

Supplementary File

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Supplementary Table S1. Demographic and clinical characteristics

Characteristics	Total	Healthy	Sarcopenia	Sarcopenic obesity	Obesity	<i>P</i>
TOTAL	402	118	20	12	252	
Sex, n(%)						
Men	240	78(66.1)	12 (60.0)	6(50.0)	144(57.1)	0.367
Women	162	40(33.9)	8 (40.0)	6(50.0)	108(42.9)	
Age groups, n(%)						
50-64years	101	34(28.8)	1(5.0)	0(0.0)	66(26.2)	<0.001***
65-79years	264	75(63.6)	11(55.0)	9(75.0)	169(67.1)	
80 years and older	37	9(7.6) ^a	8(40.0) ^{a, b}	3(25.0)	17(6.7) ^b	
BMI, n(%)						
< 18.5	20	13(11.0) ^a	7(35.0) ^a	0(0.0)	0(0.0)	<0.001***
18.5-23.9	173	90(76.3) ^a	13(65.0) ^b	8(66.7) ^c	62(24.6) ^{a, b, c}	
24-27.9	168	15(12.7) ^a	0(0.0)	3(25.0)	150(59.5) ^a	
≥28	41	0(0.0)	0(0.0)	1(8.3)	40(15.9)	
Blood biomarkers						
Blood glucose	5050(5.00,6.20)	5.21(1.80,5.83) ^{a, b}	5.21(4.80,5.83) ^{c, d}	5.79(5.52,6.33) ^{a, c}	5.60(5.10,6.40) ^{b, d}	0.001**
Hb	139.00(129.00,151.00)	141.59±16.15	129.15±8.90	141.17±23.21	140.00(129.00,151.00)	0.06
TG	1.39(1.09,1.98)	1.18(0.96,1.50) ^a	1.13±0.37 ^b	1.67(1.01,1.87)	1.57(1.16,2.28) ^{a, b}	<0.001***
TC	5.46(4.73,6.26)	5.37±1.29	5.38±1.16	5.49±1.74	5.49±1.34	0.854

Continuous variables are shown as mean \pm standard deviation for variables with normal distribution, median (interquartile range [IQR]) for nonnormal distributions.

Categorical variables are shown as n (%).

BMI, Body mass index; Hb, Hemoglobin; TG, Triglyceride; TC, Serum total cholesterol.

^{a, b, c} declared $P < 0.05$ between two means with the same upper letter in the same line.

^{**} $P < 0.01$, ^{***} $P < 0.001$

Supplementary Table S2. The consumption of macronutrients and micronutrients between different population

