

Supplementary Table S1. Maternal serum concentrations of perfluorinated compounds during early pregnancy (ng/mL)

PFCs	LOD	N > LOD (%)	25%	50%	75%
PFCA					
PFBA	0.083	0 (0.00)	< LOD	< LOD	< LOD
PFHpA	0.051	11 (12.50)	< LOD	< LOD	< LOD
PFHxA	0.200	0 (0.00)	< LOD	< LOD	< LOD
PFNA	0.337	86 (97.27)	0.718	0.996	1.323
PFDA	0.042	88 (100.00)	0.499	0.810	1.155
PFUdA	0.040	88 (100.00)	0.378	0.539	0.727
PFDoA	0.022	88 (100.00)	0.050	0.070	0.098
PFTTrDA	0.017	88 (100.00)	0.091	0.120	0.180
PFTeDA	0.004	88 (100.00)	0.010	0.015	0.025
P5MHpA	0.070	3 (3.41)	< LOD	< LOD	< LOD
P6MHpA	0.040	27 (30.68)	< LOD	< LOD	0.043
P4MHpA	0.100	0 (0.00)	< LOD	< LOD	< LOD
PFOA	0.500	88 (100.00)	4.287	5.640	10.194
PFSA					
L-PFBS	0.018	64 (72.73)	< LOD	0.029	0.058
L-PFHxS	0.036	88 (100.00)	0.474	0.714	0.986
L-PFDS	0.005	0 (0.00)	< LOD	< LOD	< LOD
L-PFHpS	0.034	80 (90.91)	0.076	0.117	0.175
P44DMHxS	0.005	44 (50.00)	< LOD	< LOD	0.007
P5MHpS	0.020	85 (96.59)	0.160	0.228	0.357
P4MHpS	0.010	85 (96.59)	0.118	0.174	0.240
P3MHpS	0.010	84 (95.45)	0.099	0.141	0.191
P6MHpS	0.050	76 (86.36)	0.179	0.301	0.594
P1MHpS	0.050	83 (94.32)	0.109	0.160	0.235
PFOS	1.500	88 (100.00)	3.423	5.244	9.027
4:2FTS	0.103	0 (0.00)	< LOD	< LOD	< LOD
6:2FTS	0.200	0 (0.00)	< LOD	< LOD	< LOD
8:2FTS	0.300	0 (0.00)	< LOD	< LOD	< LOD
6:2diPAP	0.030	87 (98.86)	0.164	0.312	0.594
PFOS substitute					
11CL-PF3OUdS	0.007	88 (100.00)	0.025	0.038	0.063
9CL-PF3ONS	0.025	88 (100.00)	1.064	1.871	2.682
TA	0.019	14 (15.91)	< LOD	< LOD	< LOD
TeA	0.048	8 (9.09)	< LOD	< LOD	< LOD

