

**Table 1.** Baseline participant characteristics of adult offspring, exposed to maternal gestational diabetes (regardless of maternal BMI), maternal pre-pregnancy obesity or overweight but not gestational diabetes and their controls, i.e. offspring of normoglycemic mothers with normal pre-pregnancy weight.

<b>Characteristic</b>	<b>Gestational diabetes (n=193)</b>	<b>P value <sup>b</sup></b>	<b>Pre-pregnancy obesity or overweight <sup>a</sup>, no gestational diabetes (n=157)</b>	<b>P value <sup>b</sup></b>	<b>Control (n=556)</b>
<i>Birth/Perinatal characteristics</i>					
Maternal body mass index before pregnancy, mean (SD), kg/m <sup>2</sup>	24.9 (5.4)	<0.001	28.0 (3.0)	<0.001	21.2 (1.9)
Twin pregnancy, n (%)	2 (1.3)		2 (1.3)		8 (1.4)
Maternal hypertension, n (%)	52 (26.9)	<0.001	53 (33.8)	<0.001	73 (13.1)
Maternal pre-eclampsia, n (%)	12 (6.2)		8 (5.1)		17 (3.1)
Maternal smoking during pregnancy, n (%)	23 (11.9)		33 (21.0)		90 (16.2)
Birth weight, mean (SD), g	3687 (626)	<0.01	3458 (864)		3535 (465)
Birth weight SD score, mean (SD)	0.55 (1.2)	<0.001	0.09 (1.4)		-0.05 (0.9)
Gestational age, mean (SD), weeks	39.0 (0.2)	<0.001	39.1 (2.9)	<0.001	39.9 (1.4)
Small for gestational age, n (%)	1 (0.5)		15 (9.6)	<0.001	8 (1.4)
Large for gestational age, n (%)	26 (13.5)	<0.001	10 (6.4)	<0.01	10 (1.8)
Male, n (%)	105 (54.4)	<0.05	78 (49.7)		258 (46.4)

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*Current characteristics*

Age, mean (SD), years	23.4 (1.3)	<0.001	24.8 (1.1)		24.4 (1.3)
Daily smoking, n (%)	55 (28.5)	<0.05	52 (33.1)		141 (25.4)
Body mass index, mean (SD), kg/m <sup>2</sup>					
Men	25.6 (4.7)	<0.001	26.5 (4.8)	<0.001	24.0 (3.6)
Women	24.3 (4.4)	<0.05	24.7 (4.6)	<0.01	23.0 (4.2)
Body mass index ≥ 25kg/m <sup>2</sup> , n (%)	81 (42.0)	<0.01	78 (49.7)	<0.001	158 (28.4)
Body mass index ≥ 30kg/m <sup>2</sup> , n (%)	24 (12.4)	<0.05	22 (14.0)	<0.05	41 (7.4)
Height, mean (SD), cm					
Men	178.9 (7.0)		178.0 (6.7)		178.9 (7.0)
Women	165.9 (6.3)		164.7 (6.4)		165.2 (6.2)
Parental education, n (%)		<0.05		<0.001	
Basic	28 (14.5)		21 (13.3)		30 (5.4)
Secondary	101 (52.3)		83 (52.9)		281 (50.5)
Lower-level tertiary	16 (8.3)		18 (11.5)		66 (11.9)
Upper-level tertiary	46 (23.8)		28 (17.8)		165 (29.7)
Maternal medical conditions at offspring mean age 24 years, n (%)					
Hypertension	42 (21.8)	<0.001	50 (31.8)	<0.001	52 (9.4)

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Diabetes	70 (36.3)	<0.001	18 (11.5)	<0.001	10 (1.8)
Stroke or myocardial infarction	3 (1.6)		1 (0.6)		3 (0.5)
Paternal medical conditions at offspring mean age 24 years, n (%)					
Hypertension	40 (20.1)		28 (17.8)		83 (14.9)
Diabetes	16 (8.3)		23 (14.6)		43 (7.7)
Stroke or myocardial infarction	13 (6.7)		3 (1.9)		19 (3.4)

<sup>a</sup> Pre-pregnancy body mass index  $\geq 25\text{kg/m}^2$

<sup>b</sup> Linear regression model, adjusted for age, sex and source cohort, comparing offspring exposed to maternal gestational diabetes or maternal pre-pregnancy overweight/obesity with controls. All remaining p values are  $>0.05$ .

