

Supplementary Materials

Associations between prenatal exposure to micro(nano)plastics and neonatal lipid profile

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Table S1 Py-GC/MS calibration curves of polymers

MNPs	Quantifier ion (m z ⁻¹)	Quantitative curve equation	R ²	Characteristic fragments	Limit (µg)
PE	111	$y = 4.5761x - 0.7551$	0.9936	Tridecene	0.50
PVC	128	$y = 17.21x + 7.9177$	0.9973	Naphthalene monomer	0.02
PS	78	$y = 557.76x + 41.458$	0.992	Styrene monomer	0.02
PA66	84	$y = 40.796x - 7.4651$	0.9956	Cyclopentanone monomer	0.02

Abbreviations: PE, polyethylene; PVC, polyvinyl chloride; PS, polystyrene; PA66, polyamide 66.

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Table S2 Spiked recovery experiments for umbilical cord blood and neonatal urine samples

Sample Type	MNPs	Recovery (%)
Umbilical cord blood	Polystyrene	114.40
	Polyethylene	89.93
	Polypropylene	83.98
	Polymethylmethacrylate	98.61
	Polyvinylchloride	115.33
	Polycarbonate	98.75
	Polyethylene Terephthalate	94.85
	Polyamide6	98.09
Neonatal urine	Polyamide66	99.40
	Polystyrene	108.08
	Polyethylene	84.41
	Polypropylene	104.60
	Polymethylmethacrylate	93.27
	Polyvinylchloride	101.07
	Polycarbonate	100.67
	Polyethylene Terephthalate	91.85
	Polyamide6	106.02
	Polyamide66	102.13

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Table S3 Basic information of the study volunteers

Sample number	Maternal age (year)	Gestational age	Sex of newborn	Birth length (cm)	Birth weight (g)	Umbilical cord length (cm)	Placental weight (g)	1 min Apgar score	5 min Apgar score	10 min Apgar score
1	35	38 weeks 1 day	Male	49	3090	45	410	10	10	10
2	29	41 weeks	Female	49	3030	53	450	10	10	10
3	31	39 weeks 2 days	Female	50	3510	70	550	10	10	10
4	28	39 weeks 4 days	Male	50	3580	50	500	10	10	10
5	24	40 weeks	Female	50	3200	50	500	10	10	10
6	25	40 weeks 2 days	Male	49	3450	60	590	10	10	10
7	24	39 weeks 5 days	Female	50	3240	55	450	10	10	10
8	28	38 weeks 1 days	Male	49	3040	50	500	10	10	10
9	32	39 weeks 2 days	Female	49	2610	50	500	10	10	10
10	25	38 weeks 2 days	Female	48	2960	60	550	10	10	10
11	27	40 weeks 1 days	Female	50	3460	60	600	10	10	10
12	28	40 weeks 5 days	Female	50	3570	55	580	10	10	10
13	29	40 weeks 3 days	Male	50	3680	60	620	10	10	10
14	25	38 weeks 2 days	Female	49	2630	55	500	10	10	10
15	27	39 weeks 2 days	Female	49	3050	50	500	10	10	10
16	31	39 weeks 3 days	Female	50	3300	60	600	10	10	10
17	27	39 weeks 5 days	Male	50	3500	70	600	10	10	10
18	25	40 weeks 3 days	Male	51	3940	50	750	10	10	10
19	35	39 weeks 2 days	Male	48	2770	65	550	10	10	10
20	29	38 weeks 2 days	Female	48	2650	50	480	9	10	10
21	31	39 weeks 6 days	Male	50	3150	60	630	10	10	10
22	32	41 weeks	Female	50	3280	60	620	10	10	10
23	28	38 weeks 1 days	Female	50	3200	55	450	10	10	10
24	26	40 weeks 2 days	Female	50	3820	65	600	10	10	10
25	35	37 weeks 6 days	Male	50	3300	55	500	9	10	10
26	31	39 weeks 6 days	Female	50	3320	50	500	10	10	10
27	28	38 weeks 5 days	Male	50	3370	60	550	10	10	10
28	30	40 weeks 5 days	Male	52	3560	65	600	10	10	10
29	24	40 weeks	Female	50	3400	28	580	10	10	10
30	30	40 weeks	Male	51	3510	70	600	10	10	10

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Table S4 Detailed Py-GC/MS results for each sample

