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Intakes and status of riboflavin in a representative sample of Irish adults aged 18–90 years screened for *MTHFR* C677T polymorphism

Emma O'Sullivan¹, Laura Kehoe¹, Janette Walton^{2,1}, Helene McNulty³, Mary Ward³, Liadhan McAnena³, Sinead M. Hopkins⁴, Breige A. McNulty⁴, Anne P. Nugent^{4,5} and Albert Flynn¹

¹School of Food and Nutritional Sciences, University College Cork, Cork, Ireland,

²Department of Biological Sciences, Cork, Ireland,

³Nutrition Innovation Centre for Food and Health, Ulster University, Coleraine, United Kingdom,

⁴UCD Institute of Food and Health, University College Dublin, Dublin, Ireland and

⁵Institute for Global Food Security, School of Biological Sciences, Queens University Belfast, Belfast, United Kingdom

Abstract

Meta-analyses of epidemiological data report that adults who carry a common polymorphism, the *MTHFR* 677C→T, in the gene encoding the folate-metabolising enzyme methylenetetrahydrofolate reductase (*MTHFR*) have a 40% increased risk of CVD and an 87% increased risk of hypertension. Riboflavin (vitamin B2), in its co-enzymatic form flavin adenine nucleotide (FAD), is required as a co-factor by *MTHFR* and previous trials in hypertensive patients have shown a blood pressure lowering response to riboflavin supplementation that is specific to individuals homozygous for this polymorphism (TT genotype). Low folate status is commonly reported in adults with the TT genotype however the effect of this genetic variant on riboflavin status has not previously been investigated. The aim of this study, therefore, was to investigate dietary intake and biomarker status of riboflavin by *MTHFR* genotype in Irish adults using data from the National Adult Nutrition Survey (2008–2010) (www.iuna.net).

A 4-day semi-weighed food record was used to collect food and beverage intake data from a representative sample of 1500 Irish adults (18–90 years). Dietary intake data were analysed using WISP[®] based on UK food composition tables (modified to include recipes of composite dishes, nutritional supplements, fortified foods and generic Irish foods that were commonly consumed). Usual intakes were calculated via the NCI-method using SAS[®] Enterprise Guide. Blood samples (n = 1126) were collected by venepuncture by a trained professional and were processed and analysed using standard operating procedures. Biomarker status of riboflavin was determined by erythrocyte glutathione reductase activation coefficient (EGRac), a functional assay that measures the activity of the enzyme glutathione reductase before and after in vitro activation with its prosthetic group FAD; a lower value indicates better status.

It was found that 12% of the population had the TT genotype. As expected, there was no significant difference in riboflavin intake across the genotype (CC, CT or TT) groups. Similarly, no significant genotype differences in riboflavin status (EGRac) were observed (1.36 vs 1.37 vs 1.38 respectively). Overall, 61% of the total population had EGRac values > 1.3, indicative of low/deficient status with no significant difference observed between the genotype groups (60%, 61% and 61%, respectively).

These data suggest that riboflavin status is not influenced by the C677T polymorphism in *MTHFR* in this cohort of nationally representative Irish adults. Further research is needed to see the impact of riboflavin status on blood pressure across the genotype groups in this nationally representative cohort of Irish adults.

Conflict of Interest

There is no conflict of interest.