

**Fetal abdominal Overgrowth is already present at 20-24 gestational weeks prior to diagnosis of gestational diabetes mellitus**

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Supplementary Table S1. Clinical and biochemical characteristics and pregnancy outcomes in NGT and GDM subjects with and without fetal biometry

	NGT (N=6,721)			GDM (N=378)		
	With fetal biometry data (n=6,639)	Without fetal biometry data (n=82)	p-value	With fetal biometry data (n=357)	Without fetal biometry data (n=21)	p-value
	<b>Clinical and biochemical</b>					
Age (years)	33.2±3.8	32.0±3.7	<0.001	35.3±3.9	34.2±3.7	0.1935
Pre-pregnancy BMI (kg/m <sup>2</sup> )	20.6±2.6	20.5±2.6	0.7393	22.3±3.4	21.8±4.1	0.5053
Weight gain (kg)						
Pre-pregnancy – At diagnosis	7.5±3.25	7.5±3.8	0.7455	7.8±3.6	8.0±3.5	0.8291
Pre-pregnancy – Near term	12.9±4.1	13.4±4.4	0.0296	11.4±4.6	12.7±4.6	0.2573
50-g GCT (mmol/L)	6.2±1.2	6.2±1.1	0.6712	9.2±1.4	8.9±1.4	0.4270
Fasting plasma glucose <sup>a</sup> (mmol/L)	4.5±0.4	4.5±0.3	0.9708	5.0±0.8	4.7±0.9	0.2130
HbA1c at diagnosis <sup>a</sup> (%)	5.0±0.3	5.0±0.3	0.8635	5.3±0.5	5.2±0.5	0.4017
Fasting insulin <sup>a</sup> (pmol/L)	7.9±4.0	11.4±10.6	0.2429	9.9±4.9	9.6±5.5	0.7593
Insulin treatment (%)	-	-		10.9	4.8	0.3723
<b>Pregnancy outcomes</b>						
Primipara (%)	67.4	65.7	0.4910	66.7	66.7	1.0000
Cesarean delivery (%)	36.1	35.7	0.8792	50.1	47.1	0.8037

Primary cesarean delivery (%)	21.9	15.3	0.0024	31.1	14.3	0.1029
Infant birth weight (gm)	3195.1±419.4	3240.4±445.9	0.0637	3224.4±516.5	3261.2±396.0	0.7726
GA at delivery (weeks)	39.0±1.5	39.0±1.68	0.3912	38.4±1.8	38.7±0.9	0.4671
LGA (%)	5.1	8.0	0.0409	13.6	11.8	0.8247
Macrosomia <sup>b</sup> (%)	1.9	2.9	0.3127	4.7	5.9	0.8310

NGT, normal glucose tolerance; GDM, gestational diabetes mellitus; BMI, body mass index; GCT, glucose challenge test; HbA1c, glycosylated hemoglobin; GA, gestational age; LGA, large for gestational age.

<sup>a</sup> Column Ns for the variable are different from the Ns presented in the table, <sup>b</sup> Infant birth weight  $\geq$  4kg

Supplementary Table S2. Odds ratios of FAO by each FAOR at 20-24 GW in NGT, total GDM, and GDM subgroups

	Fetal Abdominal Obesity		
	Odds Ratio (95% CI)		
	GA-AC/GA-LMP <sup>b</sup> $\geq 90^{\text{th}}$	GA-AC/GA-BPD $\geq 90^{\text{th}}$	GA-AC/GA-FL $\geq 90^{\text{th}}$
NGT	1 (ref.)	1 (ref.)	1 (ref.)
Total GDM	1.496 <sup>a</sup> (1.097, 2.038)	1.088 (0.770, 1.538)	1.589 <sup>a</sup> (1.171, 2.156)
GDM Group 1	0.978 (0.549, 1.743)	0.973 (0.546, 1.734)	1.253 (0.739, 2.126)
GDM Group 2	1.620 (0.474, 5.544)	3.915 <sup>a</sup> (1.500, 10.223)	2.331 (0.777, 6.992)
GDM Group 3	2.041 <sup>a</sup> (1.344, 3.098)	0.986 (0.575, 1.690)	1.637 <sup>a</sup> (1.043, 2.568)
GDM Group 4	1.312 (0.556, 3.098)	0.831 (0.297, 2.319)	2.151 <sup>a</sup> (1.037, 4.461)

FAO, fetal abdominal obesity; FAOR, fetal abdominal overgrowth ratio; GW, gestational weeks; GA-AC, estimated gestational age by abdominal circumference; GA-LMP, gestational age by last menstruation period; GA-BPD, estimated gestational age by biparietal diameter; GA-FL, estimated gestational age by femur length; NGT, normal glucose tolerance; GDM, gestational diabetes mellitus.

<sup>a</sup> $p < 0.05$ , <sup>b</sup>Gestational age by LMP at 20-24 GW, <sup>c</sup>Fetal abdominal overgrowth defined as fetal abdominal overgrowth ratio (FAOR)  $\geq 90^{\text{th}}$  were GA-AC/GA-LMP  $\geq 1.076$ , GA-AC/GA-BPD  $\geq 1.070$ , and GA-AC/GA-FL  $\geq 1.077$

Supplementary Table S3. Odds ratios of FAO by FAOR of GA-AC/GA-LMP  $\geq 90^{\text{th}}$  according to GW at which fetal biometry was performed.