Note. PFCs: Perfluorinated Compounds; LOD: lower limit of detection; PFCA: perfluorocarboxylic acid; PFBA: Perfluoro-n-butanoic acid; PFHpA: Perfluoro-n-heptanoic acid; PFHxA: Perfluoro-n-hexanoic acid; PFNA: Perfluoro-n-nonanoic acid; PFDA: Perfluoro-n-decanoic acid; PFUdA: Perfluoro-n-undecanoic acid; PFDoA: Perfluoro-n-dodecanoic acid; PFTTrDA: Perfluoro-n-tridecanoic acid; PFTeDA: Perfluoro-n-tetradecanoic acid; P5MHpA: Perfluoro-5-methylheptane acid; P6MHpA: Perfluoro-6-methylheptane acid; P4MHpA: Perfluoro-4-methylheptane acid; PFOA: Perfluoro-n-octanoic acid; PFSA: perfluorosulfonic acid; L-PFBS: Potassium perfluoro-1-butanedisulfonate; L-PFHxS: Sodium perfluoro-1-hexanesulfonate; L-PFDS: Sodium perfluoro-1-decanedisulfonate; L-PFHpS: Sodium perfluoro-1-heptanesulfonate; P44DMHxS: Perfluoro-4,4-dimethylhexane sulfonate; P5MHpS: Perfluoro-5-methylheptane sulfonate; P4MHpS: Perfluoro-4-methylheptane sulfonate; P3MHpS: Perfluoro-3-methylheptane sulfonate; P6MHpS: Perfluoro-6-methylheptane sulfonate; P1MHpS: Perfluoro-1-methylheptane sulfonate; PFOS: Sodium perfluoro-octanesulfonate; 4:2FTS: Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2); 6:2FTS: Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2); 8:2FTS: Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2); 6:2diPAP: Sodium bis (1H,1H,2H,2H-perfluorooctyl)phosphate; 11CL-PF3OUdS: Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate; 9CL-PF3ONS: Potassium 9-chlorohexadeca-fluoro-3-oxanonane-1-sulfonate; TA: perfluoro-2,5-dimethyl-3,6-dioxanonanoic acid; TeA: perfluoro- (2,5,8-trimethyl-3,6,9-trioxadodecanoic) acid.

Supplementary Table S2. Maternal socio-demographic, passive smoking, drinking, and disease history characteristics of early pregnancy loss cases and controls

Characteristics	Case (n = 41)	Control (n = 47)	P
	n (%)	n (%)	
Maternal age at conception			
< 32	17 (41.46)	21 (44.68)	
≥ 32	24 (58.54)	26 (55.32)	0.761
Parity			
Nulliparous	33 (82.50)	19 (59.38)	
Parous	7 (17.50)	13 (40.63)	0.029
Maternal history of pregnancy loss			
No	32 (78.05)	39 (82.98)	
Yes	9 (21.95)	8 (17.02)	0.559
Maternal education			
High school or lower	13 (31.71)	12 (25.53)	
College school or higher	28 (68.29)	35 (74.47)	0.522
Paternal education			
High school or lower	16 (39.02)	18 (38.30)	
College school or higher	25 (60.98)	29 (61.70)	0.944
Maternal alcohol drinking during first trimester			
No	36 (87.80)	46 (97.87)	
Yes	5 (12.20)	1 (2.13)	0.093*
Maternal passive smoking during first trimester			
No	21 (51.22)	36 (76.60)	
Yes	20 (48.78)	11 (23.40)	0.013
Mother having fever during pregnancy			
No	38 (92.68)	46 (97.87)	
Yes	3 (7.32)	1 (2.13)	0.335*
Mother having infections during pregnancy			
No	40 (97.56)	46 (97.87)	
Yes	1 (2.44)	1 (2.13)	1.000*
Mother having serious nausea and vomiting during pregnancy			
No	39 (95.12)	44 (93.62)	
Yes	2 (4.88)	3 (6.38)	1.000*
Mother having vaginal bleeding during pregnancy			
No	25 (60.98)	43 (91.49)	
Yes	16 (39.02)	4 (8.51)	0.001*

Note. * Fisher's exact test.

Supplementary Table S3. Differences of maternal serum concentrations of major perfluorinated compounds between early pregnancy loss cases and controls (ng/mL)

PFCs	Median and Interquartile Ranges		P ^a
	Cases (n = 41)	Controls (n = 47)	
∑PFCA	8.856 (6.886–13.711)	8.090 (6.149–14.877)	0.532
PFOA	5.444 (4.836–9.257)	5.723 (4.090–10.371)	0.940
PFNA	0.943 (0.722–1.562)	1.019 (0.700–1.240)	0.837
PFDA	0.961 (0.586–1.454)	0.668 (0.423–0.985)	0.012
PFUdA	0.633 (0.429–0.780)	0.481 (0.335–0.672)	0.016
∑PFSA	8.087 (5.376–12.632)	7.032 (4.945–11.346)	0.469
PFOS	5.996 (3.848–9.222)	4.976 (2.885–8.685)	0.187
L-PFHxS	0.678 (0.63–0.882)	0.733 (0.493–1.120)	0.260
∑PFOS substitute	1.917 (1.477–3.044)	1.947 (0.961–2.360)	0.226
9CL-PF3ONS	1.819 (1.437–3.002)	1.910 (0.943–2.295)	0.240
∑PFCs	19.680 (13.779–29.266)	19.780 (13.864–24.971)	0.746

