Supplementary Material

# Supplementary Figures and Tables

Figure 1. Directed Acyclic Graph (DAG) of PFAS Exposure and Infant Birthweight

Chart

Description automatically generated

Note: Diagram was visualized using DAGitty software.

Table 1. Median PFAS Analyte Concentrations (ng/mL) by Maternal Demographic Characteristics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PFOS | PFHxS | PFOA | PFDA | PFNA |
| Race/Ethnicity  Hispanic (n=260)  Non-Hispanic Black (n=37)  Non-Hispanic white (n=30)  Non-Hispanic other (n=15) | 1.27\*\*  1.45\*\*  1.95\*\*  1.76\*\* | 1.01\*\*  1.08\*\*  1.81\*\*  1.34\*\* | 0.11\*\*  0.05\*\*  0.52\*\*  0.35\*\* | 0.04  0.04  0.05  0.08 | 0.07\*  0.06\*  0.16\*  0.14\* |
| Household Income  <$50,000 (n=165)  $50,000-$99,999 (n=65)  >$100,000 (n=28)  Reported “Don’t Know” (n=84) | 1.27\*\*  1.48\*\*  1.99\*\*  1.26\*\* | 1.05\*\*  0.98\*\*  1.69\*\*  1.13\*\* | 0.10\*\*  0.19\*\*  0.59\*\*  0.06\*\* | 0.05  0.04  0.07  0.04 | 0.06\*\*  0.11\*\*  0.23\*\*  0.06\*\* |
| Education  Completed high school or less (n=181)  Some college of completed college (n=133)  Some graduate training (n=28) | 1.26\*\*  1.38\*\*  2.06\*\* | 1.00\*\*  1.15\*\*  1.49\*\* | 0.08\*\*  0.12\*\*  0.53\*\* | 0.04  0.04  0.05 | 0.06\*\*  0.09\*\*  0.21\*\* |
| Country of Birth  USA (n=175)  Other (n=157)  Unknown (n=10) | 1.44\*  1.26\*  1.08\* | 1.13\*  1.01\*  1.30\* | 1.18  0.09  0.10 | 0.04  0.05  0.03 | 0.09  0.07  0.06 |
| Birth Order of Child  First Born (n=119)  Second or more born (n=212)  Unknown (n=11) | 1.63\*\*  1.25\*\*  1.21\*\* | 1.25\*\*  0.99\*\*  1.30\*\* | 0.35\*\*  0.07\*\*  0.10\*\* | 0.05\*  0.04\*  0.05\* | 0.16\*\*  0.06\*\*  0.07\*\* |
| Pregnancy Fish Consumption  Never (n=214)  Monthly (n=55)  At least Weekly (n=42)  Unknown (n=31) | 1.26\*  1.43\*  1.73\*  1.38\* | 1.07\*  1.19\*  1.28\*  0.90\* | 0.09  0.18  0.23  0.22 | 0.04  0.04  0.07  0.02 | 0.06\*  0.11\*  0.14\*  0.07\* |

\*Kruskal-Wallis One Way ANOVA p<0.05 \*\*Kruskal-Wallis One Way ANOVA p<0.0001

Supplemental Table 2. Univariate and Adjusted Models for Independent Prenatal PFAS Compounds and Gestational Age at Birth, in Weeks (N=342)

|  |  |  |
| --- | --- | --- |
| Compound | Unadjusted  (95% CI) | Adjusted\*  (95% CI) |
| PFHxS  < 0.79 ng/mL  0.79- 1.08 ng/mL  1.09-1.46 ng/mL  1.47 ng/mL | 0.31 (-0.1, 0.8)  REF  -0.1 (-0.6, 0.5)  -0.1 (-0.6, 0.5)  0.4 (-0.2, 0.9) | 0.11 (-0.5, 0.6)  REF  -0.03 (-0.5, 0.5)  -0.3 (-0.8, 0.3)  0.2 (-0.5, 0.5) |
| PFOS  <0.97 ng/mL  0.97-1.33 ng/mL  1.34-1.85 ng/mL  1.86 ng/mL | 0.21 (-0.2, 0.5)  REF  0.3 (-0.3, 0.8)  0.003 (-0.5, 0.5)  0.1 (-0.4, 0.7) | -0.31 (-0.4, 0.3)  REF   * 1. (-0.3, 0.7)   -0.1 (-0.6, 0.4)  -0.2 (-0.7, 0.4) |
| PFDA  LOD  >LOD | REF  0.1 (-0.3, 0.5) | REF  0.02 (-0.3, 0.4) |
| PFNA  LOD  >LOD | REF  -0.1 (-0.5, 0.3) | REF  -0.3 (-0.7, 0.1) |
| PFOA  LOD  >LOD | REF  0.002 (-0.4, 0.4) | REF  -0.1 (-0.5, 0.3) |