	Odds ratios of FAO by FAOR $\geq 90^{\text{th}}$	
	NGT	GDM
20-21 GW	1 (ref.)	1.624 (0.581, 4.536)
21-22 GW	1 (ref.)	1.731 (1.081, 2.772)
22-23 GW	1 (ref.)	1.474 (0.923, 2.353)
23-24 GW	1 (ref.)	0.999 (0.404, 2.474)

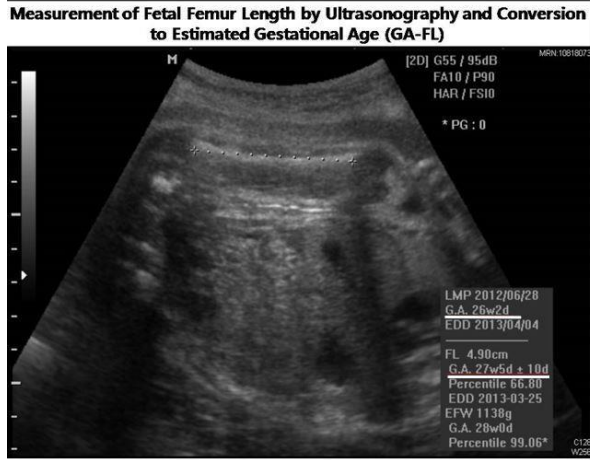
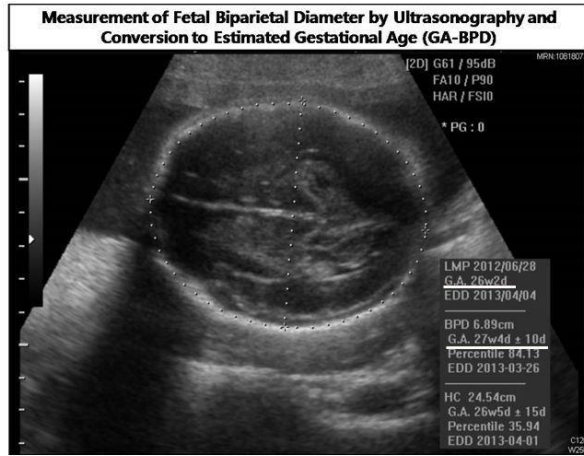
FAO, fetal abdominal obesity; FAOR, fetal abdominal overgrowth ratio; GA-AC, estimated gestational age by abdominal circumference; GA-LMP, gestational age by last menstruation period; GW, gestational week; NGT, normal glucose tolerance; GDM, gestational diabetes mellitus.

Supplementary Table S4. Correlation of FAORs measured at 20-24 GW with FAORs measured at the time of diagnosis of GDM

<b>FAORs</b>	<b>Variables</b>	<b>Correlation Coefficient</b>	<b>p-value</b>
GA-AC / GA-LMP - at 20-24GW	GA-AC / GA-LMP - at diagnosis	0.4348	<0.0001
GA-AC / GA-BPD - at 20-24 GW	GA-AC / GA-BPD - at diagnosis	0.3054	<0.0001
GA-AC / GA-FL - at 20-24 GW	GA-AC / GA-FL - at diagnosis	0.2839	<0.0001

FAOR, fetal abdominal overgrowth ratio; GW, gestational week; GDM, gestational diabetes mellitus; GA-AC, estimated gestational age by abdominal circumference; GA-LMP, gestational age by last menstruation period; GA-BPD, estimated gestational age by biparietal diameter; GA-FL, estimated gestational age by femur length.

Fig. S1. Measurement of fetal biparietal diameter, femur length, and abdominal circumference by ultrasonography and conversion to estimated gestational age



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ID  
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LMP 2012-06-28 Estab. Due Date  
GA(LMP) 26w2d Average US GA 27w5d  
EDD(LMP) 2013-04-04 EDD(Average US GA) 2013-03-25  
EFW Shinozuka1 1138g GA(EFW) 28w0d  
Percentile(EFW) 99.06\* SD(EFW) +2.35\*

Fetal Biometry	1	2	3	Avg.	G.A.	Percent
<u>BPD</u>	Shinozuka	6.89		6.89	cm 27w4d ± 10d	84.13
<u>HC</u>	Hadlock	24.54		24.54	cm 26w5d ± 15d	35.94
<u>AC</u>	Shinozuka	23.16		23.16	cm 28w5d ± 12d	78.12
<u>FL</u>	Shinozuka	4.90		4.90	cm 27w5d ± 10d	66.80
<u>FTA</u>	Osaka			42.68	cm² 27w5d	

Calc		%	
FL/AC	21.16	%	(20 - 24*)
FL/BPD	71.12	%	(71 - 87*)
FL/HC	19.97	%	
HC/AC	105.96	%	(104 - 122*)

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