	Healthy			Sarcopenia			Sarcopenic obesity			Obesity			<i>P</i>
	< EAR	> EAR	> RNI	< EAR	> EAR	> RNI	< EAR	> EAR	> RNI	< EAR	> EAR	> RNI	
Macronutrients													
Carbohydrates (g/d)	3(2.5)	23(19.5)	92(78.0)	1(5.0)	4(20.0)	15(75)	0(0.0)	2(16.7)	10(83.3)	2(0.8)	39(15.5)	211(83.7)	0.386
Total proteins (g/d)	67(56.8)	13(11.0)	38(32.2)	9(45.0)	1(5.0)	10(50.0)	8(66.7)	2(16.7)	2(16.7)	144(57.1)	22(8.7)	86(34.1)	0.557
Micronutrients													
Magnesium (mg/d)	39(33.1)	31(26.3)	48(40.7)	4(20.0)	5(25.0)	11(55.0)	4(33.3)	3(25.0)	5(41.7)	67(26.6)	74(29.4)	111(44.0)	0.812
Phosphorus (mg/d)	5(4.2)	15(12.7)	98(83.1)	1(5.0)	1(5.0)	18(90.0)	0(0.0)	2(16.7)	10(83.3)	2(0.8)	28(11.1)	222(88.1)	0.192
Ferrum (mg/d)	0(0.0)	0(0.0)	118(100.0)	0(0.0)	0(0.0)	20(100.0)	0(0.0)	0(0.0)	12(100.0)	0(0.0)	0(0.0)	252(100.0)	—
Calcium (mg/d)	100(84.7)	7(5.9)	11(9.3)	17(85.0)	1(5.0)	2(10.0)	9(75.0)	2(16.7)	1(8.3)	195(77.7)	22(8.8)	34(13.5)	0.640
Vitamin A (μg/d)	53(44.9)	12(10.2)	53(44.9)	8(40.0)	1(5.0)	11(55.0)	7(58.3)	0(0.0)	5(41.7)	128(50.8)	25(9.9)	99(39.3)	0.646
Vitamin B1 (μg/d)	113(95.8)	4(3.4)	1(0.8)	20(100.0)	0(0.0)	0(0.0)	11(91.7)	0(0.0)	1(8.3)	229(90.9)	15(6.0)	8(3.2)	0.399
Vitamin B2(μg/d)	0(0.0)	0(0.0)	118(100.0)	0(0.0)	0(0.0)	20(100.0)	0(0.0)	0(0.0)	12(100.0)	0(0.0)	0(0.0)	252(100.0)	—
Vitamin B3(μg/d)	39(33.1)	38(32.2)	41(34.7)	5(25.0)	7(35.0)	8(40.0)	5(41.7)	3(25.0)	4(33.3)	82(32.5)	62(24.6)	108(42.9)	0.647
Vitamin C (mg/d)	34(29.1)	5(4.3)	78(66.7)	3(15.0)	2(10.0)	15(75.0)	3(25.0)	1(8.3)	8(66.7)	66(26.2)	12(4.8)	174(69.0)	0.667
	< EER		> EER	< EER		> EER	< EER		> EER	< EER		> EER	<i>P</i>
Total energy (kcal/d)	109(92.4)		9(7.6)	18(90.0)		2(10.0)	11(91.7)		1(8.3)	211(83.7)		41(16.3)	0.114
	≤ AMDR		> AMDR	≤ AMDR		> AMDR	≤ AMDR		> AMDR	≤ AMDR		> AMDR	<i>P</i>
Carbohydrate density (%/E)	117(99.2)		1(0.8) ^{a, b}	20(100.0)		0(0.0)	11(91.7)		1(8.3) ^a	236(93.7)		16(6.3) ^b	0.046*
Lipids density (%/E)	0(0.0)		118(100.0)	0(0.0)		20(100.0)	0(0.0)		12(100.0)	5(2.0)		247(98.0)	0.461
	< AI		> AI	< AI		> AI	< AI		> AI	< AI		> AI	<i>P</i>

Manganese (mg/d)	0(0.0)	118(100.0)	0(0.0)	20(100.0)	0(0.0)	12(100.0)	3(1.2)	228(98.8)	0.653
Potassium (mg/d)	84(71.2)	34(28.8)	9(45.0)	11(55.0)	9(75.0)	3(25.0)	157(62.3)	95(37.7)	0.079

Categorical variables are shown as n (%).

^{a, b} declared $P < 0.05$ between two means with the same upper letter in the same line.

* $P < 0.05$

Supplementary Table S3. Association between BMR, body composition, dietary components and SMI

Factor included	MODEL 3			MODEL 4		
	Unstandardized	Standardized	<i>P</i>	Unstandardized	Standardized	<i>P</i>
	B(95% CI)	β		B(95% CI)	β	
Sex	-0.283	-0.139	<0.001***	-0.283	-0.139	<0.001***
Age	-0.004	-0.025	0.183	-0.004	-0.025	0.182
BMR	0.006	1.041	<0.001***	0.006	1.041	<0.001***
ECW/ICW	-3.597	-0.070	<0.001***			
ECW/TBW				-9.579	-0.069	<0.001***
Percentage Body Fat (%)	0.038	0.287	<0.001***	0.038	0.287	<0.001***
WHR	-4.256	-0.255	<0.001***	-4.252	-0.255	<0.001***
Blood glucose	0.001	0.002	0.897	0.001	0.002	0.898
Hb	-0.002	-0.030	0.089	-0.002	-0.030	0.091
TG	0.015	0.018	0.280	0.015	0.018	0.281
Total energy (kcal/d)	<0.001	-0.125	0.025*	<0.001	-0.125	0.025*
Carbohydrates density (%/E)	-0.034	-0.271	0.042*	-0.034	-0.271	0.042*
Protein density (%E)	-0.030	-0.087	0.066	-0.030	-0.087	0.066
Lipids density (%/E)	-0.034	-0.242	0.039*	-0.034	-0.241	0.039*
Dietary fiber (g/d)	0.004	0.024	0.398	0.004	0.024	0.400

