

SUPPLEMENTARY METHODS

Assessment of Body Composition

Lunar iDXA, GE Healthcare– enCORE™ 2011 software version 13.6 (Bologna, Italy); Discovery QDR, Hologic Inc.– software version 3 (Clermont-Ferrand, France); Lunar Prodigy, GE Healthcare– enCORE™ 2011 software version 13.6 (Wageningen, the Netherlands and Warsaw, Poland); and Discovery Wi, Hologic Inc., (Norwich, UK). The scanners followed standard Quality Control procedures and they were calibrated daily using a standard calibration block supplied by the manufacturers. DXA scans were performed by trained technicians according to state-of-the-art technique and manufacturers recommendation.

All metal items were removed before densitometry. Participants were placed in a supine position with arms at sides slightly separated from the trunk and correctly centered on the scanning field.

Markers of inflammation and adipose related hormones

Each recruiting center collected fresh blood samples from each participant after fasting. Blood was immediately centrifuged at 2000 x g for 10 min at 4°C and separated into plasma and serum according to a standardized operating procedure. All the specimens were stored at -80 °C until the time of analysis and sent to the project partners responsible for the analyses of the markers of inflammation and adipose-related hormones. Inflammatory and adipose-related markers were analyzed by a magnetic bead-based multiplex immunoassays (Bio-Plex) (Bio-Rad) according to the manufacturer's instructions. In particular Interleukin 6 (IL-6), Interleukin 10 (IL-10), and Tumor Necrosis Factor alpha (TNF α) were measured in multiplex with Bio-Plex Pro Cytokine, Chemokine, and Growth Factor Assays (IL-6 intra-assay coefficient of variation (CV), 4.01%; IL-10 intra-assay CV, 3.99%; TNF α intra-assay CV, 4.55%); Transforming Growth Factor beta1 (TGF- β 1 intra-assay CV, 3.83%) with Bio-Plex Pro TGF-beta assay; Ghrelin (inter-assay CV, 2%) and Resistin (inter-assay CV, 4%) in multiplex with Bio-Plex Pro human diabetes assay. Plates were read and analyzed by Bio-Plex Manager Software. The level of Interleukin 6 receptor alpha (IL-6R α , inter-assay CV, 3.1%), Glycoprotein 130 (gp130, inter-assay CV, 5.9%), Pentraxin-3 (inter-assay CV, 6.8%) and soluble TNF alpha receptors R1 (TNF α -R1, inter-assay CV, 6.1%) and R2 (TNF α -R2, inter-assay CV, 7.7%) were assessed in multiplex in a subgroup of 569 samples with Bioplex Pro human inflammation assay (gp-130, inter-assay CV 5.9%).

The quantitative determination of high sensitivity C-reactive protein (hsCRP), leptin, adiponectin has been performed by ProcartaPlex™ Immunoassay (Thermo Fisher Scientific) according to the manufacturer's instructions. Analysis was performed using Luminex 200 instrumentation (Luminex Corporation). Assay sensitivities were 19.31 pg/mL for Leptin, 4.39 pg/mL for hsCRP, and 47.46 pg/mL for adiponectin.

α 1 Acid glycoprotein (AGP) has been measured by an immunoturbidimetric assay (AAGP2, Tina-quant α 1-Acid Glycoprotein Gen.2 COBAS, Roche Diagnostics) with a measuring range of 0.1-4.0 g/L. Plasma albumin level was analyzed using the VITROS ALB slides (Ortho-Clinical Diagnostics) on a Vitros 5.1/FS analyzer.

Method	CV:	0.9	-1.7%
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SUPPLEMENTARY MATERIALS

Supplementary Table 1:

A: Five body composition groups identified by a cluster analysis performed on ten BC markers and BMI in elderly women participants (N=620)

Values are expressed as mean values \pm SD, unless otherwise indicated.

