

SUPPORTING INFORMATION

MATERNAL, PLACENTAL AND CORDONAL METALLOMIC PROFILE IN GESTATIONAL DIABETES MELLITUS

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Table S1. Literature survey of comparative metallomics results in GDM published from 2014 till 2018. This table is the prosecution of Table 1 of this reference: M. Roverso, C. Berté, V. Di Marco, A. Lapolla, D. Badocco, P. Pastore, S. Visentin and E. Cosmi, *Metallomics*, 2015, 7, 1146-1154. Where no element was indicated, no statistically significant correlation was found. If not specified, mother samples were considered.

Biological substrate	Ref.	Elements with higher GDM levels	Elements with lower GDM level
cord serum	5		Ca, Zn
blood	5		
serum	8		Mg
plasma	6		
plasma	3		Mg
blood	2		Mg
serum	11	As	
serum	12		
cord serum	1		Ca
newborn meconium	4	As, Cd, Cr, Hg	
serum	13	Cu	Fe
urine	14	Cd	
urine	15	Cd	
urine	9		
hairs	10	Hg	
cord blood	10		
urine	7		

Table S2: details about the characteristic of the women recruited for the study.

Order number of the patients	Samples		Main characteristics						Diet frequency (number of times eaten per week)											Diet supplm. (1 = yes)	
	cord blood available (y = yes)	mother blood available (y = yes)	Placenta available (y = yes)	GDM (1) or control (0)	ethnicity (C = Caucasian, N = non-caucasian)	age	BMI (kg/m ²)	newborn weight (g)	pasta/rice	bread, breadsticks, crackers	oven food	meat	fish	eggs	legumes	milk or yogurth	cheese	vegetables	fruit	general diet supplements	multivitaminic and mineral diet supplement
1	y	y	y	1	C	30	18.69	3430	7	7	7	3	2	1	1	7	3	14	7	1	1
2			y	1	C	34	20.9	2750	14	14	0	1	1	0	0	1	2	21	7	1	
3	y	y	y	1	N	26	22.38	3195	21	7	7	0	1	0	2	7	2	28	7		
4	y	y	y	1	N	29	27.78	2480	28	7	7	3	0	1	0	7	0	7	0		
5	y	y	y	1	C	42	23.05	3230	2	3	0	4	3	1	3	14	2	21	14	1	
6	y	y	y	1	C	47	17.07	3100	7	7	0	1	1	0	0	21	1	7	7	1	
7	y	y	y	1	C	43	16.65	3180	2	0	0	3	1	0	2	7	2	14	7		
8	y	y	y	1	C	33	16.65	2920	0	14	0	1	2	1	2	7	2	21	14	1	
9			y	1	C	37	20.42	3290	2	14	0	1	3	1	0	7	2	14	7	1	
10	y	y	y	1	C	30	19.37	3400	3	0	0	2	2	0	1	1	2	14	14		
11	y	y	y	1	C	23	20.96	2940	7	7	0	2	1	0	0	1	2	21	7		
12	y	y	y	1	C	35	17.72	3770	14	14	7	0	3	1	2	7	7	14	14	1	
13	y	y	y	1	C	27	21.2	3150	0	0	7	3	3	14	0	0	0	21	0		
14	y	y	y	1	C	30	18.83	2830	7	14	2	3	2	1	1	14	7	14	7		
15	y	y	y	1	C	36	18.56	3330	2	7	2	2	2	2	5	7	7	14	7	1	1
17	y	y	y	1	N	31	27.55	2675	14	7	7	3	4	1	1	2	2	14	3		
18	y	y		1	C	37	19	3130	2	14	0	2	3	1	2	7	2	21	14		
19	y	y	y	1	C	40	21.8	3650	7	0	1	2	2	1	1	7	2	5	7	1	1
20	y	y	y	1	C	42	19.26	3680	4	7	2	2	1	1	7	0	2	7	7	1	1
21	y	y	y	1	C	25	28.72	2690	2	2	0.75	7	1	1	7	3	1	14	21		

