Prediction of Fetal Growth Restriction using Estimated Fetal Weight versus a Combined Screening Model at 34 Weeks of Gestation

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Objective
To explore the potential value of a third trimester screening based on estimated fetal weight centile (EFWc) versus a combined model composed by maternal baseline characteristics, mean arterial pressure (MAP), ultrasound and biochemical markers for the prediction of smallness for gestational age (SGA) and late-onset fetal growth restriction (FGR).

Methods
Nested case-control study within a prospective cohort of 1590 singleton gestations referred for third-trimester evaluation (32-36 weeks of gestation). Maternal baseline characteristics, MAP, feto-placental ultrasound and circulating biochemical markers [placental growth factor (PIGF), lipocalin-2, unconjugated estriol, and inhibin-A] were assessed in all women who subsequently delivered a SGA neonate defined as a birth weight (BW) <10th centile by customized standards (n=175) and in a control group (n=875). Among SGA cases, those with a BW <3rd centile and/or abnormal uterine artery (UtA) Doppler and/or abnormal cerebroplacental ratio (CPR) were classified as FGR. Logistic regression predictive models were developed for SGA and FGR, and their performance was compared to that obtained using EFWc alone.

Results
EFWc, cerebroplacental ratio and maternal serum concentrations of estriol and PIGF were significantly lower in SGA cases than in controls, while mean UtA-PI values and lipocalin-2 concentrations were significantly higher. Using EFWc alone, 52% (AUC 0. 82, 95% CI 0. 77-0. 85) and 64% (AUC 0. 86, 95% CI 0. 81-0. 91) of SGA and FGR cases were predicted at a 10% false positive rate, respectively. A combined screening model including a priori risk (maternal characteristics), EFWc, UtA Doppler, PIGF, and estriol, achieves a detection rate of 61% (AUC 0. 86, 95% CI 0. 83-0. 89) for SGA cases and 77% (AUC 0. 92, 95% CI 0. 88-0. 95) for FGR. The detection rate of a combined model for the prediction of SGA and FGR performs significantly better than that obtained using EFWc alone (p<0. 01 and p=0. 002, respectively).

Conclusion
A multivariable integrative model at 32-36 weeks of gestation modestly improves the detection of SGA and FGR cases as compared to EFWc alone.