Sample type	Sample number	Number of MNPs types	PE ($\mu\text{g g}^{-1}$)	PVC ($\mu\text{g g}^{-1}$)	PS ($\mu\text{g g}^{-1}$)	PA66 ($\mu\text{g g}^{-1}$)	Total ($\mu\text{g g}^{-1}$)
Umbilical cord blood	1	4	71.42	15.27	1.50	13.72	101.91
	2	3	66.27	16.13	N.D.	9.36	91.76
	3	2	42.43	5.67	N.D.	N.D.	48.10
	4	4	27.95	9.24	2.80	16.03	56.02
	5	3	83.16	9.00	0.21	N.D.	92.37
	6	2	53.30	17.25	N.D.	N.D.	70.55
	7	4	9.17	11.92	2.48	4.10	27.67
	8	4	9.06	7.23	2.33	2.61	21.24
	9	4	19.30	11.71	2.44	8.29	41.73
	10	4	11.40	12.60	4.09	5.52	33.62
	11	4	25.84	25.70	4.26	17.77	73.56
	12	4	22.92	21.12	4.81	14.06	62.91
	13	4	9.24	7.15	0.85	1.89	19.14
	14	4	11.19	7.54	2.05	2.40	23.19
	15	3	14.12	22.87	2.93	N.D.	39.92
	16	4	9.09	5.47	1.70	0.97	17.23
	17	3	68.87	55.35	2.60	N.D.	126.82
	18	3	11.27	13.32	3.47	N.D.	28.05
	19	4	13.69	10.92	1.10	2.33	28.04
	20	4	17.74	9.48	1.33	7.05	35.60
	21	4	13.94	11.15	2.87	8.71	36.67
	22	4	14.06	6.10	1.70	3.07	24.92
	23	3	21.75	20.02	4.75	N.D.	46.51
	24	4	10.46	6.63	1.30	3.45	21.83
	25	4	13.50	17.00	5.36	6.29	42.16
	26	4	13.01	10.44	1.04	2.83	27.31
	27	4	12.30	17.56	0.54	2.05	32.46
	28	4	14.69	5.08	1.18	3.00	23.96
	29	4	17.53	9.74	0.99	2.09	30.35
	30	4	19.23	7.65	2.82	1.79	31.50
Neonatal urine	1	2	7.60	3.95	N.D.	N.D.	11.55
	2	2	6.87	1.45	N.D.	N.D.	8.32
	3	2	5.32	2.47	N.D.	N.D.	7.79
	4	2	3.91	3.95	N.D.	N.D.	7.86
	5	2	5.23	10.29	N.D.	N.D.	15.52
	6	2	5.80	2.71	N.D.	N.D.	8.51

Note: N.D., not detected; Abbreviations: PE, polyethylene; PVC, polyvinyl chloride; PS, polystyrene; PA66, polyamide 66.

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Table S5 Detailed results of liver function indicators and lipid profile for each sample

