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Comment

—to: Ong KK, Petry CJ, Emmett PM et al.; ALSPAC study team (2004) Insulin sensitivity and secretion in normal children related to size at birth, postnatal growth, and plasma insulin-like growth factor-I levels. Diabetologia 47:1064–1070

To the Editor: Ong and co-workers recently reported that, among 8-year-old children, lower birthweights predicted lower insulin secretion and reduced insulin sensitivity [1], albeit the latter only occurred in the highest BMI tertile of their population. We have studied the relationship between birthweight and later development of glucose intolerance and metabolic syndrome in a cohort of 660 obese Caucasian children and adolescents. Subjects had the following characteristics: mean age 14 years (range 6–18 years), 46% male, BMI 35.2±0.2 kg/m^2, standard deviation score of BMI (SDS-BMI) 3.8±0.03 and waist circumference 106.0±14.1 cm. Metabolic syndrome was defined by the presence of one or more of insulin resistance, IFG, IGT and diabetes, plus two or more of the following factors: (i) a BMI and/or waist circumference ≥97th percentile of the control group; (ii) triglycerides ≥97th percentile; (iii) HDL cholesterol <5th percentile; and (iv) systolic and diastolic blood pressure ≥97th percentile.

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Insulin resistance was evaluated by homeostasis model assessment (HOMA-IR). However, the adult definition is unlikely to apply to children as we have previously shown that HOMA-IR changes during childhood according to the pubertal stage [2]. We considered HOMA-IR values greater than the median value for each of the Tanner stages to be indicative of insulin resistance.

We found that birthweight was related to SDS-BMI, but not to insulin sensitivity, insulin secretion (evaluated using the insulinogenic index, ΔI30/ΔG30) or the presence of the metabolic syndrome (Table 1).

When HOMA-IR values were adjusted for current SDS-BMI, we found a significant association between low birthweight and reduced insulin sensitivity (first vs third tertile of birthweight: 3.0±1.0 vs 2.8±1.0, $p<0.0001$). On adjustment of values of the insulinogenic index for current SDS-BMI, we observed that insulin secretion was significantly higher in obese children with birthweights in the lower tertile (first vs third tertile of birthweight: 306.7±22.5 vs 275.9±22.3 pmol/mmol, $p<0.05$). Adjusted fasting and 2-h blood glucose values were similar in the two birthweight groups (first vs third tertile of birthweight: 4.5±0.03 vs 4.5±0.03 mmol/l, NS and 5.9±0.06 vs 5.8±0.07 mmol/l, NS respectively). These observations suggest a compensatory insulin response.

These results indicate that, in this population of grossly obese children, any effect of birthweight on the development of insulin resistance is largely mediated by the current degree of obesity, as the insulin response appeared appropriate for the degree of weight-adjusted insulin sensitivity.

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Table 1. Degree of obesity and metabolic profile according to tertiles of birthweight in 660 obese children and adolescents

	Tertiles of birthweight			*p* value
	I	II	III	
	(1300–3180 g)	(3190–3600 g)	(3630–5700 g)	
SDS-BMI	3.6±0.05	3.7±0.05	3.9±0.05	0.05
HOMA-IR	2.98±1.0	2.93±1.0	2.96±1.0	NS
ΔI30/ΔG30 (pmol/mmol)	301.5±22.7	303.1±22.4	281.0±22.3	NS
Metabolic syndrome	23	22	25	NS

Values are means ± SD or %

References

1. Ong KK, Petry CJ, Emmett PM et al.; ALSPAC study team (2004) Insulin sensitivity and secretion in normal children related to size at birth, postnatal growth, and plasma insulin-like growth factor-I levels. Diabetologia 47:1064–1070
2. Invitti C, Guzzaloni G, Gilardini L, Morabito F, Viberti G (2003) Prevalence and concomitants of glucose intolerance in European obese children and adolescents. Diabetes Care 26:118–124

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Abbreviations: HOMA-IR, homeostasis model assessment of insulin resistance · SDS, standard deviation score