

Table S1. Standardized beta's of the link between sex and the changes in individual lipid species following loss and weight maintenance

| Lipid species | Change from CID1-2 | | Change from CID2-3 | |
|---------------|--------------------|---------|--------------------|---------|
| | Std. beta \pm SE | q-value | Std. beta \pm SE | q-value |
| TAG (46:2) | -0.023 \pm 0.018 | 0.290 | 0.023 \pm 0.044 | 0.599 |
| TAG (48:0) | -0.038 \pm 0.021 | 0.159 | -0.070 \pm 0.047 | 0.154 |
| TAG (48:1) | -0.010 \pm 0.022 | 0.764 | -0.099 \pm 0.046 | 0.041 |
| TAG (48:2) | -0.004 \pm 0.023 | 0.910 | -0.072 \pm 0.044 | 0.114 |
| TAG (48:3) | -0.002 \pm 0.024 | 0.950 | -0.024 \pm 0.041 | 0.570 |
| TAG (48:4) | -0.057 \pm 0.026 | 0.078 | 0.045 \pm 0.042 | 0.299 |
| TAG (50:0) | -0.038 \pm 0.022 | 0.169 | -0.140 \pm 0.047 | 0.005 |
| TAG (50:1) | 0.009 \pm 0.028 | 0.831 | -0.119 \pm 0.046 | 0.015 |
| TAG (50:2) | 0.070 \pm 0.029 | 0.046 | -0.132 \pm 0.045 | 0.005 |
| TAG (50:3) | 0.068 \pm 0.030 | 0.061 | -0.099 \pm 0.040 | 0.020 |
| TAG (50:4) | 0.047 \pm 0.029 | 0.182 | -0.075 \pm 0.038 | 0.065 |
| TAG (50:5) | 0.031 \pm 0.025 | 0.295 | -0.056 \pm 0.041 | 0.182 |
| TAG (51:1) | -0.005 \pm 0.024 | 0.874 | -0.160 \pm 0.045 | <0.001 |
| TAG (51:2) | -0.008 \pm 0.026 | 0.831 | -0.070 \pm 0.043 | 0.119 |
| TAG (51:3) | 0.042 \pm 0.031 | 0.255 | -0.108 \pm 0.037 | 0.006 |
| TAG (51:4) | 0.046 \pm 0.030 | 0.220 | -0.097 \pm 0.038 | 0.016 |
| TAG (52:0) | -0.037 \pm 0.017 | 0.068 | -0.210 \pm 0.047 | <0.001 |
| TAG (52:1) | -0.001 \pm 0.025 | 0.958 | -0.177 \pm 0.046 | <0.001 |
| TAG (52:2) | 0.065 \pm 0.036 | 0.158 | -0.135 \pm 0.043 | 0.004 |
| TAG (52:3) | 0.105 \pm 0.034 | 0.010 | -0.098 \pm 0.041 | 0.024 |
| TAG (52:4) | 0.118 \pm 0.034 | <0.001 | -0.094 \pm 0.040 | 0.024 |
| TAG (52:5) | 0.067 \pm 0.027 | 0.0428 | -0.098 \pm 0.039 | 0.017 |
| TAG (52:6) | 0.037 \pm 0.022 | 0.174 | -0.110 \pm 0.040 | 0.011 |
| TAG (53:1) | -0.037 \pm 0.027 | 0.253 | -0.053 \pm 0.045 | 0.259 |
| TAG (54:0) | 0.014 \pm 0.009 | 0.215 | 0.072 \pm 0.044 | 0.118 |
| TAG (54:0) | -0.034 \pm 0.023 | 0.228 | -0.151 \pm 0.041 | <0.001 |
| TAG (54:1) | -0.025 \pm 0.018 | 0.248 | -0.235 \pm 0.047 | <0.001 |
| TAG (54:2) | 0.043 \pm 0.031 | 0.248 | -0.193 \pm 0.043 | <0.001 |
| TAG (54:3) | 0.050 \pm 0.036 | 0.248 | -0.126 \pm 0.041 | 0.004 |
| TAG (54:4) | 0.065 \pm 0.034 | 0.136 | -0.115 \pm 0.039 | 0.006 |
| TAG (54:5) | 0.094 \pm 0.032 | 0.018 | -0.147 \pm 0.040 | <0.001 |
