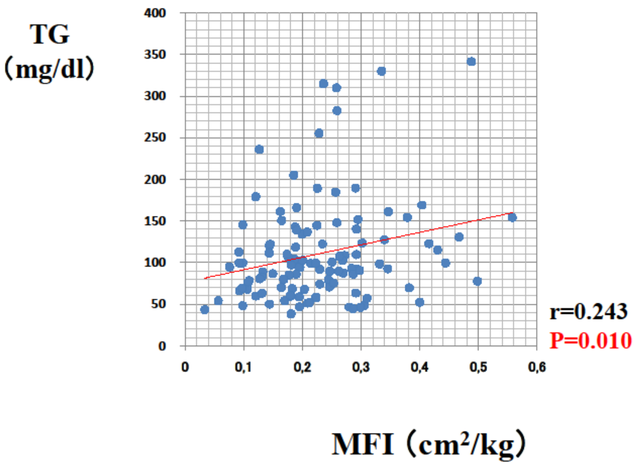
The correlation between MFI and BMI



The correlation between vesceral fat area (VFA) and MFI



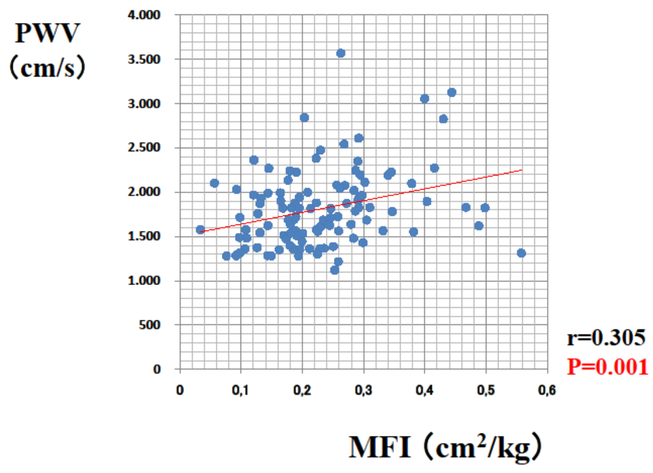
The correlation between MFI and TG



The correlation between MFI and related parameters

	Univariate analysis		Multivariate analysis	
	r	P value	β	P value
Age	0.219	0.021	0.180	0.090
BMI	0.321	0.001	0.250	0.006
Coronary Artery calcification score	0.215	0.023	0.028	0.792
Abdominal Aorta calcification volume	0.196	0.038	0.061	0.575
Mg	-0.212	0.025	-0.110	0.245
TG	0.243	0.010	0.235	0.015
ABI	-0.224	0.019	-0.119	0.169
PWV	0.305	0.001	0.210	0.026

The correlation between MFI and PWV



SUMMURIES and DISCUSSIONS

MFI was significantly higher in hemodialysis patients than in normal kidney subjects. Among hemodialysis patients, in univariate analysis, MFI was significantly correlated with age , BMI , Mg , TG , coronary artery calcification score, abdominal aorta calcification volume , ABI and PWV . Multivariate analysis showed that BMI (β value=0.250, P=0.006), TG (β value=0.235, P=0.015) and PWV (β value=0.210, P=0.026) were significant independent determinants of MFI. In addition, vsceral fat area was significantly associated with MFI. This results indicated that MFI might be related to atherosclerosis as same as vescreral fat and mediastinal fat might be influenced by body weight and lipid.

CONCLUSIONS

As with visceral fat, Mediastinal fat index was significantly greater in hemodialysis patients than in control subjects. High mediastinal fat may be associated with atherosclerosis and the related factors. Mediastinal fat index might be a useful marker for atherosclerosis in hemodialysis patients.

***CONFLICT of INTERESTS**: None*

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53 ERA
523--MP
Dialysis. Cardiovascular complications.
Tetsuya Ogawa
DOI: 10.3252/pso.eu.53era.2016
ePosters supported by F. Hoffmann- La Roche Ltd.
53rd CONGRESS ERA-EDTA VIENNA AUSTRIA MAY 21st-24th, 2016
Held jointly with Österreichische Gesellschaft für Nephrologie
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