Variation of uncoupling protein 2 (–866G/A), dietary fat intake and blood pressure: an Indonesian Nutrigenetic Cohort

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Funding Acknowledgement: Type of funding source: Public Institution(s). Main funding source(s): Universitas Gadjah Mada

Background/Introduction: The uncoupling protein 2 (UCP2) is recently being recognized as an important molecule involved in the development of cardiovascular diseases such as vascular dysfunction, atherosclerosis, and hypertension. It was previously reported that the UPC2 –866 G/A gene variation was associated with obesity and hypertension.

Purpose: The objective of this study was to investigate the association between UCP2 –866 G/A gene variation on changes in blood pressure after 2 years of follow up. Additionally, we investigate the interaction between UCP2 –866G/A and dietary fat on changes in blood pressure.

Methods: This was a cohort study conducted in 503 men and women without chronic diseases in the city of Yogyakarta, Indonesia. Bodyweight, systolic (SBP) and diastolic blood pressure (DBP) were measured at baseline and after 2 years while the dietary intake was recorded once within 2 years period using a semi-quantitative food frequency questionnaire. Subjects were divided based on UCP2 gene variations: GG genotype and GA+AA genotypes.

Results: There was no difference in blood pressure at baseline between UCP2 genotypes (SBP AA+GA vs. GG: 130.5±26.3 vs. 127.2±24.9 mmHg, p=0.178; DBP AA+GA vs. GG: 80.9±16.1 vs. 78.9±13.8 mmHg, p=0.171). After 2 years, a total of 310 individuals were followed and measured (AA+GA n=197; GG n=113). In all subjects, there was a significant reduction in SBP (from 130.6±26.3 to 126.4±22.8 mmHg, $p<0.001$) and increment in DBP (from 80.9±15.5 to 82.2±13.7 mmHg, p=0.013). Subjects in GA + AA genotype group had a greater reduction in SBP (–5.3±15.4 vs. –1.5±18.0 mmHg, p=0.018) and lesser increment in DBP (0.7±10.6 vs. 2.7±12.2 mmHg, p=0.045). In this study, we showed that sex and age were not associated with changes in blood pressure (all $p>0.05$) but changes in body weight were positively correlated with SBP ($r=0.219$, $p<0.001$) and DBP ($r=0.227$, $p<0.001$). In all subjects, energy, protein, and carbohydrate intake were not correlated with changes in SBP and DBP (all $p>0.05$). By contrast, total fat intake (B=0.137, p=0.017), saturated fat (B=0.123, p=0.032) and MUFA (B=0.142, p=0.014) were positively correlated with increased SBP while PUFA, trans fat, and cholesterol were not correlated with SBP. There was no correlation between dietary intake and changes in DBP. Among subjects with GA+AA genotype, total fat, saturated fat and MUFA were positively correlated with changes in SBP (all $p<0.05$) but these correlations were not seen among subjects with GG genotype (all $p>0.05$).

Conclusion: We concluded that UCP2 –866G/A gene variation was associated with changes in blood pressure and those who have an A allele were more protected towards increased blood pressure. Total fat, saturated fat, and MUFA were positively correlated with blood pressure and those with A allele were more responsive to the hypertensive effect of dietary fat.