

Supplemental material

Table S1: serum sterol concentrations according to gender, CoLaus|PsyCoLaus study, Lausanne, Switzerland.

	First survey			Second survey		
	Women (N=538)	Men (N=372)	P-value	Women (N=434)	Men (N=287)	P-value
Campesterol [mg/dl]	0.30 [0.19 - 0.44]	0.26 [0.17 - 0.37]	<0.001	0.26 [0.18 - 0.38]	0.26 [0.17 - 0.35]	0.281
Campestanol [µg/dl]	5.29 [3.39 - 8.02]	4.73 [3.10 - 7.15]	0.005	3.71 [3.07 - 4.61]	3.71 [3.09 - 4.49]	0.809
Stigmasterol [µg/dl]	5.55 [3.42 - 8.73]	5.02 [3.17 - 7.76]	0.020	7.33 [5.70 - 9.59]	6.76 [5.08 - 8.74]	0.006
Sitosterol [mg/dl]	0.24 [0.17 - 0.33]	0.21 [0.15 - 0.28]	<0.001	0.22 [0.17 - 0.31]	0.22 [0.16 - 0.29]	0.064
Sitostanol [µg/dl]	6.33 [4.64 - 9.29]	6.10 [4.42 - 8.14]	0.023	3.73 [3.24 - 4.47]	3.81 [3.32 - 4.44]	0.674
Brassicasterol [µg/dl]	17.4 [11.6 - 24.7]	17.0 [11.6 - 23.4]	0.253	18.2 [13.7 - 25.0]	19.0 [13.1 - 24.8]	0.954
Total cholesterol GC [µg/dl]	217 [193 - 245]	196 [173 - 220]	<0.001	198 [175 - 218]	178 [148 - 203]	<0.001

Results are expressed as median [interquartile range]. Between-sex comparisons performed using Kruskal-Wallis test.

Table S2: correlation coefficients between serum phytosterols and lipid markers, participants devoid of lipid-lowering drug treatment, CoLaus|PsyCoLaus study, Lausanne, Switzerland.

	Total cholesterol		Total cholesterol GC		LDL cholesterol		HDL cholesterol		Triglycerides		ApoA-IV	Lp(a)
	First	Second	First	Second	First	Second	First	Second	First	Second	First	First
Campesterol [mg/dl]	0.365	0.357	0.378	0.294	0.308	0.253	0.262	0.280	-0.091	-0.120	0.083	0.070
Campestanol [μg/dl]	0.358	0.344	0.382	0.290	0.327	0.292	0.114	0.144	0.076	0.022	0.062	0.083
Stigmasterol [μg/dl]	0.261	0.315	0.253	0.239	0.222	0.244	0.098	0.172	0.042	-0.050	0.091	0.059
Sitosterol [mg/dl]	0.350	0.345	0.370	0.275	0.288	0.249	0.254	0.283	-0.087	-0.144	0.105	0.075
Sitostanol [μg/dl]	0.261	0.286	0.286	0.224	0.224	0.220	0.096	0.163	0.060	-0.005	0.080	0.046
Brassicasterol [μg/dl]	0.293	0.327	0.307	0.272	0.259	0.250	0.133	0.203	0.008	-0.050	0.061	0.036

Results are expressed as Spearman nonparametric correlation coefficient. Data for the first (2009-2012) and second (2014-2017) follow-ups. Significant ($p < 0.05$) results are indicated in bold.

Table S3: correlation coefficients between serum phytosterols and lipid markers, stratified by sex, CoLaus|PsyCoLaus study, Lausanne, Switzerland.

	Total cholesterol		Total cholesterol GC		LDL cholesterol		HDL cholesterol		Triglycerides		ApoA-IV	Lp(a)
	First	Second	First	Second	First	Second	First	Second	First	Second	First	First
Male												
Campesterol [mg/dl]	0.340	0.202	0.327	0.176	0.270	0.257	0.273	0.141	-0.015	-0.095	0.117	0.038
Campestanol [µg/dl]	0.334	0.254	0.323	0.205	0.149	0.132	0.293	0.212	0.076	0.014	0.027	0.048
Stigmasterol [µg/dl]	0.205	0.202	0.203	0.176	0.093	0.140	0.172	0.189	0.042	-0.083	0.089	-0.006
Sitosterol [mg/dl]	0.309	0.250	0.300	0.230	0.256	0.232	0.259	0.213	-0.066	-0.112	0.127	0.019
Sitostanol [µg/dl]	0.214	0.134	0.201	0.074	0.145	0.091	0.177	0.091	0.023	0.016	0.091	0.002
Brassicasterol [µg/dl]	0.273	0.233	0.253	0.219	0.204	0.210	0.204	0.176	0.040	-0.006	0.057	0.000
Female												
Campesterol [mg/dl]	0.260	0.270	0.307	0.245	0.188	0.328	0.204	0.150	-0.074	-0.153	0.073	0.025
Campestanol [µg/dl]	0.320	0.275	0.386	0.268	0.077	0.173	0.281	0.217	0.084	-0.028	0.036	0.051
Stigmasterol [µg/dl]	0.223	0.236	0.247	0.187	0.094	0.217	0.163	0.156	0.055	-0.114	0.082	0.045
Sitosterol [mg/dl]	0.243	0.240	0.289	0.233	0.201	0.331	0.171	0.128	-0.060	-0.177	0.073	0.042
Sitostanol [µg/dl]	0.192	0.211	0.259	0.213	0.039	0.209	0.148	0.135	0.106	-0.042	0.048	0.024
Brassicasterol [µg/dl]	0.212	0.241	0.255	0.226	0.084	0.230	0.176	0.148	0.019	-0.078	0.080	0.029