22	y	y	y	1	N	30	28.95	3690	7	2	0	7	7	1	0	3	2	1	7		
23	y	y	y	1	N	22	23.05	3515	2	7	7	7	3	2	1	14	14	7	1		
24	y	y	y	1	C	32	26.33	2800	6	7	2	4	2	2	2	7	5	14	5	1	1
25	y	y	y	1	C	34	23.39	3730	7	1	7	2	2	1	2	7	2	14	7		
26	y	y	y	1	C	41	28.09	4040	5	1.25	3	3	0.25	0.25	1	7	7	3	5		
27	y	y	y	1	C	33	26.77	3980	7	7	1	2	1	0	2	7	14	7	0.5	1	
28	y	y	y	1	C	36	20.9	3945	7	7	7	7	1	1	1	7	3	7	7		
29	y	y	y	1	N	31	26.71	4150	14	2	7	7	2	1	0.5	4	3	5	4	1	1
30	y	y	y	1	C	35	23.14	4290	7	3	1	7	0.5	1	0.75	7	2	7	7	1	1
31	y	y	y	0	C	24	21.87	3365	7	21	0	3	1	1	2	3	14	14	7	1	
32	y	y	y	0	C	32	32.39	3610	14	14	1	0	3	0	0	1	2	21	14	1	
33	y	y	y	0	C	29	19.84	3830	7	14	0	4	1	0.75	0	3	2	3	3		
34	y	y	y	0	N	37	26.77	3830	7	7	2	7	0	0.5	3	1	0.25	3	7		
35	y	y	y	0	C	38	17.86	3520	14	14	0	2	3	2	1	2	7	7	0		
36			y	0	C		34.81	3670	7	21	0	1	2	0.5	1	2	3	14	3		
37	y	y	y	0	C	42	18.36	3100	14	14	0	3	2	0.25	1	7	7	14	7	1	
38	y	y	y	0	C	37	31.89	3190	0	14	0	0	2	1	0.5	14	3	3	14		
39			y	0	N	25	23.88	3465	7	14	0	2	1	0.75	1	3	1	7	7		
40			y	0	N	32	25.1	2950	3	14	0	2	4	1	1.25	14	2	5	3		
41	y	y	y	0	N	31	17.99	3400	2	21	1	1	0	2	1	1	2	14	14		
42	y	y	y	0	N	25	19.83	3370	14	14	0	2	2	0	0.75	2	1	21	14		
43			y	0	N	32	38.51	3545	2	14	0	7	1	0	1	14	0	7	7		
44	y	y	y	0	C	38	23.74	3140	3	21	7	7	0	0.5	0	14	3	14	4		
45	y	y	y	0	N	41	29.76	3580	3	4	1	4	3	1	2	3	1	2	2		
46	y	y	y	0	C	35	25	3700	2	7	2	3	1	1	7	7	4	7	7		
47	y	y	y	0	N	30	20.81	3430	7	7	7	3	2	5	1	7	2	14	7		
48	y	y	y	0	N		23.88	3680	7	3	7	7	3	1	2	4	2	4	7		
49	y	y	y	0	N	28	17.93	3410	9	1	3	7	2	3	0	14	3	14	7	1	
50	y	y	y	0	C	43	26.62	3320	14	7	0	7	3	2	0	0	2	14	14	1	
51	y	y	y	1	N	30	24.61	3230	14	7	0	1	0	0	2	0	0	21	7		
52	y		y	1	C	31	23.8	3830													
53		y	y	1	C	30	18.44	3000	7	4	4	5	1	1	0.5	7	2	7	7	1	1

