

## Long-term effects of green tea ingestion on atherosclerotic biological markers in smokers

Woochang Lee<sup>a</sup>, Won-Ki Min<sup>a,\*</sup>, Sail Chun<sup>a</sup>, Yong-Wha Lee<sup>a</sup>, Hyosoon Park<sup>b</sup>,  
Do Hoon Lee<sup>c</sup>, You Kyoung Lee<sup>d</sup>, Ji Eun Son<sup>a</sup>

<sup>a</sup>Department of Laboratory Medicine, Asan Medical Center and University of Ulsan College of Medicine, Seoul, South Korea

<sup>b</sup>Department of Laboratory Medicine, Kangbuk Samsung Hospital and Sungkyunkwan University School of Medicine, Seoul, South Korea

<sup>c</sup>Department of Laboratory Medicine, Daejin Medical Center, Pundang Jesaeng General Hospital, Sunnam, South Korea

<sup>d</sup>Department of Diagnostic Laboratory Medicine, Soon Chun Hyang University College of Medicine,  
Soon Chun Hyang University Bucheon Hospital, Bucheon, South Korea

Received 26 August 2003; received in revised form 20 September 2004; accepted 27 September 2004

### Abstract

**Objectives:** Smoking is a risk factor for coronary artery disease and triggers vascular injury by platelet aggregation and induces atherosclerosis through induction of oxidative stress. Green tea is known to have antioxidant capacity and anti-platelet activity.

**Design and methods:** Twenty adult male smokers ingested 600 mL of green tea for 4 weeks. Their lipid profile, C-reactive protein (CRP), total antioxidant capacity, oxidized LDL, soluble VCAM-1, soluble ICAM-1, and soluble P-selectin were measured at baseline and 2 and 4 weeks after green tea ingestion.

**Results:** Plasma soluble P-selectin (sP-selectin) levels decreased significantly after 2 and 4 weeks of green tea ingestion compared with those before green tea ingestion ( $P < 0.001$ ). Plasma concentrations of oxidized LDL decreased significantly after green tea ingestion ( $P < 0.05$ ).

**Conclusions:** The results of this study suggest the effect of green tea on sP-selectin and oxidized LDL.

© 2004 The Canadian Society of Clinical Chemists. All rights reserved.

**Keywords:** Green tea; P-selectin; Oxidized LDL; Smoker

### Introduction

Smoking is major risk factors for coronary artery diseases [1] and other atherosclerotic vascular diseases such as stroke and peripheral vascular diseases [2,3]. Smoking triggers vascular injury by platelet aggregation [4]. P-selectin, which is induced by platelet activation, acts on the adhesion of white blood cells to endothelial cells in the early phase of inflammatory process. In addition, it has been reported that the plasma concentrations of P-selectin in smokers were

higher than those of non-smokers [5]. Smoking also induces atherosclerosis through induction of oxidative stress and subsequent elevation of oxidized LDL [6].

We measured the biological markers for atherosclerosis including P-selectin in smokers before and 2 and 4 weeks after green tea ingestion to investigate the effect of long-term green tea ingestion on in vivo vascular inflammatory responses.

### Subjects and methods

#### Subjects

The study subjects were 20 adult smokers with mean age of 32.8 (range: 26–41 years). All of them were free of

\* Corresponding author. Department of Laboratory Medicine, Asan Medical Center and University of Ulsan College of Medicine, 388-1 Pungnap-dong, Songpa-Gu Seoul, 138-736, South Korea. Fax: +82 2 478 0884.

E-mail address: [wkmin@amc.seoul.kr](mailto:wkmin@amc.seoul.kr) (W.-K. Min).

known clinical, biochemical, or hematological manifestations of cardiovascular, hepatic, renal, or endocrine disorders. Before the study, they were instructed to avoid drinking green tea for 1 week, otherwise to keep their usual diet and life style. This study was approved by the Ethical Committee of the Asan Medical Center and written informed consent was obtained from all volunteers.

#### Experimental design

Each subject ingested 150 mL of green tea four times a day (09, 11, 13, and 15 h) for 4 weeks. They were asked to abstain from wine and other types of antioxidant supplements but to continue usual daily diet. Blood samples were collected just before the start of the study (baseline), 2 and 4 weeks into the study. Samples were taken after 12-h fasting to rule out the acute effect of green tea intake.

#### Preparation of tea

Commercially available tea was used (JinHyang, Amore Pacific Corporation, Seoul, Korea) for preparation by dipping a tea bag containing 1.3 g of tea-leaf into 150 mL of boiled tap water. The mixture was allowed to stand for 2 min and then consumed hot. No milk or sugar was added to tea preparations.