| TAG (54:6) | 0.078 \pm 0.029 | 0.024 | -0.152 \pm 0.041 | <0.001 |
| TAG (54:7) | 0.045 \pm 0.026 | 0.163 | -0.158 \pm 0.042 | <0.001 |
| TAG (55:1) | -0.029 \pm 0.026 | 0.344 | -0.184 \pm 0.047 | <0.001 |
| TAG (55:2) | 0.011 \pm 0.035 | 0.831 | -0.077 \pm 0.043 | 0.094 |
| TAG (55:3) | 0.064 \pm 0.035 | 0.158 | -0.076 \pm 0.043 | 0.094 |
| TAG (56:1) | -0.057 \pm 0.013 | <0.001 | -0.215 \pm 0.047 | <0.001 |
| TAG (56:2) | -0.043 \pm 0.015 | 0.024 | -0.251 \pm 0.048 | <0.001 |
| TAG (56:3) | -0.014 \pm 0.028 | 0.760 | -0.198 \pm 0.043 | <0.001 |
| TAG (56:4) | 0.014 \pm 0.030 | 0.764 | -0.090 \pm 0.040 | 0.033 |
| TAG (56:5) | 0.028 \pm 0.032 | 0.478 | -0.108 \pm 0.037 | 0.006 |
| TAG (56:6) | 0.105 \pm 0.032 | 0.007 | -0.139 \pm 0.040 | <0.001 |
| TAG (56:7) | 0.077 \pm 0.030 | 0.029 | -0.177 \pm 0.043 | <0.001 |
| TAG (56:8) | 0.093 \pm 0.030 | 0.010 | -0.184 \pm 0.047 | <0.001 |
| TAG (57:1) | -0.029 \pm 0.025 | 0.317 | -0.216 \pm 0.045 | <0.001 |
| TAG (57:2) | 0.014 \pm 0.033 | 0.786 | -0.198 \pm 0.042 | <0.001 |
| TAG (58:1) | -0.057 \pm 0.015 | <0.001 | -0.184 \pm 0.049 | <0.001 |
| TAG (58:2) | -0.059 \pm 0.014 | <0.001 | -0.185 \pm 0.049 | <0.001 |
| TAG (58:3) | -0.045 \pm 0.014 | 0.009 | -0.198 \pm 0.049 | <0.001 |
| TAG (58:6) | 0.080 \pm 0.030 | 0.024 | -0.131 \pm 0.040 | 0.002 |
| TAG (58:8) | 0.086 \pm 0.031 | 0.024 | -0.156 \pm 0.046 | 0.002 |

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|-----------------|----------------|--------|----------------|--------|
| TAG (58:9) | 0.103 ± 0.031 | 0.007 | -0.175 ± 0.045 | <0.001 |
| TAG (58:10) | 0.098 ± 0.031 | 0.010 | -0.149 ± 0.047 | 0.004 |
| TAG (59:0) | -0.031 ± 0.023 | 0.258 | -0.123 ± 0.040 | 0.004 |
| TAG (60:2) | -0.056 ± 0.013 | <0.001 | -0.197 ± 0.050 | <0.001 |
| DAG (36:2) | | | -0.139 ± 0.039 | <0.001 |
| DAG (36:3) | | | -0.082 ± 0.035 | 0.020 |
| CholE02 | 0.038 ± 0.033 | 0.250 | | |
| CholE05 | 0.208 ± 0.039 | <0.001 | | |
| CholE06 | 0.208 ± 0.039 | <0.001 | | |
| LPC (14:0) | -0.066 ± 0.033 | 0.069 | 0.031 ± 0.041 | 0.460 |
| LPC (16:0) | -0.072 ± 0.039 | 0.081 | -0.178 ± 0.041 | <0.002 |
| LPC (16:1) | -0.010 ± 0.034 | 0.776 | -0.061 ± 0.043 | 0.176 |
| LPC (18:0) | -0.042 ± 0.039 | 0.308 | -0.102 ± 0.040 | 0.017 |
| LPC (18:1) | -0.275 ± 0.037 | <0.001 | -0.159 ± 0.047 | 0.002 |
| LPC (18:2) | -0.235 ± 0.040 | <0.001 | -0.146 ± 0.040 | <0.001 |
| LPC (18:3) | -0.171 ± 0.029 | <0.001 | -0.097 ± 0.043 | 0.032 |
| LPC (20:3) | -0.198 ± 0.036 | <0.001 | -0.108 ± 0.042 | 0.016 |