Note. PFCs: Perfluorinated Compounds; PFCA: perfluorocarboxylic acid; PFOA: Perfluoro-n-octanoic acid; PFNA: Perfluoro-n-nonanoic acid; PFDA: Perfluoro-n-decanoic acid; PFUdA: Perfluoro-n-undecanoic acid; PFSA: perfluorosulfonic acid; PFOS: Sodium perfluoro-octanesulfonate; L-PFHxS: Sodium perfluoro-1-hexanesulfonate; 9CL-PF3ONS: Potassium 9-chlorohexadeca-fluoro-3-oxanonane-1-sulfonate. ∑PFCA were the sum of PFNA, PFDA, PFUdA, PFDaA, PFTTrDA, PFTeDA, and PFOA; ∑PFSA were the sum of L-PFHxS, L-PFHpS, P5MHpS, P4MHpS, P3MHpS, P6MHpS, P1MHpS, and PFOS; ∑PFOS substitute was the sum of 11CL-PF3OUdS and 9CL-PF3ONS; ∑PFCs were the sum of ∑PFCA, ∑PFSA, ∑PFOS substitute, and 6:2diPAP. ^aMann – Whitney U test.

Supplementary Table S4. Rotated factor loading of three principal components identified by principal component analysis

	PFCs	Factor loading*	Explained variance (%)	Explained variance cumulative(%)
PC-1 (PFSAAs)	P5MHpS	0.91	32.78	32.78
	P4MHpS	0.89		
	P1MHpS	0.86		
	P3MHpS	0.74		
	L-PFHpS	0.67		
	PFOS	0.62		
	P6MHpS	0.58		
PC-2 (PFCAs)	PFDA	0.92	23.52	56.30
	PFDoA	0.82		
	PFUdA	0.79		
	PFNA	0.45		
	PFTTrDA	0.42		
PC-3 (PFOS substitutes)	11CL-PF3OUdS	0.88	14.94	71.24
	9CL-PF3ONS	0.83		
	PFOA	0.40		

Note. PFCs: Perfluorinated Compounds; PFNA: Perfluoro-n-nonanoic acid; PFDA: Perfluoro-n-decanoic acid; PFUdA: Perfluoro-n-undecanoic acid; PFDoA: Perfluoro-n-dodecanoic acid; PFTTrDA: Perfluoro-n-tridecanoic acid; PFTeDA: Perfluoro-n-tetradecanoic acid; L-PFHpS: Sodium perfluoro-1-heptanesulfonate; P5MHpS: Perfluoro-5-methylheptane sulfonate; P4MHpS: Perfluoro-4-methylheptane sulfonate; P3MHpS: Perfluoro-3-methylheptane sulfonate; P6MHpS: Perfluoro-6-methylheptane sulfonate; P1MHpS: Perfluoro-1-methylheptane sulfonate; PFOS: Sodium perfluoro-octanesulfonate; 11CL-PF3OUdS: Potassium 11-chloroeicosafuoro-3-oxaundecane-1-sulfonate; 9CL-PF3ONS: Potassium 9-chlorohexadeca-fluoro-3-oxanonane-1-sulfonate; PFOA: Perfluoro-n-octanoic acid. PC: principal component. * Factor loadings are the correlation coefficients between the original variables (levels of PFCs) and the extracted components. Principal components with eigenvalue >1 are retained. Variable levels are sorted by the size of the loading coefficients. Variable level with factor loading below |0.30| are not listed.