Clusters	BMI (kg/m ²)	FM (kg)	FMI (kg/m ²)	LM (kg)	LMI (kg/m ²)	ALMI (kg/m ²)	FM/LM	SMI	T-score	BMC (g)	BMD (g/cm ²)
Normal weight (NW; n = 89; 14.4%)	21.4 \pm 1.7	15.9 \pm 3.4	6.1 \pm 1.3	38.4 \pm 3.1	14.9 \pm 1.1	6.2 \pm 0.6	0.4 \pm 0.1	0.29 \pm 0.0 ₃	-1.4 \pm 1.0	1905.1 \pm 230. ₉	1.0 \pm 0.1
Overweight A (OWA; n = 251; 40.5%)	25.1 \pm 1.9	23.8 \pm 4.0 ¹	9.2 \pm 1.5 ¹	40.4 \pm 4.1 ¹	15.5 \pm 1.1 ¹	6.4 \pm 0.5	0.6 \pm 0.1 ¹	0.26 \pm 0.0 ₂ ¹	-0.4 \pm 1.0 ¹	2190.4 \pm 294. ₉ ¹	1.1 \pm 0.1 ¹
Overweight B (OWB; n = 137; 22.1%)	26.6 \pm 2.7	26.9 \pm 5.9	10.9 \pm 2.3	37.2 \pm 3.7	15.1 \pm 1.0	6.3 \pm 0.6	0.7 \pm 0.2	0.24 \pm 0.0 ₂	-1.9 \pm 0.8	1804.1 \pm 249. ₅	0.9 \pm 0.1
Low Obesity A (LOA; n = 61; 9.8%)	31.5 \pm 4.1	32.7 \pm 6.4 ^a	12.9 \pm 2.6 ^a	47.1 \pm 5.8 ^a	18.6 \pm 1.7 ^a	8.0 \pm 0.8 ^a	0.7 \pm 0.1 ^a	0.25 \pm 0.0 ₂ ^a	-0.6 \pm 1.5 ^a	2133.4 \pm 378. ₂ ^a	1.1 \pm 0.1 ^a
Low Obesity B (LOB; n = 82; 13.2%)	31.9 \pm 2.4	38.5 \pm 5.4	14.9 \pm 2.0	42.1 \pm 4.4	16.2 \pm 1.1	6.8 \pm 0.6	0.9 \pm 0.1	0.21 \pm 0.0 ₂	0.2 \pm 0.8	2454.4 \pm 297. ₃	1.1 \pm 0.1

¹Significant difference between OWA and OWB (¹: p<0.0001)

^aSignificant difference between LOA and LOB (^a: p<0.0001)

B: Six body composition groups identified by a cluster analysis performed on ten BC markers and BMI in elderly men participants (N=501)

Clusters	BMI (kg/m ²)	FM (kg)	FMI (kg/m ²)	LM (kg)	LMI (kg/m ²)	ALMI (kg/m ²)	FM/LM	SMI	T-score	BMC (g)	BMD (g/cm ²)
Normal weight (NW; n = 122; 24.4%)	24.0 \pm 2.1	13.7 \pm 4.2	4.6 \pm 1.4	57.0 \pm 5.5	19.2 \pm 1.4	8.5 \pm 0.7	0.2 \pm 0.1	0.36 \pm 0.0 ₀₃	-0.9 \pm 1.0	2631.9 \pm 418. ₈	1.1 \pm 0.1
Overweight A (OWA; n = 20; 4.0%)	25.7 \pm 2.8	15.6 \pm 5.3 ¹	5.1 \pm 1.6 ¹	61.8 \pm 6.6 ₁	20.3 \pm 1.3 ¹	9.1 \pm 0.6 ¹	0.2 \pm 0.1 ¹	0.36 \pm 0.0 ₀₃ ¹	1.9 \pm 0.6 ¹	3576.2 \pm 401. ₁ ¹	1.4 \pm 0.1 ¹
Overweight B (OWB; n = 233; 46.5%)	26.3 \pm 2.3	22.2 \pm 5.3	7.5 \pm 1.8	54.0 \pm 5.3	18.2 \pm 1.3	8.1 \pm 0.7	0.4 \pm 0.1	0.31 \pm 0.0 ₀₂	-0.4 \pm 0.9	2891.4 \pm 331. ₉	1.2 \pm 0.1
Low Obesity A (LOA; n = 34; 6.8%)	30.1 \pm 1.6	23.3 \pm 4.8 ^a	7.8 \pm 1.5 ^a	65.8 \pm 5.2 _a	22.0 \pm 1.1 ^a	9.8 \pm 0.6 ^a	0.4 \pm 0.1 ^a	0.32 \pm 0.0 ₀₃ ^a	-0.5 \pm 0.9 ^a	2791.9 \pm 347. ₂ ^a	1.6 \pm 0.1 ^a

