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The role of NMR-based circulating metabolic biomarkers in development and risk prediction of new onset type 2 diabetes

Supplementary Materials, Table of Contents

Page 3. China Kadoorie Biobank collaborative group and members

Page 4. Supplementary Table S1. Associations of metabolic biomarkers with risk of incident type 2 diabetes

Page 8. Supplementary Table S2. Chinese population type 2 diabetes risk prediction models

Page 9. Supplementary Figure S1. Correlation between directly-measured metabolic biomarkers within subcohort participants (n=789)

Page 10. Supplementary Figure S2. Associations of directly-measured metabolic biomarkers with incident type 2 diabetes

Page 11. Supplementary Figure S3. Associations of metabolic biomarkers with incident type 2 diabetes

Page 13. Supplementary Figure S4. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by adiposity

Page 14. Supplementary Figure S5. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by adiposity

Page 15. Supplementary Figure S6. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by age

Page 16. Supplementary Figure S7. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by age

Page 17. Supplementary Figure S8. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by sex

Page 18. Supplementary Figure S9. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by sex

Page 19. Supplementary Figure S10. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by region

Page 20. Supplementary Figure S11. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by region

Page 21. Supplementary Figure S12. Associations of metabolic biomarkers with risk of incident type 2 diabetes (n=757) excluding the first 2 years of follow-up

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Supplementary Table S1. Associations of metabolic biomarkers with risk of incident type 2 diabetes

Metabolic biomarker	Mean (SD)	Model A		Model B		Model C1		Model C2		Model C3		Model D	
		HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†
18:2, linoleic acid	2.70 (0.56) mmol/L	1.88 (1.60, 2.21)	5.50×10^{-14}	1.87 (1.58, 2.21)	4.38×10^{-13}	1.74 (1.45, 2.09)	6.25×10^{-09}	1.72 (1.43, 2.07)	2.72×10^{-08}	1.72 (1.43, 2.07)	2.79×10^{-08}	1.64 (1.35, 1.99)	1.76×10^{-06}
22:6, docosahexaenoic acid	0.13 (0.048) mmol/L	0.79 (0.69, 0.90)	6.60×10^{-04}	0.78 (0.68, 0.89)	4.00×10^{-04}	0.68 (0.58, 0.81)	1.53×10^{-05}	0.66 (0.55, 0.79)	1.01×10^{-05}	0.66 (0.55, 0.79)	1.01×10^{-05}	0.67 (0.55, 0.82)	1.60×10^{-04}
3-hydroxybutyrate	0.13 (0.05) mmol/L	1.16 (1.01, 1.33)	0.05	1.17 (1.02, 1.35)	0.03	1.21 (1.05, 1.39)	0.01	1.21 (1.05, 1.39)	0.01	1.21 (1.05, 1.39)	0.01	1.32 (1.15, 1.51)	1.20×10^{-04}
Acetate	0.046 (0.079) mmol/L	1.11 (1.00, 1.22)	0.05	1.11 (1.01, 1.22)	0.04	1.06 (0.94, 1.20)	0.35	1.08 (0.95, 1.23)	0.29	1.08 (0.95, 1.23)	0.30	1.01 (0.89, 1.14)	0.94
Acetoacetate	0.027 (0.014) mmol/L	1.57 (1.31, 1.89)	2.28×10^{-06}	1.56 (1.29, 1.88)	7.75×10^{-06}	1.34 (1.16, 1.54)	1.10×10^{-04}	1.31 (1.14, 1.51)	4.00×10^{-04}	1.31 (1.14, 1.51)	4.20×10^{-04}	1.32 (1.10, 1.58)	5.00×10^{-03}
Alanine	0.39 (0.062) mmol/L	1.69 (1.47, 1.94)	4.50×10^{-13}	1.70 (1.48, 1.95)	3.17×10^{-13}	1.58 (1.35, 1.84)	2.09×10^{-08}	1.59 (1.35, 1.87)	6.19×10^{-08}	1.59 (1.35, 1.87)	6.43×10^{-08}	1.38 (1.15, 1.66)	1.00×10^{-03}
Albumin	0.086 (0.0035) signal area	1.11 (0.98, 1.26)	0.12	1.11 (0.98, 1.27)	0.13	1.02 (0.88, 1.18)	0.78	0.98 (0.84, 1.14)	0.79	0.98 (0.84, 1.14)	0.80	0.97 (0.82, 1.16)	0.78
Apolipoprotein A-I	1.40 (0.15) g/L	0.67 (0.59, 0.76)	4.15×10^{-09}	0.66 (0.57, 0.75)	2.82×10^{-09}	0.64 (0.54, 0.75)	1.26×10^{-07}	0.62 (0.52, 0.73)	3.65×10^{-08}	0.62 (0.52, 0.73)	3.43×10^{-08}	0.57 (0.47, 0.68)	1.02×10^{-08}
Apolipoprotein B	0.77 (0.16) g/L	1.48 (1.28, 1.71)	1.74×10^{-07}	1.46 (1.26, 1.70)	6.81×10^{-07}	1.32 (1.12, 1.55)	1.30×10^{-03}	1.28 (1.09, 1.50)	5.00×10^{-03}	1.28 (1.09, 1.50)	5.00×10^{-03}	1.29 (1.08, 1.54)	7.70×10^{-03}
CE in chylomicrons and extremely large VLDL	0.0032 (0.0023) mmol/L	1.85 (1.57, 2.17)	6.91×10^{-13}	1.90 (1.62, 2.23)	1.16×10^{-14}	1.64 (1.38, 1.95)	3.86×10^{-08}	1.61 (1.36, 1.91)	1.53×10^{-07}	1.61 (1.36, 1.91)	1.51×10^{-07}	1.59 (1.31, 1.93)	5.44×10^{-06}
CE in IDL	0.38 (0.10) mmol/L	0.89 (0.77, 1.02)	0.12	0.88 (0.76, 1.02)	0.1	0.86 (0.73, 1.02)	0.12	0.83 (0.70, 0.99)	0.05	0.83 (0.70, 0.99)	0.05	0.86 (0.72, 1.04)	0.16
CE in large HDL	0.24 (0.093) mmol/L	0.46 (0.38, 0.56)	2.55×10^{-14}	0.46 (0.38, 0.56)	1.38×10^{-14}	0.50 (0.41, 0.61)	9.41×10^{-11}	0.50 (0.40, 0.62)	5.99×10^{-10}	0.50 (0.40, 0.62)	6.34×10^{-10}	0.47 (0.37, 0.59)	2.29×10^{-09}
CE in large LDL	0.47 (0.14) mmol/L	0.95 (0.82, 1.10)	0.51	0.94 (0.81, 1.10)	0.47	0.94 (0.79, 1.12)	0.51	0.90 (0.75, 1.08)	0.29	0.90 (0.75, 1.08)	0.29	0.93 (0.78, 1.12)	0.5
CE in large VLDL	0.039 (0.023) mmol/L	1.93 (1.64, 2.26)	7.28×10^{-15}	1.98 (1.69, 2.32)	7.40×10^{-17}	1.71 (1.44, 2.02)	2.93×10^{-09}	1.68 (1.42, 1.99)	8.68×10^{-09}	1.68 (1.42, 2.00)	8.42×10^{-09}	1.69 (1.40, 2.04)	1.62×10^{-07}
CE in medium HDL	0.31 (0.057) mmol/L	0.83 (0.73, 0.95)	8.80×10^{-03}	0.81 (0.71, 0.93)	3.50×10^{-03}	0.79 (0.68, 0.91)	2.50×10^{-03}	0.77 (0.66, 0.90)	1.40×10^{-03}	0.77 (0.66, 0.90)	1.50×10^{-03}	0.69 (0.58, 0.83)	1.20×10^{-04}
CE in medium LDL	0.26 (0.099) mmol/L	0.94 (0.81, 1.10)	0.49	0.94 (0.81, 1.10)	0.47	0.95 (0.80, 1.13)	0.61	0.92 (0.77, 1.10)	0.38	0.92 (0.77, 1.10)	0.39	0.94 (0.79, 1.13)	0.58
CE in medium VLDL	0.09 (0.04) mmol/L	1.74 (1.49, 2.03)	4.58×10^{-12}	1.75 (1.50, 2.04)	3.91×10^{-12}	1.52 (1.29, 1.80)	1.95×10^{-06}	1.51 (1.28, 1.77)	2.76×10^{-06}	1.51 (1.28, 1.78)	2.64×10^{-06}	1.58 (1.32, 1.89)	1.77×10^{-06}
CE in small HDL	0.31 (0.054) mmol/L	0.78 (0.66, 0.92)	3.60×10^{-03}	0.77 (0.65, 0.91)	2.60×10^{-03}	0.81 (0.68, 0.97)	0.03	0.79 (0.66, 0.94)	0.01	0.79 (0.66, 0.94)	0.01	0.79 (0.65, 0.95)	0.02
CE in small LDL	0.16 (0.06) mmol/L	0.89 (0.77, 1.04)	0.16	0.89 (0.76, 1.04)	0.16	0.91 (0.76, 1.08)	0.31	0.87 (0.73, 1.05)	0.17	0.87 (0.73, 1.05)	0.17	0.91 (0.76, 1.08)	0.33
CE in small VLDL	0.11 (0.043) mmol/L	0.99 (0.87, 1.12)	0.85	0.98 (0.86, 1.11)	0.78	0.91 (0.79, 1.06)	0.28	0.88 (0.76, 1.02)	0.12	0.88 (0.76, 1.02)	0.12	0.95 (0.80, 1.12)	0.56
CE in very large HDL	0.14 (0.056) mmol/L	0.48 (0.41, 0.56)	5.72×10^{-18}	0.48 (0.41, 0.57)	1.93×10^{-17}	0.48 (0.40, 0.58)	3.30×10^{-13}	0.47 (0.39, 0.57)	1.49×10^{-13}	0.47 (0.39, 0.57)	1.21×10^{-13}	0.47 (0.38, 0.58)	6.28×10^{-12}
CE in very large VLDL	0.0094 (0.0063) mmol/L	1.82 (1.54, 2.15)	6.51×10^{-12}	1.89 (1.61, 2.22)	2.45×10^{-14}	1.63 (1.37, 1.94)	9.61×10^{-08}	1.59 (1.34, 1.89)	4.43×10^{-07}	1.60 (1.34, 1.90)	4.36×10^{-07}	1.54 (1.26, 1.87)	5.40×10^{-05}
CE in very small VLDL	0.13 (0.038) mmol/L	0.73 (0.64, 0.83)	5.55×10^{-06}	0.72 (0.63, 0.83)	4.84×10^{-06}	0.69 (0.59, 0.81)	1.81×10^{-05}	0.66 (0.56, 0.78)	2.76×10^{-06}	0.66 (0.56, 0.78)	2.64×10^{-06}	0.70 (0.58, 0.84)	2.20×10^{-04}
