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Riboﬂavin, $MTHFR\, 677C\rightarrow T$ 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 $677C\rightarrow T$ polymorphism in the $MTHFR$ gene is associated with an increased risk of hypertension in pregnancy.¹² 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 $MTHFR\, 677C\rightarrow T$ 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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