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Central adiposity markers, plasma lipid profile and cardiometabolic risk prediction in overweight-obese individuals

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Supplementary Table 1. Association analysis between HOMA-IR index or presence of Metabolic Syndrome (MetS) and gender (M=male), age, Body Mass Index (BMI), waist circumference (WC), waist to height ratio (WtoH), body roundness index (BRI), a body shape index (ABSI), visceral adiposity index (VAI), plasma triglycerides, total and HDL-cholesterol (Chol), glucose and insulin, HOMA-IR index, systolic (SBP) and diastolic blood pressure (DBP), presence of diabetes, hypertension, dyslipidemia in all and overweight-obese subjects on baseline data. Same analysis is performed in the subgroup undergoing follow-up vs. 5-year HOMA-IR index or presence of Metabolic Syndrome. ρ: Sperman's rho. Different letters indicate different ($p<0.05$) association strengths between tested factors for each column, as assessed by Meng, Rosenthal and Rubin's z-test.

	All (n=1965)				Overweight/Obese (n=1140)				Follow-up Overweight/Obese (n=263)			
	Basal HOMA-IR		Basal MetS		Basal HOMA-IR		Basal MetS		5-year HOMA-IR		5-year MetS	
Basal	ρ	p	ρ	p	ρ	p	ρ	p	ρ	p	ρ	p
Gender (M)	0.127	<0.001	-	0.094	0.028	0.349	-	0.044	0.116	0.061	-	0.805
Age	0.197	<0.001	0.274	<0.001	0.127	<0.001	0.182	<0.001	-0.046	0.461	0.049	0.427
BMI	0.586	<0.001	0.481	<0.001	0.488	<0.001	0.361	<0.001	0.431	<0.001	0.331	<0.001
WC	0.556[a]	<0.001	0.492[a]	<0.001	0.449[a]	<0.001	0.384[a]	<0.001	0.340[a]	<0.001	0.288[a]	<0.001
WtoH	0.530[a]	<0.001	0.503[a]	<0.001	0.408[a]	<0.001	0.398[a]	<0.001	0.261[a]	<0.001	0.293[a]	<0.001
BRI	0.530[a]	<0.001	0.503[a]	<0.001	0.408[a]	<0.001	0.398[a]	<0.001	0.261[a]	<0.001	0.293[a]	<0.001
ABSI	0.102[b]	<0.001	0.163[b]	<0.001	0.087[b]	0.003	0.177[b]	<0.001	-0.042[b]	0.500	0.034[b]	0.583
VAI	0.458[c]	<0.001	0.553[c]	<0.001	0.396[a]	<0.001	0.586[c]	<0.001	0.286[a]	<0.001	0.461[c]	<0.001
Triglycerides	0.427	<0.001	0.442	<0.001	0.350	<0.001	0.474	<0.001	0.297	<0.001	0.411	<0.001
Total-Chol	0.084	<0.001	0.058	0.010	0.016	0.579	-0.017	0.555	-0.018	0.766	-0.011	0.856
HDL-Chol	-0.277	<0.001	-0.341	<0.001	-0.249	<0.001	-0.395	<0.001	-0.151	0.015	-0.256	<0.001
Glucose	0.506	<0.001	0.365	<0.001	0.495	<0.001	0.339	<0.001	0.334	<0.001	0.361	<0.001
Insulin	0.970	<0.001	0.408	<0.001	0.957	<0.001	0.359	<0.001	0.665	<0.001	0.379	<0.001
HOMA-IR	-	-	0.407	<0.001	-	-	0.425	<0.001	0.684	<0.001	0.432	<0.001
SBP	0.271	<0.001	0.288	<0.001	0.147	<0.001	0.205	<0.001	0.149	0.016	0.071	0.252
DBP	0.261	<0.001	0.262	<0.001	0.199	<0.001	0.199	<0.001	0.230	<0.001	0.108	0.082
Diabetes	0.336	<0.001	-	<0.001	0.363	<0.001	-	<0.001	0.244	<0.001	-	<0.001
Hypertension	0.293	<0.001	-	<0.001	0.192	<0.001	-	<0.001	0.196	0.001	-	<0.001
Dyslipidemia	0.349	<0.001	-	<0.001	0.297	<0.001	-	<0.001	0.272	<0.001	-	<0.001