Note: CI=confidence interval; PFHxS=Perfluorohexanesulfonic acid; PFOS=Perfluorooctanesulfonic acid; PFNA=Perfluorononanoic acid; PFOA=Perfluorooctanoic acid; PFDA=Perfluorodecanoic acid. Reference group: Samples <LOD PFNA LOD=0.02 ng/mL, PFDA LOD=0.035 ng/mL, PFOA LOD=0.035 ng/mL.

\*Adjusted formaternal age, pre-pregnancy BMI, maternal education, country of birth, household income, mother’s race, gestational age at time of blood sample, study recruitment site, parity, infant sex, and fish consumption  
1Beta estimate represents a per natural log increase

Table 3.Maternal Serum PFAS and Birthweight Models Restricted to Participants Without Preeclampsia/Eclampsia, Gestational Hypertension or Gestational Diabetes Mellitus (GDM) (N=261)

|  |  |  |  |
| --- | --- | --- | --- |
| Model | Birthweight1  (95% CI) | BW-for-GA, sex2  (95% CI) | BW-for-GA, parity3  (95% CI) |
| **Single Pollutant Models** |  |  |  |
| PFOS  <0.97 ng/mL  0.97-1.33 ng/mL  1.34-1.85 ng/mL  1.86 ng/mL | -17.5§ (-120.3, 85.2)  REF  -41.5(-187.9, 104.9)  -24.4 (-169.8, 120.9)  -22.2 (-176.7, 132.3) | -0.1§ (-0.3, 0.2)  REF  -0.1 (-0.5, 0.2)  -0.1 (-0.5, 0.3)  -0.1 (-0.5, 0.3) | -0.1§ (-0.3, 0.2)  REF  -0.2§ (-0.6, 0.2)  -0.1 (-0.5, 0.3)  -0.2 (-05, 0.2) |
| PFHxS  < 0.79 ng/mL  0.79- 1.08 ng/mL  1.09-1.46 ng/mL  1.47 ng/mL | 106.6§ (-48.1, 261.2)  REF  93.8 (-50.4, 238.0)  77.4 (-85.5, 240.4)  190.7 (14.6, 366.8)\* | 0.3§ (-0.1, 0.7)  REF  0.3 (-0.1, 0.6)  0.2 (-0.2, 0.6)  0.5 (0.02, 0.9)\* | 0.3§ (-0.1, 0.7)  REF  0.3 (-0.1, 0.6)  0.2 (-0.2, 0.6)  0.5 (0.01, 0.9)\* |
| PFOA  LOD  >LOD | REF  -121.9 (-232.9, -10.9)\* | REF  -0.3 (-0.6, -0.03)\* | REF  -0.3 (-0.6, -0.1)\* |
| PFNA  LOD  >LOD | REF  -114.7 (-229.2, -0.2)\* | REF  -0.3 (-0.6, 0.003) | REF  -0.3 (-0.6, -0.01)\* |
| PFDA  LOD  >LOD | REF  -34.9 (-138.2, 68.3) | REF  -0.1 (-0.4, 0.1) | REF  -0.2 (-0.4, 0.1) |
| **Multipollutant Model** |  |  |  |
| PFOS  PFHxS  PFOA (LOD)  PFOA (> LOD)  PFNA (LOD)  PFNA (>LOD)  PFDA (LOD)  PFDA (>LOD) | 47.3§ (-78.5, 173.0)  126.3§ (-32.3, 284.9)  REF  -107.2 (-247.8, 33.4)  REF  -81.8 (-230.8, 67.3)  REF  -21.9 (-135.6, 91.8) | 0.1§ (-0.2, 0.4)  0.3§ (-0.1, 0.7)  REF  -0.3 (-0.6, 0.1)  REF  -0.2 (-0.5, 0.2)  REF  -0.1 (-0.4, 0.2) | 0.1§ (-0.2, 0.5)  0.3§ (-0.1, 0.7)  REF  -0.3 (-0.7, 0.02)  REF  -0.2 (-0.6, 0.2)  REF  -0.1 (-0.4, 0.2) |