54	y	y	y	1	C	46	22.05	3360	7	7	3	4	1.5	1	2	7	4	14	14	1	
55	y	y	y	1	C	28	21.5	3005	3	2	1	4	0.5	0	0	0	3	1	0	1	1
56	y	y	y	1	C	31	21.11	4215	2	14	2	2	0.5	0.25	0.5	7	2	14	7		
57	y	y	y	1	N	36	29.76	3840	3	3	0.75	0.25	0.5	0	0.5	1	7	3	14		
58	y	y	y	0	N	35	27.56	2710	3	14	0	3	2	0	0.25	0	1	3	14		
59	y	y		0	C	38	22.58	3290	4	3	4	2	0	0	0.75	1	4	14	14	1	
60	y	y	y	0	C	34	22.03	3190	3	7	1	3	1	5	1	5	7	7	7		
61	y		y	0	N	35		3630	7	7	0.5	2	0.5	0	0	0	0.5	0	0		
62	y	y	y	0	C	35	24.61	3115	7	7	0	3	3	1	1	7	3	14	14	1	
63	y	y	y	0	N	26	21.78	2860	7	14	0	1	2	2	2	1	3	14	14		
64	y	y	y	0	C	43	21.72	3520	7	14	0.75	3	0.5	0.25	1	0	0	14	3		
65	y	y	y	0	C	35	30.42	3470	7	4	0.25	2	2	1	1	0	1	14	14	1	1
66	y	y	y	0	N	34	23.73	3760	3	14	1	1	0.25	0.25	0.5	7	1	14	14		
67	y	y	y	0	C	27	20.2	3185	14	14	1	1	2	1	1	2	2	7	7		
68	y	y	y	0	N	39	23.4	2995	14	14	2	1	0.5	1	7	1	1	7	2		
69	y	y	y	1	C		23.8	3540	2	14	2	2	2	2	1	7	7	21	14	1	1
70	y		y	0	C		20.7	3470	7	3	2	0.75	1	0.5	0.5	7	7	14	14	1	1
71	y	y	y	0	N	28	32.27	3955	14	7	0.25	2	0.25	0.5	0.25	0	2	2	0		
72	y	y	y	0	N	24	35.16	4390	14	7	0.25	2	0.25	0	0.25	7	0.5	3	0		
73	y	y	y	0	N		22.27	3340	3	14	0.5	0.5	0.5	0	1	7	1	14	7	1	1
74	y		y	0	C		28.89		3	7	0.5	2	1	0.25	0.25	2	7	14	14		
75	y		y	0	C		26.1		14	7	1	2	1	0.25	0.5	2	0.25	14	14	1	1
76	y	y		1	C			3620	7	14	2	2	2	0.5	1	0	2	14	14	1	1
77	y	y		0	C	46		2970	7	2	1	1	1	1	1	7	1	21	14	1	1

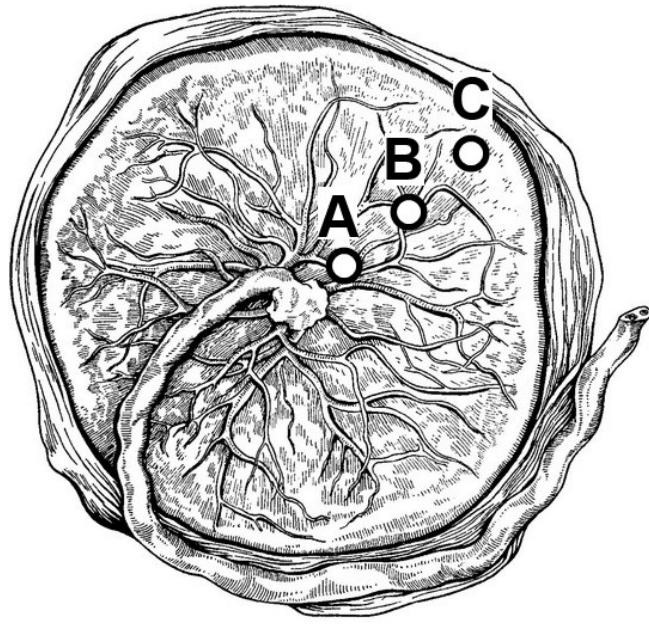


Figure S1: sampling zones (A, B, C) of the placenta.