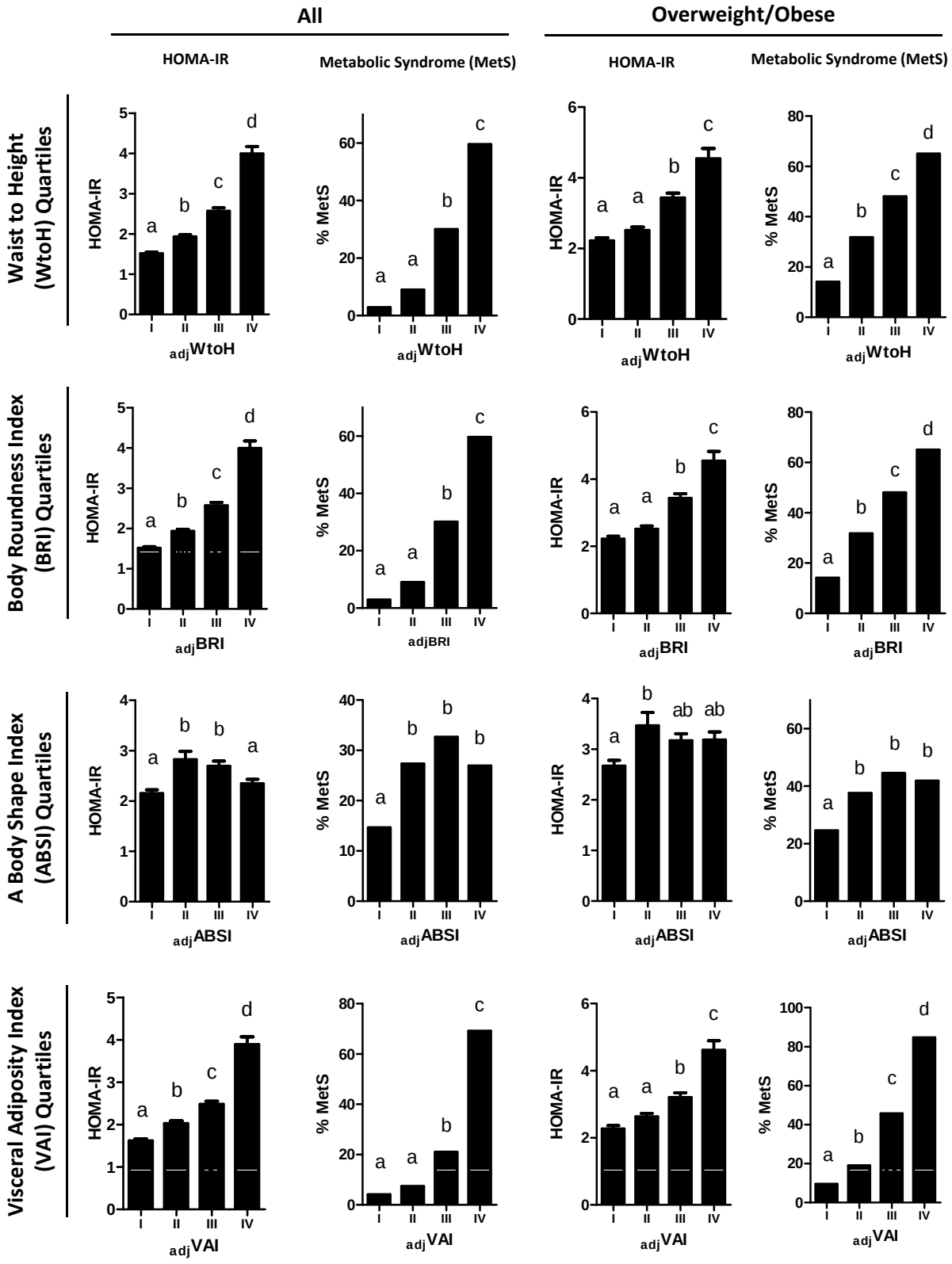
Supplementary Table 2. Association analysis between HOMA-IR index or presence of Metabolic Syndrome (MetS) and gender (M=male), age, Body Mass Index (BMI), waist circumference (WC), waist to height ratio (WtoH), body roundness index (BRI), a body shape index (ABSI), visceral adiposity index (VAI), plasma triglycerides, total and HDL-cholesterol (Chol), glucose and insulin, HOMA-IR index, systolic (SBP) and diastolic blood pressure (DBP), presence of diabetes, hypertension, dyslipidemia in lean subjects. ρ: Sperman's rho. Different letters indicate different ($p<0.05$) association strengths between tested factors for each column, as assessed by Meng, Rosenthal and Rubin's z-test. * association strength lower ($p<0.05$) than in obese/overweight individuals and all study population, also by Meng, Rosenthal and Rubin's z-test.