WHR, Waist hip ratio; TBW, Total body water; ICW, Intracellular water; ECW, Extracellular water; BMR, Basal metabolic rate; SMI, Appendicular skeletal muscle index; Hb, Hemoglobin; TG, Triglyceride; TC, Serum total cholesterol.

* $P < 0.05$, *** $P < 0.001$

Supplementary Table S4. Determinate important factors for predicting sarcopenia and sarcopenic obesity

	Sensitivity	Specificity	Cut-off value
BMR			
Healthy vs. Sarcopenia	0.900	0.568	1316.2570
Healthy vs. Sarcopenic obesity	0.917	0.661	1271.2500
Sarcopenia vs. Sarcopenic obesity	0.833	0.450	1256.6730
BMR/BMI			
Healthy vs. Sarcopenia	0.250	0.881	70.4416
Healthy vs. Sarcopenic obesity	0.917	0.746	56.8966
Sarcopenia vs. Sarcopenic obesity	0.917	0.750	57.2843
BMR/BSA			
Healthy vs. Sarcopenia	0.900	0.525	832.2929
Healthy vs. Sarcopenic obesity	0.917	0.720	810.7782
Sarcopenia vs. Sarcopenic obesity	0.750	0.800	791.1238
BMR/Height²			
Healthy vs. Sarcopenia	0.750	0.720	0.0479
Healthy vs. Sarcopenic obesity	0.500	0.695	0.0481
Sarcopenia vs. Sarcopenic obesity	0.833	0.600	0.0474
ECW/ICW			
Healthy vs. Sarcopenia	0.667	0.644	0.6348
Healthy vs. Sarcopenic obesity	0.850	0.720	0.6370
Sarcopenia vs. Sarcopenic obesity	0.583	0.850	0.6373
ECW/TBW			
Healthy vs. Sarcopenia	0.850	0.720	0.3891
Healthy vs. Sarcopenic obesity	0.667	0.644	0.3883
Sarcopenia vs. Sarcopenic obesity	0.583	0.850	0.3892

BMI, Body mass index; BMR, Basal metabolic rate; BSA, Body surface area; TBW, Total body water; ICW, Intracellular water; ECW, Extracellular water.

Supplementary Table S5. Predictive role of BMR and ECW/ICW

	MODEL 3 BMR		MODEL 3 BMR/BMI		MODEL 3 BMR/BSA		MODEL 3 BMR/ Height ²	
	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>
Healthy vs. Sarcopenia								
BMR	0.042 (0.007,0.249)	0.001**						
BMR/BMI			2.621 (0.619,11.088)	0.190				
BMR/BSA					0.078 (0.014,0.428)	0.003**		
BMR/Height ²							0.212 (0.061,0.737)	0.015*
ECW/ICW	7.251 (1.704,30.854)	0.007**	5.573 (1.443,21.526)	0.013*	4.346 (1.077,17.530)	0.039*	4.148 (1.030,16.713)	0.045*
Healthy vs. Sarcopenic obesity								
BMR	0.006 (0.000,0.087)	<0.001***						
BMR/BMI			0.002 (0.000,0.053)	<0.001***				
BMR/BSA					—	0.998		
BMR/Height ²							0.766 (0.167,3.524)	0.732
ECW/ICW	1.703 (0.376,7.719)	0.490	2.459 (0.461,13.118)	0.292	1.739 (0.301,10.064)	0.537	1.593 (0.437,5.807)	0.481
Sarcopenia vs. Sarcopenic obesity								
BMR	0.217 (0.018,2.601)	0.228						
BMR/BMI			—	0.999				
BMR/BSA					—	0.999		
BMR/Height ²							20.563 (1.304,324.336)	0.032*
ECW/ICW	0.088 (0.011,0.678)	0.020*	0.109 (0.008,1.501)	0.098	0.055 (0.001,0.750)	0.030*	0.097 (0.010,0.935)	0.044*

MODEL3: Model 2 + ECW/ICW

BMI, Body mass index; BMR, Basal metabolic rate; BSA, Body surface area; ICW, Intracellular water; ECW, Extracellular water.