Results are expressed as Spearman nonparametric correlation coefficient. Data for the first (2009-2012) and second (2014-2017) follow-ups. Significant ($p < 0.05$) results are indicated in bold.

Table S4: multivariable regression analysis between lipid and lipoprotein levels (dependent variable) and serum phytosterol levels, participants not treated for hyperlipidemia, CoLaus | PsyCoLaus study, Lausanne, Switzerland.

	Total cholesterol		Total cholesterol GC		LDL cholesterol		HDL cholesterol		Triglycerides	
	First	Second	First	Second	First	Second	First	Second	First	Second
Campesterol [mg/dl]	1.645 (1.265; 2.025)	1.348 (1.002; 1.695)	62.4 (48.3 ; 76.6)	71 (50.5 ; 91.5)	1.606 (1.105; 2.106)	2.237 (1.708; 2.766)	0.231 (0.070; 0.392)	0.551 (0.298; 0.804)	0.068 (-0.105; 0.241)	-0.006 (-0.269; 0.257)
Campestanol [µg/dl]	0.077 (0.058; 0.095)	0.068 (0.051; 0.084)	3.207 (2.529 ; 3.885)	6.952 (4.893 ; 9.012)	0.184 (0.134; 0.233)	0.229 (0.176; 0.282)	-0.002 (-0.010; 0.006)	0.019 (-0.007; 0.044)	0.016 (0.008; 0.025)	0.038 (0.012; 0.064)
Stigmasterol [µg/dl]	0.060 (0.041; 0.078)	0.051 (0.034; 0.067)	2.085 (1.39 ; 2.780)	1.921 (1.085 ; 2.757)	0.051 (0.031; 0.071)	0.062 (0.040; 0.084)	0.001 (-0.007; 0.009)	0.004 (-0.006; 0.014)	0.012 (0.004; 0.020)	0.009 (-0.001; 0.019)
Sitosterol [mg/dl]	2.465 (1.885; 3.044)	2.009 (1.481; 2.537)	94.6 (73.1 ; 116.1)	84.2 (57.7 ; 110.6)	2.138 (1.502; 2.773)	2.694 (2.010; 3.378)	0.296 (0.050; 0.541)	0.494 (0.166; 0.821)	0.189 (-0.074; 0.452)	-0.020 (-0.357; 0.318)
Sitostanol [µg/dl]	0.049 (0.030; 0.068)	0.043 (0.026; 0.059)	2.25 (1.564 ; 2.935)	3.209 (1.428 ; 4.991)	0.093 (0.051; 0.136)	0.123 (0.077; 0.170)	-0.003 (-0.011; 0.005)	0.018 (-0.004; 0.040)	0.015 (0.007; 0.023)	0.017 (-0.005; 0.039)
Brassicasterol [µg/dl]	0.024 (0.017; 0.030)	0.019 (0.013; 0.025)	0.882 (0.632 ; 1.132)	0.945 (0.662 ; 1.228)	0.020 (0.013; 0.028)	0.029 (0.022; 0.037)	0.002 (-0.001; 0.005)	0.007 (0.003; 0.010)	0.003 (0.000; 0.006)	0.002 (-0.001; 0.006)

Results are expressed as slope and (95% confidence interval). Data for the first (2009-2012) and second (2014-2017) follow-ups. Statistical analysis conducted by linear regression adjusting for age (continuous), sex (male, female), BMI (continuous) and diabetes (yes, no). Significant ($p < 0.05$) associations are indicated in bold.

Table S5: multivariable regression analysis between lipid and lipoprotein levels (dependent variable) and serum phytosterol levels, stratified by gender, CoLaus | PsyCoLaus study, Lausanne, Switzerland.