**Table 2.** Cardio-metabolic markers of adult offspring, exposed to maternal gestational diabetes (regardless of maternal BMI), maternal pre-pregnancy obesity or overweight but not gestational diabetes and their controls, i.e. offspring of normoglycemic mothers with normal pre-pregnancy weight.

<b>Characteristic</b>	<b>Gestational diabetes (n=193)</b>	<b>Pre-pregnancy obesity or overweight, no gestational diabetes (n=157)</b>	<b>Control (n=556)</b>	<b>Reference</b>
Fasting plasma glucose, mean (SD), mmol/l	5.2 (1.1)	5.2 (1.2)	5.1 (1.1)	4.2-6.0
Fasting serum insulin, mean (SD), mU/l	10.3 (2.1)	22.8 (2.5)	14.8 (2.6)	2.0-20
Total cholesterol, mean (SD), mmol/l	4.5 (1.2)	4.7 (1.2)	4.6 (1.2)	< 5.0
HDL cholesterol, mean (SD), mmol/l	1.4 (1.3)	1.5 (1.3)	1.6 (1.3)	> 1.0 / > 1.2 <sup>a</sup>
LDL cholesterol, mean (SD), mmol/l	2.7 (1.4)	2.7 (1.3)	2.6 (1.3)	< 3.0
Triglycerides, mean (SD), mmol/l	1.0 (1.6)	1.0 (1.6)	0.9 (1.6)	< 1.7
Lipoprotein (a), mean (SD), mg/l	78.8 (3.1)	99.0 (3.3)	95.1 (3.1)	< 250
Apolipoprotein A1, mean (SD), g/l	1.4 (1.2)	1.5 (1.2)	1.5 (1.2)	1.0-2.0 / 1.1-2.3 <sup>a</sup>
Apolipoprotein B, mean (SD) g/l	0.7 (1.3)	0.8 (1.3)	0.7 (1.3)	0.66-1.33 / 0.60-1.17 <sup>a</sup>
Serum free fatty acid, mean, (SD), mmol/l	0.5 (1.6)	0.5 (1.5)	0.5 (1.6)	0.08-0.7
Serum sex hormone binding globulin, (SD) nmol/l				
Men	28.6 (1.5)	31.0 (1.5)	32.4 (1.5)	14-71

Women	100.2 (2.4)	126.1 (2.6)	137.3 (2.3)	20-155
Serum testosterone, (SD), nmol/l				
Men	18.4 (1.4)	17.6 (1.6)	19.7 (1.4)	10-38
Women	1.3 (1.4)	1.3 (1.4)	1.3 (1.4)	0.4-2
Plasma uric acid, mean (SD), $\mu$ mol/l	290.1 (1.6)	286.4 (1.3)	279.7 (1.3)	230-480 / 155-400 <sup>a</sup>
High-sensitivity C-reactive protein, mean (SD), mg/l	1.0 (3.5)	1.2 (3.3)	1.0 (3.7)	0.2-3
Plasma alanine aminotransferase, mean (SD), U/l	23.0 (1.7)	21.9 (1.8)	21.1 (1.7)	< 50 / < 35 <sup>a</sup>
Plasma aspartate transaminase, mean (SD), U/l	22.5 (1.4)	24.7 (1.4)	23.3 (1.4)	15-45 / 15-35 <sup>a</sup>
Plasma gamma glutamate, mean (SD), U/l	19.2 (1.8)	20.2 (1.8)	18.0 (1.7)	< 60 / < 40 <sup>a</sup>
Systolic blood pressure, mean (SD), mmHg	119.4 (14.3)	126.2 (16.4)	122.6 (15.0)	<130
Diastolic blood pressure, mean (SD), mmHg	75.1 (7.5)	76.8 (8.9)	76.0 (8.1)	<85
Heart rate, mean (SD), beats/min	71.0 (13.0)	74.2 (14.0)	72.7 (12.1)	60-80