CE:TL in chylomicrons and extremely large VLDL	10.00 (3.70) %	0.76 (0.66, 0.88)	4.20×10^{-04}	0.77 (0.67, 0.90)	8.40×10^{-04}	0.82 (0.69, 0.97)	0.03	0.84 (0.71, 1.01)	0.08	0.84 (0.71, 1.01)	0.08	0.89 (0.73, 1.08)	0.30
CE:TL in IDL	44.00 (2.30) %	0.89 (0.79, 1.01)	0.09	0.89 (0.78, 1.01)	0.09	0.85 (0.73, 0.98)	0.03	0.81 (0.70, 0.94)	9.50×10^{-03}	0.81 (0.70, 0.94)	9.60×10^{-03}	0.81 (0.68, 0.96)	0.03
CE:TL in large HDL	37.00 (2.20) %	0.62 (0.54, 0.72)	8.34×10^{-10}	0.61 (0.53, 0.71)	2.38×10^{-10}	0.66 (0.56, 0.78)	8.74×10^{-07}	0.69 (0.58, 0.81)	1.91×10^{-05}	0.69 (0.58, 0.81)	1.71×10^{-05}	0.68 (0.57, 0.81)	2.52×10^{-05}
CE:TL in large LDL	46.00 (3.00) %	0.86 (0.73, 1.01)	0.09	0.87 (0.73, 1.03)	0.12	0.87 (0.72, 1.05)	0.17	0.83 (0.68, 1.00)	0.06	0.83 (0.68, 1.00)	0.06	0.84 (0.70, 1.02)	0.12
CE:TL in large VLDL	14.00 (2.10) %	0.63 (0.54, 0.73)	1.47×10^{-08}	0.62 (0.53, 0.73)	2.14×10^{-08}	0.75 (0.63, 0.91)	4.10×10^{-03}	0.80 (0.67, 0.96)	0.03	0.80 (0.67, 0.96)	0.03	0.88 (0.72, 1.08)	0.27
CE:TL ratio in medium HDL	40.00 (2.50) %	0.71 (0.62, 0.82)	3.50×10^{-06}	0.71 (0.62, 0.81)	1.30×10^{-06}	0.75 (0.64, 0.87)	3.60×10^{-04}	0.75 (0.64, 0.88)	6.00×10^{-04}	0.75 (0.64, 0.88)	6.10×10^{-04}	0.64 (0.56, 0.73)	1.91×10^{-10}
CE:TL ratio in medium LDL	43.00 (6.90) %	0.80 (0.69, 0.92)	2.60×10^{-03}	0.80 (0.69, 0.93)	5.70×10^{-03}	0.84 (0.71, 0.99)	0.05	0.82 (0.70, 0.97)	0.03	0.82 (0.70, 0.97)	0.03	0.85 (0.72, 1.00)	0.08
CE:TL ratio in medium VLDL	16.00 (2.90) %	0.64 (0.55, 0.74)	3.08×10^{-09}	0.63 (0.54, 0.74)	8.59×10^{-09}	0.72 (0.61, 0.85)	1.50×10^{-04}	0.73 (0.62, 0.87)	7.70×10^{-04}	0.73 (0.62, 0.87)	7.90×10^{-04}	0.78 (0.65, 0.95)	0.02
CE:TL ratio in small HDL	30.00 (4.60) %	0.63 (0.53, 0.75)	4.31×10^{-07}	0.62 (0.52, 0.73)	5.42×10^{-08}	0.69 (0.57, 0.83)	2.10×10^{-04}	0.69 (0.57, 0.84)	2.40×10^{-04}	0.69 (0.57, 0.83)	2.40×10^{-04}	0.74 (0.60, 0.90)	4.90×10^{-03}
CE:TL ratio in small LDL	41.00 (7.30) %	0.77 (0.67, 0.88)	4.10×10^{-04}	0.77 (0.67, 0.90)	9.50×10^{-04}	0.82 (0.69, 0.96)	0.02	0.80 (0.68, 0.95)	0.01	0.80 (0.68, 0.95)	0.01	0.84 (0.71, 0.99)	0.06
CE:TL ratio in small VLDL	20.00 (5.20) %	0.58 (0.50, 0.68)	5.18×10^{-12}	0.56 (0.48, 0.66)	1.23×10^{-12}	0.59 (0.49, 0.70)	9.46×10^{-09}	0.57 (0.48, 0.69)	8.23×10^{-09}	0.57 (0.48, 0.69)	6.78×10^{-09}	0.58 (0.48, 0.70)	7.97×10^{-08}
CE:TL ratio in very large HDL	33.00 (4.80) %	1.06 (0.88, 1.27)	0.57	1.06 (0.88, 1.28)	0.56	0.93 (0.76, 1.14)	0.53	0.88 (0.72, 1.08)	0.25	0.88 (0.72, 1.08)	0.25	0.91 (0.73, 1.13)	0.45
CE:TL ratio in very large VLDL	13.00 (3.30) %	0.65 (0.55, 0.77)	2.08×10^{-06}	0.65 (0.54, 0.77)	1.95×10^{-06}	0.74 (0.62, 0.90)	3.40×10^{-03}	0.79 (0.65, 0.95)	0.02	0.79 (0.65, 0.95)	0.02	0.88 (0.74, 1.06)	0.22
CE:TL ratio in very small VLDL	32.00 (4.00) %	0.56 (0.46, 0.68)	1.05×10^{-08}	0.54 (0.46, 0.63)	4.70×10^{-14}	0.56 (0.47, 0.66)	1.13×10^{-10}	0.55 (0.46, 0.65)	8.93×10^{-11}	0.55 (0.46, 0.65)	8.02×10^{-11}	0.55 (0.46, 0.66)	1.49×10^{-09}
Citrate	0.15 (0.021) mmol/L	1.10 (0.98, 1.24)	0.14	1.10 (0.97, 1.25)	0.14	1.08 (0.94, 1.25)	0.29	1.12 (0.96, 1.29)	0.17	1.11 (0.96, 1.29)	0.17	1.05 (0.89, 1.24)	0.60
Chylomicrons and extremely large VLDL particles	$1.5e\times10^{-10}$ (1.1×10^{-10}) mol/L	2.05 (1.73, 2.44)	2.26×10^{-15}	2.19 (1.86, 2.58)	1.03×10^{-19}	1.87 (1.57, 2.24)	2.65×10^{-11}	1.81 (1.52, 2.17)	4.99×10^{-10}	1.82 (1.52, 2.17)	4.93×10^{-10}	1.68 (1.38, 2.06)	1.21×10^{-06}
IDL particles	8.6e-08 (2e-08) mol/L	0.95 (0.82, 1.10)	0.54	0.94 (0.81, 1.10)	0.47	0.94 (0.79, 1.12)	0.53	0.91 (0.77, 1.08)	0.34	0.91 (0.77, 1.08)	0.34	0.95 (0.79, 1.14)	0.61
Large HDL particles	1×10^{-6} ($\times10^{-7}$) mol/L	0.48 (0.39, 0.58)	9.74×10^{-14}	0.47 (0.39, 0.57)	4.72×10^{-14}	0.50 (0.41, 0.62)	9.79×10^{-11}	0.50 (0.41, 0.62)	5.03×10^{-10}	0.50 (0.41, 0.62)	5.30×10^{-10}	0.47 (0.37, 0.59)	1.16×10^{-09}
Large LDL particles	1.4×10^{-7} (3.5×10^{-8}) mol/L	0.99 (0.85, 1.15)	0.87	0.98 (0.84, 1.14)	0.79	0.98 (0.82, 1.16)	0.80	0.94 (0.79, 1.12)	0.53	0.94 (0.79, 1.12)	0.53	0.97 (0.81, 1.17)	0.79
Large VLDL particles	5.1×10^{-9} (3.4×10^{-9}) mol/L	1.97 (1.67, 2.31)	1.64×10^{-15}	2.05 (1.76, 2.39)	5.17×10^{-19}	1.75 (1.48, 2.07)	3.41×10^{-10}	1.70 (1.44, 2.02)	3.64×10^{-09}	1.71 (1.44, 2.02)	3.67×10^{-09}	1.65 (1.36, 1.99)	1.09×10^{-06}
Medium HDL particles	1.8×10^{-6} (2.9×10^{-7}) mol/L	1.02 (0.89, 1.17)	0.79	0.99 (0.86, 1.14)	0.90	0.92 (0.79, 1.07)	0.32	0.90 (0.77, 1.05)	0.22	0.90 (0.77, 1.05)	0.22	0.81 (0.68, 0.96)	0.03
Medium LDL particles	1.1×10^{-7} (3×10^{-8}) mol/L	1.08 (0.93, 1.24)	0.35	1.07 (0.92, 1.24)	0.43	1.06 (0.90, 1.26)	0.52	1.02 (0.86, 1.22)	0.81	1.02 (0.86, 1.22)	0.8	1.04 (0.87, 1.24)	0.72
Medium VLDL particles	1.8×10^{-8} (8.8×10^{-9}) mol/L	2.00 (1.71, 2.35)	2.02×10^{-16}	2.07 (1.77, 2.41)	3.69×10^{-19}	1.75 (1.48, 2.07)	3.22×10^{-10}	1.71 (1.44, 2.03)	3.15×10^{-09}	1.71 (1.45, 2.03)	2.93×10^{-09}	1.72 (1.42, 2.07)	7.80×10^{-08}
Small HDL particles	4.6×10^{-6} (4.3×10^{-7}) mol/L	1.47 (1.29, 1.68)	1.02×10^{-08}	1.46 (1.28, 1.66)	2.84×10^{-08}	1.29 (1.13, 1.49)	5.10×10^{-04}	1.24 (1.07, 1.43)	5.50×10^{-03}	1.24 (1.07, 1.43)	5.30×10^{-03}	1.14 (0.97, 1.34)	0.15
Small LDL particles	1.3×10^{-7} (3.3×10^{-8}) mol/L	1.07 (0.93, 1.23)	0.40	1.06 (0.91, 1.22)	0.48	1.04 (0.88, 1.23)	0.67	1.00 (0.84, 1.18)	0.98	1.00 (0.84, 1.19)	0.99	1.01 (0.85, 1.20)	0.92
Small VLDL particles	2.9×10^{-8} (9.5×10^{-9}) mol/L	1.82 (1.54, 2.14)	2.65×10^{-12}	1.84 (1.57, 2.15)	1.70×10^{-13}	1.59 (1.35, 1.89)	1.71×10^{-07}	1.58 (1.33, 1.86)	3.20×10^{-07}	1.58 (1.33, 1.86)	2.97×10^{-07}	1.63 (1.35, 1.95)	9.09×10^{-07}
Very large HDL particles	4.1×10^{-7} (1.6×10^{-7}) mol/L	0.45 (0.37, 0.53)	1.78×10^{-17}	0.44 (0.37, 0.53)	2.83×10^{-17}	0.46 (0.38, 0.57)	8.58×10^{-13}	0.45 (0.37, 0.56)	1.20×10^{-12}	0.45 (0.37, 0.56)	1.17×10^{-12}	0.45 (0.36, 0.57)	4.34×10^{-11}
Very large VLDL particles	8.1×10^{-10} (6×10^{-10}) mol/L	1.92 (1.62, 2.27)	9.58×10^{-14}	2.02 (1.72, 2.37)	2.13×10^{-17}	1.72 (1.45, 2.05)	3.45×10^{-09}	1.67 (1.40, 1.99)	3.81×10^{-08}	1.67 (1.40, 1.99)	3.76×10^{-08}	1.56 (1.27, 1.91)	3.78×10^{-05}
Very small VLDL particles	3.3×10^{-8} (7.6×10^{-9}) mol/L	1.15 (1.00, 1.31)	0.06	1.14 (0.99, 1.30)	0.09	1.07 (0.91, 1.24)	0.47	1.03 (0.88, 1.20)	0.75	1.03 (0.88, 1.20)	0.74	1.09 (0.91, 1.31)	0.40
Creatinine	0.054 (0.029) mmol/L	1.08 (1.01, 1.15)	0.03	1.09 (1.02, 1.16)	0.01	1.06 (0.99, 1.13)	0.12	1.08 (1.01, 1.16)	0.03	1.08 (1.01, 1.16)	0.03	1.07 (0.99, 1.14)	0.10
Esterified cholesterol	2.40 (0.48) mmol/L	1.20 (1.05, 1.38)	0.01	1.18 (1.03, 1.37)	0.03	1.20 (1.03, 1.41)	0.03	1.18 (1.00, 1.39)	0.06	1.18 (1.00, 1.39)	0.06	1.11 (0.94, 1.32)	0.29
Estimated degree of unsaturation	1.10 (0.06)	1.22 (1.09, 1.36)	7.40×10^{-04}	1.23 (1.10, 1.38)	4.80×10^{-04}	1.33 (1.17, 1.52)	4.35×10^{-05}	1.40 (1.22, 1.61)	4.05×10^{-06}	1.40 (1.22, 1.61)	4.06×10^{-06}	1.33 (1.14, 1.56)	7.20×10^{-04}
FC	1.10 (0.19) mmol/L	1.12 (0.97, 1.29)	0.14	1.11 (0.96, 1.28)	0.20	1.11 (0.94, 1.31)	0.27	1.09 (0.92, 1.29)	0.35	1.09 (0.92, 1.29)	0.35	1.07 (0.89, 1.29)	0.51

