Supplementary Table 1. Effects of the interaction between MEHP and PFOS levels on fatty acid levels

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| --- | --- | --- | --- |
|  |  | Crude | Adjusted |
| Outcome | Exposure | β (95% CI) | β (95% CI) |
| Triglyceride | MEHP | -0.150 (-0.389, 0.089) | -0.156 (-0.395, 0.082) |
|  | PFOS | -0.347 (-0.686, -0.009)\* | -0.302 (-0.645, 0.041) |
|  | MEHP × PFOS | 0.150 (-0.175, 0.476) | 0.134 (-0.191, 0.460) |
|  |  | *pint* = 0.364 | *pint* = 0.418 |
| Palmitic acid | MEHP | -0.082 (-0.262, 0.098) | -0.087 (-0.269, 0.094) |
|  | PFOS | -0.077 (-0.331, 0.177) | -0.072 (-0.334, 0.189) |
|  | MEHP × PFOS | -0.010 (-0.255, 0.235) | -0.008 (-0.258, 0.239) |
|  |  | *pint* = 0.936 | *pint* = 0.947 |
| Palmitoleic acid | MEHP | -0.091 (-0.357, 0.175) | -0.089 (-0.356, 0.177) |
|  | PFOS | -0.171 (-0.547, 0.359) | -0.093 (-0.476, 0.291) |
|  | MEHP × PFOS | -0.002 (-0.364, 0.359) | -0.037 (-0.401, 0.327) |
|  |  | *pint* = 0.989 | *pint* = 0.841 |
| Stearic acid | MEHP | -0.014 (-0.182, 0.154) | -0.011 (-0.180, 0.159) |
|  | PFOS | 0.089 (-0.148, 0.326) | 0.109 (-0.135, 0.353) |
|  | MEHP × PFOS | -0.030 (-0.258, 0.198) | -0.039 (-0.270, 0.192) |
|  |  | *pint* = 0.797 | *pint* = 0.740 |
| Oleic acid | MEHP | -0.078 (-0.281, 0.124) | -0.075 (-0.279, 0.128) |
|  | PFOS | -0.121 (-0.408, 0.165) | -0.068 (-0.360, 0.225) |
|  | MEHP × PFOS | 0.005 (-0.270, 0.281) | -0.020 (-0.298, 0.257) |
|  |  | *pint* = 0.971 | *pint* = 0.885 |
| Linoleic acid | MEHP | -0.081 (-0.493, 0.331) | -0.085 (-0.502, 0.332) |
|  | PFOS | -0.344 (-0.927, 0.239) | -0.339 (-0.938, 0.260) |
|  | MEHP × PFOS | -0.080 (-0.641, 0.480) | -0.079 (-0.647, 0.490) |
|  |  | *pint* = 0.779 | *pint* = 0.785 |
| Linolenic acid | MEHP | -0.248 (-0.730, 0.233) | -0.236 (-0.721, 0.249) |
|  | PFOS | -0.583 (-1.265, 0.099) | -0.498 (-1.196, 0.200) |
|  | MEHP × PFOS | 0.149 (-0.507, 0.804) | 0.105 (-0.557, 0.767) |
|  |  | *pint* = 0.656 | *pint* = 0.755 |
| Arachidonic acid | MEHP | 0.168 (-0.240, 0.576) | 0.167 (-0.245, 0.580) |
|  | PFOS | 0.057 (-0.520, 0.634) | 0.056 (-0.537, 0.649) |
|  | MEHP × PFOS | -0.312 (-0.867, 0.243) | -0.306 (-0.869, 0.257) |
|  |  | *pint* = 0.270 | *pint* = 0.285 |
| Eicosapentaenoic acid | MEHP | 0.338 (-0.099, 0.775) | 0.358 (-0.081, 0.797) |
|  | PFOS | 0.742 (0.126, 1.358)\* | 0.863 (0.234, 1.493)\*\* |
|  | MEHP × PFOS | -0.590 (-1.184, 0.005) | -0.650 (-1.249, -0.050) |
|  |  | *pint* = 0.052 | *pint* = 0.034 |
| Docosahexaenoic acid | MEHP | 0.481 (0.039, 0.923)\* | 0.488 (0.040, 0.935)\* |
|  | PFOS | 0.538 (-0.088, 1.164) | 0.546 (-0.097, 1.190) |
|  | MEHP × PFOS | -0.652 (-1.253, -0.050) | -0.655 (-1.265, -0.045) |
|  |  | *pint* = 0.034 | *pint* = 0.035 |