Means other than blood pressure and pulse are geometric means. The geometric mean is the  $n^{\text{th}}$  root of the product of  $n$  values. Geometric standard deviations correspond to the percentage increase in a variable corresponding to one standard deviation unit change in the logarithm of the variable. Statistical comparisons among the three groups are shown in Table 3.

<sup>a</sup> men/women

**Table 3.** Cardio-metabolic markers of young adults born to mothers with gestational diabetes (regardless of maternal BMI) compared with controls, comprising offspring of normoglycemic mothers with normal pre-pregnancy weight, and offspring of mothers with pre-pregnancy obesity or overweight but no gestational diabetes, compared with controls.

Characteristic/Measure and model	Controls (n=556)	Maternal gestational diabetes (n=193)		P value	Maternal pre-pregnancy obesity or overweight, no gestational diabetes (n=157)		P value
	Mean (SD)	Mean difference <sup>a</sup>	95 % Confidence interval		Mean difference <sup>a</sup>	95 % Confidence interval	
Fasting plasma glucose, mmol/l	5.1 (1.1)						
1		1.6	0.1, 3.1	0.03	2.3	0.5, 4.3	0.01
4		0.4	-1.3, 2.2	0.62	0.4	-1.5, 2.3	0.69
Fasting serum insulin, mU/l	14.8 (2.6)						
1		12.7	4.4, 21.9	0.002	8.7	0.2, 17.8	0.05
4		8.4	-0.1, 17.6	0.05	-3.1	-10.7, 5.0	0.44
Serum testosterone in men, nmol/l	19.7 (1.4)						
1		-7.9	-15.2, 0.2	0.06	-10.1	-18.4, -0.9	0.03
4		-7.3	-15.9, 2.1	0.12	-6.1	-15.4, 4.2	0.23
Serum testosterone in women, nmol/l	1.3 (1.4)						
1		0.2	-8.6, 9.7	0.97	1.0	-7.7, 10.6	0.83
4		3.8	-7.0, 15.8	0.51	0.5	-9.4, 11.5	0.92

Serum sex hormone binding globulin in men, nmol/l	32.4 (1.5)						
1		-12.4	-20.2, -3.9,	0.005	-3.9	-13.3, 6.5	0.45
4		-10.3	-19.2, -0.5	0.04	2.7	-7.9, 14.6	0.63
Serum sex hormone binding globulin in women, nmol/l	137.3 (2.3)						
1		-33.2	-46.3, -16.8	0.0003	-3.3	-22.3, 20.3	0.76
4		-36.6	-50.9, -18.0	0.001	2.0	-20.4, 30.6	0.88
Serum free fatty acid, mmol/l	0.5 (1.6)						
1		-3.6	-11.0, 4.5	0.37	3.9	-4.1, 12.6	0.35
4		-6.9	-15.5, 2.5	0.15	2.2	-6.7, 12.0	0.64
Total cholesterol, mmol/l	4.6 (1.2)						
1		-2.9	-6.5, 0.9	0.14	1.9	-3.9, 8.1	0.53
4		-3.9	-7.5, -0.2	0.04	-0.3	-4.0, 3.6	0.88
HDL cholesterol, mmol/l	1.6 (1.3)						
1		-6.6	-10.9, -2.2	0.004	-0.6	-7.3, 6.5	0.86
4		-5.4	-9.4, -1.0	0.02	-1.8	-5.8, 2.4	0.40
LDL cholesterol, mmol/l	2.6 (1.3)						
1		-1.4	-7.5, 5.2	0.67	2.6	-6.9, 13.1	0.59
4		-4.0	-9.8, 2.0	0.19	0.2	-5.5, 6.3	0.95

