Table 2. Association of EL Mass with Cardiovascular Risk Factor

Variable	Total *R* (*p*-Value)		Men *R* (*p*-Value)		Women *R* (*p*-Value)	
	Pre	Post	Pre	Post	Pre	Post
Age	0.14 (0.004)	0.048 (0.29)	0.08 (0.09)	0.11 (0.06)	0.13 (0.01)	0.06 (0.44)
BMI	0.28 (<0.001)	0.22 (<0.001)	0.24 (<0.001)	0.15 (0.01)	0.33 (<0.001)	0.26 (<0.001)
Waist circumference	0.28 (<0.001)	0.26 (<0.001)	0.25 (<0.001)	0.17 (<0.017)	0.38 (<0.001)	0.3 (0.001)
Blood pressure	0.18 (<0.001)	0.24 (<0.001)	0.15 (<0.001)	0.26 (<0.001)	0.21 (<0.001)	0.19 (<0.001)
Fasting glucose	0.11 (0.001)	0.16 (0.002)	0.1 (0.04)	0.14 (0.04)	0.13 (0.01)	0.19 (0.02)
HOMA-IR	0.27 (<0.001)	0.24 (<0.001)	0.22 (<0.001)	0.23 (<0.001)	0.33 (<0.001)	0.23 (0.003)
Triglycerides	0.22 (<0.001)	0.133 (0.004)	0.23 (<0.001)	0.13 (0.03)	0.22 (<0.001)	0.18 (0.016)
Total cholesterol	0.14 (<0.001)	0.11 (0.04)	0.1 (0.03)	0.1 (0.18)	0.19 (<0.001)	0.18 (0.01)
LDL-C	0.12 (<0.001)	0.07 (0.12)	0.06 (0.25)	0.01 (0.87)	0.2 (<0.001)	0.18 (0.01)
ApoB	0.22 (<0.001)	0.21 (<0.001)	0.2 (<0.001)	0.18 (0.002)	0.25 (<0.001)	0.27 (<0.001)
HDL-C	−0.11 (0.002)	−0.18 (<0.001)	−0.13 (0.005)	−0.12 (0.05)	−0.1 (0.08)	−0.15 (0.04)
ApoA-I	−0.042 (0.23)	−0.05 (0.32)	−0.08 (0.075)	0.032 (0.59)	0.016 (0.8)	−0.03 (0.67)

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measure of insulin resistance [33], are shown in Table 2. There was a significant but modest positive correlation between pre-heparin EL mass and age in the entire cohort ($r = 0.14$, $p = 0.004$) and in women ($r = 0.13$, $p = 0.013$) (Table 2). There were significant positive correlations between both pre-heparin ($r = 0.28$, $p < 0.001$) and post-heparin ($r = 0.22$, $p < 0.001$) EL concentrations and both BMI and waist circumference, and these associations remained significant when each gender was examined separately (Table 2). In addition, EL concentrations were greater in obese (BMI $>$ 30) compared to lean men and women in pre-heparin plasma, 575 ± 364 ng/ml versus 456 ± 328 ng/ml, $p < 0.001$, and in post-heparin plasma, 1,820 ± 1,253 ng/ml versus 1,417 ± 836 ng/ml, $p < 0.001$. Both pre- and post-heparin EL mass were correlated with an increased HOMA-IR score: $r = 0.27$, $p < 0.001$ and $r = 0.24$, $p < 0.001$, respectively.

Association of EL Concentrations with Plasma Lipid and Lipoprotein Concentrations

Both pre-heparin and post-heparin EL mass concentrations were positively associated with aspects of an atherogenic lipoprotein profile (Table 2). In pre- and post-heparin plasma, EL mass concentrations were significantly positively correlated with fasting plasma triglyceride and apolipoprotein B (apoB) concentrations in men and women and with LDL-C in women but not men.

To further explore the relationship between plasma EL mass and apoB-containing lipoproteins, we examined the correlations between plasma EL mass and lipoprotein particle size as determined by NMR lipoprotein analysis (Table 3). A significant positive correlation was found between post-heparin EL mass and large VLDL concentrations in men and women, consistent with the positive association of EL with triglycerides. There was a very modest association of EL mass with concentrations of intermediate-size LDL particles in the entire group, which was not significant when assessed separately in men or women. There were no other significant associations of EL mass concentrations with apoB-containing lipoprotein subclasses.

There was a modest, but highly statistically significant, negative association between HDL-C concentrations and both pre- and post-heparin EL concentrations (see Table 2). EL mass concentrations in the lowest and the highest HDL quartile were significantly different, with the difference more pronounced in post-heparin plasma, 1,766 ± 1,231 ng/ml in the lowest HDL quartile versus 1,342 ± 917 ng/ml in the highest ($p = 0.001$). Interestingly, the NMR analysis revealed a negative association of post-heparin EL concentrations with large HDL particles, and a positive association of EL mass with small HDL particles (Table 3). There was no correlation between either pre-heparin or post-heparin EL mass and apoA-I concentrations.

Table 3. Correlations between Post-Heparin EL Mass and Lipoprotein Subclasses Assessed by NMR

Lipoprotein Subclass	Total ($n = 510$) *R* (*p*-Value)	Men ($n = 294$) *R* (*p*-Value)	Women ($n = 216$) *R* (*p*-Value)
Small VLDL (27–35 nm)	0.06 (0.16)	0.05 (0.42)	0.1 (0.14)
Intermediate VLDL (35–60 nm)	0.04 (0.34)	0.05 (0.43)	0.07 (0.32)
Large VLDL (60–200 nm)	0.14 (0.002)	0.12 (0.04)	0.18 (0.01)
Small LDL (18.3–19.7 nm)	0.04 (0.35)	0.03 0.6)	0.04 (0.6)
Intermediate LDL (19.8–21.2 nm)	0.1 (0.03)	0.08 (0.18)	0.07 (0.34)
Large LDL (21.3–23 nm)	−0.04 (0.38)	−0.05 (0.46)	−0.06 (0.4)
Small HDL (7.3–8.2 nm)	0.16 (<0.001)	0.17 (0.005)	0.14 (0.05)
Intermediate HDL (8.2–8.8 nm)	0.04 (0.36)	0 (0.99)	0.1 (0.15)
Large HDL (8.8–13 nm)	−0.17 (<0.001)	−0.17 (0.004)	−0.22 (<0.001)

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