Metabolic biomarker	Mean (SD)	Model A		Model B		Model C1		Model C2		Model C3		Model D	
		HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†
FC in chylomicrons and extremely large VLDL	0.0022 (0.0018) mmol/L	1.98 (1.67, 2.35)	2.05×10^{-14}	2.10 (1.79, 2.46)	9.54×10^{-19}	1.79 (1.51, 2.14)	2.56×10^{-10}	1.74 (1.46, 2.07)	4.18×10^{-09}	1.74 (1.46, 2.07)	4.14×10^{-09}	1.62 (1.32, 1.98)	7.25×10^{-06}
FC in IDL	0.15 (0.042) mmol/L	0.69 (0.58, 0.81)	2.04×10−05	0.68 (0.57, 0.80)	1.36×10^{-05}	0.71 (0.59, 0.86)	8.20×10^{-04}	0.70 (0.57, 0.84)	4.40×10^{-04}	0.70 (0.57, 0.84)	4.40×10^{-04}	0.73 (0.60, 0.88)	2.80×10^{-03}
FC in large HDL	0.064 (0.029) mmol/L	0.40 (0.32, 0.50)	5.47×10^{-16}	0.40 (0.32, 0.49)	1.13×10^{-16}	0.43 (0.35, 0.53)	4.76×10^{-13}	0.43 (0.34, 0.54)	2.53×10^{-12}	0.43 (0.34, 0.54)	3.00×10^{-12}	0.40 (0.31, 0.52)	1.73×10^{-11}
FC in large LDL	0.19 (0.047) mmol/L	0.74 (0.63, 0.88)	6.00×10^{-04}	0.74 (0.63, 0.88)	7.10×10^{-04}	0.77 (0.64, 0.94)	0.01	0.75 (0.62, 0.91)	6.10×10^{-03}	0.75 (0.62, 0.91)	6.20×10^{-03}	0.80 (0.66, 0.97)	0.03
FC in large VLDL	0.028 (0.023) mmol/L	1.95 (1.66, 2.29)	2.80×10^{-15}	2.03 (1.74, 2.37)	9.72×10^{-19}	1.73 (1.46, 2.05)	6.82×10^{-10}	1.69 (1.42, 2.00)	6.45×10^{-09}	1.69 (1.42, 2.00)	6.64×10^{-09}	1.62 (1.34, 1.96)	2.56×10^{-06}
FC in medium HDL	0.064 (0.015) mmol/L	0.80 (0.70, 0.92)	3.20×10^{-03}	0.78 (0.67, 0.90)	8.50×10^{-04}	0.75 (0.64, 0.88)	8.20×10^{-04}	0.74 (0.63, 0.87)	4.60×10^{-04}	0.74 (0.63, 0.87)	4.60×10^{-04}	0.66 (0.55, 0.80)	3.40×10^{-05}
FC in medium LDL	0.11 (0.022) mmol/L	0.96 (0.83, 1.10)	0.57	0.95 (0.82, 1.10)	0.52	0.95 (0.80, 1.13)	0.59	0.91 (0.76, 1.09)	0.34	0.91 (0.77, 1.09)	0.35	0.93 (0.78, 1.11)	0.48
FC in medium VLDL	0.066 (0.037) mmol/L	1.98 (1.69, 2.33)	5.34×10^{-16}	2.04 (1.75, 2.38)	9.72×10^{-19}	1.73 (1.46, 2.05)	7.33×10^{-10}	1.69 (1.43, 2.00)	6.09×10^{-09}	1.69 (1.43, 2.01)	5.61×10^{-09}	1.70 (1.40, 2.05)	1.61×10^{-07}
FC in small HDL	0.10 (0.012) mmol/L	1.28 (1.13, 1.46)	2.70×10^{-04}	1.27 (1.11, 1.44)	6.70×10^{-04}	1.11 (0.96, 1.28)	0.19	1.07 (0.92, 1.24)	0.43	1.07 (0.92, 1.24)	0.43	0.96 (0.81, 1.14)	0.72
FC in small LDL	0.066 (0.013) mmol/L	0.94 (0.82, 1.08)	0.40	0.93 (0.81, 1.07)	0.36	0.92 (0.78, 1.09)	0.37	0.88 (0.74, 1.04)	0.17	0.88 (0.74, 1.04)	0.17	0.89 (0.75, 1.06)	0.24
FC in small VLDL	0.074 (0.024) mmol/L	1.56 (1.33, 1.82)	5.34×10^{-08}	1.56 (1.35, 1.82)	1.13×10^{-08}	1.39 (1.18, 1.63)	1.10×10^{-04}	1.37 (1.17, 1.60)	2.00×10^{-04}	1.37 (1.17, 1.60)	2.00×10^{-04}	1.42 (1.19, 1.69)	2.00×10^{-04}
FC in very large HDL	0.051 (0.023) mmol/L	0.46 (0.39, 0.54)	7.51×10^{-18}	0.46 (0.39, 0.55)	1.93×10^{-17}	0.48 (0.39, 0.58)	4.34×10^{-13}	0.47 (0.38, 0.57)	3.65×10^{-13}	0.47 (0.39, 0.57)	3.47×10^{-13}	0.47 (0.38, 0.58)	2.61×10^{-11}
FC in very large VLDL	0.0066 (0.0055) mmol/L	1.86 (1.58, 2.20)	8.15×10^{-13}	1.94 (1.66, 2.28)	1.24×10^{-15}	1.65 (1.39, 1.97)	3.86×10^{-08}	1.61 (1.35, 1.91)	3.16×10^{-07}	1.61 (1.35, 1.92)	3.09×10^{-07}	1.50 (1.23, 1.84)	1.70×10^{-04}
FC in very small VLDL	0.061 (0.017) mmol/L	0.77 (0.66, 0.89)	1.10×10^{-03}	0.76 (0.65, 0.89)	7.80×10^{-04}	0.74 (0.62, 0.89)	1.90×10^{-03}	0.71 (0.60, 0.86)	6.10×10^{-04}	0.72 (0.60, 0.86)	6.20×10^{-04}	0.75 (0.63, 0.91)	5.50×10^{-03}
FC:TL in chylomicrons and extremely large VLDL	6.10 (2.00) %	1.14 (1.02, 1.26)	0.02	1.14 (1.03, 1.27)	0.02	1.10 (1.00, 1.22)	0.08	1.11 (1.00, 1.23)	0.06	1.11 (1.00, 1.23)	0.06	1.10 (0.98, 1.24)	0.13
FC:TL in IDL	17.00 (1.80) %	0.57 (0.47, 0.70)	4.28×10^{-08}	0.54 (0.45, 0.66)	9.10×10^{-10}	0.59 (0.48, 0.72)	8.74×10^{-07}	0.59 (0.48, 0.73)	1.35×10^{-06}	0.59 (0.48, 0.73)	1.36×10^{-06}	0.58 (0.49, 0.71)	7.97×10^{-08}
FC:TL in large HDL	9.60 (1.50) %	0.44 (0.36, 0.54)	1.64×10^{-15}	0.42 (0.35, 0.51)	2.81×10^{-17}	0.44 (0.36, 0.53)	1.07×10^{-15}	0.45 (0.37, 0.54)	6.73×10^{-14}	0.45 (0.37, 0.54)	3.75×10^{-14}	0.43 (0.35, 0.53)	1.40×10^{-14}
FC:TL in large LDL	19.00 (1.20) %	0.46 (0.38, 0.56)	1.19×10^{-13}	0.43 (0.36, 0.52)	1.73×10^{-19}	0.49 (0.41, 0.60)	5.04×10^{-12}	0.51 (0.42, 0.62)	1.00×10^{-10}	0.51 (0.42, 0.62)	1.07×10^{-10}	0.53 (0.43, 0.66)	1.96×10^{-08}
FC:TL in large VLDL	8.50 (2.20) %	1.90 (1.60, 2.26)	9.92×10^{-13}	1.89 (1.59, 2.24)	9.27×10^{-13}	1.58 (1.32, 1.89)	1.50×10^{-06}	1.51 (1.27, 1.81)	1.12×10^{-05}	1.51 (1.27, 1.81)	1.19×10^{-05}	1.42 (1.18, 1.73)	5.70×10^{-04}
FC:TL in medium HDL	8.20 (0.66) %	0.56 (0.48, 0.66)	2.93×10^{-12}	0.54 (0.46, 0.63)	1.08×10^{-14}	0.55 (0.47, 0.65)	2.48×10^{-11}	0.54 (0.45, 0.64)	2.35×10^{-11}	0.54 (0.45, 0.64)	2.51×10^{-11}	0.49 (0.40, 0.59)	1.00×10^{-12}
FC:TL in medium LDL	20.00 (1.90) %	0.85 (0.72, 1.00)	0.06	0.85 (0.72, 1.00)	0.06	0.87 (0.73, 1.03)	0.13	0.89 (0.76, 1.06)	0.23	0.89 (0.75, 1.06)	0.23	0.87 (0.72, 1.05)	0.18
FC:TL in medium VLDL	11.00 (1.00) %	1.87 (1.57, 2.22)	6.54×10^{-12}	1.84 (1.56, 2.19)	4.72×10^{-12}	1.53 (1.28, 1.84)	1.08×10^{-05}	1.46 (1.22, 1.76)	1.20×10^{-04}	1.46 (1.22, 1.76)	1.20×10^{-04}	1.48 (1.20, 1.82)	5.70×10^{-04}
FC:TL in small HDL	9.80 (0.55) %	0.90 (0.77, 1.05)	0.20	0.89 (0.76, 1.04)	0.16	0.81 (0.68, 0.97)	0.03	0.82 (0.68, 0.98)	0.04	0.82 (0.68, 0.97)	0.03	0.76 (0.63, 0.93)	0.01
FC:TL in small LDL	18.00 (1.40) %	0.80 (0.68, 0.94)	9.40×10^{-03}	0.80 (0.68, 0.94)	9.10×10^{-03}	0.83 (0.70, 0.98)	0.04	0.85 (0.72, 1.00)	0.07	0.85 (0.72, 1.00)	0.07	0.81 (0.67, 0.98)	0.05
FC:TL in small VLDL	13.00 (0.67) %	0.62 (0.54, 0.72)	1.23×10^{-10}	0.60 (0.52, 0.70)	2.26×10^{-11}	0.62 (0.52, 0.73)	2.24×10^{-08}	0.60 (0.50, 0.71)	2.72×10^{-08}	0.60 (0.50, 0.71)	2.79×10^{-08}	0.60 (0.50, 0.72)	7.39×10^{-08}
FC:TL in very large HDL	12.00 (1.30) %	0.69 (0.59, 0.81)	7.52×10^{-06}	0.69 (0.59, 0.81)	7.75×10^{-06}	0.71 (0.61, 0.83)	3.51×10^{-05}	0.70 (0.60, 0.82)	$1.83\times10^{-0}5$	0.70 (0.60, 0.82)	1.82×10^{-05}	0.70 (0.60, 0.81)	4.86×10^{-06}
FC:TL in very large VLDL	7.50 (2.00) %	1.35 (1.19, 1.55)	1.21×10^{-05}	1.34 (1.17, 1.54)	6.19×10^{-05}	1.24 (1.04, 1.49)	0.03	1.23 (1.03, 1.47)	0.03	1.23 (1.03, 1.48)	0.03	1.10 (0.93, 1.31)	0.30
FC:TL in very small VLDL	15.00 (1.40) %	0.66 (0.55, 0.80)	2.84×10^{-05}	0.64 (0.53, 0.78)	1.03×10^{-05}	0.67 (0.55, 0.82)	1.60×10^{-04}	0.68 (0.56, 0.82)	1.60×10^{-04}	0.67 (0.56, 0.82)	1.60×10^{-04}	0.64 (0.53, 0.76)	2.89×10^{-06}
Glucose	4.10 (1.90) mmol/L	3.45 (2.67, 4.46)	2.60×10^{-19}	3.64 (2.82, 4.69)	1.70×10^{-21}	3.67 (2.82, 4.78)	1.27×10^{-19}	3.49 (2.70, 4.52)	6.57×10^{-19}	3.53 (2.72, 4.58)	7.14×10^{-19}		N/A
Glutamine	0.46 (0.066) mmol/L	1.15 (1.01, 1.31)	0.05	1.18 (1.04, 1.35)	0.02	1.21 (1.05, 1.40)	0.02	1.22 (1.05, 1.43)	0.04	1.22 (1.05, 1.42)	0.01	1.17 (0.98, 1.40)	0.12
Glycoprotein acetyls, mainly a1-acid glycoprotein	1.20 (0.24) mmol/L	1.20 (1.06, 1.35)	5.80×10^{-03}	1.20 (1.06, 1.36)	6.70×10^{-03}	1.00 (0.87, 1.16)	0.99	0.95 (0.81, 1.11)	0.53	0.95 (0.81, 1.11)	0.53	0.94 (0.79, 1.11)	0.53
Histidine	0.058 (0.006) mmol/L	1.10 (0.97, 1.25)	0.15	1.12 (0.98, 1.27)	0.1	1.11 (0.96, 1.29)	0.19	1.12 (0.96, 1.31)	0.17	1.12 (0.96, 1.31)	0.17	1.09 (0.91, 1.30)	0.40
Isoleucine	0.061 (0.021) mmol/L	1.98 (1.65, 2.37)	6.32×10^{-13}	2.15 (1.82, 2.54)	3.21×10^{-18}	1.79 (1.49, 2.16)	3.45×10^{-09}	1.75 (1.45, 2.12)	2.27×10^{-08}	1.76 (1.46, 2.13)	2.32×10^{-08}	1.64 (1.33, 2.03)	1.29×10^{-05}
Lactate	2.40 (0.77) mmol/L	1.45 (1.28, 1.65)	3.47×10^{-08}	1.43 (1.25, 1.63)	2.41×10^{-07}	1.54 (1.33, 1.78)	3.51×10^{-08}	1.47 (1.26, 1.72)	2.22×10^{-06}	1.49 (1.28, 1.74)	9.78×10^{-07}	1.60 (1.33, 1.91)	1.21×10^{-06}
Leucine	0.071 (0.021) mmol/L	2.06 (1.73, 2.46)	2.15×10^{-15}	2.19 (1.86, 2.57)	6.16×10^{-20}	1.85 (1.54, 2.21)	1.40×10^{-10}	1.81 (1.51, 2.18)	1.79×10^{-09}	1.82 (1.51, 2.20)	1.99×10^{-09}	1.65 (1.34, 2.03)	5.31×10^{-06}
Mean diameter for HDL particles	9.90 (0.22) nm	0.43 (0.36, 0.51)	5.72×10^{-18}	0.42 (0.35, 0.50)	9.14×10^{-19}	0.44 (0.36, 0.54)	3.49×10^{-14}	0.43 (0.35, 0.53)	1.11×10^{-13}	0.43 (0.35, 0.53)	1.11×10^{-13}	0.42 (0.33, 0.53)	2.24×10^{-12}
Mean diameter for LDL particles	24.00 (0.10) nm	0.84 (0.72, 0.98)	0.04	0.84 (0.72, 0.98)	0.03	0.91 (0.77, 1.07)	0.29	0.95 (0.80, 1.13)	0.58	0.95 (0.80, 1.12)	0.57	1.03 (0.86, 1.24)	0.75
Mean diameter for VLDL particles	37.00 (1.30) nm	1.97 (1.66, 2.34)	4.90×10^{-14}	2.07 (1.76, 2.44)	1.93×10^{-17}	1.79 (1.50, 2.13)	6.97×10^{-10}	1.73 (1.44, 2.08)	1.32×10^{-08}	1.74 (1.45, 2.08)	1.34×10^{-08}	1.68 (1.38, 2.04)	9.09×10^{-07}
Monounsaturated fatty acids; 16:1, 18:1	3.00 (0.73) mmol/L	1.73(1.48, 2.02)	1.57×10^{-11}	1.74 (1.50, 2.03)	2.03×10^{-12}	1.50 (1.27, 1.77)	3.59×10^{-06}	1.47 (1.25, 1.73)	9.70×10^{-06}	1.47 (1.25, 1.73)	9.16×10^{-06}	1.48 (1.23, 1.77)	5.82×10^{-05}
Omega-3 fatty acids	0.41 (0.15) mmol/L	1.27 (1.09, 1.48)	2.50×10^{-03}	1.25 (1.07, 1.46)	0.01	1.07 (0.90, 1.27)	0.5	1.05 (0.88, 1.25)	0.58	1.05 (0.88, 1.25)	0.59	0.98 (0.81, 1.19)	0.87
Omega-6 fatty acids	3.20 (0.59) mmol/L	1.88 (1.60, 2.20)	5.03×10^{-14}	1.85 (1.57, 2.18)	5.16×10^{-13}	1.72 (1.44, 2.05)	6.25×10^{-09}	1.71 (1.43, 2.05)	1.81×10^{-08}	1.71 (1.43, 2.05)	1.89×10^{-08}	1.60 (1.32, 1.93)	3.23×10^{-06}
Phenylalanine	0.061 (0.0094) mmol/L	1.49 (1.30, 1.71)	2.36×10^{-08}	1.53 (1.33, 1.76)	5.22×10^{-09}	1.31 (1.10, 1.56)	4.10×10^{-03}	1.36 (1.15, 1.61)	5.10×10^{-04}	1.37 (1.16, 1.62)	4.20×10^{-04}	1.29 (1.05, 1.58)	0.03
Phosphatidylcholine and other cholines	1.60 (0.23) mmol/L	1.50 (1.30, 1.74)	1.17×10^{-07}	1.48 (1.27, 1.72)	7.18×10^{-07}	1.45 (1.23, 1.70)	1.78×10^{-05}	1.44 (1.22, 1.70)	3.46×10^{-05}	1.44 (1.22, 1.70)	3.47×10^{-05}	1.30 (1.08, 1.57)	8.30×10^{-03}
PL in chylomicrons and extremely large VLDL	0.0037 (0.003) mmol/L	2.03 (1.71, 2.41)	6.05×10^{-15}	2.16 (1.83, 2.54)	2.67×10^{-19}	1.85 (1.55, 2.20)	6.58×10^{-11}	1.79 (1.49, 2.14)	1.22×10^{-09}	1.79 (1.49, 2.14)	1.21×10^{-09}	1.65 (1.35, 2.02)	3.41×10^{-06}
PL in IDL	0.24 (0.053) mmol/L	0.87 (0.74, 1.01)	0.08	0.86 (0.73, 1.01)	0.07	0.88 (0.74, 1.06)	0.22	0.86 (0.72, 1.03)	0.13	0.86 (0.72, 1.03)	0.13	0.89 (0.74, 1.08)	0.29
PL in large HDL	0.32 (0.10) mmol/L	0.47 (0.39, 0.57)	6.35×10^{-14}	0.46 (0.38, 0.56)	1.86×10^{-14}	0.49 (0.40, 0.60)	1.63×10^{-11}	0.48 (0.39, 0.59)	6.54×10^{-11}	0.48 (0.39, 0.59)	6.98×10^{-11}	0.44 (0.35, 0.56)	8.99×10^{-11}
PL in large LDL	0.26 (0.052) mmol/L	0.98 (0.85, 1.14)	0.81	0.97 (0.84, 1.13)	0.74	0.97 (0.81, 1.15)	0.72	0.93 (0.78, 1.11)	0.45	0.93 (0.78, 1.11)	0.46	0.96 (0.80, 1.15)	0.71
PL in large VLDL	0.052 (0.035) mmol/L	1.97 (1.68, 2.32)	1.21×10^{-15}	2.06 (1.76, 2.40)	4.35×10^{-19}	1.76 (1.49, 2.08)	2.56×10^{-10}	1.71 (1.44, 2.03)	2.67×10^{-09}	1.71 (1.45, 2.03)	2.74×10^{-09}	1.66 (1.37, 2.00)	8.55×10^{-07}
PL in medium HDL	0.35 (0.056) mmol/L	1.01 (0.88, 1.16)	0.90	0.98 (0.85, 1.13)	0.78	0.91 (0.78, 1.06)	0.28	0.89 (0.76, 1.05)	0.19	0.89 (0.76, 1.05)	0.19	0.80 (0.67, 0.95)	0.02
PL in medium LDL	0.16 (0.03) mmol/L	1.32 (1.15, 1.52)	1.20×10^{-04}	1.30 (1.13, 1.50)	4.30×10^{-04}	1.25 (1.07, 1.47)	7.70×10^{-03}	1.21 (1.03, 1.42)	0.03	1.21 (1.03, 1.42)	0.03	1.20 (1.01, 1.42)	0.05
PL in medium VLDL	0.12 (0.056) mmol/L	2.01 (1.71, 2.36)	1.80×10^{-16}	2.07 (1.77, 2.42)	4.52×10^{-19}	1.76 (1.49, 2.08)	2.99×10^{-10}	1.72 (1.45, 2.04)	2.61×10^{-09}	1.72 (1.45, 2.04)	2.38×10^{-09}	1.73 (1.43, 2.09)	5.46×10^{-08}
PL in small HDL	0.56 (0.067) mmol/L	1.61 (1.39, 1.86)	3.25×10^{-10}	1.60 (1.38, 1.85)	5.24×10^{-10}	1.38 (1.18, 1.62)	1.50×10^{-04}	1.32 (1.12, 1.56)	1.40×10^{-03}	1.32 (1.12, 1.56)	1.40×10^{-03}	1.21 (1.02, 1.45)	0.05
PL in small LDL	0.12 (0.02) mmol/L	1.28 (1.12, 1.46)	5.40×10^{-04}	1.26 (1.10, 1.44)	1.60×10^{-03}	1.20 (1.02, 1.39)	0.03	1.15 (0.98, 1.34)	0.12	1.15 (0.98, 1.34)	0.11	1.12 (0.95, 1.32)	0.23
PL in small VLDL	0.13 (0.038) mmol/L	1.73 (1.47, 2.05)	1.44×10^{-10}	1.75 (1.50, 2.05)	7.19×10^{-12}	1.55 (1.31, 1.83)	6.59×10^{-07}	1.54 (1.30, 1.81)	8.72×10^{-07}	1.54 (1.30, 1.81)	8.16×10^{-07}	1.59 (1.32, 1.91)	2.39×10^{-06}
PL in very large HDL	0.21 (0.086) mmol/L	0.41 (0.34, 0.50)	1.78×10^{-17}	0.40 (0.33, 0.49)	6.18×10^{-18}	0.44 (0.35, 0.54)	4.34×10^{-13}	0.43 (0.34, 0.54)	1.53×10^{-12}	0.43 (0.34, 0.54)	1.71×10^{-12}	0.43 (0.34, 0.55)	3.66×10^{-11}
PL in very large VLDL	0.012 (0.01) mmol/L	1.91 (1.62, 2.26)	1.27×10^{-13}	2.00 (1.71, 2.35)	5.60×10^{-17}	1.70 (1.43, 2.03)	6.33×10^{-09}	1.65 (1.39, 1.97)	6.19×10^{-08}	1.66 (1.39, 1.97)	6.10×10^{-08}	1.54 (1.26, 1.89)	5.57×10^{-05}
PL in very small VLDL	0.12 (0.03) mmol/L	0.99 (0.85, 1.15)	0.89	0.98 (0.84, 1.14)	0.78	0.96 (0.81, 1.14)	0.69	0.93 (0.78, 1.11)	0.46	0.93 (0.78, 1.11)	0.46	0.98 (0.81, 1.18)	0.83