Table S3: p -values obtained when the considered factors were related to GDM. n. = number of times eaten per week. For clarity purposes, p -values below 0.05 were evidenced in yellow background, and p -values below 0.01 were evidenced in orange background.

	Average controls	Average GDM	σ_{controls}	σ_{GDM}	p -value1	p -value2	p -value3
age (y)	34.1	33.4	6.2	6.3	0.33	0.00	0.46
BMI (kg/m ²)	24.2	22.7	4.8	4.1	0.10	0.14	–
birth weight (g)	3400	3400	350	470	0.44	0.36	0.46
pasta/rice (n.)	7.7	6.7	4.7	6.0	0.24	0.50	0.11
bread, breadsticks, crackers (n.)	10.6	6.3	5.7	4.7	0.00	–	0.49
oven food (n.)	1.4	2.8	2.1	2.8	0.01	0.10	0.00
meat (n.)	2.9	3.1	2.2	2.1	0.31	0.01	0.00
fish (n.)	1.4	1.7	1.1	1.3	0.17	0.00	0.00
eggs (n.)	1.1	1.2	1.3	2.3	0.47	–	0.01
legumes (n.)	1.3	1.6	1.7	1.7	0.27	0.50	0.00
milk or yoghurt (n.)	4.3	6.0	4.2	4.6	0.06	0.00	0.00
cheese (n.)	2.8	3.6	2.8	3.4	0.15	0.50	0.00
vegetables (n.)	10.6	12.3	6.0	6.8	0.14		0.00
fruit (n.)	8.4	7.9	5.1	5.0	0.36	0.50	0.00
diet supplements (n.)	0.3	0.5	0.5	0.5	0.11	0.50	0.00

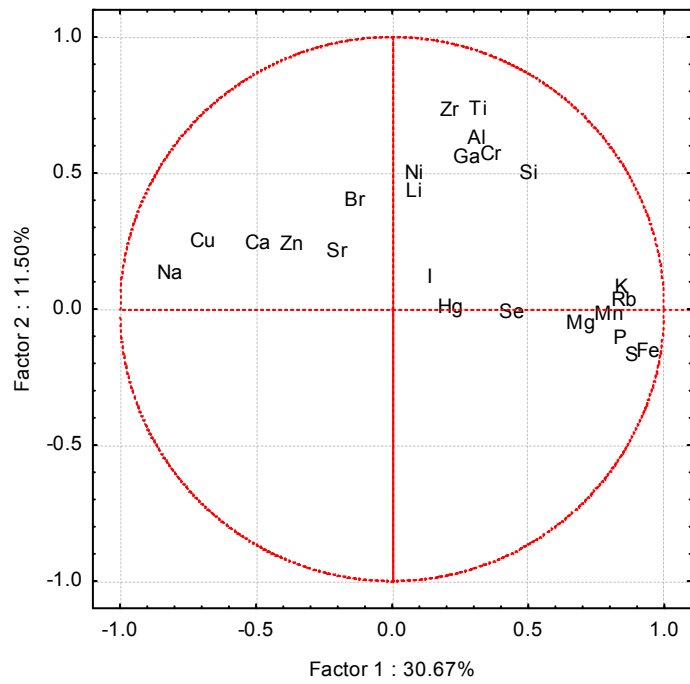
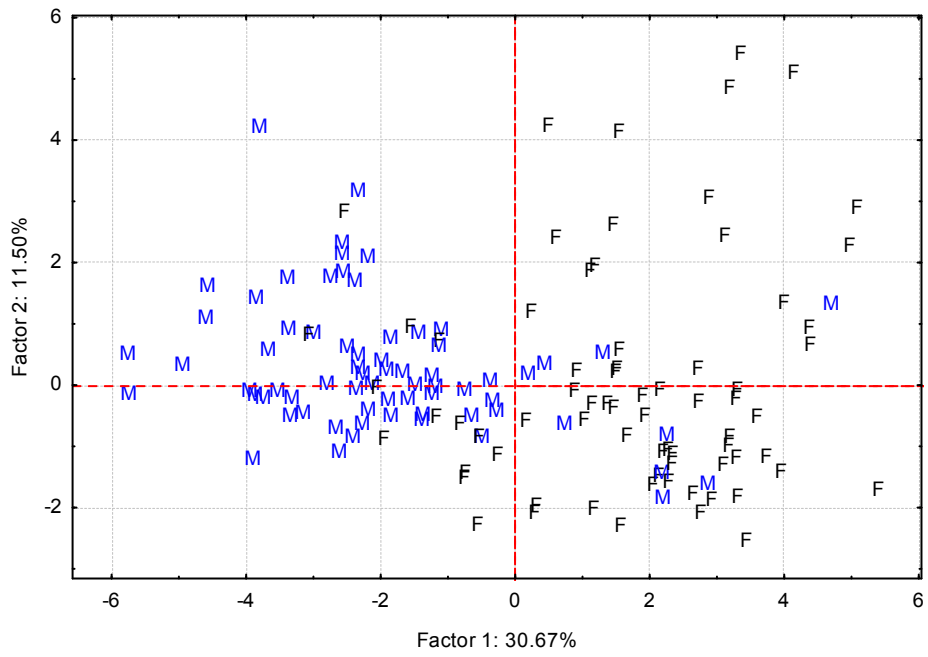