Note: CI= confidence interval; PFHxS=Perfluorohexanesulfonic acid; PFOS=Perfluorooctanesulfonic acid; PFNA=Perfluorononanoic acid; PFOA=Perfluorooctanoic acid; PFDA=Perfluorodecanoic acid. Reference group: Samples <LOD PFNA LOD=0.02 ng/mL, PFDA LOD=0.035 ng/mL, PFOA LOD=0.035 ng/mL. Multipollutant model is mutually adjusted for all five analytes.  
1Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, infant sex, gestational age at birth, parity  
2Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, and parity  
3Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, and infant sex; N=251  
\*p<0.05  
§Beta estimate interpreted as per natural log increase

Table 4.Maternal Serum PFAS and Birthweight Models Restricted to Samples Collected Prior to 30 Weeks Gestation (N=239)

|  |  |  |  |
| --- | --- | --- | --- |
| Model | Birthweight1  (95% CI) | BW-for-GA, sex2  (95% CI) | BW-for- GA, parity3  (95% CI) |
| **Single Pollutant Models** |  |  |  |
| PFOS  <0.97 ng/mL  0.97-1.33 ng/mL  1.34-1.85 ng/mL  1.86 ng/mL | -53.3§ (-166.9, 60.2)  REF  -11.1 (-172.4, 150.2)  -48.4 (-212.0, 115.2)  -60.2 (-227.5, 107.1) | -0.1§ (-0.4, 0.1)  REF  -0.06 (-0.5, 0.3)  -0.1 (-0.5, 0.3)  -0.2 (-0.6, 0.3) | -0.2§ (-0.4, 0.1)  REF  -0.1 (-0.5, 0.3)  -0.1 (-0.5, 0.3)  -0.2 (-0.6, 0.2) |
| PFHxS  < 0.79 ng/mL  0.79- 1.08 ng/mL  1.09-1.46 ng/mL  1.47 ng/mL | 36.7§ (-125.3, 198.8)  REF  71.7 (-71.7, 215.0)  15.5 (-145.5, 176.5)  119.7 (-81.3, 320.6) | 0.1§ (-0.3, 0.5)  REF  0.2 (-0.2, 0.5)  0.04 (-0.4, 0.4)  0.3 (-0.2, 0.8) | 0.1§ (-0.3, 0.5)  REF  0.2 (-0.1, 0.6)  0.1 (-0.3, 0.5)  0.3 (-0.2, 0.8) |
| PFOA  LOD  >LOD | REF  -121.0 (-242.4, 0.3) | REF  -0.3 (-0.6, -0.003)\* | REF  -0.3 (-0.6, -0.007)\* |
| PFNA  LOD  >LOD | REF  -127.7 (-254.2, -1.2)\* | REF  -0.3 (-0.6, -0.01)\* | REF  -0.3 (-0.7, -0.03)\* |
| PFDA  LOD  >LOD | REF  -85.9 (-196.4, 24.6) | REF  -0.2 (-0.5, 0.05) | REF  -0.3 (-0.5, 0.02) |
| **Multipollutant Model** |  |  |  |
| PFOS  PFHxS  PFOA (LOD)  PFOA (> LOD)  PFNA (LOD)  PFNA (>LOD)  PFDA (LOD)  PFDA (>LOD) | 44.5§ (-110.1, 199.1)  69.3§ (-103.1, 241.6)  REF  -97.5 (-258.2, 63.3)  REF  -77.9 (-245.3, 89.4)  REF  -67.4 (-192.0, 57.3) | 0.1§ (-0.3, 0.5)  0.2§ (-0.2, 0.6)  REF  -0.2 (-0.6, 0.2)  REF  -0.2 (-0.6, 0.2)  REF  -0.2 (-0.5, 0.1) | 0.1§ (-0.3, 0.5)  0.2§ (-0.2, 0.7)  REF  -0.2 (-0.6, 0.2)  REF  -0.2 (-0.5, 0.1)  REF  -2 (-0.5, 0.1) |

Note: CI= confidence interval; PFHxS=Perfluorohexanesulfonic acid; PFOS=Perfluorooctanesulfonic acid; PFNA=Perfluorononanoic acid, PFOA = Perfluorooctanoic acid; PFDA=Perfluorodecanoic acid. Reference group: Samples <LOD PFNA LOD=0.02 ng/mL, PFDA LOD=0.035 ng/mL, PFOA LOD=0.035 ng/mL. Multipollutant model is mutually adjusted for all five analytes.  
1Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, infant sex, gestational age at birth, parity  
2Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, and parity  
3Adjusted for maternal race, maternal age at study recruitment, maternal education, country of birth, maternal household income, recruitment site, gestational age at time of blood sample, pre-pregnancy BMI, pregnancy fish consumption, and infant sex   
\*p<0.05  
§Beta estimate interpreted as per natural log increase