

## Can black tea influence plasma total homocysteine concentrations?

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Elevated plasma total homocysteine concentrations (tHcy) are associated with increased risk of atherothrombotic cardiovascular disease. The metabolism of homocysteine is influenced by several dietary factors including folate, vitamin B<sub>12</sub>, vitamin B<sub>6</sub> and betaine, and may be influenced by intake of poly-hydroxylated phenolic compounds (polyphenols). Polyphenols can act as acceptors of methyl groups during metabolism of methionine to homocysteine. This may result in elevations in plasma total homocysteine concentrations (tHcy) following ingestion of polyphenol-rich beverages such as tea. A controlled intervention study has shown that high doses of tea can raise tHcy. However, results of cross-sectional population studies generally show inverse associations of tea intake with tHcy. The effect of a dose of tea more representative of population intake levels on tHcy in an intervention study has not been previously investigated. If dietary polyphenols can alter tHcy then the overall effects of a polyphenol-rich beverage may relate to polyphenol metabolism. Individual differences in the degree of O-methylation of polyphenols may influence tHcy.

The major objective was to determine if regular ingestion of a moderate to high intake of black tea alters tHcy. We also assessed the relationship between degree of O-methylation of tea-derived polyphenols and the change in tHcy with regular ingestion of tea. Twenty-two subjects completed a randomized-controlled crossover study. Subjects consumed 1250 mL/d of black tea (as 5 cups containing 2 g tea leaves in 250 mL boiled water) and 1250 mL/d of hot water for 4 wk each. Fasting tHcy and 24h urinary excretion of 4-O-methylgallic acid (4OMGA, the major O-methylated metabolite of gallic acid) were measured at the end of each period. 4OMGA was used as a marker of overall O-methylation of tea-derived polyphenols.

Black tea did not alter tHcy ( $9.9 \pm 0.5 \mu\text{mol/L}$  [hot water],  $10.0 \pm 0.5 \mu\text{mol/L}$  [black tea]). However, the degree of increase in 4OMGA following ingestion of black tea was positively associated with change in tHcy from hot water to black tea periods ( $r = 0.55$ ,  $P = 0.008$ ). Subjects within the bottom quartile of change in 4OMGA excretion had a significant decrease in tHcy ( $-0.28 \pm 0.10 \mu\text{mol/L}$ ;  $P = 0.046$ ), and those within the top quartile had a significant increase in tHcy ( $0.78 \pm 0.16 \mu\text{mol/L}$ ;  $P = 0.005$ ).

Overall, regular ingestion of a moderate to high intake of black tea did not alter mean tHcy. However, the degree of O-methylation of tea-derived gallic acid was associated with the change in tHcy following ingestion of black tea. Subjects who methylated more gallic acid to 4OMGA had a significant increase in tHcy, and those who methylated less gallic acid to 4OMGA had a significant decrease in tHcy. Individual differences in O-methylation of polyphenolic compounds may influence the ultimate effects of black tea on tHcy.

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