Association of Abdominal Aortic Wall Thickness in the Newborn with Maternal Factors

Satoru Iwashima, Ph.D. 1 Takamichi Ishikawa, M.D. 1 Ohishi Akira, M.D. 1 Hiroaki Itou, Ph.D. 2

1 Department of Pediatrics, Hamamatsu University School of Medicine, Japan
2 Department of Obstetrics and Gynecology, Hamamatsu University School of Medicine, Japan


Purpose The goal of the present study is to carry out prospective echocardiographic measurements of intima-media thickness (IMT) in the abdominal artery of newborns.

Methods Study subjects were 96 mothers and their newborns. We measured the adjusted IMT (aIMT, mm/mm) of newborn abdominal arteries by high-resolution ultrasound and evaluated the association of aIMT with various maternal and newborn factors.

Results Negative correlations were observed between aIMT and gestational age \( (r = -0.678, p < 0.01) \) and positive correlations between aIMT and placenta-to-fetus weight ratio \( (r = 0.418, p < 0.01) \). Comparing the small-for-gestational-age (SGA) versus appropriate-for-gestational-age (AGA) categories, aIMT in the SGA \( (n = 14) \) was greater than in the AGA \( (n = 82) \), with values of 0.115 (0.117) mm/mm versus 0.084 (0.074) mm/mm, \( p < 0.01 \), respectively. A multiple linear regression analysis was performed with aIMT as a dependent variable, and significant correlations were noted with gestational age \( (R^2 = 0.524, \beta = -0.515, p < 0.001 \text{ for gestational age}) \).

Conclusion On the basis of these findings, we suggest that aIMT thickness is associated with placenta-to-fetus weight ratio and gestational age, and that increased values of aIMT in SGA may indicate presence of a latent link to cardiovascular disease that might otherwise go undetected in infancy.
growth during the early postnatal period may be important themes to improve future health. However, whether increased IMT has a causal or noncausal link to CVD remains unclear, because genetic and maternal factors (e.g., nutrition, stress, smoking, hypoxemia, and anemia) and fetal exposures (e.g., excessive glucocorticoid and hypoxia) may influence both adjusted IMT (aIMT) and placental weight.\textsuperscript{10,11,12} A greater placental diameter or area relative to fetal size also marks placental inefficiency, which predicts a higher systolic blood pressure (BP) long term.\textsuperscript{13}

The goal of the present study was to prospectively measure IMT of abdominal arteries in newborns using ultrasound and to correlate the findings with various maternal and newborn factors.

**Materials and Methods**

**Subjects**

Study subjects were mothers and their newborns seen at the Hamamatsu University School of Medicine Department of and Obstetrics and Pediatrics from January to December 2009. Infants were born at our institution or admitted to our neonatal intensive care units for treatment of disease. Excluded were twins, infants with congenital heart disease or poor cardiac function manifested by a left ventricular ejection fraction less than 60%, and those on ventilators, showing an Apgar score less than 7 at 5 minutes and those having chromosomal abnormalities. In newborns, the categories were SGA or appropriate for gestational age (AGA), as defined by a birth weight below or above the 10th percentile for gestational age.\textsuperscript{14} Although a few infants were excluded based on these diagnoses, we sought to include infants with a range of problems, and some of them required intensive care. Our case mix included 66 normal infants (AGA = 66), 16 with a birth weight of less than 2300 g (SGA = 10, AGA = 6), 7 with transient tachypnea (SGA = 3, AGA = 4), 5 with respiratory distress syndrome (SGA = 1, AGA = 4), and 2 with neonatal hypoglycemia (AGA = 2). No patient was treated with inotropic drugs.

Informed consent was obtained from parents or legal guardians before examination. The study protocol was approved by the Ethics Committee of Hamamatsu University School of Medicine. The study was conducted according to the Declaration of Helsinki.