Low Obesity B (LOB; n = 80; 16.0%)	30.4±2.9	31.5±5.4	10.3±1.9	59.5±5.8	19.3±1.6	8.5±0.8	0.5±0.1	0.28±0.02	0.7±1.1	3391.6±432.8	1.3±0.1
Moderate Obesity (MO; n = 12; 2,3%)	36.6±2.9	42.4±5.1	13.9±1.5	67.3±7.8	21.9±2.0	8.5±1.1	0.6±0.1	0.26±0.03	1.6±1.2	3667.6±637.3	1.3±0.1

Values are expressed as mean values ± SD, unless otherwise indicated.

¹Significant difference between OWA and OWB (¹: p<0.0001)

^aSignificant difference between LOA and LOB (^a: p<0.0001)

Supplementary Table 2A: Correlation Matrix for Body Composition Markers with pro- and anti-inflammatory markers in women. *p < .05. **p < .01. ***p < .001

	BMI	FM	FMI	FM/LM	LM	LMI	ALMI	SMI	BMC	BMD	T-score	IL-6	IL-6Rα	gp130	Pentra xin-3	TNFα	TNFα-R1	TNFα-R2	IL -10	TGF-β1	
BMI	1																				
FM	.90***	1																			
FMI	.93***	.96***	1																		
FM/LM	.80***	.92***	.96***	1																	
LM	.38***	.34***	.16	-.05	1																
LMI	.61***	.32***	.35***	.06	.69***	1															
ALMI	.59***	.34***	.36***	.11	.63***	.89***	1														
SMI	-.69***	-.79***	-.82***	-.89***	.12	.05	.17*	1													
BMC	.34***	.43***	.29***	.25***	.49***	.17*	.19**	-.24***	1												
BMD	.29***	.28***	.22***	.16	.34***	.23***	.18*	-.20**	.85***	1											
T-score	.31***	.31***	.26***	.19**	.32***	.24***	.22***	-.19**	.84***	.96***	1										
IL-6	-.06	-.05	-.06	-.05	-.02	-.05	-.04	.03	-.05	-.09	-.06	1									
IL-6Rα	.00	.00	-.01	-.02	.04	.02	-.01	-.01	.06	.06	.04	-.12	1								
gp130	-.01	-.01	-.02	-.02	.02	-.02	-.04	-.02	.09	.09	.07	-.14	.70***	1							
Pentraxin-3	.06	.06	.07	.09	-.06	-.03	.00	-.08	.03	.04	.04	-.09	.42***	.63***	1						
TNFα	.03	.02	.03	.03	-.03	.00	-.02	-.06	-.01	-.03	.00	.63***	-.12	-.11	-.12	1					
TNFα-R1	.16	.19	.16	.16	.11	.06	.05	-.16	.21	.20	.19	-.11	.65***	.78***	.52***	-.07	1				
TNFα-R2	.16	.17	.16	.16	.04	.04	.04	-.16	.13	.11	.09	-.05	.68***	.77***	.57***	-.04	.83***	1			
IL-10	-.02	-.03	-.03	-.03	.01	.00	-.01	.01	-.02	-.04	-.04	.63***	-.09	-.07	-.13	.64***	-.04	.00	1		
TGF-β1	.09	.09	.09	.11	-.04	-.02	-.04	-.14	.07	.06	.04	.18	-.40***	-.37***	-.23*	.19*	-.28***	-.31***	.15	1	

Supplementary Table 2B: Correlation Matrix for Body Composition Markers with pro- and anti-inflammatory markers in men. *p < .05. **p < .01. *p < .001**