Abbreviations: CI, confidence interval; MEHP, mono-(2-ethylhexyl) phthalate; PFOS, perfluorooctanesulfonate.

Association between MEHP and fatty acid levels was tested in multiple linear regression models.

Crude: Non-adjusted.

Adjusted: Adjusted for maternal age (years, continuous), maternal smoking during the 3rd trimester (yes/no), maternal alcohol consumption during pregnancy (yes/no), annual household income (< 5/≥ 5 million Japanese yen), parity (primiparous or multiparous), and sampling period (during pregnancy or after delivery).

β (95% CI) represents the change in log10-transformed levels of triglycerides (mg/100 mL), palmitic acid (μg/mL), palmitoleic acid (μg/mL), stearic acid (μg/mL), oleic acid (μg/mL), linoleic acid (μg/mL), linolenic acid (μg/mL), arachidonic acid (μg/mL), eicosapentaenoic acid (μg/mL), or docosahexaenoic acid (μg/mL).

*pint*represents the *p*-value for the interaction.

\* *p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.

Supplementary Table 2. Association between MEHP and fatty acid levels stratified by maternal *PPARGC1A* (rs8192678) genotype

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Exposure: MEHP (ng/mL) | | |
|  |  | Crude | Adjusted 1 | Adjusted 2 |
| Outcome | Genotype | β (95% CI) | β (95% CI) | β (95% CI) |
| Triglyceride | GG | -0.193 (-0.336, -0.050)\*\* | -0.205 (-0.353, -0.058)\*\* | -0.092 (-0.255, 0.072) |
|  | GA/AA | -0.085 (-0.163, -0.006)\* | -0.094 (-0.173, -0.015)\* | -0.059 (-0.146, 0.029) |
| Palmitic acid | GG | -0.206 (-0.313, -0.098)\*\*\* | -0.219 (-0.332, -0.106)\*\*\* | -0.128 (-0.253, -0.003)\* |
|  | GA/AA | -0.090 (-0.148, -0.032)\*\* | -0.092 (-0.151, -0.032)\*\* | -0.085 (-0.151, -0.019)\* |
| Palmitoleic acid | GG | -0.146 (-0.309, 0.017) | -0.165 (-0.332, 0.003) | -0.016 (-0.200, 0.168) |
|  | GA/AA | -0.153 (-0.239, -0.067)\*\* | -0.164 (-0.251, -0.077)\*\*\* | -0.153 (-0.249, -0.056)\*\* |
| Stearic acid | GG | -0.082 (-0.172, 0.008) | -0.081 (-0.176, 0.013) | -0.056 (-0.165, 0.052) |
|  | GA/AA | 0.006 (-0.050, 0.063) | 0.008 (-0.050, 0.065) | -0.032 (-0.095, 0.031) |
| Oleic acid | GG | -0.226 (-0.347, -0.105)\*\*\* | -0.236 (-0.364, -0.109)\*\*\* | -0.130 (-0.271, 0.010) |
|  | GA/AA | -0.077 (-0.143, -0.012)\* | -0.085 (-0.151, -0.018)\* | -0.077 (-0.151, -0.004)\* |
| Linoleic acid | GG | -0.377 (-0.655, -0.098)\*\* | -0.399 (-0.693, -0.104)\*\* | -0.185 (-0.513, 0.144) |
|  | GA/AA | -0.247 (-0.377, -0.117)\*\*\* | -0.242 (-0.374, -0.109)\*\*\* | -0.131 (-0.275, 0.214) |
| Linolenic acid | GG | -0.383 (-0.669, -0.098)\*\* | -0.381 (-0.682, -0.079)\* | -0.206 (-0.546, 0.133) |
|  | GA/AA | -0.261 (-0.421, -0.101)\*\* | -0.268 (-0.430, -0.107)\*\* | -0.158 (-0.336, 0.019) |
| Arachidonic acid | GG | -0.085 (-0.351, 0.182) | -0.090 (-0.372, 0.191) | 0.045 (-0.274, 0.365) |
|  | GA/AA | -0.152 (-0.280, -0.024)\* | -0.142 (-0.273, -0.011)\* | -0.078 (-0.222, 0.067) |
| Eicosapentaenoic acid | GG | -0.050 (-0.305, 0.205) | -0.047 (-0.316, 0.222) | -0.073 (-0.380, 0.235) |
|  | GA/AA | -0.018 (-0.160, 0.125) | -0.027 (-0.173, 0.118) | -0.114 (-0.275, 0.046) |
| Docosahexaenoic acid | GG | 0.072 (-0.210, 0.354) | 0.054 (-0.245, 0.353) | 0.156 (-0.185, 0.498) |
|  | GA/AA | -0.042 (-0.180, 0.097) | -0.036 (-0.178, 0.107) | -0.022 (-0.180, 0.136) |

