

Supplemental Material

Prenatal Exposure to Organophosphates, Paraoxonase 1, and Cognitive Development in Childhood

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Supplemental Material, Table 1 PON Genotype and Phenotype Distributions and Dialkylphosphate Metabolite distributions according to race/ethnicity for subjects returning for at least 1 postnatal neurodevelopmental exam between 12 months and 9 years of age (n = 318)

| | Total Population (n = 318) ^a | | Whites (n = 71) | | Blacks (n = 88) | | Hispanics (n = 156) | |
|--|---|-----|-----------------|-----|-----------------|-----|---------------------|-----|
| | N | % | N | % | N | % | N | % |
| PON Q192R^b | 308 | | 67 | | 86 | | 152 | |
| QQ | 92 | 30% | 38 | 57% | 13 | 15% | 40 | 26% |
| QR | 143 | 46% | 25 | 37% | 41 | 48% | 76 | 50% |
| RR | 73 | 24% | 4 | 6% | 32 | 37% | 36 | 24% |
| PON -108C>T^b | 310 | | 67 | | 88 | | 152 | |
| TT | 48 | 15% | 26 | 39% | 2 | 2% | 19 | 13% |
| CT | 120 | 39% | 29 | 43% | 22 | 25% | 68 | 45% |
| CC | 142 | 46% | 12 | 18% | 64 | 73% | 65 | 43% |
| PON L55M^b | 310 | | 67 | | 88 | | 152 | |
| LL | 27 | 9% | 14 | 21% | 3 | 3% | 9 | 6% |
| LM | 130 | 42% | 32 | 48% | 32 | 36% | 66 | 43% |
| MM | 153 | 49% | 21 | 31% | 53 | 60% | 77 | 51% |
| PON Enzymatic Activity (units/mL) | 304 | | 64 | | 84 | | 153 | |
| Tertile 1 (2964 - 9576) | 108 | 36% | 22 | 34% | 35 | 42% | 50 | 33% |
| Tertile 2 (9700 - 11660) | 95 | 31% | 19 | 30% | 27 | 32% | 48 | 31% |
| Tertile 3 (11665 - 19674) | 101 | 33% | 23 | 36% | 22 | 26% | 55 | 36% |
| Σ DAP (nm/g Creatinine)^b | 294 | | 62 | | 81 | | 148 | |
| Tertile 1 (0.002 - 0.57) | 96 | 33% | 8 | 13% | 29 | 36% | 57 | 39% |
| Tertile 2 (0.57 - 1.79) | 94 | 32% | 25 | 40% | 20 | 25% | 49 | 33% |
| Tertile 3 (1.79 - 85.79) | 104 | 35% | 29 | 47% | 32 | 40% | 42 | 28% |
| Σ DEP (nm/g Creatinine) | 294 | | 62 | | 81 | | 148 | |
| Tertile 1 (0.002 - 0.15) | 96 | 33% | 16 | 26% | 29 | 36% | 49 | 33% |
| Tertile 2 (0.15 - 0.50) | 94 | 32% | 19 | 31% | 25 | 31% | 49 | 33% |
| Tertile 3 (0.50 - 16.43) | 104 | 35% | 27 | 44% | 27 | 33% | 50 | 34% |
| Σ DMP (nm/g Creatinine)^b | 304 | | 64 | | 84 | | 153 | |
| Tertile 1 (0.002 - 0.30) | 97 | 32% | 10 | 16% | 28 | 33% | 57 | 37% |
| Tertile 2 (0.31 - 1.17) | 100 | 33% | 25 | 39% | 26 | 31% | 49 | 32% |
| Tertile 3 (1.18 - 85.69) | 107 | 35% | 29 | 45% | 30 | 36% | 47 | 31% |

| | Median | IQR (25%, 75%) | % detect | Median | IQR | % detect | Median | IQR | % detect | Median | IQR | % detect |
|----------------------------|---------------|-----------------------|-----------------|---------------|-------------|-----------------|---------------|-------------|-----------------|---------------|-------------|-----------------|
| Σ DAP (nm/L) | 81.3 | 31.7, 198.1 | 97.3 | 88.1 | 31.7, 192.9 | 98.4 | 81.5 | 42.9, 243.7 | 96.3 | 76.2 | 28.0, 176.7 | 97.3 |
| Σ DEP (nm/L) | 20.2 | 7.8, 54.6 | 87.8 | 19.9 | 7.1, 42.2 | 87.1 | 16.9 | 8.0, 64.2 | 85.2 | 21.0 | 8.1, 58.0 | 89.2 |
| Σ DMP (nm/L) | 44.8 | 16.0, 149.4 | 96.4 | 55.0 | 22.0, 165.1 | 96.9 | 47.8 | 19.1, 182.9 | 95.2 | 37.0 | 13.1, 125.4 | 96.7 |

^a 3 people self-identified as not black, white or hispanic; ^b Significant difference in race-specific proportions or means according to chi-square or Kruskal-Wallis test as appropriate, at $p < 0.05$.