**Ultrasound Studies**

Ultrasound studies were performed in a resting state using a standardized scanning protocol for the abdominal arteries. For data acquisition a Philips HDI1 equipped with a linear 11.0-MHz transducer (Philips Medizin Systeme GmbH, Tokyo, Japan) was employed. IMT was measured in a straight, nonbranched 1-cm longitudinal segment of the proximal abdominal aorta by high-resolution ultrasound as previously described. To minimize variability during the cardiac cycle, all images were taken at the end-diastole simultaneous with the R-wave of a continuously recorded electrocardiogram. Three or four images of the best quality were chosen in each study subject. Computer software (QLAB; Philips Medizin Systeme GmbH) that analyzed the IMT distance automatically at 50 points within a segment of 10 mm was adopted; IMT was calculated with validated edge detection software, previously shown to be accurate and reproducible.\textsuperscript{15} The value given was the arithmetic mean of the IMT calculated. The digitally stored scans were analyzed by one reader (S.I.) blinded to subjects’ details. A manual second reading of the accurate border detection during computed analysis was performed in all images obtained.

**Relationship between AImT and Various Factors**

In newborns we measured the ratio of IMT (mm) to systolic abdominal aortic lumen diameter (mm). This measurement, designated as the aIMT, was evaluated with respect to various factors for both mothers and newborns. Aortic lumen diameter was measured at the same point as the IMT measurement, in a straight, nonbranched 1-cm longitudinal segment of the proximal abdominal aorta, and in a location that identified the media-adventitia interface of the two opposing arterial walls.

Maternal factors studied were age (years), systolic and diastolic BP, body mass index (BMI; kg/m\textsuperscript{2}), weight gain increase during pregnancy (kg), placenta-to-fetus weight ratio (placental weight [g]/birth weight [g]). Placental and birth weight measurements were obtained in the delivery room and recorded in grams. Newborn factors studied were gestational age (weeks); abdominal aortic lumen diameter (mm); systolic, diastolic, and mean BP; and indices of newborn arterial elasticity, including the \( \beta \) index,\textsuperscript{16} and “YEM,” or Young’s elastic modulus.\textsuperscript{17} Replicate BP measurements were obtained on the left or right arm of the mothers and on the left or right leg of the newborns in a relaxed, supine position by an automatic oscillometric cuff device (UA-787, A&D company, Tokyo, Japan). Arm or leg length and circumference measurements were made during the examination to ensure proper cuff size. Maternal BP was defined as maximal systolic or diastolic BP during pregnancy. BP in newborns was measured at the time of the ultrasound study. Maternal weight gain increase was defined as the weight gain increase at delivery during pregnancy minus prepregnancy weight. Ultrasound and concomitant leg BP measurements were used to calculate the \( \beta \) index and YEM, defined as follows:

\[
\beta \text{ index} = \ln(P_s/P_d)\sqrt{(D_s - D_d)/D_d}
\]

\[
YEM = (|P_s - P_d| \times D_d)(U_d - D_d)/\text{IMT}
\]

Where \( P_s \) is vessel systolic pressure, \( P_d \) is diastolic pressure, \( D_s \) is systolic diameter, and \( D_d \) is diastolic diameter.

The \( \beta \) index was developed to reduce the impact of the curvilinear pressure-stiffness relationship on arterial stiffness and is therefore considered to be relatively independent of BP. YEM gives an estimate of arterial stiffness that is independent of wall (intima-media) thickness.

**Comparison With AImT and Various Other Factors**

Several categories were defined for aIMT comparison. In mothers, these included primiparity versus nonprimiparity,
weight gain during pregnancy less than or greater than 5 kg, presence or absence of maternal complications, and maternal smoking or nonsmoking status. In newborns the categories were SGA or AGA.

Data Analysis
Results are expressed as mean (median). Pearson’s linear regression analysis was performed to show the degree of correlation between variables. Two-sided comparisons between groups were made using the Mann-Whitney U test. Univariate analyses of each parameter on aIMT were performed with a simple linear regression model. To find independent factors for aIMT, multiple linear regression analyses by forced entry method were applied separately with aIMT as a dependent variable. For all statistics, a p value < 0.05 was considered significant. All analyses were performed by means of an SPSS statistical software package, version 11.0J (SPSS, Tokyo, Japan).