	Lean (n=825)			
	Basal HOMA-IR		Basal MetS	
	ρ	p	ρ	p
Gender (M)	0.028	0.420	-	0.276
Age	-0.024	0.482	0.231	<0.001
BMI	0.212	<0.001	0.125	<0.001
WC	0.220[a]*	<0.001	0.243[a]*	<0.001
WtoH	0.217[a]*	<0.001	0.250[a]*	<0.001
BRI	0.217[a]*	<0.001	0.250[a]*	<0.001
ABSI	0.117[b]	<0.001	0.220[a]*	<0.001
VAI	0.283[a]*	<0.001	0.292[a]*	<0.001
Triglycerides	0.254	<0.001	0.248	<0.001
Total-Chol	0.051	0.147	0.109	0.002
HDL-Chol	-0.083	0.017	-0.107	<0.001
Glucose	0.395	<0.001	0.224	<0.001
Insulin	0.965	<0.001	0.141	<0.001
HOMA-IR	-	-	0.200	<0.001
SBP	0.110	0.002	0.183	<0.001
DBP	0.051	0.141	0.105	0.003
Diabetes	-	<0.001	0.191	<0.001
Hypertension	-	<0.001	0.110	0.002
Dyslipidemia	-	<0.001	0.175	<0.001

Supplementary Table 3. Multiple regression analyses between body mass index (BMI), waist circumference (WC), waist to height ratio (WtoH), body roundness index (BRI), a body shape index (ABSI) and visceral adiposity index (VAI) and HOMA-IR or presence of Metabolic Syndrome in lean subjects in different statistical adjustment models. B: Coefficient, SE: Standard Error; t: t value; z: Wald test.

		Lean			
Basal		Basal HOMA-IR			
	Model	B	SE	t	p
BMI	1	0.094	0.015	6.200	<0.001
	2a	0.078	0.015	5.163	<0.001
	2b	0.077	0.015	5.278	<0.001
WC	1	0.023	0.003	6.636	<0.001
	2a	0.020	0.003	5.725	<0.001
	2b	0.018	0.003	5.414	<0.001
WtoH	1	3.673	0.571	6.434	<0.001
	2a	3.069	0.564	5.437	<0.001
	2b	3.069	0.564	5.437	<0.001
BRI	1	0.193	0.030	6.397	<0.001
	2a	0.161	0.030	5.382	<0.001
	2b	0.161	0.030	5.382	<0.001
ABSI	1	1.377	0.413	3.333	<0.001
	2a	1.176	0.402	2.927	0.004
	2b	0.995	0.391	2.547	0.011
VAI	1	0.313	0.035	8.986	<0.001
	2a	0.427	0.077	5.520	<0.001
	2b	0.427	0.077	5.520	<0.001
		Basal Metabolic Syndrome			
		B	SE	z	p
BMI	1	0.276	0.107	6.658	0.010
	2a	0.086	0.119	0.520	0.471
	2b	0.140	0.148	0.900	0.343
WC	1	0.132	0.024	31.150	<0.001
	2a	0.170	0.038	19.503	<0.001
	2b	0.116	0.026	19.303	<0.001
WtoH	1	20.187	3.726	29.355	<0.001
	2a	17.243	4.178	17.036	<0.001
	2b	24.009	6.045	15.774	<0.001
BRI	1	0.988	0.178	30.747	<0.001
	2a	0.851	0.201	18.011	<0.001
	2b	1.203	0.298	16.319	<0.001
ABSI	1	12.447	2.519	24.408	<0.001
	2a	12.466	2.825	19.473	<0.001
	2b	18.140	4.167	18.954	<0.001
VAI	1	1.179	0.170	47.997	<0.001
	2a	1.729	0.389	19.775	<0.001
	2b	1.378	0.346	15.832	<0.001

Data adjustments:
Model 1: Age, Gender
Model 2a: Model 1 + HOMA (not for HOMA), MAP, Triglycerides
Model 2b: Model 1 + Diabetes, Hypertension, Hyperlipidemia



Supplementary Figure 1. Levels of basal HOMA-IR insulin resistance index or Metabolic Syndrome (MetS) prevalence in all subjects from the genaral population study cohort (n=1945) and in overweight/obese individuals (n=1140), divided in quartiles of Waist to Height (WtoH), Body Roundness Index (BRI), A Body Shape Index (ABSI) and Visceral Adiposity Index (VAI). WtoH, BRI, ABSI and VAI were adjusted (adj) for gender and age in the whole population. Different letters indicate differences ($p<0.05$) among quartiles.