

Supplemental table 1 The association between the bone turnover markers and BMD in pre and postmenopausal women (Spss 16.0).

Metabolites	Spinal BMD		Hip BMD	
	Pearson correlation coefficients	P Value	Pearson correlation coefficients	P Value
ALP	-0.303	0.005	-0.248	0.022
CTX	-0.289	0.007	-0.223	0.041
PINP	-0.121	0.27	-0.07	0.087
Tracp5b	-0.295	0.006	-0.187	0.087

Supplemental table 2 Endogenous metabolites detected by GC/MS.

Lipids	EPA, DHA, hexadecenoic acid, nonadecanoic acid, hexadecanoic acid, heptadecanoic acid, lioleic acid, oleic acid, octadecanoic acid, arachidonic acid, 11,14-Eicosadienoic acid, Eicosanoic acid, dodecanoic acid, 1-Monooleoylglycerol, Cholesterol
Amino acids	L- valine, Acetyllysine, L-threonine, Tryptophan, L-Isoleucine, L-proline, Glycine, Serine, L-alanine, Homoserine, 3-hydroxy-L-proline, L-phenylalanine, L-asparagine, L-cystine, 3-cyano-alanine, L-tyrosine, DL-ornithine, L-lysine
Energy metabolism related metabolites	Propanoic Acid, 2-hydroxybutyric acid, pyruvic acid, carbamic acid, succinic acid, fumaric acid, Acetic acid, L-Lactic acid, phosphoric acid, oxalic acid, 3-hydroxybutyric acid, 2-ketobutyric acid, Butanoic acid, malonic acid, Butylamine, Aminobutyric acid, hydroxypropanedioic acid, 1,4-benzenedicarboxylic acid, Aminomalonic acid, Phenylethanolamine, benzoic acid, Monoethanolamine, 1,2,3-Propanetricarboxylic acid, tartaric acid, Glutamic acid, Gluconic acid, ascorbic acid, 2-Oxpentanedioic acid, 1H-Indole-3-acetic acid, Glycerol, Pinitol, Sorbitol, 1,5-Anhydrosorbitol, Threitol, Maltitol, Myo-Inositol, erythritol, ribitol, xylitol, indolelactic-acid, Fructose, Mannose, Glucose, Allose, Mannobiose, Lactose, turanose, Uric acid, Sucrose, Lyxose, melezitose, Uridine, Ribose, Inosine, Pseudouridine, Pyridine, uracil, Creatinine, Urea, α -Tocophenrol, arabinofuranose, dimethyl-3-pentanol,

Supplemental table 3 The area under ROC curve adjusted by the lipid profile in premenopausal women and postmenopausal women.

Metabolites	Group I vs Group II			Group I vs Group III			Group I vs Group IV			Group II vs Group III			Group II vs Group IV		
	Area	Std. Error ^a	Sig. ^b	Area	Std. Error ^a	Sig. ^b	Area	Std. Error ^a	Sig. ^b	Area	Std. Error ^a	Sig. ^b	Area	Std. Error ^a	Sig. ^b
Oleic acid	0.677	0.040	0.000	0.703	0.035	0.000	0.895	0.031	0.000	0.529	0.042	0.501	0.813	0.043	0.000
LA	0.634	0.041	0.002	0.68	0.036	0.000	0.879	0.034	0.000	0.538	0.042	0.374	0.812	0.044	0.000
11,14-Eicosadienoic acid	0.593	0.042	0.032	0.563	0.039	0.108	0.928	0.022	0.000	0.488	0.041	0.773	0.915	0.028	0.000
AA	0.496	0.043	0.924	0.613	0.039	0.004	0.773	0.042	0.000	0.626	0.041	0.003	0.789	0.044	0.000
EPA	0.607	0.042	0.014	0.600	0.038	0.011	0.795	0.038	0.000	0.488	0.043	0.771	0.694	0.048	0.000

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

Supplemental table 4-1 The cut-off values, sensitivity and specificity of ROC curves of models adjusted for FFAs.

Metabolites	Group I vs Group II			Group I vs Group III			Group I vs Group IV		
	Cut-off values	Sensitivity	Specificity	Cut-off values	Sensitivity	Specificity	Cut-off values	Sensitivity	Specificity
Oleic acid	0.14	0.658	0.365	0.14	0.605	0.596	0.18	0.841	0.817
LA	0.09	0.608	0.606	0.08	0.588	0.567	0.11	0.818	0.702
11,14-Eicosadienoic acid	3.59	0.582	0.587	3.52	0.579	0.558	4.37	0.864	0.817
AA	0.04	0.506	0.481	0.06	0.596	0.567	0.11	0.705	0.692
EPA	0.04	0.557	0.517	0.03	0.588	0.587	0.01	0.750	0.750

Supplemental table 4-2 The cut-off values, sensitivity and specificity of ROC curves of models adjusted for FFAs.

Metabolites	Group II vs Group III			Group II vs Group IV		
	Cut-off values	Sensitivity	Specificity	Cut-off values	Sensitivity	Specificity
Oleic acid	0.17	0.500	0.506	0.23	0.727	0.722
LA	0.09	0.509	0.430	0.13	0.773	0.722
11,14-Eicosadienoic acid	3.67	0.509	0.468	4.46	0.841	0.823
AA	0.06	0.596	0.582	0.10	0.750	0.759
EPA	0.02	0.518	0.494	0.01	0.659	0.633