Results
Maternal and newborn characteristics are summarized in Table 1. Mean aIMT was 0.089 (0.076) mm/mm and ranged from 0.047 to 0.196 mm/mm. Figure 1 shows IMT findings in two cases, one an AGA neonate and the other an SGA neonate. Correlations of variable factors with aIMT are shown in Table 2. Negative correlations were observed between aIMT and maternal weight gain increase (r = −0.367, p < 0.01), gestational age (r = −0.678, p < 0.01), and newborn systolic, mean, and diastolic BP (r = −0.354, p < 0.01; r = −0.338, p < 0.01; r = −0.425, p < 0.01, respectively). A positive correlation of aIMT was observed with placenta-to-fetus weight ratio (r = 0.418, p < 0.01) and β index (r = 0.262, p = 0.01). There were no significant differences observed comparing aIMT with maternal age, BMI, and systolic and diastolic BP, or with the indices of newborn YEM.

Comparison of maternal factors with aIMT are shown in Table 3. There were 40 primiparities, but no significant difference between primiparity and nonprimiparity. There were 13 mothers who gained less than 5 kg during pregnancy, and this group had a significantly higher value for aIMT than individuals who gained more than 5 kg (0.111 [0.110] mm/mm versus 0.085 [0.075] mm/mm, p = 0.02). In the present study, there were 24 mothers with complications, including 14 with pregnancy-induced hypertension, two with pregnancy-related diabetes, two with systemic lupus erythematosus, one with ulcerative colitis, two with cancer, one with endometriosis, one with epilepsy, and one with cervicitis. Values of aIMT in mothers with pregnancy accompanied by complications were not significantly different from those in mothers without complications. Values of aIMT in smokers versus nonsmokers were also not significantly different.

Analysis of the 14 newborns in the SGA group versus the 82 in the AGA group revealed several significant differences. Gestational age of SGA was 35.4 (35.5) weeks and of AGA was 37.9 (39.0) weeks, a significant difference (p < 0.01). Mean weight in the SGA group was 1915 (2032) g versus 2893 (2928) g in the AGA group, a significant difference (p < 0.01).

Values of aIMT in the SGA group were significantly greater than in the AGA group (0.115 [0.117] mm/mm versus 0.084 [0.074] mm/mm, p < 0.01). Moreover, even in the absence of adjustment for abdominal aortic lumen diameter, the values of IMT in the SGA group were greater than in the AGA group (0.444 [0.440] mm versus 0.382 [0.370] mm, p < 0.01). Placental weight in the SGA group was lower than in the AGA group (418.2 [420.0] g versus 569.9 [550.0] g, p < 0.01), but the placenta-to-fetus weight ratio was higher in SGA than in the AGA group (0.23 [0.22] versus 0.20 [0.19], p < 0.05). There was also a significant difference in BP between the SGA and AGA groups (for systolic BP 67.2 [66.5] mm Hg versus 76.2 [75.0] mm Hg, p < 0.01, and for diastolic BP 39.1 [39.1] mm Hg versus 44.4 [44.0] mm Hg, p < 0.05). The β index and YEM did not differ between the two groups.

The multiple regression analysis for models predicting aIMT in the present study is shown in Table 4. When this analysis was performed using aIMT as a dependent variable, and employing as independent variables maternal weight gain; placenta-to-fetus weight ratio; gestational age; newborn systolic, mean, and diastolic BP; β index; weight gain less or than more than 5 kg; presence or absence of maternal complications; and SGA or AGA status, significant correlations were noted for gestational age (respectively values were R² = 0.524, β = −0.515, p < 0.001 for gestational age).

It is acknowledged that the postnatal age range of 1 to 38 days in this study may introduce some variability. The median time of the exam was 3 days after birth, but exams were delayed in many preterm infants until after the first week, resulting in a negative correlation between exam day and gestational age (r = −0.644, p < 0.01) and a positive correlation between exam day and aIMT (r = 0.597, p = 0.01). We also evaluated repeatability of the aIMT measurement by carrying out repeat scans in nine infants at 1 week and 1 month, which showed mean aIMT values of 0.13 and 0.14 mm/mm, respectively (not significant).

Discussion
In the present study, we assessed CVD risk factors using noninvasive ultrasound techniques. The carotid artery has been the target in recent studies because it is located superficially on the neck and can in many instances easily be visualized by ultrasound. However, in the newborn visualizing the carotid artery in the neck may prove to be difficult.

The multiple regression analysis for models predicting aIMT in the present study showed significant correlations for gestational age. An inverse relationship between gestational age and adult hypertension has been described in both adult men and women born prematurely.18,19 In a large epidemiological study, the risk of hypertension in adulthood was correlated with the degree of immaturity.20 These findings are in agreement with the wider concept of the developmental origins of cardiovascular and metabolic disease, which relate to a particular window of vulnerability.

