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Effect of epigallocatechin gallate on energy expenditure and key metabolic indices

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Epigallocatechin gallate (EGCG), the principle and most abundant compound of green tea, has been studied predominantly in animal models and to a certain extent in human subjects for anti-obesity properties[1,2]. With the rising incidence of metabolic syndrome and its associated complications, further research is essential to elicit metabolic implications of oral supplementation of pure EGCG in human subjects.

The aim of the current study was to investigate changes in key metabolic variables such as thermogenesis, energy expenditure, fasting blood glucose, blood lipids, body weight and body composition with ingestion of varying doses of 94% pure EGCG (75, 150 and 300 mg/d) each for a period of 7 d (Teavigo®; DSM Nutritional Products, Heanor, Derbyshire, UK). Eight healthy men (BMI 24.3 (SE 1.4) kg/m^2, body weight 75.2 (SE 7.4) kg, age 38.8 (SE 8.2) years, body fat 19.7 (SE 4.4) %) participated in a randomised cross-over design trial with a washout period of 7 d between each dose administration. Energy expenditure was measured using indirect calorimetry (Deltatrac II; Datex-Ohmeda Inc. Madison, WI, USA) and body composition was determined by skinfold measurements. Venepuncture blood samples were analysed for blood glucose and lipid concentrations.

	Weight (kg)*		Body fat (%)*		Fasting blood glucose (mmol/l)*		BMR (kJ/)*		TC (mg/l)†		HDL-C (mg/l)†		LDL-C (mg/l)†	
Test session	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Baseline	75.2	2.6	19.7	1.5	4.7	0.2	6826	244	64	3	27	1	24	4
EGCG:														
75 mg	75.1	2.5	20.2	1.6	4.8	0.2	6530	295	66	3	26	2	23	6
150 mg	74.9	2.7	19.7	1.5	4.7	0.3	6377	233	63	3	28	2	21	4
300 mg	74.8	2.6	19.8	1.5	4.9	0.2	6641	309	65	5	25	3	24	4

TC, total cholesterol; HDL-C, HDL-cholesterol; LDL-C, LDL-cholesterol. *n 8; †n 7.

Oral administration of varying doses of pure EGCG over a period of 7 d for each dose did not show any significant changes (repeated measures ANOVA performed using SPSS 14; SPSS Inc., Chicago, IL, USA) in any of the measured variables. These results could be a result of a number of factors such as the lack of interaction between EGCG and other green tea flavanols such as epicatechin, epicatechin gallate and epigallocatechin. Synergy between green-tea flavanols and caffeine may possibly increase energy expenditure. EGCG used in the present study was caffeine free, which might have led to the obtained results. It is possible that anti-obesity properties of EGCG could be more apparent in leptin-resistant individuals and might not show any substantial changes in lean, healthy human subjects.

The study set out to examine the metabolic effects of pure EGCG in free-living human subjects. Analyses of obtained data indicates that further studies need to investigate effects of EGCG towards weight loss and weight maintenance in combination with caffeine and other green-tea flavanols and that leptin resistance of individuals should be taken into account.

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2. Dulloo A, Duret C, Rohrer D *et al*. (1999) *Am J Clin Nutr* **70**, 1040–1045.