Sample number	TP (g L ⁻¹)	ALB (g L ⁻¹)	TBIL (μmol L ⁻¹)	ALT (U L ⁻¹)	AST (U L ⁻¹)	GGT (U L ⁻¹)	ALP (U L ⁻¹)	LDH (U L ⁻¹)	PA (g L ⁻¹)	TBA (μmol L ⁻¹)	TG (mmol L ⁻¹)	TC (mmol L ⁻¹)	HDL-C (mmol L ⁻¹)	LDL-C (mmol L ⁻¹)
1	51.9	39.5	34.6	10	56	264	183	552	0.08	3.4	0.37	1.11	0.45	0.34
2	58.4	40.1	26.8	14	47	268	147	493	0.11	4.6	0.47	1.35	0.49	0.36
3	54.5	37.7	30.3	14	60	309	271	695	0.08	0.1	0.33	1.46	0.58	0.44
4	52.9	38.9	26.8	6	23	40	134	294	0.07	3.3	0.33	1.04	0.53	0.35
5	52.0	38.5	35.0	5	40	847	284	530	0.09	1.2	0.24	1.78	0.64	0.75
6	51.6	40.3	34.0	7	25	140	141	276	0.07	3.0	0.24	1.61	0.81	0.40
7	61.0	43.0	41.1	5	30	268	139	314	0.10	7.8	0.25	1.70	0.70	0.69
8	46.0	33.8	35.2	6	48	398	100	425	0.05	2.2	0.21	2.22	0.93	0.93
9	50.3	36.1	25.2	5	35	171	153	422	0.07	2.4	0.44	1.44	0.52	0.33
10	52.5	36.5	26.3	5	42	172	167	549	0.07	0.7	0.49	1.50	0.55	0.33
11	60.3	45.3	35.8	8	24	306	123	317	0.12	4.1	0.33	1.58	0.78	0.43
12	56.8	41.8	34.0	13	40	100	141	570	0.11	0.6	0.61	1.69	0.62	0.44
13	55.1	41.9	28.5	9	65	237	161	434	0.11	2.3	0.20	1.69	0.74	0.65
14	55.2	40.2	34.8	6	32	378	160	346	0.06	5.1	0.23	1.58	0.68	0.62
15	55.3	40.0	24.0	7	29	51	98	293	0.11	1.8	0.31	1.40	0.76	0.25
16	50.3	38.5	20.9	7	30	77	84	377	0.10	1.6	0.20	1.36	0.71	0.31
17	54.5	39.3	27.2	10	58	74	123	948	0.10	1.6	0.23	1.20	0.64	0.32
18	62.6	43.8	26.2	12	51	56	183	776	0.11	3.5	0.43	1.94	0.67	0.60
19	52.3	38.1	30.4	14	81	95	251	768	0.07	3.3	0.35	1.81	0.72	0.56
20	64.5	45.2	36.7	17	52	244	328	454	0.11	3.3	0.34	2.73	1.11	1.17
21	56.6	39.3	32.1	11	83	174	129	929	0.09	3.2	0.30	2.39	1.14	0.71
22	56.7	44.0	29.1	8	35	115	191	500	0.11	2.9	0.12	1.76	0.80	0.54
23	48.7	36.0	28.8	5	24	209	213	341	0.08	3.6	0.23	1.32	0.60	0.44
24	58.3	41.4	33.3	10	25	73	137	387	0.11	1.2	0.27	1.62	0.65	0.63
25	52.5	41.9	25.3	4	24	277	170	310	0.10	0.3	0.19	1.95	0.65	0.94
26	56.8	41.5	47.6	6	30	214	185	326	0.07	3.3	0.46	1.44	0.59	0.40
27	52.8	40.7	23.0	5	28	84	222	322	0.10	3.0	0.14	1.16	0.48	0.45
28	55.2	40.6	29.0	8	30	236	148	331	0.10	3.7	0.38	1.76	0.71	0.65
29	53.1	37.0	32.9	11	34	100	154	295	0.08	3.7	0.42	1.88	1.08	0.35
30	56.0	37.7	28.6	9	42	77	149	603	0.07	1.8	0.20	1.23	0.65	0.31

Abbreviations: TP, total protein; ALB, albumin; TBIL, total bilirubin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; GGT, gamma-glutamyltransferase; ALP, alkaline phosphatase; LDH, lactate dehydrogenase; PA, prealbumin; TBA, total bile acid; TG, triglyceride; TC, total cholesterol; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol.

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Table S6 Detailed results of the questionnaire surveys on pregnancy lifestyle