Our results showed a positive correlation with placenta-to-fetus weight ratio, and values of aIMT in the SGA group.
were significantly greater than in the AGA group. However, the placenta-to-fetus weight ratio in SGA was higher than in AGA, and placenta weight in SGA was lower than in AGA. BP measurements also differed between SGA and AGA. As the main organ supplying nutrients, oxygen, and hormones to the fetus, the placenta can be a key to understanding fetal programming of BP.\textsuperscript{10,21,22}

Large placental volume is a marker of both low vascular resistance and placental inefficiency, defined as the inverse of the grams of fetus that can be supported by each gram of placenta,\textsuperscript{23} and simply calculated as the ratio between the weight of the placenta and fetus. Recent reports on placental inefficiency have suggested that higher placental weight and placenta-to-fetus weight ratios may predict higher childhood

\begin{table}[h]
\caption{Characteristics of Newborns and Their Mothers ($n = 96$)}
\begin{tabular}{|l|c|c|c|}
\hline
& Mean & Median & Range \\
\hline Maternal age (y) & 30.2 & 31 & 20–41 \\
Maternal height (cm) & 157.9 & 158.0 & 143.0–173.0 \\
Maternal weight (kg) & 52.6 & 52.0 & 36.0–102.0 \\
Maternal BMI (kg/m\textsuperscript{2}) & 21.1 & 20.0 & 16.2–36.6 \\
Weight gain increase (kg) & 9.9 & 10.0 & –2.0–17.9 \\
Maximum maternal systolic BP (mm Hg) & 129.0 & 130.0 & 92.0–180.0 \\
Maximum maternal diastolic BP (mm Hg) & 76.9 & 78.0 & 38.0–109.0 \\
Placental weight (g) & 547.8 & 540.0 & 230.0–1070.0 \\
Placenta-to-fetus weight ratio & 0.21 & 0.20 & 0.13–0.50 \\
Gestational age (wk) & 37.6 & 38.0 & 29–41 \\
Apgar scores (5 min) & 9 & 9 & 8–10 \\
Newborn height (cm) & 48.1 & 50.0 & 35.0–55.0 \\
Newborn weight (g) & 2751 & 2833 & 946–3746 \\
Newborn IMT (mm) & 0.391 & 0.380 & 0.250–0.580 \\
Weight-adjusted IMT (mm/mm) & 0.089 & 0.076 & 0.047–0.196 \\
Heart rate (beat/min) & 128 & 128 & 78–180 \\
Newborn systolic BP on exam day (mm Hg) & 74.9 & 74.0 & 51–97 \\
Newborn mean BP on exam day (mm Hg) & 54.6 & 54.0 & 33–76 \\
Newborn diastolic BP on exam day (mm Hg) & 43.6 & 44.0 & 24–62 \\
Postnatal exam (d) & 4.9 & 3.0 & 1–38 \\
\hline
\end{tabular}
\end{table}

BMI, body mass index; BP, blood pressure, IMT, intima-media thickness. Weight gain increase = weight at delivery minus prepregnancy weight.
systolic BP despite the presence of lower systolic BPs during infancy,²³ and other reports have suggested that placental inefficiency may also predict higher BPs in offspring.¹³ Although some of these findings may seem contrary to our observations, other studies examining the associations between placenta-to-fetus weight ratio and BP have been inconsistent, with some studies finding positive associations²⁴,²⁵,²⁶ but others none.²⁷,²⁸ Thus the issue remains unsettled at the present time. In the present study, there were also significant negative correlations between aIMT and gestational age, and aIMT in SGA was thicker than in AGA.