* $P < 0.05$, ** $P < 0.001$, *** $P < 0.001$

Supplementary Table S6. Predictive role of BMR and ECW/TBW

	MODEL 4 _{BMR}		MODEL 4 _{BMR/BMI}		MODEL 4 _{BMR/BSA}		MODEL 4 _{BMR/ Height²}	
	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>	OR(95% CI)	<i>P</i>
Healthy vs. Sarcopenia								
BMR	0.046 (0.007,0.280)	0.001**						
BMR/BMI			2.953 (0.655,13.317)	0.159				
BMR/BSA					0.084 (0.015,0.478)	0.005**		
BMR/Height ²							0.259 (0.074,0.914)	0.036*
ECW/TBW	10.062 (2.414,41.942)	0.002**	9.119 (2.359,35.244)	0.001**	6.991 (1.740,28.091)	0.006**	6.582 (1.609,26.914)	0.009**
Healthy vs. Sarcopenic obesity								
BMR	0.005 (0.000,0.079)	<0.001***						
BMR/BMI			0.001 (0.000,0.042)	<0.001***				
BMR/BSA					—	0.998		
BMR/Height ²							0.807 (0.173,3.760)	0.784
ECW/TBW	2.923 (0.512,16.683)	0.227	6.336 (0.636,63.152)	0.116	4.748 (0.473,47.633)	0.185	1.968 (0.503,7.696)	0.331
Sarcopenia vs. Sarcopenic obesity								
BMR	0.221 (0.020,2.492)	0.222						
BMR/BMI			—	0.998				
BMR/BSA					—	0.998		
BMR/Height ²							15.522 (1.171,205.743)	0.038*
ECW/TBW	0.125 (0.016,0.948)	0.044*	0.171 (0.012,2.358)	0.187	0.076 (0.006,1.001)	0.050	0.206 (0.024,1.786)	0.152

MODEL 4: Model 2 + ECW/TBW

BMI, Body mass index; BMR, Basal metabolic rate; BSA, Body surface area; TBW, Total body water; ECW, Extracellular water.

P*<0.05, ** *P*<0.01, * *P*<0.001

Supplementary Table S7. Correlations among SMI, BMR, carbohydrates intake and body water distribution

	SMI	BMR	Carbohydrates	ECW/ICW	ECW/TBW
SMI	1				
BMR	0.941***	1			
Carbohydrates	0.222***	0.250***	1		
ECW/ICW	-0.273***	-0.244***	-0.073	1	
ECW/TBW	-0.273***	-0.244***	-0.074	1.000***	1

BMR, Basal metabolic rate; TBW, Total body water; ICW, Intracellular water; ECW, Extracellular water; SMI, Appendicular skeletal muscle index.

*** $P < 0.001$

Supplementary Table S8. Moderated mediation analysis for carbohydrates, BMR, SMI and body water distribution

	Effect	Boot SE	Boot LLCI	Boot ULCI
ECW/ICW				
Low (0.6154)	0.0036	0.0010	0.0016	0.0055
Moderate (0.6310)	0.0039	0.0011	0.0018	0.0060
High (0.6490)	0.0042	0.0012	0.0019	0.0065
ECW/TBW				
Low (0.3810)	0.0036	0.0010	0.0017	0.0056
Moderate (0.3869)	0.0039	0.0011	0.0018	0.0060
High (0.3936)	0.0042	0.0012	0.0019	0.0065

SE, Standard Error; LLCI, Lower limit confidence interval; ULCI, Upper limit confidence interval; BMR, Basal metabolic rate; TBW, Total body water; ICW, Intracellular water; ECW, Extracellular water; SMI, Appendicular skeletal muscle index