Sample number	Renovated residence within 1 year	Renovated workplace within 1 year	Smoking	Secondhand smoke	Drinking	Skin care products	Takeaway food	Plastic tableware	Nail art	Clothing material	Washing hair	Bathing	Milk tea	Coffee	Gum	Source of drinking water
1	No	No	No	No	No	1 time a week	6 times a week	No	No	Not cotton	3 times a week	Every day	4 times a month	1 time a week	No	Purified tap water
2	No	No	No	No	No	7 times a week	2 times a week	No	No	Not cotton	2 times a week	Every day	4 times a month	1 time a week	No	Purified tap water
3	No	No	No	No	No	2 times a week	Never	No	No	Not cotton	1 time a week	Every day	Never	Never	No	Purified tap water
4	No	No	No	No	No	Never	Never	No	No	Not cotton	5 times a week	Every day	Never	Never	No	Purified water
5	No	No	No	No	No	7 times a week	7 times a week	Yes	No	Cotton	2 times a week	Every day	1 time a month	Never	No	Purified tap water
6	No	No	No	No	No	2 times a week	3 times a week	No	No	Cotton	3 times a week	Every day	1 time a month	Never	No	Purified tap water
7	No	No	No	No	No	5 times a week	4 times a week	No	No	Cotton	5 times a week	Every day	Never	Never	No	Purified tap water
8	No	No	No	No	No	7 times a week	Never	No	No	Not cotton	4 times a week	Every day	Never	Never	Yes	Purified tap water
9	No	No	No	No	No	5 times a week	3 times a week	No	No	Cotton	7 times a week	Every day	4 times a month	Never	No	Purified tap water
10	No	No	No	No	No	4 times a week	4 times a week	No	No	Not cotton	3 times a week	Every day	Never	Never	No	Purified water
11	No	No	No	Yes	No	Never	5 times a week	No	No	Cotton	2 times a week	Every day	1 time a month	Never	No	Purified tap water
12	No	No	No	No	No	1 time a week	5 times a week	Yes	No	Not cotton	3 times a week	Not every day	5 times a month	Never	Yes	Purified tap water
13	No	No	No	No	No	3 times a week	1 time a month	No	No	Not cotton	5 times a week	Every day	1 time a month	2 times a month	No	Purified tap water
14	No	No	No	No	No	6 times a week	2 times a month	No	No	Cotton	2 times a week	Every day	Never	Never	No	Purified tap water
15	No	No	No	No	No	3 times a week	2 times a week	Yes	No	Not cotton	2 times a week	Every day	Never	Never	No	Purified water
16	No	No	No	No	No	2 times a month	Never	No	No	Not cotton	5 times a week	Every day	Never	Never	No	Purified tap water
17	No	No	No	No	No	Never	3 times a week	No	No	Not cotton	3 times a week	Not every day	2 times a month	1 time a month	No	Purified tap water

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Table S6 Detailed results of the questionnaire surveys on pregnancy lifestyle

Sample number	Renovated residence within 1 year	Renovated workplace within 1 year	Smoking	Secondhand smoke	Drinking	Skin care products	Takeaway food	Plastic tableware	Nail art	Clothing material	Washing hair	Bathing	Milk tea	Coffee	Gum	Source of drinking water
18	No	No	No	No	No	2 times a month	2 times a week	No	No	Cotton	4 times a week	Every day	2 times a month	Never	No	Purified tap water
19	No	No	No	Yes	No	7 times a week	2 times a week	No	Yes	Not cotton	6 times a week	Every day	Never	3 times a month	No	Purified tap water
20	No	No	No	No	No	6 times a week	2 times a week	No	No	Not cotton	2 times a week	Every day	Never	Never	No	Purified tap water
21	No	No	No	No	No	6 times a week	2 times a week	No	No	Not cotton	6 times a week	Every day	Never	Never	No	Purified tap water
22	No	No	No	No	No	4 times a week	4 times a week	Yes	No	Not cotton	3 times a week	Not every day	Never	3 times a month	No	Purified tap water
23	No	No	No	No	No	3 times a week	3 times a week	No	No	Cotton	3 times a week	Every day	2 times a month	1 time a month	No	Purified tap water
24	No	No	No	No	No	Never	2 times a month	No	No	Cotton	1 time a week	Every day	Never	Never	No	Purified tap water
25	No	No	No	No	No	4 times a week	4 times a week	No	No	Not cotton	4 times a week	Every day	Never	Never	No	Purified water
26	No	No	No	No	No	3 times a month	1 time a week	No	No	Cotton	3 times a week	Every day	Never	Never	No	Purified tap water
27	No	No	No	No	No	6 times a week	Never	No	No	Not cotton	6 times a week	Every day	Never	Never	Yes	Purified tap water
28	No	No	No	No	No	4 times a week	2 times a week	Yes	No	Not cotton	2 times a week	Not every day	3 times a month	1 times a month	No	Purified tap water
29	No	No	No	No	No	3 times a week	2 times a week	No	No	Not cotton	3 times a week	Every day	Never	Never	No	Purified tap water
30	No	No	No	No	No	3 times a week	5 times a week	No	No	Cotton	4 times a week	Every day	7 times a month	2 times a month	No	Purified water

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Table S7 Detailed LDIR results for each sample

Sample number	Number of MPs	Type of MPs	Abundance (particles g ⁻¹)	Width (μm)	Height (μm)	Diameter (μm)	Area (μm ²)	Circularity	Solidity
1	0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
2	2	ACR	10.84	24.00	53.00	29.32	675.00	0.40	0.69
		PP	10.84	24.00	75.00	35.23	975.00	0.37	0.73
3	2	ACR	17.39	33.00	84.00	37.42	1100.00	0.22	0.58
		ACR		25.00	35.00	29.04	662.50	0.75	0.91
4	1	PET	0.94	78.00	71.00	70.69	3925.00	0.70	0.92
5	1	PET	2.29	47.00	33.00	34.09	912.50	0.56	0.82
6	1	ACR	19.38	48.00	65.00	51.71	2100.00	0.58	0.85

Note: N.D., not detected; Abbreviations: ACR, acrylate copolymer; PP, polypropylene; PET, polyethylene terephthalate.