Metabolic biomarker	Mean (SD)	Model A		Model B		Model C1		Model C2		Model C3		Model D	
		HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†
PL:TL in chylomicrons and extremely large VLDL	10.00 (2.30) %	1.82 (1.54, 2.15)	6.16×10^{-12}	1.82 (1.54, 2.15)	9.60×10^{-12}	1.53 (1.29, 1.82)	3.27×10^{-06}	1.47 (1.23, 1.76)	6.53×10^{-05}	1.47 (1.23, 1.76)	6.69×10^{-05}	1.37 (1.12, 1.66)	3.60×10^{-03}
PL:TL in large VLDL	28.00 (1.10) %	2.24 (1.81, 2.79)	8.09×10^{-13}	2.22 (1.78, 2.76)	2.03×10^{-12}	2.07 (1.61, 2.65)	3.18×10^{-08}	1.96 (1.53, 2.51)	2.91×10^{-07}	1.97 (1.53, 2.52)	2.81×10^{-07}	1.85 (1.41, 2.43)	2.64×10^{-05}
PL:TL in medium HDL	50.00 (2.90) %	1.16 (1.03, 1.31)	0.02	1.16 (1.03, 1.30)	0.02	1.14 (1.00, 1.30)	0.08	1.14 (1.00, 1.31)	0.07	1.14 (1.00, 1.31)	0.07	1.26 (1.09, 1.45)	3.20×10^{-03}
PL:TL in medium LDL	27.00 (1.60) %	1.36 (1.17, 1.57)	8.17×10^{-05}	1.36 (1.17, 1.58)	1.40×10^{-04}	1.28 (1.08, 1.52)	7.30×10^{-03}	1.30 (1.09, 1.53)	4.50×10^{-03}	1.30 (1.09, 1.53)	4.60×10^{-03}	1.24 (1.04, 1.48)	0.02
PL:TL in medium VLDL	17.00 (0.79) %	0.76 (0.66, 0.88)	2.60×10^{-04}	0.75 (0.65, 0.87)	2.00×10^{-04}	0.90 (0.77, 1.06)	0.27	0.92 (0.78, 1.09)	0.36	0.92 (0.78, 1.09)	0.37	0.86 (0.72, 1.04)	0.16
PL:TL in small HDL	46.00 (1.70) %	1.42 (1.20, 1.68)	8.43×10^{-05}	1.43 (1.20, 1.70)	7.67×10^{-05}	1.28 (1.05, 1.54)	0.02	1.28 (1.06, 1.54)	0.02	1.28 (1.06, 1.54)	0.02	1.20 (0.98, 1.47)	0.10
PL:TL in small LDL	29.00 (3.70) %	1.29 (1.12, 1.49)	5.80×10^{-04}	1.29 (1.11, 1.49)	1.40×10^{-03}	1.22 (1.03, 1.44)	0.03	1.24 (1.05, 1.46)	0.02	1.23 (1.05, 1.46)	0.02	1.18 (1.00, 1.39)	0.08
PL:TL in small VLDL	20.00 (0.44) %	0.78 (0.68, 0.89)	2.70×10^{-04}	0.77 (0.68, 0.88)	2.60×10^{-04}	0.89 (0.77, 1.04)	0.18	0.92 (0.79, 1.08)	0.34	0.92 (0.79, 1.08)	0.35	0.87 (0.73, 1.03)	0.15
PL:TL in very large HDL	55.00 (3.60) %	0.72 (0.59, 0.86)	7.40×10^{-04}	0.70 (0.58, 0.85)	4.20×10^{-04}	0.82 (0.67, 1.00)	0.07	0.86 (0.70, 1.05)	0.17	0.86 (0.70, 1.05)	0.17	0.84 (0.67, 1.04)	0.16
PL:TL in very large VLDL	33.00 (4.40) %	1.76 (1.48, 2.09)	5.24×10^{-10}	1.73 (1.45, 2.06)	2.13×10^{-09}	1.51 (1.25, 1.83)	5.85×10^{-05}	1.45 (1.20, 1.75)	2.60×10^{-04}	1.45 (1.20, 1.76)	2.60×10^{-04}	1.28 (1.06, 1.56)	0.02
PL:TL in very small VLDL	24.00 (1.30) %	0.85 (0.74, 0.99)	0.04	0.85 (0.74, 0.98)	0.03	0.93 (0.80, 1.08)	0.36	0.94 (0.80, 1.09)	0.43	0.94 (0.80, 1.09)	0.44	0.89 (0.75, 1.04)	0.19
PL:TL in IDL	51.00 (6.50) %	0.82 (0.72, 0.94)	6.20×10^{-03}	0.83 (0.72, 0.95)	8.80×10^{-03}	0.93 (0.81, 1.07)	0.33	0.96 (0.84, 1.10)	0.57	0.96 (0.84, 1.10)	0.57	0.93 (0.78, 1.11)	0.47
PL:TL in large HDL	14.00 (2.60) %	1.53 (1.33, 1.76)	6.56×10^{-09}	1.53 (1.33, 1.77)	6.83×10^{-09}	1.36 (1.16, 1.59)	2.50×10^{-04}	1.29 (1.09, 1.52)	5.30×10^{-03}	1.29 (1.09, 1.52)	4.90×10^{-03}	1.31 (1.09, 1.58)	8.30×10^{-03}
PL:TL in large LDL	29.00 (2.50) %	1.30 (1.10, 1.54)	3.50×10^{-03}	1.30 (1.09, 1.55)	5.40×10^{-03}	1.24 (1.02, 1.52)	0.05	1.29 (1.05, 1.57)	0.02	1.28 (1.05, 1.57)	0.02	1.22 (1.00, 1.50)	0.08
Polyunsaturated fatty acids	3.60 (0.70) mmol/L	1.81 (1.55, 2.13)	9.92×10^{-13}	1.77 (1.50, 2.09)	2.27×10^{-11}	1.62 (1.36, 1.93)	2.82×10^{-07}	1.61 (1.35, 1.93)	4.69×10^{-07}	1.61 (1.35, 1.93)	4.79×10^{-07}	1.49 (1.24, 1.80)	6.72×10^{-05}
18:2 linoleic acid to TFA ratio	26.00 (2.80) %	1.04 (0.92, 1.17)	0.57	1.05 (0.93, 1.20)	0.44	1.21 (1.05, 1.41)	0.02	1.23 (1.05, 1.44)	0.01	1.23 (1.06, 1.44)	0.01	1.23 (1.04, 1.45)	0.03
22:6 docosahexaenoic acid to TFA ratio	1.20 (0.33) %	0.52 (0.46, 0.60)	2.09×10^{-18}	0.50 (0.44, 0.58)	3.52×10^{-19}	0.46 (0.39, 0.55)	5.47×10^{-16}	0.46 (0.38, 0.55)	1.53×10^{-14}	0.46 (0.38, 0.55)	1.48×10^{-14}	0.46 (0.37, 0.58)	1.09×10^{-10}
Apolipoprotein B:Apolipoprotein A-I	0.56 (0.11)	1.99 (1.67, 2.38)	1.04×10^{-13}	2.03 (1.69, 2.43)	8.51×10^{-14}	1.82 (1.51, 2.21)	2.80×10^{-09}	1.79 (1.48, 2.17)	8.68×10^{-09}	1.79 (1.48, 2.17)	8.92×10^{-09}	1.95 (1.58, 2.40)	2.29×10^{-09}
Monounsaturated fatty acids to TFA ratio	28.00 (2.10) %	1.54 (1.33, 1.79)	2.34×10^{-08}	1.56 (1.34, 1.81)	1.97×10^{-08}	1.34 (1.13, 1.58)	1.10×10^{-03}	1.30 (1.09, 1.54)	4.70×10^{-03}	1.30 (1.09, 1.54)	4.7×10^{-03}	1.38 (1.15, 1.66)	1.20×10^{-03}
Omega-3 fatty acids to TFA ratio	3.90 (0.82) %	0.84 (0.73, 0.96)	0.02	0.82 (0.71, 0.95)	0.01	0.73 (0.61, 0.87)	7.70×10^{-04}	0.72 (0.60, 0.87)	1.20×10^{-03}	0.72 (0.60, 0.87)	1.10×10^{-03}	0.67 (0.53, 0.85)	1.50×10^{-03}
Omega-6 fatty acids to TFA ratio	30.00 (2.70) %	0.97 (0.86, 1.09)	0.66	0.98 (0.87, 1.11)	0.78	1.14 (0.99, 1.31)	0.09	1.17 (1.01, 1.36)	0.05	1.17 (1.01, 1.36)	0.05	1.13 (0.96, 1.32)	0.19
Polyunsaturated fatty acids to TFA ratio	34.00 (2.60) %	0.93 (0.82, 1.05)	0.24	0.93 (0.82, 1.06)	0.30	1.07 (0.92, 1.23)	0.43	1.10 (0.95, 1.28)	0.24	1.10 (0.95, 1.28)	0.24	1.03 (0.88, 1.21)	0.74
Saturated fatty acids to TFA ratio	37.00 (1.60) %	0.61 (0.54, 0.70)	2.93×10^{-12}	0.60 (0.53, 0.69)	2.00×10^{-12}	0.62 (0.53, 0.73)	2.00×10^{-08}	0.62 (0.53, 0.73)	2.72×10^{-08}	0.62 (0.53, 0.73)	2.42×10^{-08}	0.61 (0.51, 0.73)	3.46×10^{-07}
TG:phosphoglycerides	0.68 (0.25)	1.94 (1.63, 2.30)	2.75×10^{-13}	2.02 (1.71, 2.39)	1.49×10^{-15}	1.73 (1.45, 2.07)	6.13×10^{-09}	1.69 (1.41, 2.03)	3.99×10^{-08}	1.69 (1.41, 2.03)	3.77×10^{-08}	1.72 (1.42, 2.08)	9.94×10^{-08}
Remnant cholesterol (non-HDL, non-LDL -cholesterol)	1.20 (0.32) mmol/L	1.24 (1.09, 1.42)	2.40×10^{-03}	1.23 (1.07, 1.41)	5.40×10^{-03}	1.12 (0.96, 1.31)	0.19	1.08 (0.93, 1.26)	0.36	1.08 (0.93, 1.26)	0.36	1.12 (0.95, 1.34)	0.24
Saturated fatty acids	3.90 (0.79) mmol/L	1.46 (1.26, 1.69)	6.81×10^{-07}	1.47 (1.27, 1.70)	2.76×10^{-07}	1.29 (1.11, 1.50)	1.90×10^{-03}	1.26 (1.09, 1.47)	4.10×10^{-03}	1.26 (1.09, 1.47)	4.30×10^{-03}	1.23 (1.04, 1.47)	0.03
Serum TC	3.70 (0.73) mmol/L	0.81 (0.71, 0.94)	6.20×10^{-03}	0.80 (0.70, 0.93)	4.90×10^{-03}	0.78 (0.66, 0.93)	6.70×10^{-03}	0.75 (0.63, 0.89)	1.70×10^{-03}	0.75 (0.63, 0.89)	1.70×10^{-03}	0.76 (0.63, 0.91)	5.00×10^{-03}
Serum total triglycerides	1.30 (0.51) mmol/L	2.06 (1.74, 2.42)	1.44×10^{-16}	2.13 (1.82, 2.49)	6.47×10^{-20}	1.82 (1.54, 2.16)	3.46×10^{-11}	1.78 (1.50, 2.11)	4.12×10^{-10}	1.78 (1.50, 2.11)	3.54×10^{-10}	1.78 (1.47, 2.16)	2.06×10^{-08}
Sphingomyelins	0.34 (0.057) mmol/L	1.24 (1.09, 1.41)	1.70×10^{-03}	1.22 (1.07, 1.39)	4.50×10^{-03}	1.21 (1.05, 1.39)	0.01	1.22 (1.05, 1.41)	0.01	1.22 (1.05, 1.41)	0.01	1.14 (0.98, 1.34)	0.13
TC in chylomicrons and extremely large VLDL	0.0054 (0.004) mmol/L	1.92 (1.62, 2.27)	1.11×10^{-13}	2.00 (1.70, 2.35)	1.03×10^{-16}	1.71 (1.44, 2.04)	3.71×10^{-09}	1.67 (1.40, 1.98)	2.72×10^{-08}	1.67 (1.40, 1.99)	2.76×10^{-08}	1.60 (1.32, 1.95)	6.26×10^{-06}
TC in HDL	1.30 (0.24) mmol/L	0.49 (0.42, 0.59)	4.08×10^{-15}	0.48 (0.40, 0.57)	6.43×10^{-16}	0.49 (0.41, 0.60)	4.27×10^{-12}	0.48 (0.39, 0.58)	6.24×10^{-12}	0.48 (0.39, 0.58)	6.43×10^{-12}	0.44 (0.35, 0.55)	6.28×10^{-12}
TC in HDL2	0.80 (0.22) mmol/L	0.50 (0.42, 0.59)	7.82×10^{-15}	0.48 (0.41, 0.57)	1.24×10^{-15}	0.50 (0.41, 0.61)	1.24×10^{-11}	0.49 (0.40, 0.60)	2.35×10^{-11}	0.49 (0.40, 0.60)	2.50×10^{-11}	0.45 (0.36, 0.56)	2.51×10^{-11}
TC in HDL3	0.46 (0.029) mmol/L	0.54 (0.47, 0.62)	1.15×10^{-15}	0.53 (0.46, 0.62)	3.80×10^{-16}	0.51 (0.43, 0.61)	2.04×10^{-13}	0.48 (0.40, 0.57)	3.81×10^{-14}	0.48 (0.40, 0.57)	3.26×10^{-14}	0.43 (0.36, 0.52)	7.31×10^{-16}
TC in IDL	0.53 (0.14) mmol/L	0.82 (0.70, 0.95)	0.01	0.81 (0.70, 0.95)	0.01	0.81 (0.68, 0.97)	0.03	0.79 (0.66, 0.94)	0.01	0.79 (0.66, 0.94)	0.01	0.82 (0.68, 0.99)	0.05
TC in large HDL	0.30 (0.12) mmol/L	0.45 (0.37, 0.55)	7.82×10^{-15}	0.44 (0.36, 0.54)	3.75×10^{-15}	0.48 (0.39, 0.59)	2.80×10^{-11}	0.48 (0.39, 0.60)	1.56×10^{-10}	0.48 (0.39, 0.60)	1.70×10^{-10}	0.45 (0.35, 0.57)	6.85×10^{-10}
TC in large LDL	0.66 (0.19) mmol/L	0.89 (0.76, 1.04)	0.16	0.89 (0.76, 1.04)	0.16	0.89 (0.75, 1.07)	0.27	0.86 (0.72, 1.03)	0.13	0.86 (0.72, 1.03)	0.14	0.90 (0.74, 1.08)	0.30
TC in large VLDL	0.067 (0.045) mmol/L	1.95 (1.66, 2.29)	3.21×10^{-15}	2.02 (1.73, 2.36)	5.25×10^{-18}	1.73 (1.46, 2.04)	9.03×10^{-10}	1.69 (1.43, 2.00)	5.41×10^{-09}	1.69 (1.43, 2.01)	5.48×10^{-09}	1.66 (1.38, 2.01)	5.54×10^{-07}
TC in LDL	1.30 (0.38) mmol/L	0.88 (0.76, 1.03)	0.14	0.88 (0.75, 1.03)	0.13	0.88 (0.74, 1.06)	0.22	0.85 (0.71, 1.02)	0.11	0.85 (0.71, 1.02)	0.11	0.87 (0.72, 1.05)	0.19
TC in medium HDL	0.37 (0.071) mmol/L	0.82 (0.72, 0.94)	6.80×10^{-03}	0.80 (0.70, 0.92)	2.50×10^{-03}	0.78 (0.67, 0.90)	1.90×10^{-03}	0.76 (0.66, 0.89)	1.10×10^{-03}	0.76 (0.66, 0.89)	1.10×10^{-03}	0.68 (0.57, 0.82)	9.01×10^{-05}
TC in medium LDL	0.37 (0.12) mmol/L	0.94 (0.81, 1.10)	0.49	0.94 (0.81, 1.09)	0.46	0.95 (0.80, 1.13)	0.58	0.91 (0.76, 1.09)	0.35	0.91 (0.76, 1.09)	0.36	0.94 (0.78, 1.12)	0.54
TC in medium VLDL	0.16 (0.075) mmol/L	1.88 (1.61, 2.20)	1.79×10^{-14}	1.91 (1.63, 2.23)	1.28×10^{-15}	1.63 (1.38, 1.93)	3.31×10^{-08}	1.60 (1.36, 1.90)	9.57×10^{-08}	1.61 (1.36, 1.90)	8.81×10^{-08}	1.65 (1.37, 1.98)	3.39×10^{-07}
TC in small HDL	0.41 (0.056) mmol/L	0.84 (0.72, 0.98)	0.03	0.83 (0.71, 0.97)	0.02	0.84 (0.71, 0.99)	0.06	0.81 (0.69, 0.96)	0.02	0.81 (0.69, 0.96)	0.03	0.79 (0.66, 0.95)	0.02
TC in small LDL	0.22 (0.073) mmol/L	0.89 (0.77, 1.04)	0.16	0.89 (0.76, 1.04)	0.16	0.90 (0.76, 1.07)	0.29	0.87 (0.72, 1.04)	0.15	0.87 (0.72, 1.04)	0.15	0.90 (0.75, 1.07)	0.29
TC in small VLDL	0.19 (0.064) mmol/L	1.19 (1.04, 1.35)	0.01	1.18 (1.03, 1.35)	0.02	1.08 (0.93, 1.25)	0.37	1.04 (0.90, 1.21)	0.60	1.04 (0.90, 1.21)	0.61	1.11 (0.94, 1.31)	0.28
TC in very large HDL	0.19 (0.079) mmol/L	0.47 (0.40, 0.56)	5.72×10^{-18}	0.47 (0.40, 0.56)	1.93×10^{-17}	0.48 (0.40, 0.58)	3.31×10^{-13}	0.47 (0.39, 0.57)	1.73×10^{-13}	0.47 (0.39, 0.57)	1.43×10^{-13}	0.47 (0.38, 0.58)	7.53×10^{-12}
TC in very large VLDL	0.016 (0.012) mmol/L	1.84 (1.56, 2.17)	2.71×10^{-12}	1.91 (1.63, 2.25)	6.25×10^{-15}	1.64 (1.38, 1.95)	6.30×10^{-08}	1.60 (1.34, 1.90)	3.76×10^{-07}	1.60 (1.34, 1.91)	3.71×10^{-07}	1.52 (1.24, 1.85)	9.01×10^{-05}
TC in very small VLDL	0.19 (0.054) mmol/L	0.73 (0.64, 0.84)	2.58×10^{-05}	0.73 (0.63, 0.84)	2.01×10^{-05}	0.70 (0.59, 0.83)	6.64×10^{-05}	0.67 (0.56, 0.79)	1.24×10^{-05}	0.67 (0.56, 0.79)	1.20×10^{-05}	0.71 (0.59, 0.85)	5.00×10^{-04}
TC in VLDL	0.62 (0.22) mmol/L	1.49 (1.29, 1.73)	1.01×10^{-07}	1.49 (1.29, 1.72)	1.21×10^{-07}	1.30 (1.11, 1.52)	1.70×10^{-03}	1.27 (1.09, 1.48)	4.10×10^{-03}	1.27 (1.09, 1.48)	4.30×10^{-3}	1.32 (1.11, 1.57)	3.10×10^{-03}
TC:TL in chylomicrons and extremely large VLDL	16.00 (4.50) %	0.92 (0.82, 1.03)	0.17	0.92 (0.82, 1.04)	0.22	0.92 (0.80, 1.07)	0.33	0.94 (0.80, 1.09)	0.43	0.94 (0.80, 1.09)	0.43	0.97 (0.82, 1.15)	0.78
TC:TL in IDL	61.00 (2.90) %	0.68 (0.57, 0.81)	3.15×10^{-05}	0.67 (0.56, 0.80)	1.37×10^{-05}	0.69 (0.58, 0.83)	1.40×10^{-04}	0.67 (0.56, 0.81)	6.19×10^{-05}	0.67 (0.56, 0.81)	6.02×10^{-05}	0.65 (0.54, 0.77)	2.73×10^{-06}
TC:TL in large HDL	46.00 (3.40) %	0.53 (0.45, 0.62)	6.83×10^{-14}	0.51 (0.43, 0.60)	4.74×10^{-15}	0.54 (0.46, 0.64)	3.13×10^{-11}	0.56 (0.47, 0.67)	1.05×10^{-09}	0.56 (0.47, 0.67)	8.18×10^{-10}	0.55 (0.46, 0.67)	2.29×10^{-09}
TC:TL in large LDL	65.00 (3.10) %	0.65 (0.55, 0.77)	1.21×10^{-06}	0.65 (0.54, 0.77)	2.35×10^{-06}	0.69 (0.57, 0.84)	4.10×10^{-04}	0.67 (0.55, 0.81)	1.20×10^{-04}	0.67 (0.55, 0.81)	1.10×10^{-04}	0.70 (0.58, 0.85)	6.90×10^{-04}
TC:TL in large VLDL	22.00 (2.20) %	1.15 (1.00, 1.33)	0.07	1.15 (0.99, 1.33)	0.09	1.18 (0.99, 1.42)	0.08	1.20 (1.00, 1.43)	0.07	1.20 (1.00, 1.43)	0.07	1.26 (1.02, 1.55)	0.04
TC:TL in medium HDL	48.00 (2.90) %	0.67 (0.58, 0.77)	1.32×10^{-07}	0.67 (0.58, 0.77)	3.15×10^{-08}	0.70 (0.60, 0.83)	3.77×10^{-05}	0.71 (0.60, 0.83)	6.76×10^{-05}	0.71 (0.60, 0.83)	6.80×10^{-05}	0.60 (0.52, 0.68)	1.56×10^{-12}
TC:TL in medium LDL	63.00 (5.30) %	0.73 (0.63, 0.85)	4.32×10^{-05}	0.73 (0.63, 0.85)	7.56×10^{-05}	0.77 (0.65, 0.91)	3.90×10^{-03}	0.76 (0.64, 0.90)	2.00×10^{-03}	0.76 (0.64, 0.90)	2.00×10^{-03}	0.79 (0.67, 0.94)	0.01
TC:TL in medium VLDL	26.00 (2.80) %	0.78 (0.69, 0.89)	3.30×10^{-04}	0.78 (0.69, 0.90)	5.40×10^{-04}	0.83 (0.72, 0.96)	0.02	0.84 (0.72, 0.98)	0.03	0.84 (0.72, 0.98)	0.03	0.92 (0.77, 1.10)	0.43
TC:TL in small HDL	40.00 (4.20) %	0.60 (0.51, 0.72)	5.19×10^{-08}	0.58 (0.49, 0.69)	1.82×10^{-09}	0.65 (0.54, 0.79)	2.02×10^{-05}	0.66 (0.54, 0.79)	2.34×10^{-05}	0.66 (0.54, 0.79)	2.33×10^{-05}	0.70 (0.57, 0.85)	8.40×10^{-04}

