Prediction model for pre-eclampsia using a combination of clinical biophysical and biochemical markers

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Objective
To develop a prediction model for pre-eclampsia using a combination of clinical biophysical and biochemical markers in a Chinese population.

Methods
Chinese women having a singleton pregnancy at 11-13 weeks of gestation were recruited. All subjects underwent measurement of MAP, UA-PI and serum levels of PlGF. Their pregnancy outcomes were followed-up and pre-eclampsia was diagnosed according to the International Society for the study of Hypertension in Pregnancy. Data from unaffected subjects were used to derive the normograms and then compared with those of the affected subjects for the development of the prediction model.

Results
Among the 1020 subjects, 63 were excluded because of either miscarriage, termination of pregnancy, or lost to follow-up. Multiple regression analysis in the 'Unaffected' subjects demonstrated that maternal BMI, fetal CRL and gestational age were significant independent contributors to MAP, UA-PI and serum levels of PlGF. Further analysis confirmed that the log10MoM distribution of each marker followed a Gaussian distribution centered on zero. Using the Fetal Medicine Foundation’s mathematical model in preference to our model resulted in a 10% higher MAP MoM and 7% lower UA-PI MoM after adjusting for covariates (p<0. 05). There were a total of 30 pregnancies which had pre-eclampsia available for statistical analysis. Of the 30 pregnancies identified, 9 developed pre-eclampsia on or before 34 weeks of gestation (“Early Pre-eclampsia”) whilst the remaining developed “Late Pre-eclampsia”. Modelling analysis indicated that for a 10% false positive rate, the detection rate was 72% of early onset pre-eclampsia and 58% of late onset pre-eclampsia. The apparently lower detection rate when compared to FMF's result will be discussed.

Conclusion
We have developed successfully a prediction model for pre-eclampsia for Chinese population using MAP, PlGF and UA-PI. The detection rate was 72% for early onset and 58% for late onset pre-eclampsia at a false-positive rate of 10%.