Prenatal growth rate	Growth Percentile	GDM	National ity	Matern al age	Mode of delivery	Gestational age (weeks +days)	Child gender	Birth weight (g)	Maternal BMI at the beginning of pregnanc Y	Maternal BMI after delivery
	56		Russia	29	Vaginal delivery	39+4	male	3460	21.5	28.9
	39		Romania	31	Caesarean delivery	39	male	3250	20.3	25.6
	36		Albania	25	Vaginal delivery	39	female	3260	21.8	25.9
	45		Greece	31	Vaginal delivery	39+2	female	3240	17.4	22.3
	40		Albania	27	Vaginal delivery	40+1	female	3000	17.8	23
	52		USA	32	Caesarean delivery	38+2	male	3270	23.4	29.3
AGA	45		Greece	34	Caesarean delivery	40+5	female	3350	20	25
	54		Greece	31	Caesarean delivery	39	female	3530	24.5	29.7
	39		Greece	39	Vaginal delivery	39	female	3320	24.5	29.1
	40		Greece	29	Vaginal delivery	40	male	3740	33	37.7
	69		Greece	22	Vaginal delivery	40+1	male	3540	20	24.6
	53		Ukraine	33	Vaginal delivery	39+4	female	3470	24.2	29.4
	55		Greece	32	Caesarean delivery	38+5	male	3560	25.9	31.1
	39		Greece	31	Vaginal delivery	38	male	2980	26	32
	70		Greece	35	Vaginal delivery	38+1	female	3400	24	26.8
	31		Czech republic	27	Vaginal delivery	40	male	3580	25.3	28.7
	47		Greece	39	Caesarean delivery	38+5	male	3250	21.8	25
	30		Greece	29	Vaginal delivery	40+4	female	3300	19.9	26.6
LGA	94	yes	Greece	35	Caesarean delivery	40+5	male	4090	25.7	28.8

**Table S1**: Summary of the characteristics for all the women participating in this study.

100	yes	Greece	38	Caesarean delivery	38+3	female	4430	24.3	27.5
96	yes	Bulgaria	34	Caesarean delivery	38+5	female	3930	20.6	30
91	yes	Greece	32	Caesarean delivery	37+4	female	3760	30.8	39.1
93	yes	Greece	29	Vaginal delivery	37+6	male	3790	25.5	33.9
96	yes	Greece	31	Caesarean delivery	37+5	male	3920	34.3	39.2
91	yes	Greece	34	Caesarean delivery	38+2	male	3600	22.4	24
93	yes	Greece	33	Caesarean delivery	38+2	female	3850	25.4	34.2
98		Philippin es	29	Caesarean delivery	39+3	female	3670	18.3	25
96		Greece	41	Caesarean delivery	37+1	female	3780	22.6	26.9
95		Greece	26	Caesarean delivery	39+2	male	3830	18	26.7
97		Greece	29	Caesarean delivery	38+6	female	3940	22	24.5
100		Greece	36	Caesarean delivery	38	male	4300	21.3	26.8
100		Albania	30	Caesarean delivery	38+5	male	4270	21.2	
99		Greece	38	Caesarean delivery	37+5	male	4130	19.7	25.6
96		Albania	35	Vaginal delivery	39+3	male	4210	23.4	31.6
94		Greece	32	Caesarean delivery	40+1	male	4380	34.4	39.3
100		Greece	40	Vaginal delivery	38+1	female	4240	21.4	25.6
95		Tashkent	34	Caesarean delivery	40+1	male	4220	21.1	25.3
94		Greece	35	Caesarean delivery	39+5	female	3700	22.2	28.9
97		Greece	31	Caesarean delivery	39+1	male	4150	19.6	26.1