Metabolic biomarker	Mean (SD)	Model A		Model B		Model C1		Model C2		Model C3		Model D	
		HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†	HR* (95% CI)	*p*-value†
TC:TL in small LDL	59.00 (6.20) %	0.72 (0.62, 0.83)	$1.38\times10^{-0}5$	0.72 (0.62, 0.83)	1.95×10^{-05}	0.77 (0.65, 0.90)	2.40×10^{-03}	0.76 (0.64, 0.89)	1.50×10^{-03}	0.76 (0.64, 0.89)	1.60×10^{-03}	0.79 (0.67, 0.94)	0.01
TC:TL in small VLDL	33.00 (5.60) %	0.58 (0.50, 0.67)	7.86×10^{-12}	0.56 (0.48, 0.65)	1.37×10^{-12}	0.58 (0.48, 0.69)	6.87×10^{-09}	0.57 (0.47, 0.68)	6.74×10^{-09}	0.56 (0.47, 0.68)	5.82×10^{-09}	0.57 (0.47, 0.69)	2.93×10^{-08}
TC:TL in very large HDL	45.00 (5.60) %	0.91 (0.77, 1.07)	0.28	0.91 (0.77, 1.08)	0.31	0.84 (0.71, 1.00)	0.07	0.80 (0.67, 0.96)	0.02	0.80 (0.67, 0.96)	0.02	0.83 (0.68, 1.01)	0.09
TC:TL in very large VLDL	20.00 (3.80) %	0.84 (0.73, 0.96)	0.02	0.83 (0.72, 0.96)	0.02	0.90 (0.76, 1.06)	0.26	0.93 (0.79, 1.11)	0.46	0.93 (0.79, 1.11)	0.46	0.95 (0.81, 1.12)	0.61
TC:TL in very small VLDL	46.00 (4.80) %	0.52 (0.41, 0.65)	1.53×10^{-08}	0.48 (0.40, 0.57)	8.19×10^{-16}	0.50 (0.41, 0.60)	1.08×10^{-11}	0.49 (0.40, 0.59)	6.16×10^{-12}	0.49 (0.40, 0.59)	4.24×10^{-12}	0.50 (0.41, 0.61)	9.51×10^{-11}
Total cholines	2.00 (0.26) mmol/L	1.09 (0.96, 1.25)	0.21	1.08 (0.94, 1.24)	0.31	1.05 (0.90, 1.23)	0.54	1.05 (0.90, 1.22)	0.59	1.05 (0.90, 1.22)	0.59	0.97 (0.81, 1.15)	0.74
Total fatty acids	10.00 (2.10) mmol/L	1.69 (1.44, 1.97)	1.96×10^{-10}	1.68 (1.44, 1.97)	1.02×10^{-10}	1.47 (1.25, 1.74)	1.06×10^{-05}	1.45 (1.23, 1.71)	1.84×10^{-05}	1.45 (1.23, 1.71)	1.82×10^{-05}	1.41 (1.18, 1.69)	4.10×10^{-04}
TL in chylomicrons and extremely large VLDL	0.032 (0.023) mmol/L	2.05 (1.72, 2.43)	2.73×10^{-15}	2.18 (1.85, 2.56)	1.26×10^{-19}	1.87 (1.56, 2.22)	3.13×10^{-11}	1.80 (1.51, 2.16)	5.99×10^{-10}	1.81 (1.51, 2.16)	6.09×10^{-10}	1.68 (1.37, 2.05)	1.34×10^{-06}
TL in IDL	0.87 (0.21) mmol/L	0.90 (0.77, 1.04)	0.18	0.89 (0.76, 1.04)	0.16	0.89 (0.75, 1.06)	0.26	0.87 (0.73, 1.03)	0.14	0.87 (0.73, 1.03)	0.14	0.90 (0.75, 1.09)	0.33
TL in large HDL	0.65 (0.23) mmol/L	0.47 (0.39, 0.57)	5.13×10^{-14}	0.46 (0.38, 0.56)	2.21×10^{-14}	0.50 (0.41, 0.61)	5.38×10^{-11}	0.49 (0.40, 0.61)	2.69×10^{-10}	0.49 (0.40, 0.61)	2.86×10^{-10}	0.46 (0.36, 0.58)	6.85×10^{-10}
TL in large LDL	1.00 (0.25) mmol/L	0.95 (0.82, 1.11)	0.54	0.94 (0.81, 1.10)	0.49	0.95 (0.79, 1.13)	0.57	0.91 (0.76, 1.09)	0.35	0.91 (0.76, 1.09)	0.35	0.94 (0.79, 1.14)	0.60
TL in large VLDL	0.30 (0.19) mmol/L	1.97 (1.67, 2.31)	1.66×10^{-15}	2.05 (1.76, 2.39)	5.73×10^{-19}	1.75 (1.48, 2.07)	3.45×10^{-10}	1.70 (1.44, 2.02)	3.65×10^{-09}	1.71 (1.44, 2.02)	3.67×10^{-09}	1.65 (1.36, 1.99)	1.07×10^{-06}
TL in medium HDL	0.77 (0.13) mmol/L	0.98 (0.86, 1.12)	0.77	0.95 (0.83, 1.09)	0.50	0.89 (0.76, 1.03)	0.16	0.87 (0.75, 1.02)	0.10	0.87 (0.75, 1.02)	0.10	0.78 (0.66, 0.93)	0.01
TL in medium LDL	0.57 (0.15) mmol/L	1.05 (0.91, 1.21)	0.54	1.04 (0.90, 1.21)	0.61	1.04 (0.88, 1.23)	0.68	1.00 (0.84, 1.19)	0.99	1.00 (0.84, 1.19)	1.00	1.02 (0.85, 1.21)	0.87
TL in medium VLDL	0.60 (0.29) mmol/L	2.00 (1.70, 2.34)	2.40×10^{-16}	2.06 (1.76, 2.40)	5.17×10^{-19}	1.74 (1.47, 2.06)	4.20×10^{-10}	1.70 (1.44, 2.02)	3.82×10^{-09}	1.71 (1.44, 2.02)	3.67×10^{-09}	1.71 (1.42, 2.07)	7.97×10^{-08}
TL in small HDL	1.00 (0.094) mmol/L	1.40 (1.23, 1.59)	4.06×10^{-07}	1.38 (1.22, 1.57)	1.29×10^{-06}	1.23 (1.07, 1.41)	4.40×10^{-03}	1.18 (1.02, 1.36)	0.03	1.18 (1.02, 1.36)	0.01	1.08 (0.92, 1.27)	0.40
TL in small LDL	0.37 (0.094) mmol/L	1.03 (0.89, 1.19)	0.69	1.02 (0.88, 1.18)	0.78	1.01 (0.85, 1.20)	0.91	0.97 (0.81, 1.15)	0.73	0.97 (0.81, 1.15)	0.74	0.98 (0.83, 1.17)	0.87
TL in small VLDL	0.56 (0.18) mmol/L	1.74 (1.48, 2.05)	4.45×10^{-11}	1.75 (1.50, 2.05)	4.58×10^{-12}	1.53 (1.30, 1.81)	1.33×10^{-06}	1.51 (1.28, 1.78)	2.34×10^{-06}	1.51 (1.28, 1.78)	2.24×10^{-06}	1.56 (1.30, 1.88)	4.00×10^{-06}
TL in very large HDL	0.41 (0.16) mmol/L	0.44 (0.37, 0.53)	1.40×10^{-17}	0.44 (0.37, 0.53)	1.95×10^{-17}	0.46 (0.38, 0.56)	5.77×10^{-13}	0.45 (0.37, 0.55)	8.25×10^{-13}	0.45 (0.37, 0.55)	7.38×10^{-13}	0.45 (0.36, 0.56)	2.75×10^{-11}
TL in very large VLDL	0.079 (0.058) mmol/L	1.91 (1.62, 2.26)	1.15×10^{-13}	2.01 (1.72, 2.36)	3.07×10^{-17}	1.71 (1.44, 2.04)	4.27×10^{-09}	1.66 (1.39, 1.98)	4.45×10^{-08}	1.67 (1.40, 1.99)	4.39×10^{-08}	1.56 (1.27, 1.90)	4.07×10^{-05}
TL in very small VLDL	0.42 (0.098) mmol/L	1.04 (0.91, 1.20)	0.56	1.03 (0.90, 1.19)	0.66	0.98 (0.83, 1.14)	0.78	0.94 (0.80, 1.10)	0.47	0.94 (0.80, 1.10)	0.47	1.00 (0.83, 1.20)	0.99
Total phosphoglycerides	1.80 (0.27) mmol/L	1.08 (0.95, 1.23)	0.26	1.06 (0.93, 1.21)	0.41	1.00 (0.86, 1.16)	0.99	0.98 (0.84, 1.14)	0.80	0.98 (0.84, 1.14)	0.80	0.92 (0.77, 1.09)	0.40
TG in chylomicrons and extremely large VLDL	0.023 (0.016) mmol/L	2.07 (1.74, 2.46)	1.58×10^{-15}	2.22 (1.88, 2.61)	6.16×10^{-20}	1.90 (1.59, 2.27)	1.29×10^{-11}	1.84 (1.53, 2.20)	2.65×10^{-10}	1.84 (1.54, 2.20)	2.63×10^{-10}	1.70 (1.39, 2.07)	9.09×10^{-07}
TG in HDL	0.13 (0.034) mmol/L	2.12 (1.79, 2.52)	1.48×10^{-16}	2.14 (1.82, 2.53)	9.14×10^{-19}	1.88 (1.57, 2.25)	2.93×10^{-11}	1.86 (1.56, 2.23)	1.00×10^{-10}	1.87 (1.56, 2.23)	8.47×10^{-11}	1.89 (1.53, 2.32)	9.99×10^{-09}
TG in IDL	0.095 (0.023) mmol/L	1.53 (1.30, 1.79)	5.78×10^{-07}	1.54 (1.31, 1.81)	2.32×10^{-07}	1.45 (1.22, 1.71)	3.08×10^{-05}	1.43 (1.21, 1.70)	6.53×10^{-05}	1.43 (1.21, 1.70)	6.65×10^{-05}	1.65 (1.40, 1.95)	1.02×10^{-08}
TG in large HDL	0.025 (0.011) mmol/L	1.17 (1.02, 1.35)	0.04	1.17 (1.01, 1.35)	0.04	1.21 (1.03, 1.43)	0.03	1.27 (1.08, 1.51)	7.40×10^{-03}	1.27 (1.08, 1.51)	7.80×10^{-03}	1.23 (1.00, 1.52)	0.01
TG in large LDL	0.078 (0.02) mmol/L	1.42 (1.22, 1.65)	1.20×10^{-05}	1.42 (1.22, 1.65)	6.82×10^{-06}	1.35 (1.15, 1.58)	4.60×10^{-04}	1.34 (1.14, 1.58)	8.70×10^{-04}	1.34 (1.14, 1.57)	8.80×10^{-04}	1.50 (1.27, 1.77)	4.58×10^{-06}
TG in large VLDL	0.18 (0.11) mmol/L	1.97 (1.67, 2.31)	1.81×10^{-15}	2.05 (1.76, 2.39)	4.57×10^{-19}	1.75 (1.48, 2.07)	3.45×10^{-10}	1.70 (1.44, 2.02)	4.04×10^{-09}	1.70 (1.44, 2.02)	4.10×10^{-09}	1.63 (1.35, 1.98)	1.58×10^{-06}
TG in LDL	0.14 (0.036) mmol/L	1.48 (1.26, 1.73)	1.72×10^{-06}	1.48 (1.27, 1.72)	8.28×10^{-07}	1.39 (1.19, 1.64)	1.20×10^{-04}	1.38 (1.17, 1.63)	2.60×10^{-04}	1.38 (1.17, 1.63)	2.60×10^{-04}	1.53 (1.30, 1.81)	1.76×10^{-06}
TG in medium HDL	0.046 (0.012) mmol/L	2.27 (1.89, 2.73)	1.78×10^{-17}	2.31 (1.95, 2.74)	4.92×10^{-20}	2.02 (1.69, 2.42)	4.76×10^{-13}	2.01 (1.68, 2.41)	9.52×10^{-13}	2.02 (1.68, 2.43)	7.38×10^{-13}	2.04 (1.67, 2.49)	3.66×10^{-11}
TG in medium LDL	0.039 (0.0097) mmol/L	1.44 (1.24, 1.68)	5.71×10^{-06}	1.44 (1.24, 1.68)	3.16×10^{-06}	1.37 (1.17, 1.61)	2.10×10^{-04}	1.36 (1.15, 1.60)	4.60×10^{-04}	1.36 (1.15, 1.60)	4.60×10^{-04}	1.52 (1.29, 1.78)	1.51×10^{-06}
TG in medium VLDL	0.32 (0.16) mmol/L	2.02(1.72, 2.38)	1.94×10^{-16}	2.10 (1.80, 2.45)	1.03×10^{-19}	1.78 (1.50, 2.11)	1.28×10^{-10}	1.73 (1.46, 2.06)	1.71×10^{-09}	1.74 (1.46, 2.06)	1.61×10^{-09}	1.72 (1.43, 2.08)	7.97×10^{-08}
TG in small HDL	0.05 (0.013) mmol/L	2.59 (2.14, 3.12)	2.71×10^{-21}	2.71 (2.26, 3.24)	1.78×10^{-25}	2.40 (1.99, 2.90)	1.44×10^{-17}	2.35 (1.94, 2.85)	5.64×10^{-16}	2.36 (1.94, 2.86)	5.79×10^{-16}	2.50 (2.03, 3.09)	7.31×10^{-16}
TG in small LDL	0.026 (0.0074) mmol/L	1.73 (1.47, 2.04)	1.45×10^{-10}	1.75 (1.49, 2.05)	2.26×10^{-11}	1.57 (1.32, 1.85)	4.61×10^{-07}	1.54 (1.30, 1.82)	1.48×10^{-06}	1.54 (1.30, 1.82)	1.50×10^{-06}	1.61 (1.34, 1.93)	1.21×10^{-06}
TG in small VLDL	0.24 (0.092) mmol/L	2.13 (1.80, 2.53)	3.93×10^{-17}	2.19 (1.86, 2.58)	1.38×10^{-19}	1.88 (1.57, 2.24)	2.98×10^{-11}	1.85 (1.55, 2.21)	1.34×10^{-10}	1.86 (1.55, 2.22)	1.05×10^{-10}	1.88 (1.55, 2.28)	1.63×10^{-09}
TG in very large HDL	0.015 (0.0068) mmol/L	1.29 (1.11, 1.50)	1.70×10^{-03}	1.28 (1.10, 1.50)	2.00×10^{-03}	1.17 (0.99, 1.38)	0.09	1.17 (0.99, 1.38)	0.08	1.17 (0.99, 1.38)	0.09	1.15 (0.95, 1.41)	0.20
TG in very large VLDL	0.051 (0.037) mmol/L	1.94 (1.64, 2.29)	5.50×10^{-14}	2.04 (1.74, 2.39)	8.95×10^{-18}	1.74 (1.46, 2.07)	2.06×10^{-09}	1.68 (1.41, 2.01)	2.72×10^{-08}	1.69 (1.41, 2.01)	2.65×10^{-08}	1.57 (1.28, 1.92)	3.45×10^{-05}
TG in very small VLDL	0.10 (0.028) mmol/L	1.82 (1.53, 2.16)	2.04×10^{-11}	1.86 (1.58, 2.19)	4.67×10^{-13}	1.67 (1.40, 1.98)	1.81×10^{-08}	1.65 (1.39, 1.97)	4.35×10^{-08}	1.65 (1.39, 1.97)	3.94×10^{-08}	1.78 (1.48, 2.15)	1.08×10^{-08}
TG in VLDL	0.90 (0.44) mmol/L	2.04 (1.73, 2.40)	1.51×10^{-16}	2.12 (1.82, 2.48)	6.47×10^{-20}	1.80 (1.52, 2.14)	5.99×10^{-11}	1.76 (1.48, 2.08)	8.53×10^{-10}	1.76 (1.48, 2.09)	7.72×10^{-10}	1.74 (1.44, 2.11)	5.46×10^{-08}
TG:TL in chylomicrons and extremely large VLDL	73.00 (5.40) %	0.89 (0.80, 1.00)	0.05	0.89 (0.79, 1.00)	0.05	0.92 (0.81, 1.06)	0.29	0.93 (0.80, 1.07)	0.35	0.93 (0.80, 1.07)	0.35	0.92 (0.78, 1.08)	0.34
TG:TL in IDL	11.00 (2.80) %	1.81 (1.52, 2.16)	1.44×10^{-10}	1.88 (1.58, 2.23)	4.02×10^{-12}	1.73 (1.43, 2.10)	4.80×10^{-08}	1.77 (1.46, 2.13)	1.49×10^{-08}	1.77 (1.47, 2.14)	1.10×10^{-08}	1.76 (1.44, 2.14)	1.11×10^{-07}
TG:TL in large HDL	4.10 (1.70) %	2.18 (1.76, 2.71)	5.58×10^{-12}	2.24 (1.81, 2.76)	2.93×10^{-13}	2.07 (1.68, 2.56)	5.70×10^{-11}	2.07 (1.67, 2.55)	1.34×10^{-10}	2.07 (1.67, 2.56)	1.41×10^{-10}	2.12 (1.69, 2.65)	4.14×10^{-10}
TG:TL in large LDL	8.10 (2.00) %	1.62 (1.37, 1.92)	3.92×10^{-08}	1.63 (1.38, 1.93)	3.82×10^{-08}	1.52 (1.26, 1.82)	2.21×10^{-05}	1.55 (1.29, 1.86)	8.09×10^{-06}	1.55 (1.29, 1.86)	7.87×10^{-06}	1.52 (1.25, 1.85)	6.72×10^{-05}
TG:TL in large VLDL	60.00 (2.80) %	0.74 (0.63, 0.87)	2.80×10^{-04}	0.75 (0.64, 0.88)	5.40×10^{-04}	0.74 (0.61, 0.90)	4.00×10^{-03}	0.74 (0.61, 0.90)	4.70×10^{-03}	0.74 (0.61, 0.90)	4.70×10^{-03}	0.72 (0.58, 0.91)	8.30×10^{-03}
TG:TL in medium HDL	6.00 (1.70) %	2.02 (1.69, 2.41)	2.38×10^{-14}	2.07 (1.73, 2.46)	1.49×10^{-15}	1.88 (1.56, 2.27)	2.99×10^{-10}	1.87 (1.54, 2.27)	1.05×10^{-09}	1.88 (1.55, 2.28)	9.92×10^{-10}	2.22 (1.84, 2.68)	4.61×10^{-15}
TG:TL in medium LDL	7.10 (1.90) %	1.37 (1.19, 1.58)	2.74×10^{-05}	1.37 (1.18, 1.58)	4.68×10^{-05}	1.30 (1.11, 1.52)	2.00×10^{-03}	1.33 (1.13, 1.55)	8.70×10^{-04}	1.33 (1.13, 1.55)	8.80×10^{-04}	1.30 (1.10, 1.55)	4.30×10^{-03}
TG:TL in medium VLDL	54.00 (3.00) %	1.31(1.15, 1.49)	8.74×10^{-05}	1.32 (1.15, 1.51)	1.40×10^{-04}	1.22 (1.05, 1.41)	0.02	1.20 (1.03, 1.40)	0.03	1.20 (1.03, 1.40)	0.03	1.11 (0.93, 1.34)	0.30
TG:TL in small HDL	4.90 (1.20) %	2.11 (1.76, 2.53)	3.31×10^{-15}	2.18 (1.83, 2.60)	1.58×10^{-17}	1.96 (1.62, 2.35)	1.30×10^{-11}	1.94 (1.60, 2.34)	8.70×10^{-11}	1.94 (1.61, 2.35)	8.02×10^{-11}	2.17 (1.78, 2.65)	5.12×10^{-13}
TG:TL in small LDL	7.40 (2.20) %	1.54 (1.31, 1.80)	1.52×10^{-07}	1.58 (1.35, 1.84)	1.15×10^{-08}	1.45 (1.23, 1.71)	3.08×10^{-05}	1.45 (1.23, 1.72)	2.67×10^{-05}	1.45 (1.23, 1.72)	2.76×10^{-05}	1.40 (1.17, 1.67)	4.50×10^{-04}
TG:TL in small VLDL	43.00 (5.50) %	1.89 (1.59, 2.26)	3.71×10^{-12}	1.99 (1.68, 2.37)	1.13×10^{-14}	1.86 (1.54, 2.25)	4.91×10^{-10}	1.88 (1.55, 2.28)	1.02×10^{-09}	1.88 (1.55, 2.28)	8.18×10^{-10}	1.86 (1.52, 2.27)	1.27×10^{-08}
TG:TL in very large HDL	3.90 (2.20) %	2.17 (1.79, 2.63)	2.24×10^{-14}	2.34 (1.93, 2.83)	1.55×10^{-17}	2.28 (1.89, 2.76)	5.47×10^{-16}	2.26 (1.86, 2.75)	2.09×10^{-14}	2.26 (1.86, 2.75)	2.12×10^{-14}	2.21 (1.84, 2.66)	2.88×10^{-15}
TG:TL in very large VLDL	65.00 (4.90) %	0.92 (0.81, 1.05)	0.23	0.93 (0.81, 1.06)	0.30	0.92 (0.78, 1.07)	0.30	0.89 (0.76, 1.05)	0.20	0.89 (0.76, 1.05)	0.20	0.94 (0.80, 1.10)	0.48
TG:TL in very small VLDL	24.00 (5.50) %	1.90 (1.56, 2.31)	3.25×10^{-10}	2.01 (1.66, 2.42)	8.59×10^{-13}	1.87 (1.52, 2.30)	$6.87\times10-^{09}$	1.90 (1.54, 2.33)	5.37×10^{-09}	1.90 (1.55, 2.34)	4.10×10^{-09}	1.88 (1.54, 2.31)	4.87×10^{-09}
Tyrosine	0.053 (0.013) mmol/L	1.49 (1.32, 1.69)	5.75×10^{-10}	1.49 (1.32, 1.68)	5.43×10^{-10}	1.25 (1.09, 1.45)	3.40×10^{-03}	1.21 (1.04, 1.40)	0.02	1.21 (1.04, 1.40)	0.02	0.97 (0.80, 1.17)	0.78
Valine	0.17 (0.041) mmol/L	2.25 (1.94, 2.62)	2.10×10^{-23}	2.39 (2.04, 2.79)	1.78×10^{-25}	2.00 (1.68, 2.38)	2.95×10^{-13}	2.01 (1.68, 2.40)	2.38×10^{-13}	2.05 (1.71, 2.45)	1.11×10^{-13}	1.91 (1.57, 2.32)	4.38×10^{-10}