Abbreviations: CI, confidence interval; MEHP, mono-(2-ethylhexyl) phthalate; PFOS, perfluorooctanesulfonate; PPARGC1A, peroxisome proliferator-activated receptor gamma coactivator 1-alpha.

Association between MEHP and fatty acid levels were tested in multiple linear regression models.

Crude: Non-adjusted.

Adjusted 1: Adjusted for maternal age (years, continuous), maternal smoking during the 3rd trimester (yes/no), maternal alcohol consumption during pregnancy (yes/no), annual household income (< 5/≥ 5 million Japanese yen), parity (primiparous or multiparous), and sampling period (during pregnancy or after delivery).

Adjusted 2: Adjusted for the covariates of “adjusted 1” plus log10-transformed PFOS level (ng/mL).

β (95% CI) represents the change in log10-transformed levels of triglycerides (mg/100 mL), palmitic acid (μg/mL), palmitoleic acid (μg/mL), stearic acid (μg/mL), oleic acid (μg/mL), linoleic acid (μg/mL), linolenic acid (μg/mL), arachidonic acid (μg/mL), eicosapentaenoic acid (μg/mL), or docosahexaenoic acid (μg/mL) for each 10-fold increase in MEHP levels (ng/mL).

\* *p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.

Supplementary Table 3. Association between MEHP and fatty acid levels stratified by maternal *LXRB* (rs2303044) genotype