	BMI	FM	FMI	FM/LM	LM	LMI	ALMI	SMI	BMC	BMD	T-score	IL-6	IL-6Rα	gp130	Pentraxin-3	TNFα	TNFα-R1	TNFα-R2	IL-10	TGFβ1	
BMI	1																				
FM	.84***	1																			
FMI	.86***	.98***	1																		
FM/LM	.72***	.96***	.97***	1																	
LM	.48***	.25***	.14	-.04	1																
LMI	.59***	.14	.15	-.08	.78***	1															
ALMI	.51***	.12	.13	-.08	.68***	.88***	1														
SMI	-.68***	-.84***	-.85***	-.88***	.04	.10	.29***	1													
BMC	.35***	.39***	.31***	.29***	.38***	.10	.08	-.33***	1												
BMD	.28***	.23***	.19*	.15	.29***	.18	.13	-.20**	.88***	1											
T-score	.29***	.24***	.21**	.17	.28***	.18	.15	-.19**	.86***	.98***	1										
IL-6	.06	.06	.07	.07	-.03	.01	.01	-.05	-.11	-.13	-.11	1									
IL-6Rα	.09	.04	.05	.03	.04	.09	.15	.02	.06	.03	.04	-.12	1								
gp130	-.04	-.06	-.07	-.07	.05	.02	.03	.08	.10	.08	.09	-.08	.72***	1							
Pentraxin-3	-.11	-.10	-.09	-.08	-.12	-.08	-.07	.06	-.01	.01	.02	-.08	.57***	.70***	1						
TNFα	-.03	-.03	-.03	-.03	-.01	.02	.04	.06	-.09	-.11	-.10	.64***	-.09	-.01	-.16	1					
TNFα-R1	.03	.00	.00	-.03	.08	.09	.09	.05	.06	.05	.06	.00	.64***	.77***	.61***	.03	1				
TNFα-R2	.08	.08	.07	.06	.09	.07	.08	-.02	.08	.03	.04	.03	.66***	.76***	.63***	.01	.85***	1			
IL-10	.00	-.04	-.02	-.03	-.05	.02	.02	.02	-.10	-.12	-.12	.51***	.07	.09	-.04	.66***	.09	.12	1		
TGF-β1	.06	.06	.07	.06	.01	.02	-.04	-.10	-.04	-.04	-.06	.03	-.37***	-.32**	-.28*	-.03	-.28*	-.29*	.03	1	

Supplementary Table 3A: Correlation Matrix of all Body Composition parameters and Inflammatory markers and adipose-related hormones in women *p < .05. **p < .01. ***p < .001

	BMI	FM	FMI	FM/LM	LM	LMI	ALMI	SMI	BMC	BMD	T Score
Ghrelin	-.26***	-.27***	-.29***	-.30***	NS	NS	NS	NS	NS	NS	NS
Leptin	.65***	.71***	.71***	.70***	NS	.19**	.19**	-.62***	.27***	.23***	.22***
Adiponectin	-.20**	-.20**	NS	NS	-.23***	-.19**	NS	NS	NS	NS	NS
CRP	.35***	.36***	.37***	.33***	NS	.19**	.22***	-.23***	NS	NS	NS
AGP	.31***	.33***	.32***	.28***	NS	.17*	NS	-.26***	NS	NS	NS

Supplementary Table 3B: Correlation Matrix of all Body Composition parameters and Inflammatory markers and adipose-related hormones in men *p < .05. **p < .01. ***p < .001

	BMI	FM	FMI	FM/LM	LM	LMI	ALMI	SMI	BMC	BMD	T Score
Ghrelin	NS	NS	NS	NS	NS	NS	NS	.19*	NS	NS	NS
Leptin	.74***	.81***	.80***	.76***	.23***	.19*	NS	-.70***	.27***	.20**	.20*
Adiponectin	-.26***	-.22**	-.21**	NS	-.24***	-.24***	-.23***	NS	NS	NS	NS
CRP	.23***	.29***	.29***	.28***	NS	NS	NS	-.24***	NS	NS	NS
Albumin	NS	NS	NS	NS	NS	.20*	.20*	.20*	NS	NS	NS