Several other authors have made observations that may be relevant to our findings. Koklu et al reported that aIMT was significantly increased in neonates with SGA with decreased serum insulinlike growth factor 1 and leptin levels compared with AGA neonates.²⁹ Cheung et al³⁰ and Rossi et al³¹ found that BP and arterial stiffness were related to LBW, but not to LBW associated with intrauterine growth restriction. LBW, caused by preterm birth or SGA or both, is known to be associated with increased rates of CVD and non–insulin-dependent status in adult life.³²,³³,³⁴ Pathological findings suggest that arterial stiffness could be caused by a deficiency in elastin synthesis in the wall of the aorta and in the large arteries.³⁵ Aortic elastic properties are determined on the basis of elastin, a major component of the extracellular matrix in the media of the vessel wall. Elastin

### Table 2 Simple Linear Regression Analysis of aIMT (mm/mm) in the Present Study

<table>
<thead>
<tr>
<th></th>
<th>r</th>
<th>95% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age (y)</td>
<td>0.047</td>
<td>−0.155−0.245</td>
<td>0.650</td>
</tr>
<tr>
<td>Maximum maternal systolic BP (mm Hg)</td>
<td>0.052</td>
<td>−0.150−0.250</td>
<td>0.613</td>
</tr>
<tr>
<td>Maximum maternal diastolic BP (mm Hg)</td>
<td>0.111</td>
<td>−0.092−0.305</td>
<td>0.283</td>
</tr>
<tr>
<td>Maternal BMI (kg/m²)</td>
<td>−0.139</td>
<td>−0.330−0.063</td>
<td>0.177</td>
</tr>
<tr>
<td>Maternal weight gain increase (kg)</td>
<td>−0.367</td>
<td>−0.529−0.180</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Placenta-to-fetus weight ratio</td>
<td>0.418</td>
<td>0.238−0.571</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gestational age (wk)</td>
<td>−0.678</td>
<td>−0.773−0.553</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Newborn systolic BP on day of exam (mmHg)</td>
<td>−0.354</td>
<td>−0.517−0.165</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Newborn mean BP on day of exam (mm Hg)</td>
<td>−0.338</td>
<td>−0.504−0.148</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Newborn diastolic BP on day of exam (mmHg)</td>
<td>−0.425</td>
<td>−0.577−0.246</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Beta index</td>
<td>0.262</td>
<td>0.065−0.439</td>
<td>0.01</td>
</tr>
<tr>
<td>YEM (mm Hg/mm)</td>
<td>−0.128</td>
<td>−0.321−0.074</td>
<td>0.214</td>
</tr>
</tbody>
</table>

aIMT, adjusted intima-media thickness; BMI, body mass index; CI, confidence interval; YEM, Young’s elastic modulus. Maternal weight gain increase = weight gain at delivery minus weight prepregnancy.

### Table 3 Comparison of Maternal Factors with aIMT

<table>
<thead>
<tr>
<th></th>
<th>aIMT (mm/mm)</th>
<th>Median</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primiparity (n = 40)</td>
<td>0.087</td>
<td>0.078</td>
<td></td>
</tr>
<tr>
<td>Nonprimiparity (n = 56)</td>
<td>0.090</td>
<td>0.076</td>
<td>0.76</td>
</tr>
<tr>
<td>Maternal weight gain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 kg (n = 13)</td>
<td>0.111</td>
<td>0.110</td>
<td></td>
</tr>
<tr>
<td>&gt; 5 kg (n = 83)</td>
<td>0.085</td>
<td>0.075</td>
<td>0.02</td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complication (n = 24)</td>
<td>0.101</td>
<td>0.039</td>
<td></td>
</tr>
<tr>
<td>No complication (n = 72)</td>
<td>0.085</td>
<td>0.031</td>
<td>0.06</td>
</tr>
<tr>
<td>Smoking (n = 9)</td>
<td>0.089</td>
<td>0.089</td>
<td></td>
</tr>
<tr>
<td>Nonsmoking (n = 87)</td>
<td>0.089</td>
<td>0.077</td>
<td>0.56</td>
</tr>
<tr>
<td>SGA (n = 14)</td>
<td>0.115</td>
<td>0.117</td>
<td></td>
</tr>
<tr>
<td>AGA (n = 82)</td>
<td>0.084</td>
<td>0.074</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Results shown as mean (median). AGA, appropriate for gestational age; aIMT, adjusted intima-media thickness; SGA, small for gestational age.
to elevated glucocorticoid levels,
rats exposed to nutrient restriction in utero, Khorram et al
cular dysfunction in adult offspring. In a study of offspring of
born vessels might maintain their arterial elasticity functions
constrain or stimulate placental growth, depending on their
gain (greater or less than 5 kg) suggests an important link not
otherwise undetectable in infancy. In particular, the associa-
newborn displaying SGA may constitute an early morpholog-
placenta-to-fetus weight ratio in mothers and in preterm
SGA newborns. Interestingly, Burkhardt et al reported recently an increased arterial stiffness with de-
creased elastin content in umbilical arteries from SGA infants.
Our results showed a weak positive correlation of abdomi-
nal artery elasticity as assessed by the β index with values of
aIMT. However, increased values of aIMT in SGA, and the
lower BPs in this group, could have an independent effect on
arterial elasticity. Increased aIMT could change endothelial function and affect the elastic properties of blood vessel walls, in turn altering the values for β index and YEM. Another study has reported that there may be an independent association between endothelial dysfunction and progression of carotid wall thickness, suggesting the possibility that in the newborn vessels might maintain their arterial elasticity functions despite increases in thickness of aIMT.