Nr	Metabolite	Chemical shift, d	Assignment	Multiplicity
1	LDL1/VLDL1 R-CH <sub>3</sub>	0.74-0.85	$CH_3(CH_2)_0/CH_3CH_2CH_2C=$	m
2	Valine	0.94, 1.03	CH <sub>3</sub> , CH <sub>3</sub>	d, d
3	Isoleucine	0.95, 1.04	δ-CH <sub>3</sub> , b-CH <sub>3</sub>	t, d
4	Leucine	0.95	δ-CH <sub>3</sub>	d+d
5	Alanine	1.42	CH <sub>3</sub>	d
6	Lactic acid	1.33, 4.11	CH <sub>3</sub> , CH	d, q
7	LDL2/VLDL2	1.16-1.25	(CH <sub>2</sub> ) <sub>n</sub> /CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> CO	m
8	3-hydroxy butyrate	1.24, 2.30, 2.40	$\gamma$ -CH <sub>3</sub> , half a-CH <sub>2</sub> , half a-CH <sub>2</sub>	d, m, m
9	Citric acid	2.53, 2.63	half $CH_2$ , half $CH_2$	d, d, d
10	Acetic acid	1.95	CH <sub>3</sub>	S
11	Acetoacetate	2.17	CH <sub>3</sub>	S
12	lipid	1.88	CH=CHCH <sub>2</sub>	m
13	lipid	2	CH <sub>2</sub> CH <sub>2</sub> CO	m
14	N-acetyl glycoprotein	1.98	NHCOCH <sub>3</sub>	S
15	N-acetyl glycoprotein	2.02	NHCOCH <sub>3</sub>	S
16	Glutamic acid	2.35	half g-CH $_2$	m
17	Glutamine	2.44	half g-CH $_2$	m
18	Lysine	1.66-1.88	$\delta$ -CH <sub>2</sub> , $\beta$ -CH <sub>2</sub>	m, m
19	Lipids	3.17	C=CCH <sub>2</sub> C=C	m
20	Creatine	2.98	CH <sub>3</sub>	S
21	Creatinine	3	CH <sub>3</sub>	S
22	TMAO	3.19	CH <sub>3</sub>	S
23	Betaine	3.21	CH <sub>3</sub>	S
24	Glycine	3.55	CH <sub>2</sub>	S
25	Threonine	4.21	β-СН	m
26	D-Glucose	5.18, 4.55, 3.4-4.0,	various, H1	d, d, m
27	Tyrosine	6.8, 7.13	СН, СН	d, d
28	L-Phenyl alanine	7.22, 7.33	H2 + H6, H3+ H5	m, m
29	L-Histidine	7.03, 7.84	H4, H2	s, s
30	Formic acid	8.4	СН	S
31	Unsaturated lipid	5.32	-CH=CH-	m
32	glycerol of lipids	5.3	CHOCOR	m
33	Urea	5.78	NH <sub>2</sub> +NH <sub>2</sub>	m
34	Unsaturated lipid	5.34-5.44	CH=CHCH <sub>2</sub> CH=CH, =CHCH <sub>2</sub> CH <sub>2</sub>	m
35	3-methyl-histidine	7.71	H2	S
36	Choline	3.14	N(CH <sub>3</sub> ) <sub>3</sub>	S
37	Glycerol	3.66, 3.74	half $CH_{2,}$ half $CH_{2}$	dd
38	fatty acyl groups	5.34-5.36	=CHCH <sub>2</sub> CH <sub>2</sub>	m

**Table S2**: Table with NMR peaks of the identified metabolites.

**Figure S1**: A. Volcano plot including all the maternal and umbilical cord blood samples, B. Box plots of the metabolites related to UC samples, C. Box plots of the metabolites related to maternal samples.



**Figure S2**: Contribution plot of the LGA-GDM samples compared to the rest of the sample pool based on the PCA model.



**Figure S3**: PCA-class models of 2 components, Par scaled with a 95 % confidence interval, Triangles= Maternal samples, Circles= UC samples. **A**) LGA-NGDM samples, R<sup>2</sup>X(cum)= 0.63, Q<sup>2</sup>(cum)= 0.45. **B**) LGA-GDM samples, R<sup>2</sup>X(cum)= 0.55, Q<sup>2</sup>(cum)= 0.21. **C**) Maternal LGA-GDM samples, R<sup>2</sup>X(cum)= 0.71, Q<sup>2</sup>(cum)= 0.43.





Figure S4: Permutation testing and ROC curves based on the OPLS-DA models of the maternal samples.



Figure S5: Permutation testing and ROC curves based on the OPLS-DA models of the UC samples.

