

## Fetal cardiac remodeling and dysfunction is associated with both preeclampsia and intrauterine growth restriction

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### Objective

To describe fetal cardiac structure and function in pregnancies complicated by preeclampsia (PE) and/or intrauterine growth restriction (IUGR) as compared to uncomplicated pregnancies.

### Methods

This was a prospective observational study including pregnancies complicated by normotensive IUGR (IUGR, n=36), PE with a normally grown fetus (PE, n=35), preeclampsia with IUGR (PE-IUGR, n=42), and 111 uncomplicated pregnancies matched by gestational age at ultrasound. Fetal echocardiography was performed at diagnosis for cases and recruitment for controls. Cord blood concentrations of B-type natriuretic peptide (BNP) and Troponin I were measured at delivery. Univariate and multiple regression analysis were conducted.

### Results

Pregnancies complicated by preeclampsia and/or IUGR showed similar patterns of fetal cardiac remodeling with larger hearts [cardiothoracic ratio, median (interquartile range): controls 0.27 (0.23 – 0.29), IUGR 0.31 (0.26–0.34), PE 0.31 (0.29–0.33) and PE-IUGR 0.28 (0.26–0.33); p<0.001] and more spherical and hypertrophic ventricles [relative wall thickness: controls 0.55 (0.48–0.61), IUGR 0.67 (0.58–0.8), PE 0.68 (0.61–0.76), and PE-IUGR 0.66 (0.58–0.77); p<0.001]. Signs of myocardial dysfunction were also observed, with increased left myocardial performance index [controls 0.78 z-scores (0.32–1.41), IUGR 1.48 (0.97–2.08), PE 1.15 (0.75–2.17) and PE-IUGR 1.45 (0.54–1.94); p<0.001] and higher cord blood BNP [controls 14.2 (8.4–30.9) pg/mL, IUGR 20.8 (13.1–33.5) pg/mL, PE 31.8 (16.4–45.8) pg/mL and PE-IUGR 37.9 (15.7–105.4) pg/mL; P<0.001] and Troponin I as compared to controls.

### Conclusion

Both PE with or without IUGR are associated with fetal cardiac remodeling and dysfunction in a similar fashion to what has been previously described for IUGR. Future research is warranted to better elucidate the mechanism(s) underlying fetal cardiac adaptation in these conditions.