Model A: adjusted for age, sex, study area, education, fasting time; Model B: additionally adjusted for smoking, alcohol, physical activity, dietary factors (meat, fish, fresh fruit, dairy), family history of diabetes; Model C1: additionally adjusted for BMI; Model C2: model B additionally adjusted for waist circumference; Model C3: model B additionally adjusted for BMI and waist circumference; Model D: Model C3 additionally adjusted for random plasma glucose.

*HR per 1 SD higher metabolic biomarker

†Adjusted for multiple testing using Benjamini-Hochberg correction (Journal of the Royal Statistical Society B 1995;57:289-300)

CE=cholesterol esters; FC=free cholesterol; PL=phospholipids; TC=total cholesterol; TFA=total fatty acids; TG=triglycerides; TL=total lipids

;

Supplementary Table S2. Chinese population type 2 diabetes risk prediction models

Study	No. of participants	No. of diabetes cases	Type 2 diabetes definition	Follow-up period	Variables included	AUC
Chin-Shan Community Cardiovascular Cohort Study*	2,960	548	FPG ≥7.0 mmol/L, oral hypoglycaemic med or insulin use	10 y	Age, FPG, BMI, TG, WBC, HDL-C	0.702
Chinese Diabetes Risk Score†	Derivation: 1,457 Validation: 394	Derivation: 304 Validation: 48	Self-reported diagnosis, use of hypoglycaemic meds, FPG ≥7.0 mmol/L, 2h post-load glucose ≥11.1 mmol/L	10 y	Age, HTN, history of elevated blood glucose, BMI, FPG, TG, HDL-C	0.722
Guangzhou Biobank Cohort‡	Derivation: 8,000 Validation: 8,043	836	Self-reported physician diagnosis, hypoglycemic meds or insulin, FPG ≥7.0 mmol/L	4.1 y	BMI, BP, antihypertensive medication use, HTN, HDL-C, TG, FPG	0.779
Kailuan§	Derivation: 49,325 Validation: 24,662	Derivation: 4,726 Validation: 2,327	Self-reported diabetes diagnosis, taking anti-diabetic meds, FPG ≥7.0 mmol/L	5 y	Age, sex, BMI, FH of diabetes, education, BP, HR, FPG, TG, lipid-lowering medication use	0.77

*****Diabetologia 2009;52:443–450

†Diab Tech Ther 2011;13(5):501-507

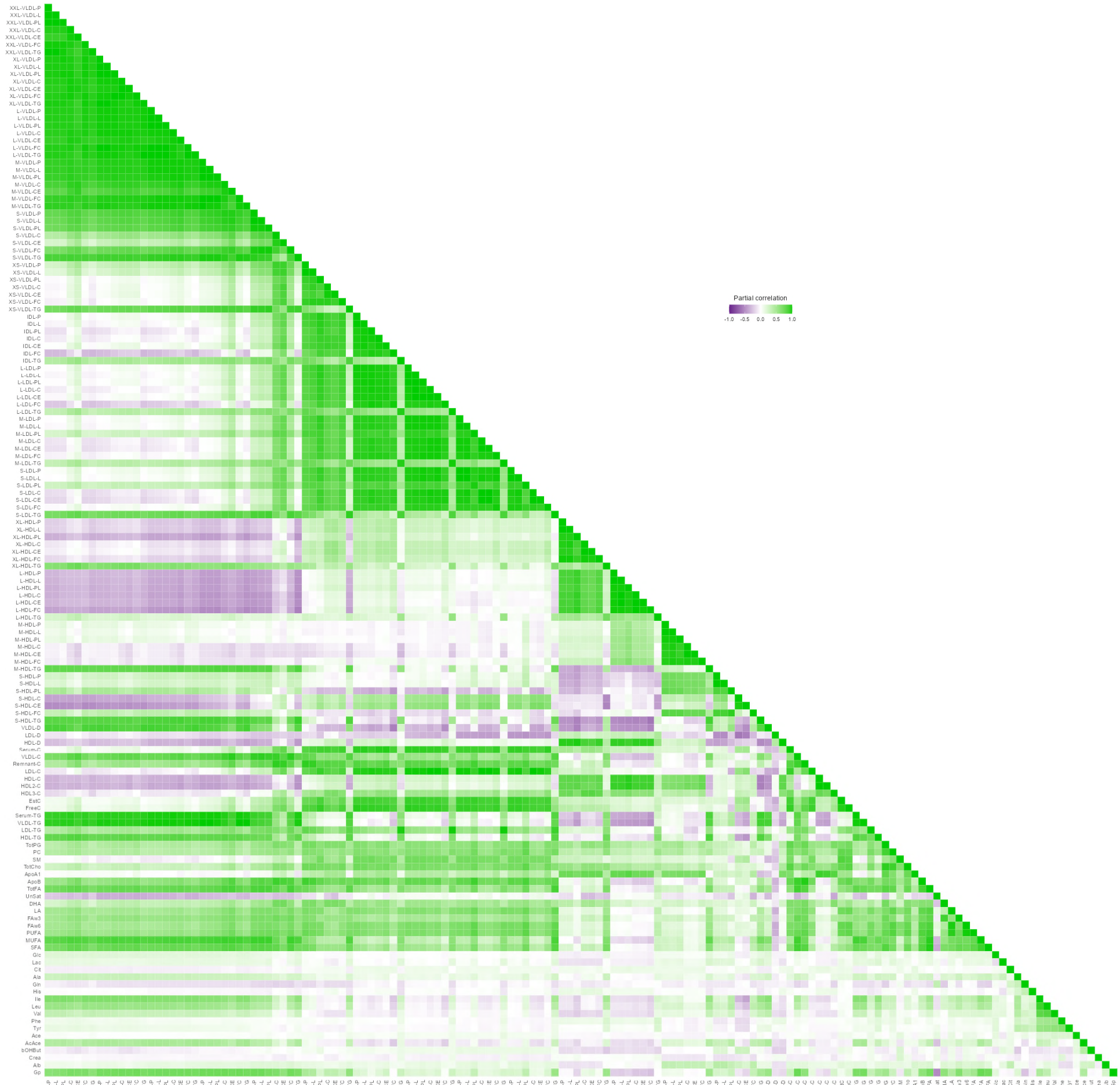
‡Prev Med 2014;69:63–68

§Sci Rep 2016;6:26548

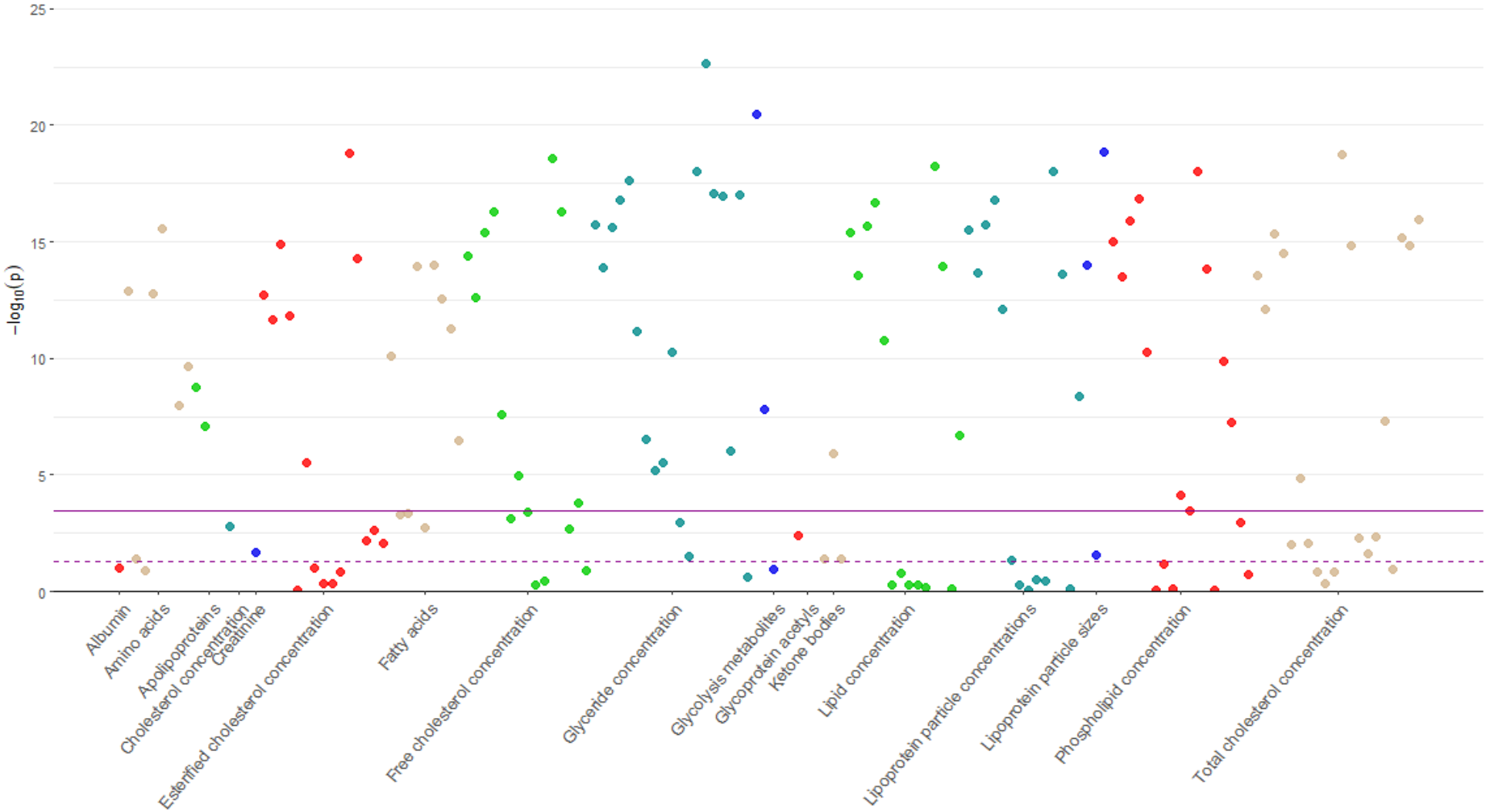
AUC=area under the curve; BMI=body mass index; BP=blood pressure; FH= family history; FPG=fasting plasma glucose; HDL-C=HDL-cholesterol; HR=heart rate; HTN=hypertension; TG=triglycerides; WBC=white blood cell count

Supplementary Figure S1. Correlation between directly-measured metabolic biomarkers within subcohort participants (n=789)

Adjusted for age, sex and study area



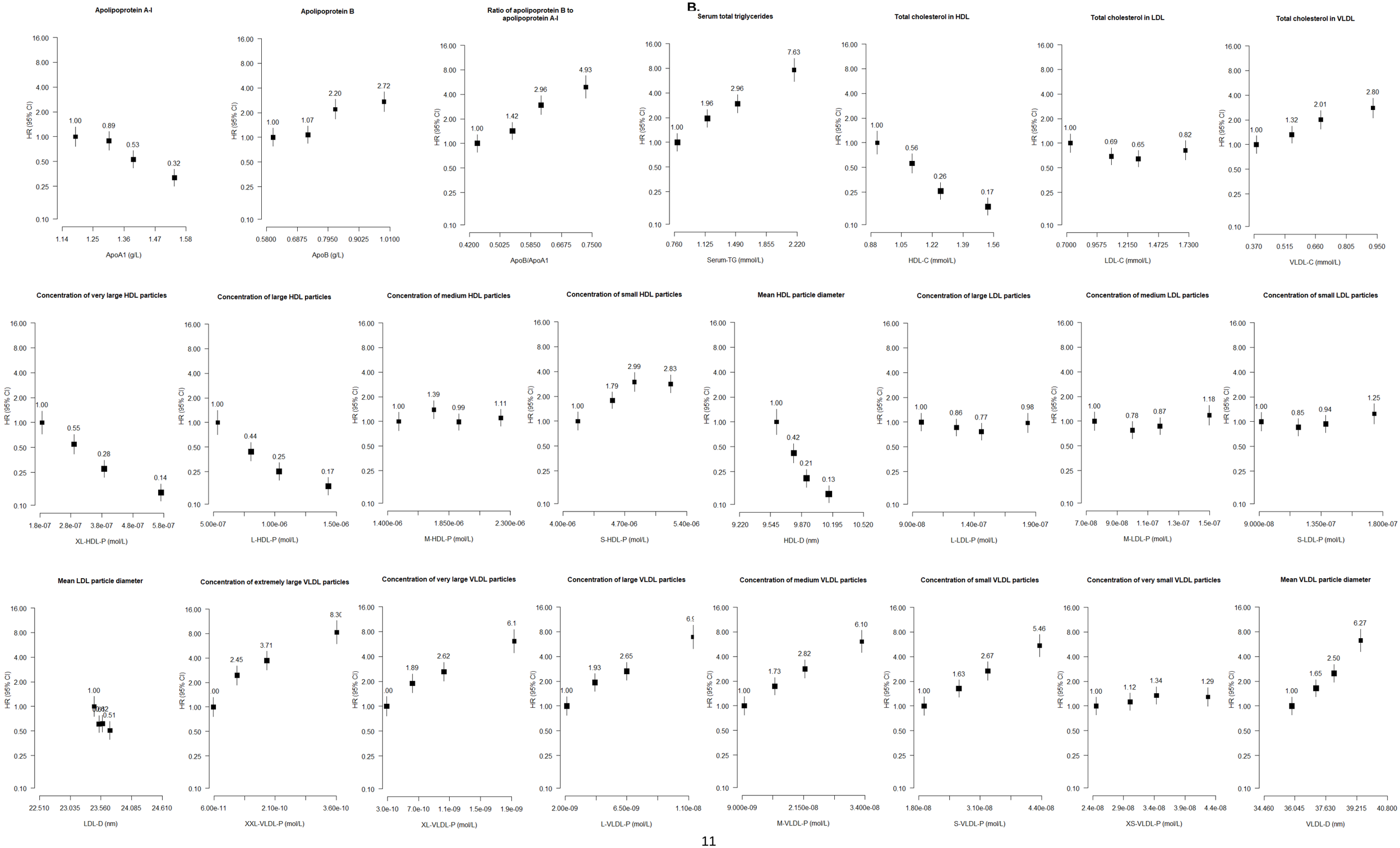
Supplementary Figure S2. Associations of directly-measured metabolic biomarkers with incident type 2 diabetes
Adjusted for age, sex, study area, education, fasting time
Dashed line: p=0.05; Solid line: Bonferroni corrected significance threshold



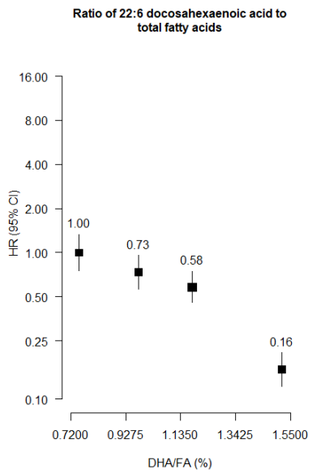
Supplementary Figure S3. Associations of metabolic biomarkers with incident type 2 diabetes
Adjusted for age, sex, region, education and fasting time

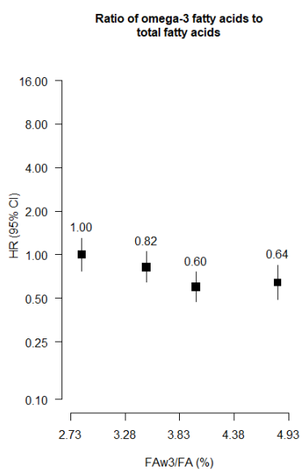
A. Lipids, apolipoproteins and lipoprotein particle concentrations

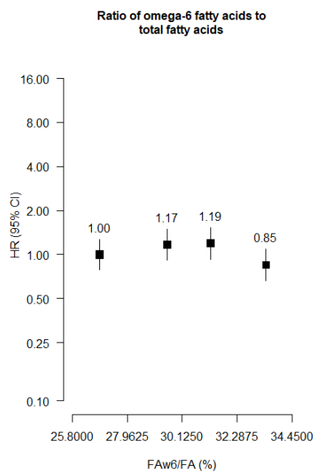
B.

