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Green tea, catechol-O-methyltransferase (COMT) genotype and vascular function

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The health benefits of green-tea catechins, in particular epigallocatechin gallate (EGCG), are becoming increasingly recognised. Amongst the proposed benefits is the maintenance of endothelial function and vascular homeostasis and an associated reduction in atherogenesis and CVD risk^(1,2). COMT is centrally involved in EGCG metabolism, with a valine (Val) to methionine (Met) amino acid substitution at position 158 reported to result in lower enzyme activity⁽³⁾. In the current pilot study the impact of the COMT Val158Met genotype on green-tea catechin metabolism and vascular function in healthy adults was investigated.

Ten participants of each homozygous COMT genotype were recruited for the study. Measurements of vascular function by laser Doppler iontophoresis (LDI) and digital volume pulse (DVP) and blood pressure (BP) were taken before and 120, 240, 360 and 480 min after consumption of capsules containing 1.1 g Sunphenon[®] decaffeinated green-tea extract (Taiyo International Inc., Minneapolis, MN, USA; equivalent to 880 mg green-tea catechins). A high carbohydrate (107 g) meal was given at 60 min. Blood samples were taken at baseline and at 30, 60, 90, 120, 150, 180, 240, 360 and 480 min and subsequently analysed for green-tea catechins (parent forms and EGCG metabolites), lipids, glucose, insulin, total antioxidant capacity (TAC), total nitrite and vascular cell adhesion molecule 1 (VCAM-1). Linear model analysis with SAS software (SAS Institute Inc., Cary, NC) was used to compare values.

There were no differences between genotype groups in relation to age, gender, BMI or fasting lipids. The change in DVP stiffness index (SI) from baseline was significantly different at 120 min ($P=0.044$) and 240 min ($P=0.026$) between the ValVal and MetMet groups. The change in BP between baseline and 120 min was also significantly different among genotype groups ($P<0.05$). Despite a similar glucose profile, insulin concentrations were significantly different 120 min and 180 min after consumption of the green-tea extract compared with baseline (mean change from baseline 373 (SE 59) and 216 (SE 28) pmol/l for ValVal and MetMet respectively ($P=0.0079$ at 180 min)). No differences were found in TAC, total nitrite, lipids or VCAM-1 between genotype groups.

| | COMT ValVal (n 10) | | | | COMT MetMet (n 10) | | | |
|------------------|--------------------|------|-------------|------|--------------------|------|-------------|------|
| | Δ 0–120 min | | Δ 0–240 min | | Δ 0–120 min | | Δ 0–240 min | |
| | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Glucose (mmol/l) | 2.50 | 0.34 | 0.26 | 0.44 | 2.30 | 0.25 | 0.25 | 0.39 |
| Insulin (pmol/l) | 382* | 63 | 177 | 63 | 255 | 32 | 115 | 28 |
| DVP SI (m/s) | -2.11* | 0.70 | -1.53* | 0.71 | -0.20 | 0.70 | 0.58 | 0.65 |
| LDI AUC (AU) | -166 | 105 | -45 | 163 | -514 | 186 | -320 | 172 |
| BP sys (mmol/Hg) | 4.32* | 3.95 | -0.08 | 2.67 | -6.24 | 1.73 | -5.67 | 3.24 |
| BP dia (mmol/Hg) | -0.07* | 1.17 | 1.77 | 1.58 | -7.68 | 1.84 | -4.47 | 2.61 |

AUC, area under the curve; AU, arbitrary units; sys, systolic; dia, diastolic; Δ, change. *Mean values were significantly different from those for MetMet: * $P<0.05$.

DVP SI, BP and insulin response differed between COMT genotype groups after consumption of the Sunphenon[®] green-tea extract and warrants further investigation in a larger placebo-controlled study.

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