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Riboﬂavin, MTHFR 677C→T and blood pressure in pregnant and non-pregnant women

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High blood pressure can compromise the successful outcome of any pregnancy and contribute to increased risk of cardiovascular disease in women in later life. Several meta-analyses have reported that the common 677C→T polymorphism in the MTHFR gene is associated with an increased risk of hypertension in pregnancy.(1,2) Previous trials from this centre in non-pregnant hypertensive adults have shown a blood pressure lowering response to riboﬂavin supplementation that is speciﬁc to those with the MTHFR 677TT genotype.(3) To date this relationship has not been examined in relation to pregnancy. Therefore, the aim of this study was to investigate the MTHFR 677C→T polymorphism and its interaction with riboﬂavin in pregnant and non-pregnant women.

Data for this study were generated from two existing cohorts, namely the Irish National Adult Nutrition Survey (NANS) and participants from a trial of Folic Acid Supplementation in the Second and Third Trimester (FASSTT) in pregnancy. In both cohorts, samples were analysed for MTHFR genotype and riboﬂavin biomarker status (erythrocyte glutathione reductase coefﬁcient; EGRac).

In the NANS cohort (n = 1500), among non-pregnant women of reproductive age, those with the MTHFR 677TT genotype compared to the CC genotype had a signiﬁcantly higher mean ± SD systolic (117.2 ± 13.5 vs 110.5 ± 11.6 mmHg; P = 0.002) and diastolic (78.3 ± 11.4 vs 73.3 ± 9.6 mm Hg; P = 0.003) blood pressure. Riboﬂavin status was found to inﬂuence blood pressure only in the TT genotype, whereas in CC and CT genotype groups, there was no signiﬁcant effect of riboﬂavin on blood pressure (ﬁgure 1).

When pregnant women from the FASSTT trial (n = 226) were examined at the 14th gestational week (GW), those with the TT genotype compared those with CC/CT genotypes were found to have signiﬁcantly higher blood pressure (not shown). In addition, the TT genotype group showed a greater increase in mean ±SD blood pressure from the 14th to the 36th GW (increase in diastolic blood pressure of 11.0±7.9 vs 4.2 ±11.1mmHg; P = 0.013; data not shown).

These results suggest that the MTHFR 677TT genotype adversely inﬂuences blood pressure in women of reproductive age and during pregnancy. A higher riboﬂavin status can however attenuate the effect of this genetic variant on blood pressure. A randomised controlled trial in pregnant women is necessary to investigate the effect of riboﬂavin on blood pressure during pregnancy in women stratiﬁed by MTHFR genotype and such a study is underway at our centre.

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