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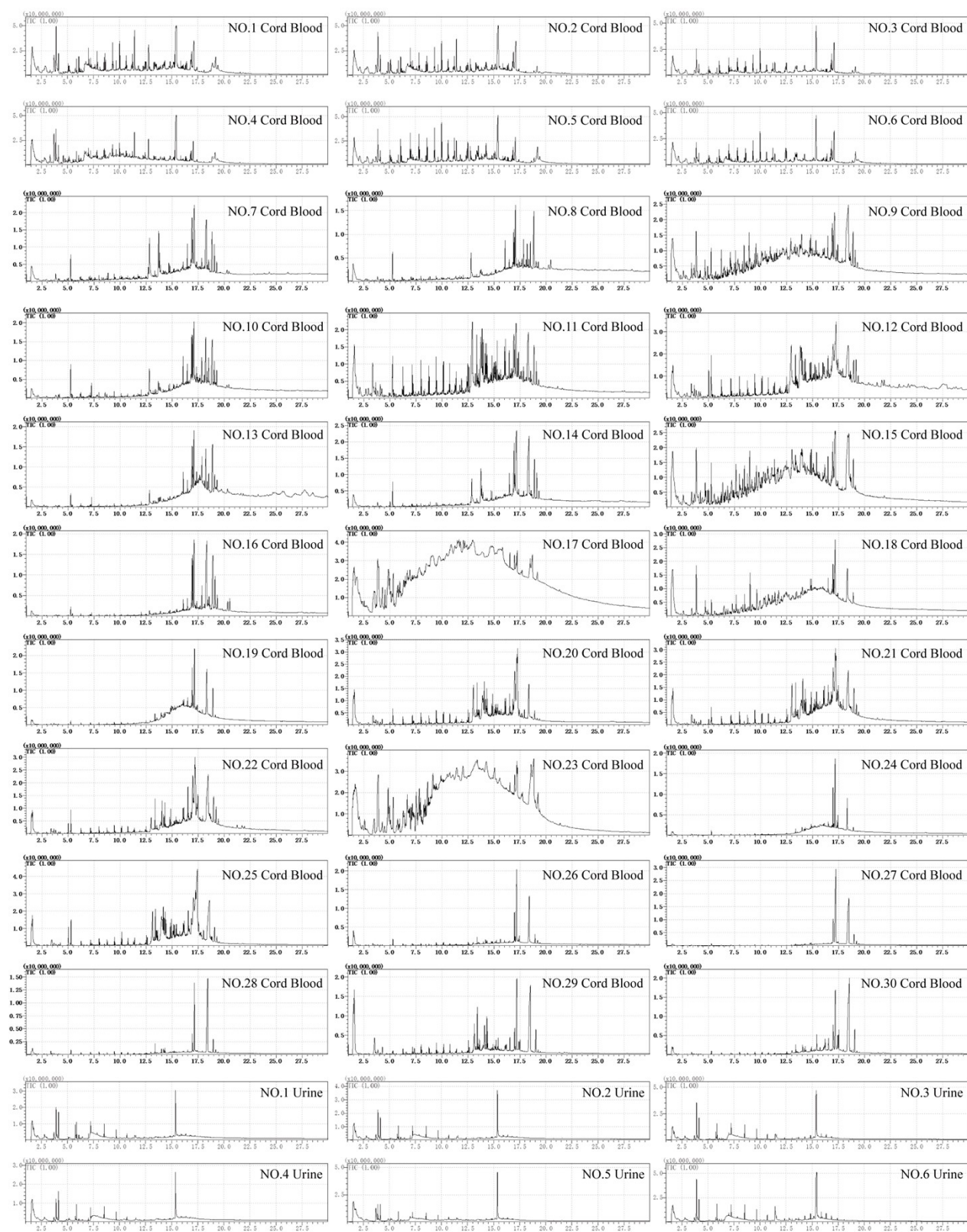


Fig.S1 Total ion chromatogram for each sample.