## Figure S6: Results of pathway analysis on maternal samples.

	Total	Expected	Hits	Raw p	-log(p)	Holm adjust	FDR	Impact
Aminoacyl-tRNA biosynthesis	75	0.50	7	1.97E-07	1.54E+01	1.57E-05	1.57E-05	0.06
Valine, leucine and isoleucine biosynthe-	27	0.18	5	4.83E-07	1.45E+01	3.82E-05	1.93E-05	0.06
sis								
Arginine and proline metabolism	77	0.51	6	5.47E-06	1.21E+01	4.27E-04	1.46E-04	0.08
Alanine, aspartate and glutamate	24	0.16	4	1.28E-05	1.13E+01	9.85E-04	2.56E-04	0.44
metabolism								
Valine, leucine and isoleucine degrada-	40	0.27	4	1.03E-04	9.18E+00	7.84E-03	1.65E-03	0.02
tion								
Taurine and hypotaurine metabolism	20	0.13	3	2.57E-04	8.27E+00	1.92E-02	3.42E-03	0.05
Glycolysis or Gluconeogenesis	31	0.21	3	9.68E-04	6.94E+00	7.16E-02	1.11E-02	0.10
Butanoate metabolism	40	0.27	3	2.05E-03	6.19E+00	1.50E-01	1.96E-02	0.13
D-Glutamine and D-glutamate	11	0.07	2	2.20E-03	6.12E+00	1.58E-01	1.96E-02	0.14
metabolism								
Glycine, serine and threonine metabolism	48	0.32	3	3.47E-03	5.66E + 00	2.47E-01	2.78E-02	0.10
Citrate cycle (TCA cycle)	20	0.13	2	7.34E-03	4.91E+00	5.14E-01	5.34E-02	0.15
Selenoamino acid metabolism	22	0.15	2	8.86E-03	4.73E+00	6.11E-01	5.91E-02	0.00
Pantothenate and CoA biosynthesis	27	0.18	2	1.32E-02	4.33E+00	8.98E-01	8.12E-02	0.00
Pentose phosphate pathway	32	0.21	2	1.83E-02	4.00E+00	1.00E+00	9.76E-02	0.00
Pyruvate metabolism	32	0.21	2	1.83E-02	4.00E+00	1.00E+00	9.76E-02	0.28
Propanoate metabolism	35	0.23	2	2.17E-02	3.83E+00	1.00E+00	1.08E-01	0.03
Nitrogen metabolism	39	0.26	2	2.66E-02	3.63E+00	1.00E+00	1.25E-01	0.00
Galactose metabolism	41	0.27	2	2.92E-02	3.53E+00	1.00E+00	1.30E-01	0.00
Synthesis and degradation of ketone bod-	6	0.04	1	3.93E-02	3.24E+00	1.00E+00	1.65E-01	0.70
ies								
Glyoxylate and dicarboxylate	50	0.33	2	4.22E-02	3.17E + 00	1.00E+00	1.69E-01	0.00
metabolism								
Cysteine and methionine metabolism	56	0.37	2	5.18E-02	2.96E+00	1.00E+00	1.97E-01	0.02
Tyrosine metabolism	76	0.51	2	8.88E-02	2.42E+00	1.00E+00	3.23E-01	0.00
Sulfur metabolism	18	0.12	1	1.14E-01	2.18E+00	1.00E+00	3.95E-01	0.03
Porphyrin and chlorophyll metabolism	104	0.69	2	1.50E-01	1.90E+00	1.00E+00	5.00E-01	0.00
Vitamin B6 metabolism	32	0.21	1	1.93E-01	1.64E+00	1.00E+00	5.89E-01	0.02
Glycerolipid metabolism	32	0.21	1	1.93E-01	1.64E+00	1.00E+00	5.89E-01	0.19
Terpenoid backbone biosynthesis	33	0.22	1	1.99E-01	1.62E+00	1.00E+00	5.89E-01	0.00
Glutathione metabolism	38	0.25	1	2.25E-01	1.49E+00	1.00E+00	6.44E-01	0.01
Nicotinate and nicotinamide metabolism	44	0.29	1	2.56E-01	1.36E+00	1.00E+00	6.53E-01	0.00
Histidine metabolism	44	0.29	1	2.56E-01	1.36E+00	1.00E+00	6.53E-01	0.00
Phenylalanine metabolism	45	0.30	1	2.61E-01	1.34E+00	1.00E+00	6.53E-01	0.00
Ascorbate and aldarate metabolism	45	0.30	1	2.61E-01	1.34E+00	1.00E+00	6.53E-01	0.02
Starch and sucrose metabolism	50	0.33	1	2.86E-01	1.25E+00	1.00E+00	6.93E-01	0.02
Pentose and glucuronate interconversions	53	0.35	1	3.00E-01	1.20E+00	1.00E+00	7.07E-01	0.00
Pyrimidine metabolism	60	0.40	1	3.33E-01	1.10E+00	1.00E+00	7.61E-01	0.00
Amino sugar and nucleotide sugar	88	0.58	1	4.50E-01	7.99E-01	1.00E+00	1.00E+00	0.00
metabolism						-	_	
Purine metabolism	92	0.61	1	4.65E-01	7.66E-01	1.00E+00	1.00E+00	0.00





Pathway Impact

**Figures 8.A-E**. Metabolic pathways of maternal samples as extracted by Metaboanalyst with box plots framing metabolites contributing to the LGA vs AGA vs GDM differentiation.



Figure S8.A. Aminoacyl-tRNA biosynthesis with 7 hits of detected metabolites



Figure S8B. Valine, leucine and isoleucine biosynthesis with 5 hits of detected metabolites







Figure S8.D. Alanine, aspartate and glutamate metabolism with 4 hits of detected metabolites



Figure S8.E Valine, leucine and isoleucine degradation with 4 hits of detected metabolites

## Figure S9: Results of pathway analysis on UC samples

0.11
0.11
0.04
0.00
0.02
0.44
0.14
0.31
0.04
0.03
0.01
0.04
0.00
0.00
0.14
0.70
0.15
0.00
0.00
0.03
0.00
0.00
0.00
0.00
0.00
0.00
0.00
0.10
0.19
0.00
0.01
0.02
0.00
0.00
0.00
0.00





Pathway Impact

**Figures S11A-E**. Metabolic pathways of UC samples as extracted by Metaboanalyst with box plots framing metabolites contributing to the LGAvsAGAvsGDM differentiation







Figure S11B. Nitrogen metabolism with 4 hits of detected metabolites



Figure S11.C Alanine, aspartate and glutamate metabolism with 3 hits of detected metabolites



Figure S11.D Valine, leucine and isoleucine degradation, with 4 hits of detected metabolites



Figure S11E Valine, leucine and isoleucine biosynthesis with 4 hits of detected metabolites