#### Lipid profiles and C-reactive protein (CRP) in serum

Serum total cholesterol, high-density lipoprotein cholesterol (HDL-C), triglyceride (TG), and LDL cholesterol (LDL-C) were measured by enzymatic method with automated analyzer (Toshiba 200FR, Toshiba Medical Systems Co., Ltd., Tokyo, Japan). CRP was measured by the CRP immunoturbidimetric method (CRPLX from Roche Diagnostics, Indianapolis, IN) on a COBAS INTEGRA 800 analyzer (Roche Diagnostics).

#### Soluble cellular adhesion molecule (CAM)s in plasma

Soluble VCAM-1 (sVCAM-1), soluble ICAM-1 (sICAM-1), and soluble P-selectin (sP-selectin) were measured by respective Human sVCAM-1 Immunoassay, Human sICAM-1 Immunoassay, and Human sP-selectin Immunoassay (all from R&D Systems Inc., Minneapolis, MN).

#### Oxidized LDL in plasma

Plasma oxidized LDL levels were measured by the Mercodia Oxidized LDL ELISA (Mercodia AB, Uppsala, Sweden).

#### Total antioxidant capacity (TAC) in plasma

The Total Antioxidant Status Kit (Randox Laboratories Ltd., UK) was applied to a Cobas Mira chemistry analyzer (Roche Diagnostics).

#### Statistics

All the statistical analyses were done with SPSS 11.5 software (SPSS Inc., Chicago, IL). Results are expressed as median (25th and 75th percentile range);  $P < 0.05$  was considered significant. Differences in the levels of biological markers according to the duration of green tea ingestion were analyzed with the Wilcoxon signed rank test.

## Results

The plasma concentrations of sP-selectin decreased significantly after 2 and 4 weeks of green tea ingestion [45.2 (37.1–63.4) ng/mL and 46.3 (37.1–59.8) ng/mL] compared with those before ingestion [103.7 (54.3–151.2) ng/mL] ( $P < 0.001$ ). However, the concentrations of

Table 1  
Changes of atherosclerotic markers according to the duration of green tea intake<sup>a</sup>

	Baseline	After 2 weeks	After 4 weeks
Total cholesterol (mmol/L)	5.04 (4.51–5.70)	5.00 (4.44–5.70)	5.09 (4.56–5.34)
Total cholesterol (mg/dL)	194.7 (174.2–220.1)	193.1 (171.3–219.9)	196.6 (176.2–206.2)
Triglyceride (mmol/L)	1.24 (0.93–1.57)	1.66 (0.94–2.08)	1.48 (1.06–1.94)
Triglyceride (mg/dL)	109.8 (82.5–139.2)	147.1 (83.1–184.2)	130.7 (93.7–171.6)
HDL-C (mmol/L)	1.25 (1.06–1.46)	1.23 (1.10–1.39)	1.20 (1.12–1.36)
HDL-C (mg/dL)	48.4 (41.1–56.5)	47.3 (42.3–53.6)	46.4 (43.1–52.5)
LDL-C (mmol/L)	3.43 (2.81–3.76)	3.40 (2.77–3.81)	3.34 (2.92–3.66)
LDL-C (mg/dL)	132.5 (108.4–145.2)	131.1 (106.9–147.0)	128.9 (112.8–141.5)
CRP (mg/L)	1.10 (0.81–1.44)	0.82 (0.59–1.41)	0.84 (0.43–1.50)
TAS (mmol/L)	1.24 (1.16–1.31)	1.21 (1.17–1.30)	1.21 (1.16–1.31)
Oxidized LDL (U/L)	45.1 (38.2–53.8)	41.3 <sup>2</sup> (33.6–45.9)	38.3 <sup>2</sup> (33.7–45.0)
sP-selectin (ng/mL)	103.7 (54.3–151.2)	45.2 <sup>3</sup> (37.1–63.4)	46.3 <sup>3</sup> (37.1–59.8)
sVCAM-1 (ng/mL)	339.0 (331.5–393.4)	348.3 (322.0–389.1)	358.0 (329.4–396.8)
sICAM-1 (ng/mL)	216.4 (144.9–263.9)	203.1 (131.4–269.2)	210.9 (137.6–258.4)

Statistically significant differences compared with the baseline values (Wilcoxon signed rank test <sup>2</sup> $P < 0.05$  and <sup>3</sup> $P < 0.001$ ).

<sup>a</sup> Data are expressed as median (25th and 75th percentile range).

Download English Version:

<https://daneshyari.com/en/article/10818137>

Download Persian Version:

<https://daneshyari.com/article/10818137>

[Daneshyari.com](https://daneshyari.com)