	Total cholesterol		Total cholesterol GC		LDL cholesterol		HDL cholesterol		Triglycerides	
	First	Second	First	Second	First	Second	First	Second	First	Second
Male										
Campesterol [mg/dl]	2.018 (1.479 ; 2.557)	1.777 (1.071 ; 2.483)	67.5 (47.1 ; 87.9)	57.2 (29.2 ; 85.2)	1.430 (0.961 ; 1.900)	1.260 (0.620 ; 1.900)	0.588 (0.379 ; 0.796)	0.538 (0.224 ; 0.852)	-0.078 (-0.347 ; 0.191)	-0.147 (-0.517 ; 0.223)
Campestanol [µg/dl]	0.104 (0.075 ; 0.133)	0.189 (0.136 ; 0.242)	3.951 (2.866 ; 5.036)	6.842 (3.501 ; 10.18)	0.086 (0.062 ; 0.111)	0.188 (0.113 ; 0.263)	0.004 (-0.008 ; 0.016)	0.033 (-0.005 ; 0.071)	0.020 (0.006 ; 0.034)	0.017 (-0.027 ; 0.062)
Stigmasterol [µg/dl]	0.05 (0.021 ; 0.079)	0.043 (0.012 ; 0.075)	1.786 (0.703 ; 2.869)	1.414 (0.177 ; 2.651)	0.039 (0.014 ; 0.064)	0.043 (0.015 ; 0.070)	0.001 (-0.01 ; 0.012)	0.002 (-0.012 ; 0.016)	0.015 (0.001 ; 0.029)	-0.003 (-0.019 ; 0.013)
Sitosterol [mg/dl]	2.996 (2.118 ; 3.874)	2.160 (1.241 ; 3.079)	107.2 (74.3 ; 140.1)	66.6 (30.2 ; 103.1)	2.212 (1.454 ; 2.970)	1.76 (0.944 ; 2.576)	0.785 (0.446 ; 1.125)	0.513 (0.102 ; 0.924)	-0.138 (-0.571 ; 0.295)	-0.322 (-0.801 ; 0.156)
Sitostanol [µg/dl]	0.070 (0.039 ; 0.100)	0.046 (-0.014 ; 0.106)	2.544 (1.403 ; 3.684)	0.286 (-2.078 ; 2.651)	0.058 (0.032 ; 0.084)	0.031 (-0.022 ; 0.084)	0.004 (-0.008 ; 0.016)	0.007 (-0.019 ; 0.034)	0.012 (-0.002 ; 0.027)	0.010 (-0.020 ; 0.041)
Brassicasterol [µg/dl]	0.033 (0.023 ; 0.043)	0.026 (0.017 ; 0.036)	1.044 (0.655 ; 1.434)	0.909 (0.527 ; 1.291)	0.023 (0.014 ; 0.032)	0.018 (0.009 ; 0.027)	0.008 (0.004 ; 0.012)	0.006 (0.002 ; 0.011)	0.002 (-0.004 ; 0.007)	0.002 (-0.004 ; 0.007)
Female										
Campesterol [mg/dl]	1.377 (0.976 ; 1.779)	1.968 (1.460 ; 2.476)	56.2 (41.2 ; 71.2)	67.7 (48.0 ; 87.5)	1.182 (0.805 ; 1.558)	1.365 (0.879 ; 1.851)	0.097 (-0.080 ; 0.275)	0.644 (0.39 ; 0.898)	0.131 (-0.043 ; 0.305)	-0.183 (-0.418 ; 0.051)
Campestanol [µg/dl]	0.062 (0.045 ; 0.08)	0.207 (0.162 ; 0.252)	2.803 (2.153 ; 3.453)	6.453 (4.397 ; 8.509)	0.059 (0.042 ; 0.075)	0.157 (0.107 ; 0.206)	-0.005 (-0.013 ; 0.002)	0.02 (-0.007 ; 0.047)	0.015 (0.007 ; 0.022)	0.017 (-0.007 ; 0.041)
Stigmasterol [µg/dl]	0.064 (0.045 ; 0.083)	0.072 (0.05 ; 0.094)	2.458 (1.733 ; 3.182)	2.217 (1.364 ; 3.069)	0.053 (0.035 ; 0.071)	0.056 (0.035 ; 0.076)	0.004 (-0.004 ; 0.013)	0.014 (0.003 ; 0.024)	0.011 (0.002 ; 0.019)	0.002 (-0.008 ; 0.012)
Sitosterol [mg/dl]	2.028 (1.420 ; 2.635)	2.304 (1.623 ; 2.986)	81.2 (58.4 ; 103.9)	86.6 (60.3 ; 112.8)	1.677 (1.107 ; 2.248)	1.731 (1.087 ; 2.374)	0.207 (-0.061 ; 0.475)	0.647 (0.307 ; 0.986)	0.219 (-0.044 ; 0.482)	-0.216 (-0.525 ; 0.094)
Sitostanol [µg/dl]	0.041 (0.023 ; 0.059)	0.087 (0.045 ; 0.129)	2.106 (1.438 ; 2.774)	2.886 (1.262 ; 4.511)	0.038 (0.022 ; 0.055)	0.071 (0.032 ; 0.110)	-0.006 (-0.013 ; 0.002)	0.013 (-0.008 ; 0.034)	0.014 (0.007 ; 0.022)	0.003 (-0.015 ; 0.022)
Brassicasterol [µg/dl]	0.018 (0.011 ; 0.025)	0.024 (0.017 ; 0.032)	0.760 (0.500 ; 1.020)	0.947 (0.663 ; 1.230)	0.015 (0.009 ; 0.022)	0.016 (0.009 ; 0.023)	0.000 (-0.003 ; 0.003)	0.008 (0.004 ; 0.012)	0.004 (0.001 ; 0.007)	-0.002 (-0.005 ; 0.002)