| LPC (20:4) | -0.127 ± 0.040 | 0.003 | -0.180 ± 0.044 | <0.001 |
| LPC (20:5) | -0.138 ± 0.033 | <0.001 | -0.194 ± 0.048 | <0.001 |
| LPC (22:6) | -0.198 ± 0.038 | <0.001 | -0.142 ± 0.047 | 0.005 |
| LPCO (16:1) | -0.177 ± 0.039 | <0.001 | | |
| LPCO (18:1) | -0.068 ± 0.039 | 0.085 | | |
| SM (d18:1/14:0) | 0.094 ± 0.036 | 0.018 | 0.092 ± 0.038 | 0.027 |
| SM (d18:1/15:0) | 0.140 ± 0.041 | 0.003 | 0.091 ± 0.039 | 0.031 |
| SM (d18:1/16:0) | 0.103 ± 0.040 | 0.018 | 0.074 ± 0.037 | 0.059 |
| SM (d18:1/16:1) | 0.185 ± 0.044 | <0.001 | 0.122 ± 0.039 | 0.007 |
| SM (d18:1/17:0) | 0.201 ± 0.040 | <0.001 | 0.027 ± 0.037 | 0.528 |
| SM (d18:1/18:0) | 0.284 ± 0.040 | <0.001 | 0.045 ± 0.030 | 0.162 |
| SM (d18:1/18:1) | 0.255 ± 0.041 | <0.001 | 0.070 ± 0.031 | 0.033 |
| SM (d18:1/18:2) | 0.289 ± 0.040 | <0.001 | 0.097 ± 0.037 | 0.016 |
| SM (d18:1/20:0) | -0.054 ± 0.033 | 0.147 | 0.104 ± 0.036 | 0.009 |
| SM (d18:1/20:1) | 0.008 ± 0.040 | 0.888 | 0.144 ± 0.040 | <0.001 |
| SM (d18:1/21:0) | -0.028 ± 0.033 | 0.467 | 0.126 ± 0.037 | 0.004 |
| SM (d18:1/22:0) | -0.049 ± 0.035 | 0.211 | 0.143 ± 0.040 | <0.001 |
| SM (d18:1/22:1) | -0.005 ± 0.038 | 0.898 | 0.217 ± 0.040 | <0.001 |
| SM (d18:1/23:0) | -0.041 ± 0.034 | 0.271 | 0.108 ± 0.036 | 0.008 |
| SM (d18:1/23:1) | 0.017 ± 0.038 | 0.724 | 0.152 ± 0.041 | <0.002 |
| SM (d18:1/24:0) | -0.073 ± 0.034 | 0.052 | 0.115 ± 0.041 | 0.012 |
| SM (d18:1/24:1) | 0.111 ± 0.041 | 0.016 | 0.082 ± 0.036 | 0.031 |
| SM (d18:1/24:2) | 0.150 ± 0.041 | <0.001 | 0.112 ± 0.038 | 0.008 |
| SM (d18:1/25:0) | 0.054 ± 0.033 | 0.147 | 0.024 ± 0.039 | 0.574 |
| SM (d18:1/25:1) | 0.197 ± 0.041 | <0.001 | -0.016 ± 0.038 | 0.677 |

Standardized beta ± standard error in linear mixed model with the individual lipid species as dependent variable, sex as fixed effect and study center as random effect. Adjusted for age, body weight at baseline, weight loss and baseline value of the dependent variable in the weight loss phase (from CID1 to CID2) and adjusted for age, baseline weight, baseline value of the dependent variable, change of the dependent variable during weight loss, weight change during the weight loss phase and weight maintenance phase and diet in the weight maintenance phase (from CID2 to CID3). *q*-value = False Discovery Rate adjusted *p*-value. Individual lipid species only shown when the change in total lipid group revealed statistically significant association with sex (Figure 2).