On the basis of these findings, we suggest that thickness of aIMT through its association with placental weight and placenta-to-fetus weight ratio in mothers and in preterm newborn displaying SGA may constitute an early morphological marker of plaque formation and atherosclerosis that is otherwise undetectable in infancy. In particular, the association of aIMT with maternal factors including maternal weight gain (greater or less than 5 kg) suggests an important link not only to the developing fetal cardiovascular system but also to overall fetal development. Intrauterine insults can either constrain or stimulate placental growth, depending on their timing and severity as well as maternal nutritional status.

Several studies have primarily been focused on maternal malnutrition during pregnancy or fetal exposure to elevated glucocorticoid levels, which may cause vascular dysfunction in adult offspring. In a study of offspring of rats exposed to nutrient restriction in utero, Khorram et al observed significant remodeling of the extracellular matrix of the aorta resulting in increased stiffness. Fetal adaptations to an adverse intrauterine environment may include altered cellular differentiation and tissue growth to ensure short-term survival but may also lead to impaired cardiovascular structure and function later in adult life. In the current study, although the mechanisms and pathways through which an increase in aIMT is affected by maternal factors including maternal weight gain greater or less than 5 kg are incompletely understood, the interactions are likely to be multiple.

Several limitations in the present study should be addressed. The number of patients studied was relatively small, and although several significant correlations were observed, the study may have been underpowered to demonstrate others such as a correlation with maternal smoking. Further studies with larger numbers of individuals are needed to test whether such correlations are present. Recently Koklu et al reported that values of IMT showed an increase with gesta-
tional age, although some bias may have been introduced into this study by exclusion of SGA subjects. However, we could not investigate other factors that might be important in causing preterm delivery including fetal distress, infection and inflammation, and genetic abnormalities. We did not perform umbilical arterial Doppler studies, and we could not follow all newborns with CVD risk factors long term.

Our study did, however, provide some significant new insights. Although Skilton and coworkers reported that differ-
ences in IMT were more marked when expressed as a ratio to body size, we adjusted the values of IMT by determining their ratio to abdominal aortic lumen diameter, defined as aIMT in mm/mm. We believe that aIMT may prove to be a more useful marker for evaluating the likelihood of developing CVD in the newborn period. In addition, we observed that an increase in abdominal artery IMT thickness is associated not only with SGA but also with placenta-to-fetus weight ratio.

Recently, the mechanism of developmental origins of health and disease (DOHaD), including mediating metabolic and hormonal factors, has been investigated. The concept of DOHaD has provided us with a new approach to preventing CVD. Further studies will be necessary over a longer period of time to define the risk factors for CVD and metabolic syndrome in children.

In conclusion, our novel findings indicate that aIMT has associations with both newborn and maternal factors. In the newborn, aIMT was directly associated with SGA. Among maternal factors, aIMT was directly associated with placenta-to-fetus weight ratio and inversely associated with maternal weight gain during pregnancy. It appears that the increase in IMT in preterm newborns with SGA may have some latent link to future risk of CVD that is otherwise undetectable in infancy.

References


Table 4 Multiple (Stepwise) Regression Analysis for Models Predicting aIMT

<table>
<thead>
<tr>
<th>Predicting Variable</th>
<th>Standardized Coefficient β</th>
<th>p Value</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age (wk)</td>
<td>−0.515</td>
<td>&lt;0.001</td>
<td>0.524</td>
</tr>
</tbody>
</table>

aIMT, adjusted intima-media thickness.
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