Triglycerides, mmol/l	0.9 (1.6)						
1		5.5	-3.7, 15.8	0.25	6.5	-7.1, 22.1	0.36
4		0.0	-8.8, 9.6	0.98	-1.0	-9.6, 8.3	0.82
Lipoprotein (a) mg/l	95.1 (3.1)						
1		-18.9	-33.9, -0.4	0.05	4.3	-16.1, 29.4	0.70
4		-10.1	-30.0, 15.5	0.40	6.3	-17.1, 36.3	0.63
Apolipoprotein A1, g/l	1.5 (1.2)						
1		-4.5	-7.5, -1.4	0.005	-2.7	-5.6, 0.4	0.09
4		-4.6	-8.1, -1.0	0.01	-2.0	-5.2, 1.4	0.25
Apolipoprotein B, g/l	0.7 (1.3)						
1		-1.6	-6.1, 3.1	0.50	-0.1	-2.3, 2.1	0.91
4		-4.5	-9.5, 0.9	0.10	0.3	-4.6, 5.4	0.91
Plasma uric acid, $\mu$ mol/l	279.7 (1.3)						
1		4.5	-2.8, 12.2	0.23	2.9	-1.9, 8.0	0.23
4		-2.9	-8.4, 3.1	0.35	-2.8	-6.7, 1.2	0.17
High-sensitivity C-reactive protein, mg/l	1.0 (3.7)						
1		-14.6	-33.6, 9.7	0.22	-4.3	-33.9, 38.7	0.82
4		-17.0	-35.8, 7.4	0.16	16.4	-8.7, 48.6	0.22



Plasma alanine aminotransferase, U/l	21.1 (1.7)						
1		4.5	-4.9, 14.8	0.36	13.2	-2.0, 30.7	0.09
4		-1.7	-10.4, 8.0	0.72	-1.9	-10.6, 7.8	0.70
Plasma aspartate transaminase, U/l	23.3 (1.4)						
1		1.9	-4.9, 9.3	0.60	3.9	-7.0, 16.2	0.50
4		1.6	-5.0, 8.7	0.64	0.2	-6.2, 7.0	0.95
Plasma gamma glutamate, U/l	18.0 (1.7)						
1		4.9	-4.6, 15.4	0.32	7.8	-6.2, 24.0	0.29
4		-1.3	-10.5, 8.9	0.79	-0.3	-9.2, 9.6	0.96
Systolic blood pressure, mmHg <sup>a</sup>	122.6 (15.0)						
1		-0.9	-2.7, 1.0	0.36	0.0	-2.0, 2.0	1.0
4		-3.6	-5.7, -1.5	0.001	-3.5	-5.7, -1.4	0.001
Diastolic blood pressure, mmHg <sup>a</sup>	76.0 (8.1)						
1		-0.9	-2.2, 0.5	0.21	0.4	-1.0, 1.9	0.61
4		-2.2	-3.8, -0.7	0.006	-1.6	-3.2, 0.0	0.05
Heart rate, beats/min <sup>a</sup>	72.7 (12.1)						
1		-1.2	-3.3, 0.9	0.27	1.4	-0.8, 3.6	0.21

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4	-1.0	-3.5, 1.5	0.41	1.1	-1.5, 3.6	0.41
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<sup>a</sup> Mean differences for blood pressures are expressed as mmHg, and for heart rate as beats/min while the remaining results are presented as % difference.

Multiple linear regression models as follows:

Model 1 adjusted for age, sex and source cohort

Model 4 adjusted for age, sex, source cohort, gestational age, birth weight standard deviation score, maternal hypertension or preeclampsia during pregnancy, maternal smoking during pregnancy, parental educational attainment and parental hypertension, diabetes, stroke or myocardial infarction, body mass index, height and daily smoking

Models 2 and 3 are shown in Supplementary Table 3.