Figure S2: PCA (above: scores; below: loadings) for the whole blood elemental content in control mothers (M) and in control fetuses (F).

Table S4: p -values (pair data test) obtained when the placenta sampling zone (A, B, C) was related to the elemental content. For clarity purposes, p -values below 0.05 were evidenced in yellow background, and p -values below 0.01 were evidenced in orange background.

	p -value		p -value		p -value
Al	0.98	Hg	0.22	Pb	0.34
Ba	0.15	I	0.15	Rb	0.61
Br	0.32	K	0.52	S	0.20
Ca	0.15	Li	0.98	Sb	0.46
Cd	0.11	Mg	0.06	Se	0.24
Co	0.43	Mn	0.31	Si	0.93
Cr	0.52	Mo	0.52	Sr	0.22
Cu	0.46	Na	0.34	Ti	0.18
Fe	0.07	Ni	1.00	Zn	0.12
Ga	0.15	P	0.05	Zr	0.98

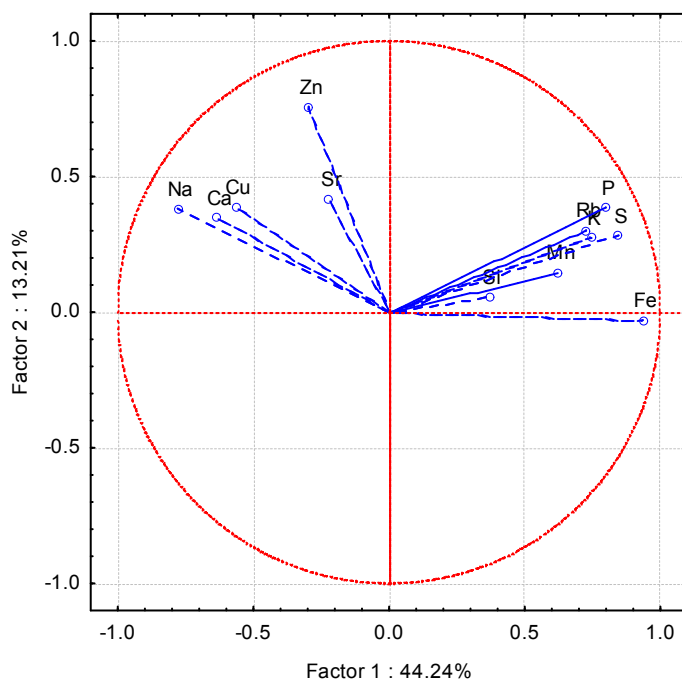


Figure S3: PCA (loadings, limited to Ca, Cu, Fe, K, Mn, Na, P, Rb, S, Si, and Zn) for the whole blood elemental content in fetuses from GDM mothers and from controls.

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