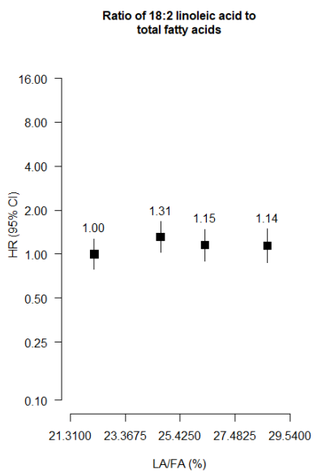


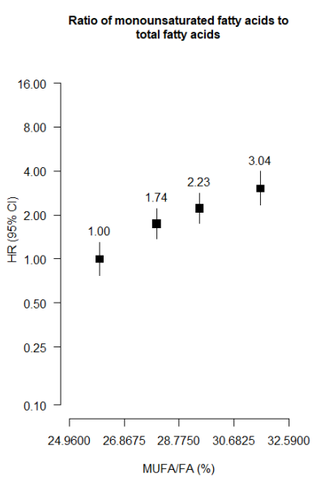
C. Fatty acids

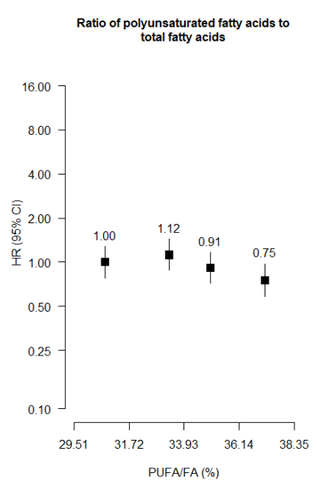


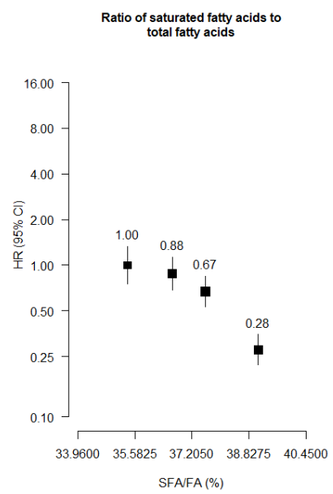




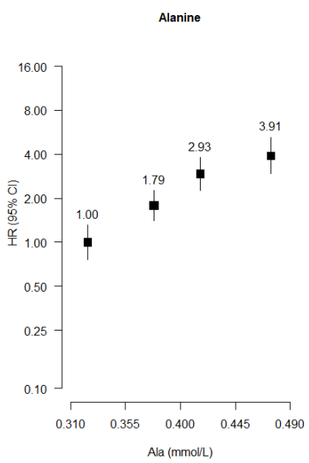


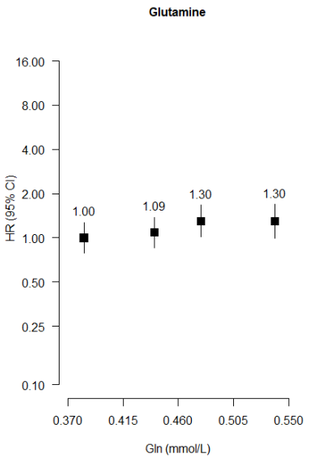


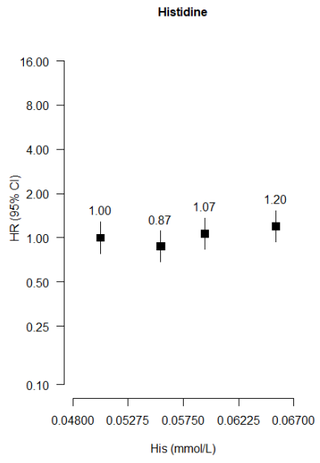


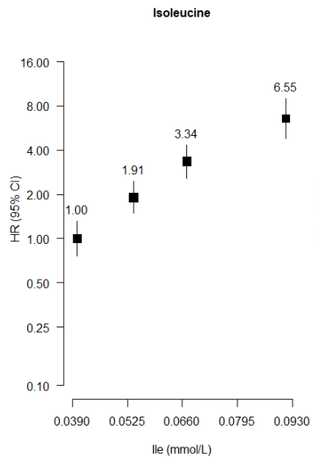


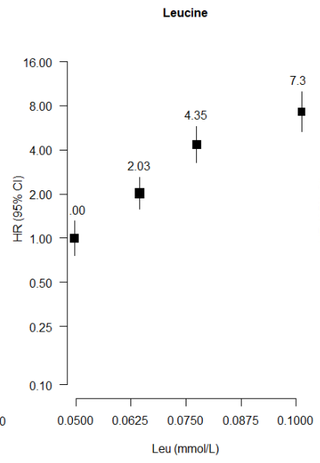
D. Amino acids

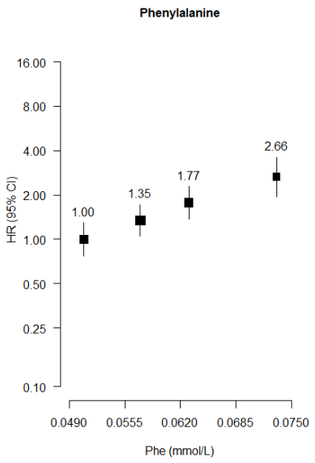


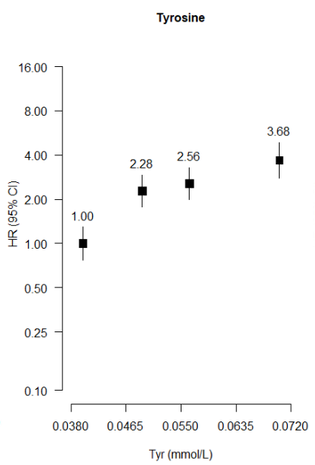


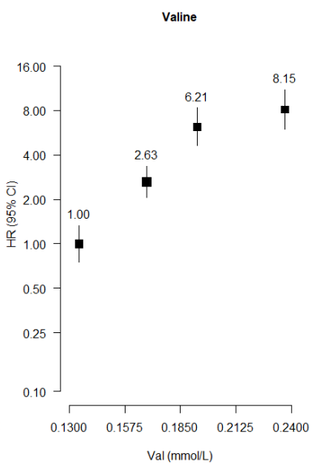




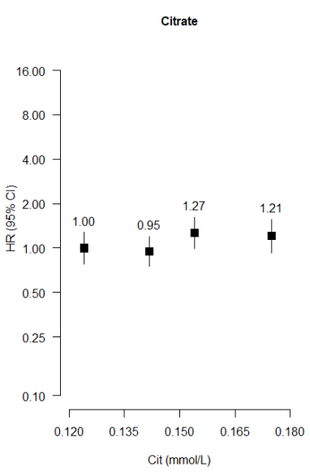


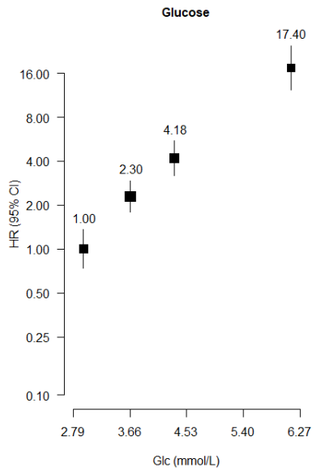


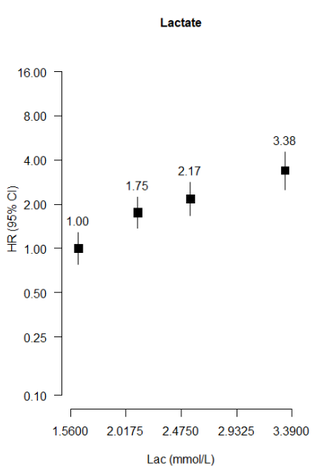




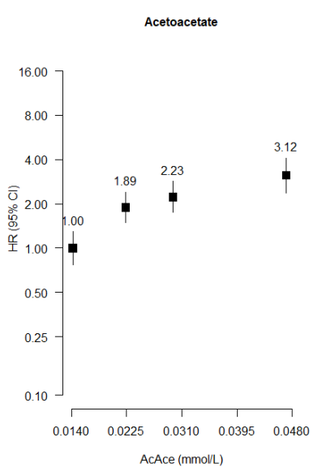
E. Glycolysis metabolites

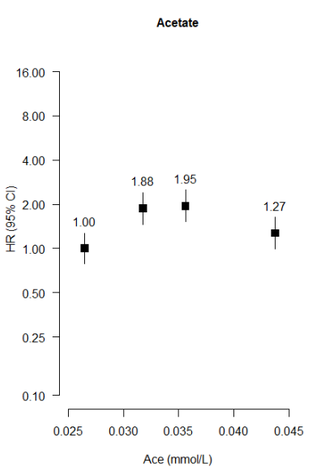


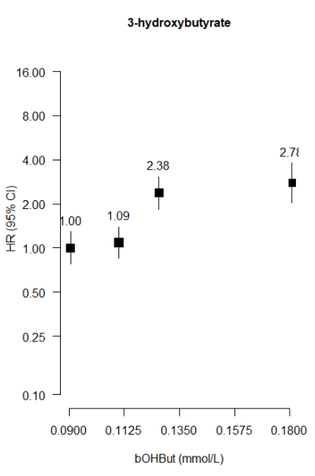




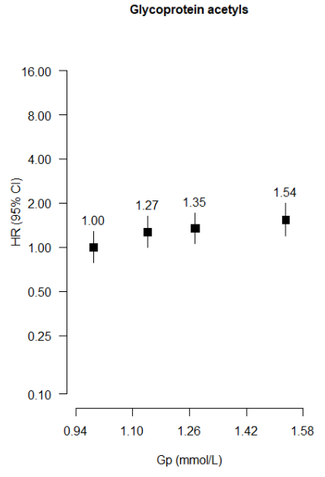
F. Ketone bodies







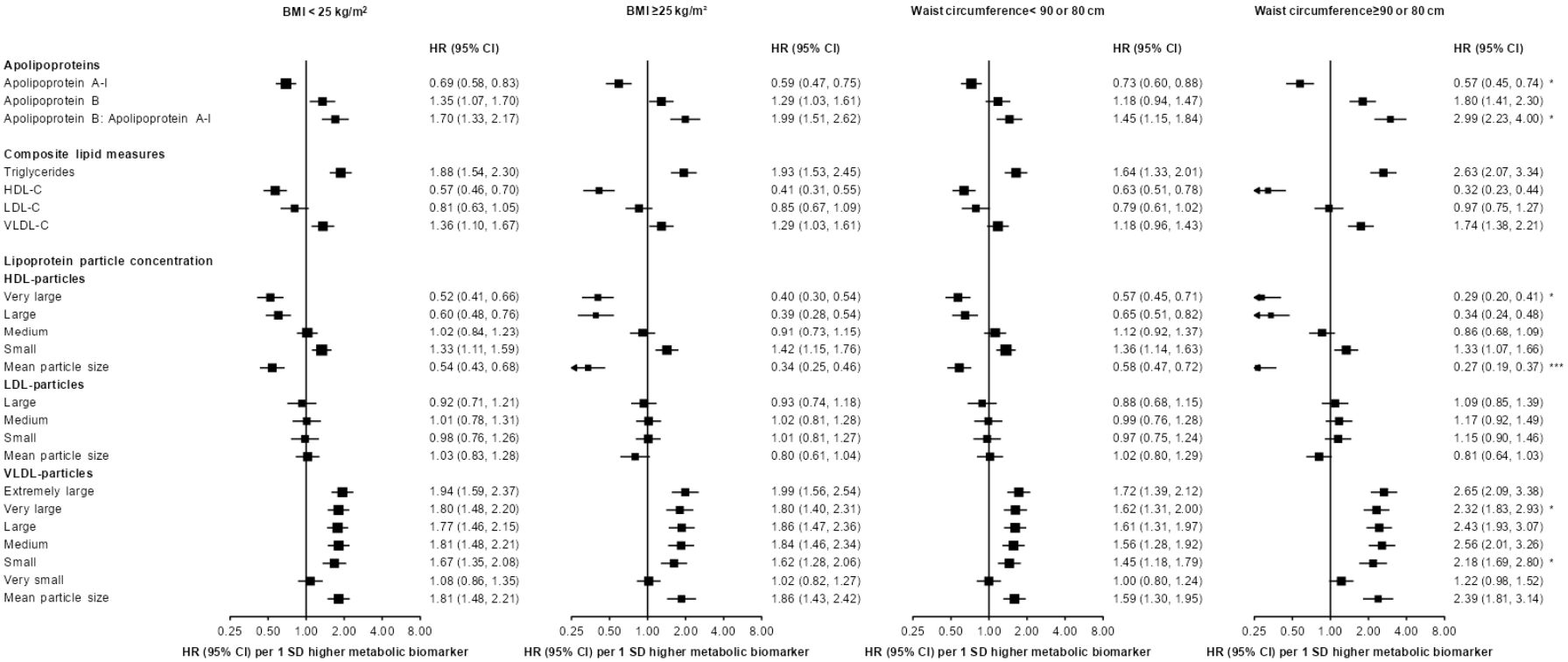
F. Inflammation



Supplementary Figure S4. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by adiposity

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors and family history of diabetes

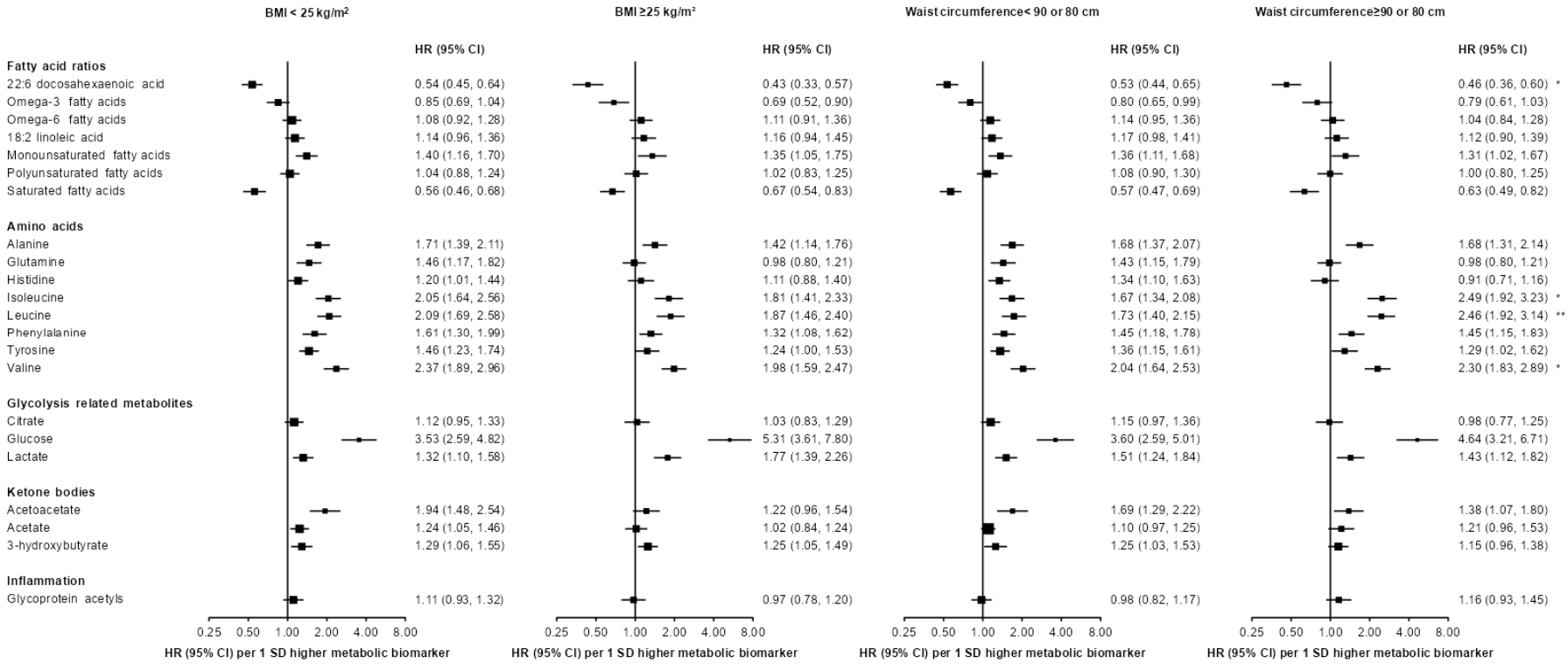
p-values for heterogeneity (comparing estimates across BMI or waist circumference strata) after adjustment for multiple testing using Benjamini-Hochberg correction: *p≤0.05, **p≤0.01, ***p≤0.001



Supplementary Figure S5. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by adiposity

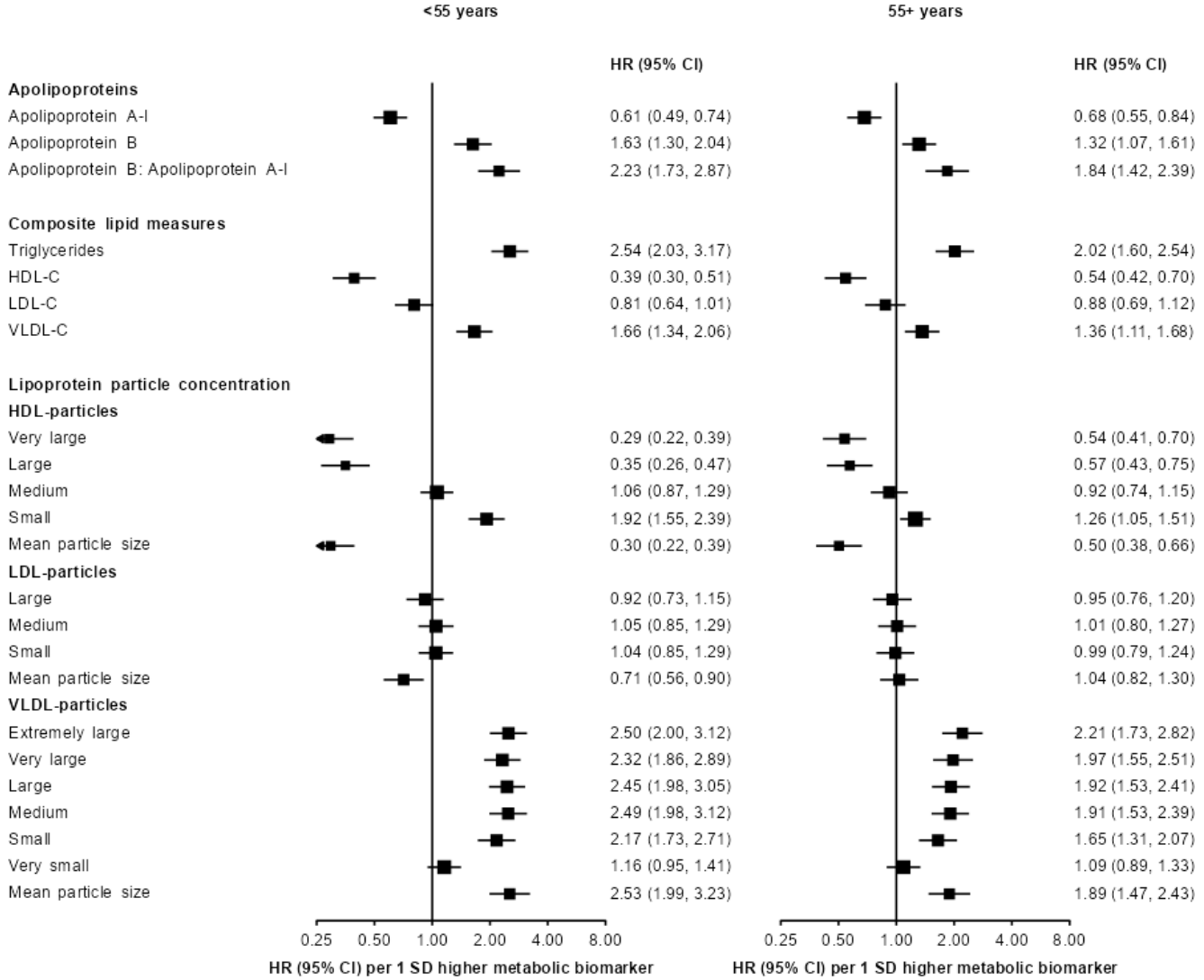
Adjusted for age, study area, education

p-values for heterogeneity (comparing estimates across BMI or waist circumference strata) after adjustment for multiple testing using Benjamini-Hochberg correction: *p≤0.05, **p≤0.01, ***p≤0.001