Results are expressed as slope and (95% confidence interval). Data for the first (2009-2012) and second (2014-2017) follow-ups. Statistical analysis conducted by linear regression adjusting for age (continuous), BMI (continuous) and diabetes (yes, no). Significant ($p < 0.05$) associations are indicated in bold.

Table S6: multivariable regression analysis between apolipoprotein A-IV, Lp(a) (dependent variable) and serum phytosterol levels, participants not treated for hyperlipidemia, CoLaus|PsyCoLaus study, Lausanne, Switzerland.

	Apolipoprotein A-IV	Lp(a), log-transformed
Campesterol [mg/dl]	0.705 (-1.137 ; 2.547)	0.192 (-0.290 ; 0.673)
Campestanol [µg/dl]	0.034 (-0.055 ; 0.123)	0.020 (-0.003 ; 0.043)
Stigmasterol [µg/dl]	-0.007 (-0.096 ; 0.082)	0.007 (-0.017 ; 0.030)
Sitosterol [mg/dl]	0.898 (-1.905 ; 3.701)	0.308 (-0.425 ; 1.041)
Sitostanol [µg/dl]	0.056 (-0.031 ; 0.143)	0.013 (-0.010 ; 0.036)
Brassicasterol [µg/dl]	0 (-0.033 ; 0.032)	0 (-0.008 ; 0.009)

Results are expressed as slope and (95% confidence interval). Data for the first follow-up (2009-2012). Statistical analysis conducted by linear regression adjusting for age (continuous), sex (male, female), BMI (continuous) and diabetes (yes, no). No significant ($p < 0.05$) association was found.

Table S7: multivariable regression analysis between apolipoprotein A-IV, Lp(a) (dependent variable) and serum phytosterol levels, stratified by sex, CoLaus|PsyCoLaus study, Lausanne, Switzerland.

	Apolipoprotein A-IV	Lp(a), log-transformed
Male		
Campesterol [mg/dl]	3.708 (0.631 ; 6.786)	0.143 (-0.585 ; 0.871)
Campestanol [µg/dl]	-0.048 (-0.214 ; 0.119)	0.016 (-0.024 ; 0.055)
Stigmasterol [µg/dl]	0.062 (-0.096 ; 0.221)	0 (-0.037 ; 0.037)
Sitosterol [mg/dl]	5.516 (0.556 ; 10.48)	-0.073 (-1.245 ; 1.099)
Sitostanol [µg/dl]	0.068 (-0.100 ; 0.236)	-0.002 (-0.042 ; 0.037)
Brassicasterol [µg/dl]	0.039 (-0.019 ; 0.097)	-0.001 (-0.015 ; 0.013)
Female		
Campesterol [mg/dl]	1.564 (-0.408 ; 3.536)	0.010 (-0.475 ; 0.496)
Campestanol [µg/dl]	0.048 (-0.039 ; 0.134)	0.004 (-0.017 ; 0.026)
Stigmasterol [µg/dl]	0.025 (-0.070 ; 0.119)	-0.003 (-0.026 ; 0.021)
Sitosterol [mg/dl]	1.242 (-1.738 ; 4.222)	0.145 (-0.588 ; 0.877)
Sitostanol [µg/dl]	0.051 (-0.035 ; 0.137)	0.002 (-0.019 ; 0.023)
Brassicasterol [µg/dl]	0.023 (-0.011 ; 0.056)	0 (-0.008 ; 0.009)

Results are expressed as slope and (95% confidence interval). Data for the first follow-up (2009-2012). Statistical analysis conducted by linear regression adjusting for age (continuous), BMI (continuous) and diabetes (yes, no). Significant ($p < 0.05$) associations are indicated in bold.