Supplemental Material, Table 2 Prenatal Organophosphate Biomarker Levels and 24-month BSID-II Mental and Psychomotor Development Index in the Mount Sinai Children's Environmental Health Study

| | | Mental Development Index | | Psychomotor Development Index | |
|-------------|-------------------------|---------------------------------|---------------|--------------------------------------|---------------|
| | | N = 208 | | N = 210 | |
| | | Adjusted Mean MDI | | Adjusted Mean PDI | |
| | | (Beta) | 95% CI | (Beta) | 95% CI |
| ΣDAP | T3 | 90.3 | 85.9, 94.7 | 95.1 | 90.9, 99.2 |
| | T2 | 90.8 | 86.3, 95.3 | 94.5 | 90.2, 98.8 |
| | T1 | 93.6 | 89.1, 98.0 | 94.8 | 90.5, 99.1 |
| | log₁₀ | (-2.08) | (-4.60, 0.44) | (0.93) | (-1.41, 3.28) |
| ΣDEP | T3 | 91.2 | 86.6, 95.7 | 94.8 | 90.5, 99.1 |
| | T2 | 90.5 | 86.1, 94.9 | 94.9 | 90.6, 99.1 |
| | T1 | 92.6 | 88.2, 97.0 | 94.7 | 90.5, 98.9 |
| | log₁₀ | (-1.47) | (-3.99, 1.04) | (0.67) | (-1.72, 3.06) |
| ΣDMP | T3 | 91.1 | 86.9, 95.3 | 94.2 | 90.2, 98.1 |
| | T2 | 92.9 | 88.6, 97.1 | 95.4 | 91.4, 99.5 |
| | T1 | 92.5 | 88.0, 96.9 | 94.8 | 90.5, 99.0 |
| | log₁₀ | (-0.93) | (-3.11, 1.25) | (0.36) | (-1.70, 2.43) |

[†] General linear model adjusted for race/ethnicity, maternal age at enrollment, child sex, examiner, maternal education, maternal PON1 enzyme activity, season of urine collection, laboratory batch, HOME Score, alcohol consumption during pregnancy, and urinary creatinine.

Supplemental Material, Table 3 *PON1* Q192R Interaction with Total Dialkyl and Dimethylphosphate Biomarker levels on the 12-Month BSID-II Mental Development Index in the Mount Sinai Children's Environmental Health Study Among Blacks and Hispanics

| Organophosphate Metabolites | 12-MONTH BSID-II AMONG ONLY BLACKS N = 44 | | | | | 12-MONTH BSID-II AMONG ONLY HISPANICS N = 66 | | | | |
|--------------------------------|---|-------------|--------------------|-------------|------------------------|--|--------------|---------------------|--------------|------------------------|
| | QR/RR (FAST) N = 37 | | QQ (SLOW) N = 7 | | Interaction p-value | QR/RR (FAST) N = 43 | | QQ (SLOW) N = 23 | | Interaction p-value |
| | Beta | 95% CI | Beta | 95% CI | | Beta | 95% CI | Beta | 95% CI | |
| \log_{10} Σ DAP | 18.75 | 4.63, 32.88 | -4.23 | -9.15, 0.70 | <0.01 | -1.83 | -10.39, 6.74 | -4.63 | -8.70, -0.57 | 0.56 |
| \log_{10} Σ DEP | 20.56 | 1.77, 39.36 | -0.09 | -6.53, 6.35 | 0.04 | 0.22 | -5.17, 5.61 | -2.35 | -6.99, 2.30 | 0.39 |
| \log_{10} Σ DMP | 15.43 | 2.14, 28.72 | -3.98 | -7.97, 0.01 | <0.01 | -3.22 | -9.58, 3.14 | -4.57 | -8.45, -0.69 | 0.72 |

General linear model adjusted for maternal age at enrollment, child sex, examiner, HOME Score, alcohol consumption during pregnancy, laboratory batch, season of urine collection, urinary creatinine, and including a biomarker-*PON1* Q192R genotype interaction. The 24-month model was additionally adjusted for maternal race/ethnicity.

Supplemental Material, Table 4 Prenatal PCB and DDE Biomarker Levels and Neurodevelopment in the Mount Sinai Children's Environmental Health Study

| Assessment | | Log _e PCB | | | Log _e DDE | | |
|-------------------------------------|----------------------|----------------------|-------|---------------|----------------------|-------|---------------|
| | | N | Beta | 95% CI | N | Beta | 95% CI |
| MDI ^a | 12 Month | 87 | -7.18 | -14.47, 0.11 | 87 | -1.87 | -6.45, 2.72 |
| | 24 Month | 102 | 1.60 | -6.57, 9.77 | 102 | -2.34 | -7.18, 2.51 |
| PDI ^a | 12 Month | 86 | -3.57 | -14.85, 7.71 | 86 | 2.03 | -4.89, 8.95 |
| | 24 Month | 104 | 2.97 | -5.55, 11.49 | 104 | -0.48 | -5.23, 4.28 |
| Combined ^b WISC-WPPSI | FSIQ | 64 | 4.25 | -8.88, 17.38 | 64 | 4.46 | -6.62, 15.54 |
| | Perceptual Reasoning | 64 | -0.33 | -14.38, 13.72 | 64 | 2.02 | -9.84, 13.89 |
| | Verbal Comprehension | 64 | 4.52 | -9.84, 18.89 | 64 | 1.66 | -10.52, 13.84 |

^a General linear model adjusted for race/ethnicity, maternal age at enrollment, child sex, examiner, maternal education, HOME Score, alcohol consumption during pregnancy, and blood lipids.

^b Generalized linear models adjusted for sex, race, maternal education, language in the home, alcohol use in pregnancy, blood lipids, and a test indicator variable.