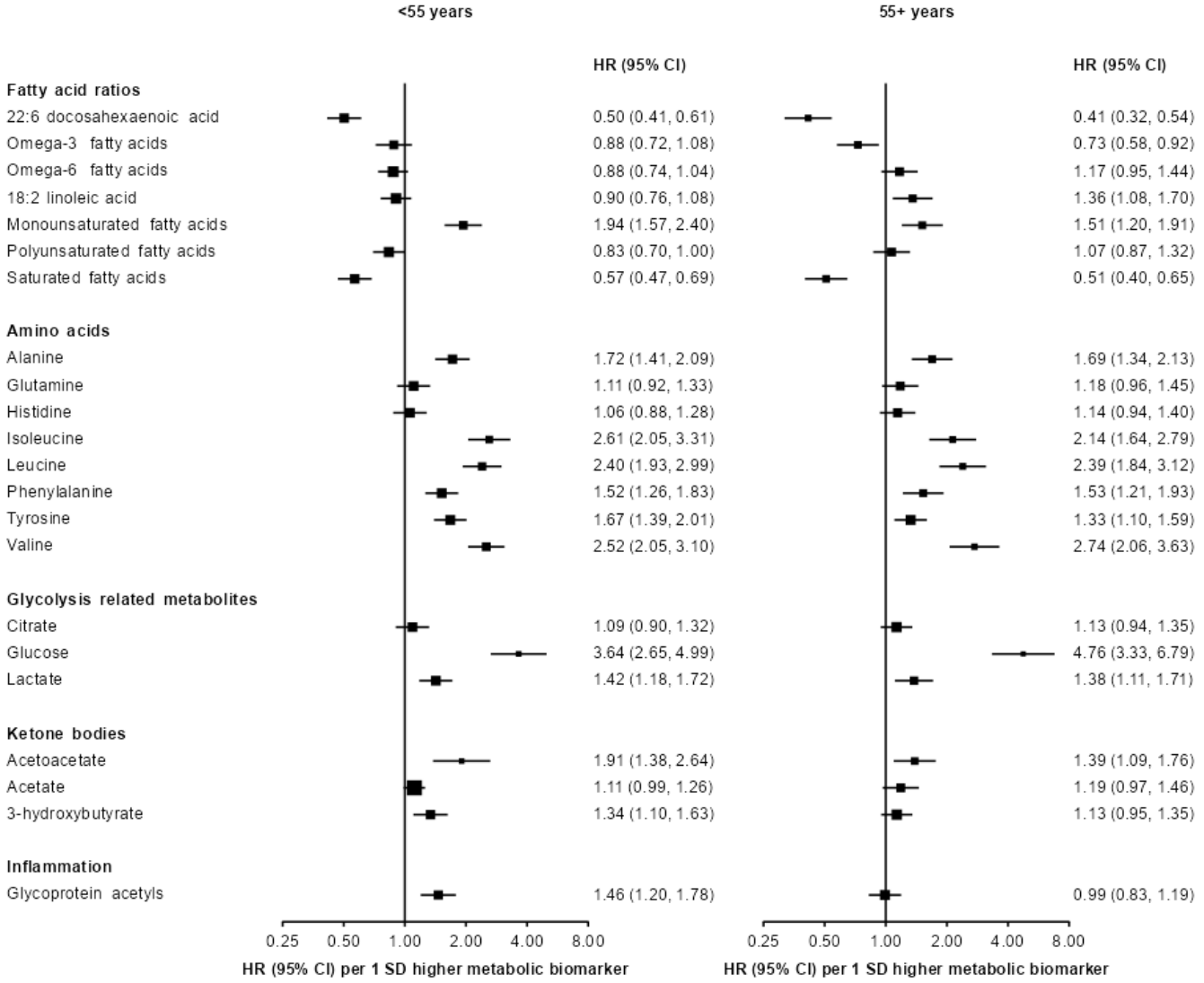
Supplementary Figure S6. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by age

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference



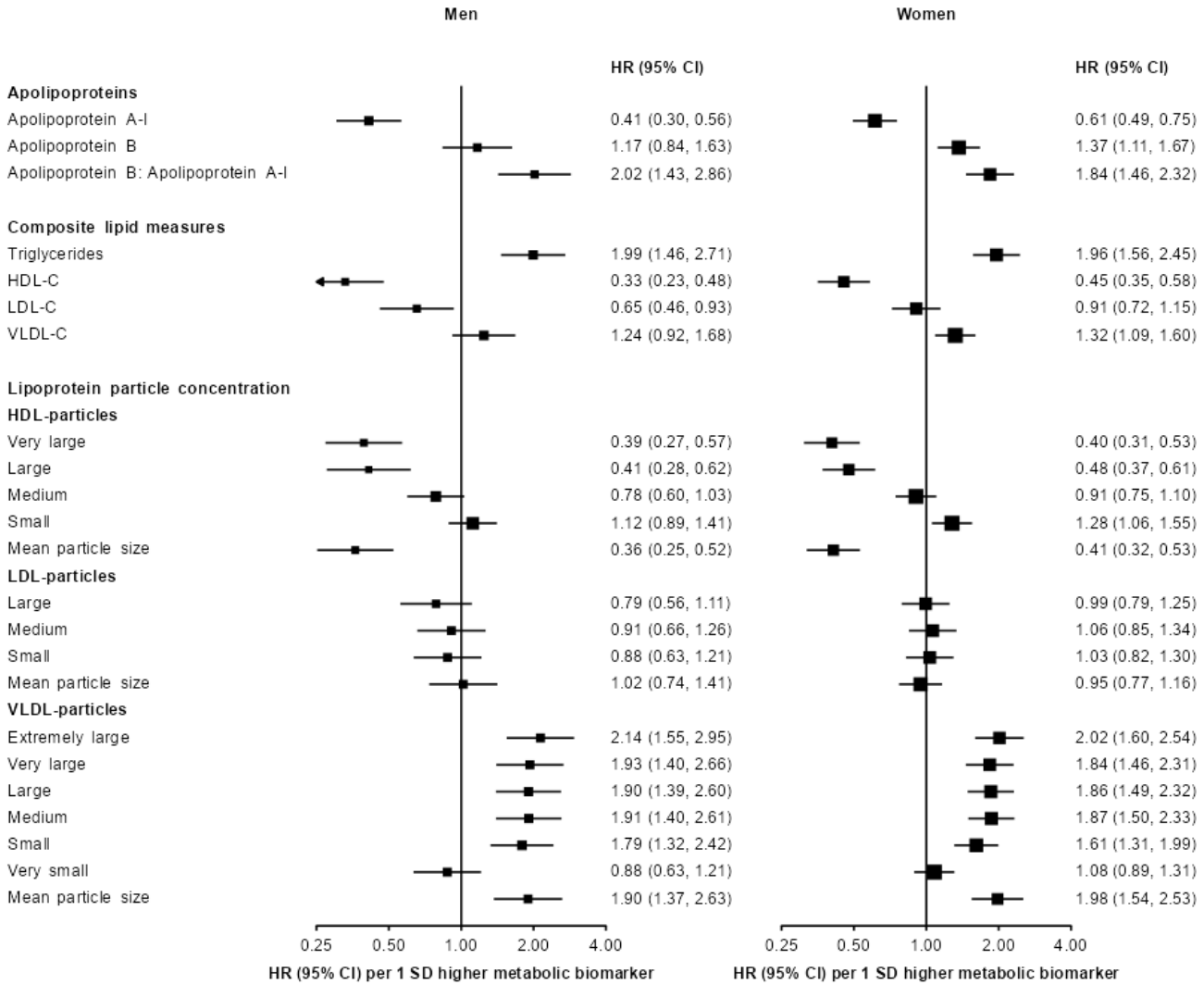
Supplementary Figure S7. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by age

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference



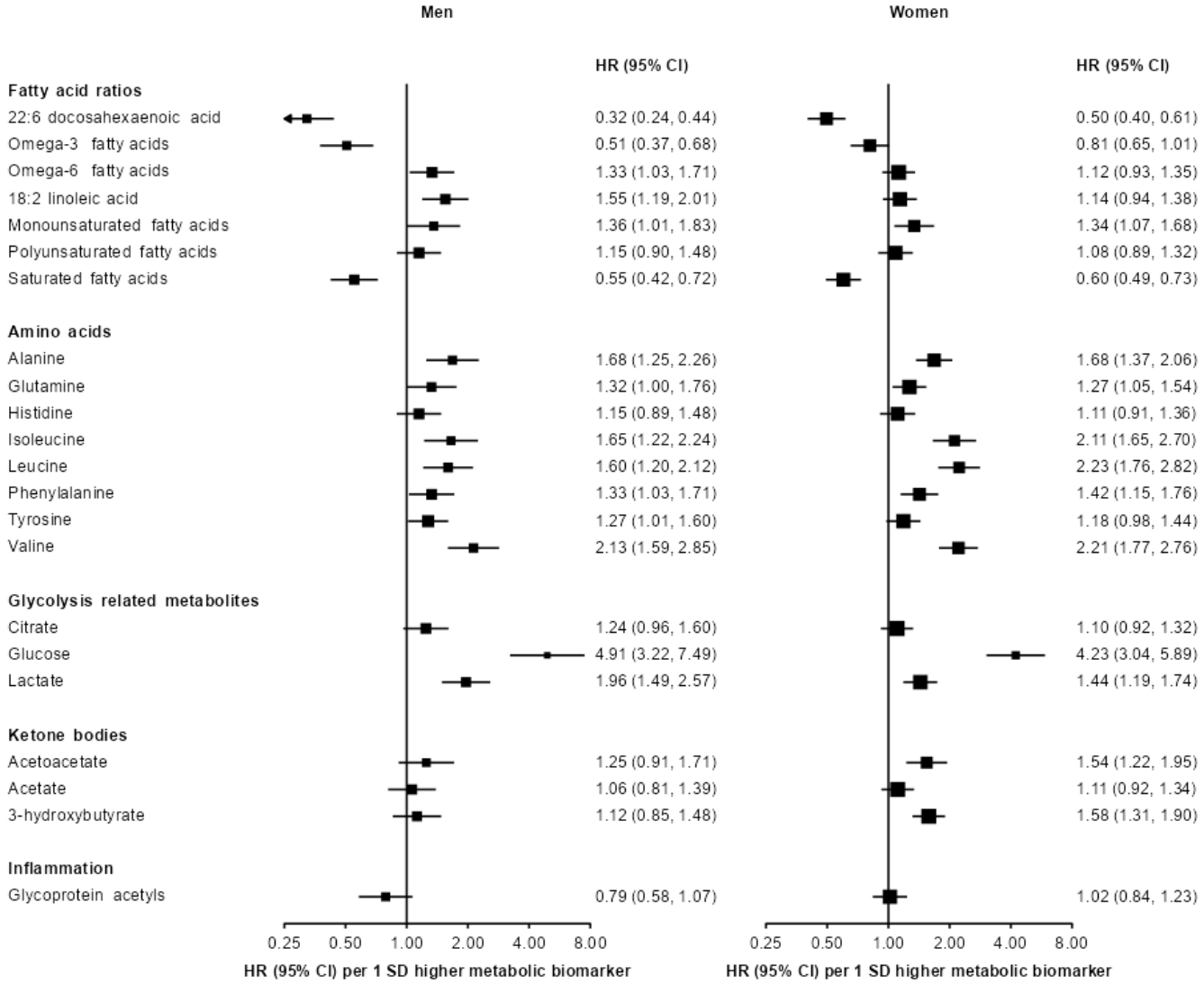
Supplementary Figure S8. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by sex

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference



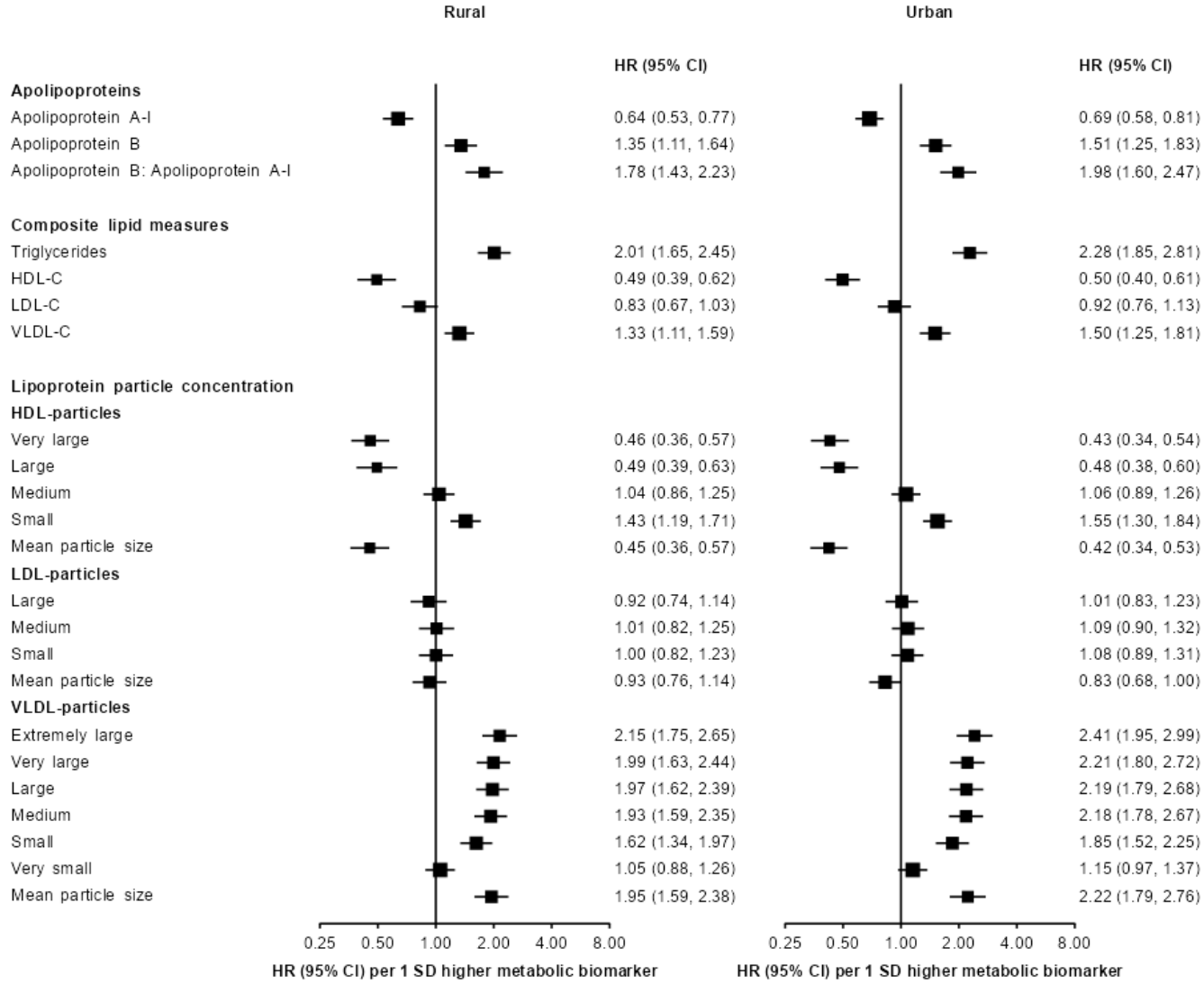
Supplementary Figure S9. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by sex

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference



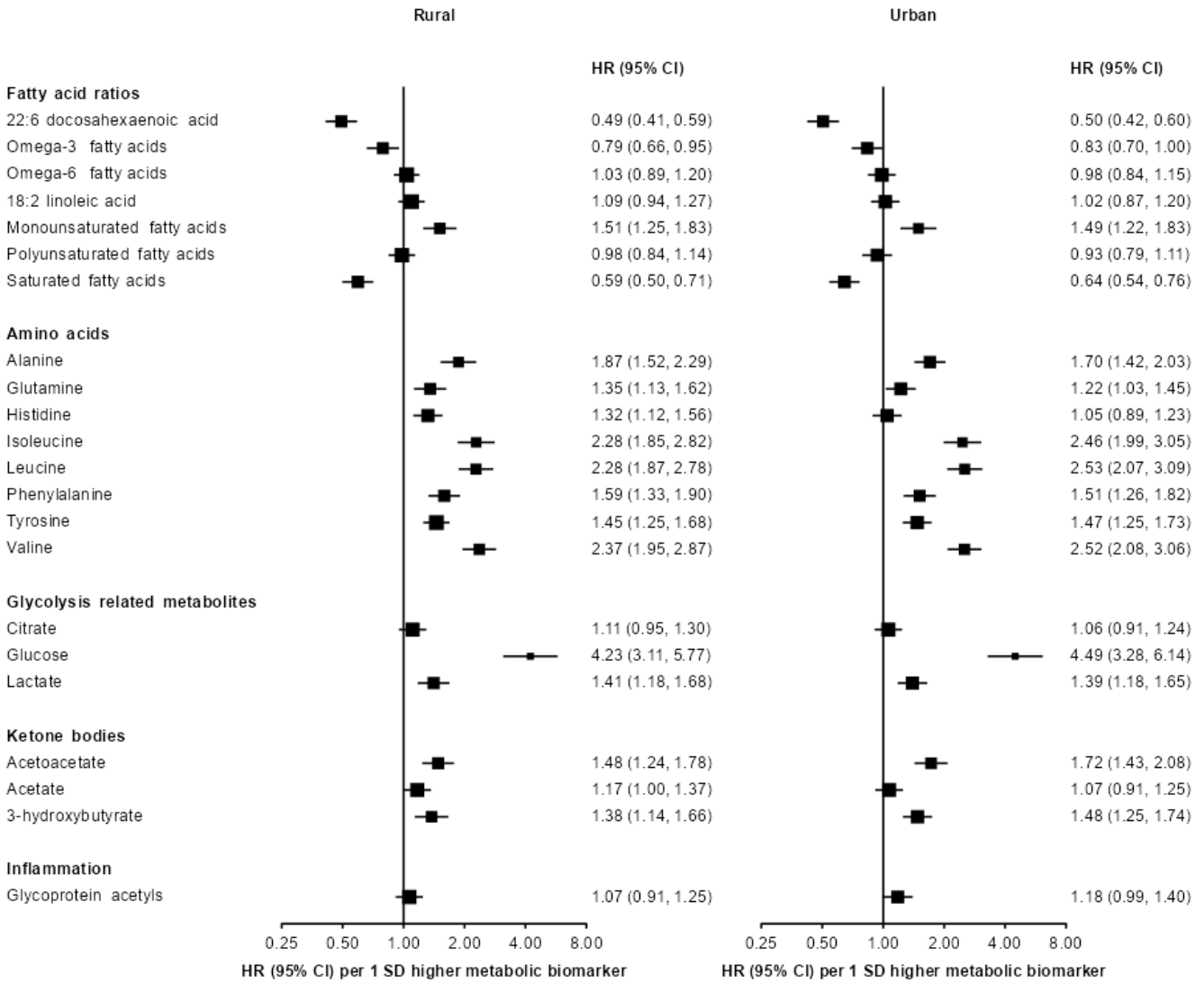
Supplementary Figure S10. Associations of lipids, apolipoproteins and lipoprotein particle concentrations with risk of incident type 2 diabetes, stratified by region

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference



Supplementary Figure S11. Associations of fatty acids, amino acids, glycolysis metabolites, ketone bodies and inflammatory markers with risk of incident type 2 diabetes, stratified by region

Adjusted for age, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference, fasting time, smoking, alcohol, physical activity, dietary factors and family history of diabetes



Supplementary Figure S12. Associations of metabolic biomarkers with risk of incident type 2 diabetes (n=757) excluding the first 2 years of follow-up

Adjusted for age, sex, study area, education, fasting time, smoking, alcohol, physical activity, dietary factors, family history of diabetes, BMI and waist circumference. Squares represent the HR. Horizontal lines represent the corresponding 95% CI. Fatty acid ratios represent ratios of individual to total fatty acids
*p≤0.05, **p≤0.01, ***p≤0.001 after adjustment for multiple testing using Benjamini-Hochberg correction