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Exposure: MEHP (ng/mL) | | |
|  |  | Crude | Adjusted 1 | Adjusted 2 |
| Outcome | Genotype | β (95% CI) | β (95% CI) | β (95% CI) |
| Triglyceride | GG | -0.136 (-0.221, -0.052)\*\* | -0.150 (-0.235, -0.065)\*\* | -0.095 (-0.189, -0.001)\* |
|  | GA/AA | -0.059 (-0.179, 0.060) | -0.047 (-0.168, 0.074) | 0.014 (-0.119, 0.147) |
| Palmitic acid | GG | -0.142 (-0.205, -0.079)\*\*\* | -0.145 (-0.209, -0.081)\*\*\* | -0.122 (-0.194, -0.051)\*\* |
|  | GA/AA | -0.067 (-0.157, 0.022) | -0.067 (-0.160, 0.025) | -0.029 (-0.131, 0.074) |
| Palmitoleic acid | GG | -0.173 (-0.266, -0.079)\*\*\* | -0.187 (-0.282, -0.092)\*\*\* | -0.148 (-0.254, -0.043)\*\* |
|  | GA/AA | -0.105 (-0.236, 0.026) | -0.093 (-0.227, 0.040) | -0.031 (-0.178, 0.116) |
| Stearic acid | GG | -0.014 (-0.073, 0.044) | -0.017 (-0.077, 0.044) | -0.039 (-0.106, 0.028) |
|  | GA/AA | -0.019 (-0.101, 0.063) | -0.017 (-0.102, 0.068) | -0.039 (-0.134, 0.056) |
| Oleic acid | GG | -0.132 (-0.203, -0.061)\*\*\* | -0.141 (-0.213, -0.069)\*\*\* | -0.114 (-0.195, -0.034)\*\* |
|  | GA/AA | -0.073 (-0.174, 0.027) | -0.067 (-0.170, 0.036) | -0.029 (-0.143, 0.085) |
| Linoleic acid | GG | -0.384 (-0.537, -0.230)\*\*\* | -0.378 (-0.536, -0.221)\*\*\* | -0.224 (-0.395, -0.052)\* |
|  | GA/AA | -0.061 (-0.237, 0.115) | -0.048 (-0.228, 0.133) | 0.071 (-0.124, 0.267) |
| Linolenic acid | GG | -0.355 (-0.528, -0.182)\*\*\* | -0.358 (-0.535, -0.182)\*\*\* | -0.213 (-0.407, -0.019)\* |
|  | GA/AA | -0.158 (-0.389, 0.074) | -0.126 (-0.359, 0.108) | -0.006 (-0.263, 0.251) |
| Arachidonic acid | GG | -0.219 (-0.367, -0.072)\*\* | -0.208 (-0.359, -0.057)\*\* | -0.105 (-0.272, 0.062) |
|  | GA/AA | 0.037 (-0.146, 0.220) | 0.052 (-0.136, 0.241) | 0.111 (-0.098, 0.321) |
| Eicosapentaenoic acid | GG | 0.010 (-0.144, 0.164) | 0.016 (-0.142, 0.173) | -0.083 (-0.257, 0.091) |
|  | GA/AA | -0.087 (-0.300, 0.125) | -0.081 (-0.295, 0.133) | -0.097 (-0.336, 0.142) |
| Docosahexaenoic acid | GG | -0.088 (-0.247, 0.071) | -0.068 (-0.231, 0.094) | -0.005 (-0.187, 0.176) |
|  | GA/AA | 0.135 (-0.061, 0.330) | 0.154 (-0.047, 0.356) | 0.161 (-0.064, 0.386) |

Abbreviations: CI, confidence interval; MEHP, mono-(2-ethylhexyl) phthalate; PFOS, perfluorooctanesulfonate; LXRB, liver X receptor beta.

Association between MEHP and fatty acid levels was tested in multiple linear regression models.

Crude: Non-adjusted.

Adjusted 1: Adjusted for maternal age (years, continuous), maternal smoking during the 3rd trimester (yes/no), maternal alcohol consumption during pregnancy (yes/no), annual household income (< 5/≥ 5 million Japanese yen), parity (primiparous or multiparous), and sampling period (during pregnancy or after delivery).

Adjusted 2: Adjusted for the covariates of “adjusted 1” plus log10-transformed PFOS level (ng/mL).

β (95% CI) represents the change in log10-transformed levels of triglycerides (mg/100 mL), palmitic acid (μg/mL), palmitoleic acid (μg/mL), stearic acid (μg/mL), oleic acid (μg/mL), linoleic acid (μg/mL), linolenic acid (μg/mL), arachidonic acid (μg/mL), eicosapentaenoic acid (μg/mL), or docosahexaenoic acid (μg/mL) for each 10-fold increase in MEHP levels (ng/mL).

\* *p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.