RE: Effect of Green Tea Polyphenols on Skin Properties of Women


Skin properties vary with endogenous and exogenous factors. Tea (Camellia sinensis) contains antioxidants (polyphenols/flavonoids), and topical use has been shown in vitro and in vivo to reduce the adverse skin effects associated with ultraviolet (UV) exposure. Consuming tea flavonoids may provide photoprotection, reduce the risk of skin cancer, and improve skin quality. Hence, the purpose of this randomized, double-blind, placebo-controlled study was to evaluate the effects of consuming green tea polyphenols on skin sensitivity toward UV exposure, skin structure, skin texture, and microcirculation.

 Chronic Study
Women (n = 60; aged 40-65 years) with healthy, normal, skin type II (light to normal UV sensitivity, Middle European skin type, and blond or light brown hair), and body mass index of 18 to 25 kg/m² participated in this study conducted at the University Witten-Herdecke, Germany. Exclusion criteria were pregnancy, breast-feeding, smoking, intake of medication that might influence the outcome of the study, sunbathing, use of sunbeds, intake of vitamin supplements, or dieting that would change normal eating habits. Subjects consumed either 1 L/day green tea beverage (containing 1402 mg/L total catechins, or 100 mg/day epicatechin, 980 mg/day epigallocatechin-3-gallate [EGCG], and 238 mg/day epicatechin gallate [ECG]) or 1 L/day control beverage (containing 0 mg/L catechins) throughout the day, until completion of dinner, for 12 weeks. The beverages were prepared specifically for the study by the Beverage Institute for Health and Wellness, The Coca-Cola Company, Atlanta, Georgia. Blood was drawn to analyze flavonoids, and skin was assessed at baseline, week 6, and week 12. Sensitivity toward UV irradiation was measured by irradiating the skin on the back, and skin color was measured before and 24 hours after irradiation. Skin elasticity was measured on the inner forearm via vacuum suction. Skin structure (density and thickness) was measured via high-frequency ultrasound B-scan. Skin texture (roughness, scaling, volume, and wrinkles) was measured on the inner forearm via evaluation. Skin hydration was
measured on the inner forearm via corneometry. Transepidermal water loss was measured on the inner forearm via a TEWA-Meter.

In the green tea group, flavonoid levels were elevated compared with baseline (P < 0.05) and compared with the control group (P < 0.05). Reddening was significantly decreased by 16% at 6 weeks and 25% at 12 weeks in the green tea group (P < 0.05 for both) compared with baseline. This improvement was also significantly better than control (P < 0.05). After 12 weeks of green tea consumption, compared with baseline, viscoelasticity decreased by 21%, biological elasticity increased by 3.9%, skin density increased by 7.7%, roughness decreased by 16%, volume decreased by 20%, scaling decreased by 25%, skin hydration increased by 17%, and transepidermal water loss decreased by 12% (P < 0.05 for all). For comparison, in the control group, there was only an 8.9% decrease in scaling, a 12% decrease in volume, and a 5.2% increase in hydration at week 12 (P < 0.05 for all versus baseline). These benefits could be attributed to the daily increase in liquid consumption. The only between group differences were for hydration, transepidermal water loss, and reddening (photoprotection).

In the green tea group, dermal blood flow and oxygen saturation increased by 40% and 38%, respectively, at week 6, and by 29% and 40%, respectively, at week 12 (P < 0.05 for all compared with baseline). There was no significant change from baseline in the control group. There was a significant difference between treatment groups for dermal blood flow and oxygen saturation (P < 0.05 for all).

**Acute Study**

Women (n = 15) meeting the same inclusion and exclusion criteria as the chronic study, but who did not participate in it, participated in the acute study to evaluate the short-term effects of green tea extract on dermal blood flow. Subjects received a single dose of 0.5, 1.0, or 2.0 g green tea extract in capsules. The polyphenol composition of the capsules was similar to that of the beverage in the chronic study. Ascorbic acid was not added to the formulation (but it was in the beverage). Capillary blood flow was measured via laser-Doppler flowmetry between 0 and 240 min after intake. Blood was drawn to measure epicatechin levels.

Serum epicatechin blood concentrations were 3-30 times higher in the acute study than in the chronic study. The authors explain that this could be attributed to bolus-type dosing in the acute study as compared with tea consumed over hours in the chronic study. Serum epicatechin concentrations increased over time and reached a maximum concentration at 2 hours after 2.0 g. For all 3 doses, cutaneous blood flow increased 15-30 min post-dosing; however, the flow rapidly returned to baseline.

The study demonstrates that tea flavonoids were absorbed and systemically available. The authors conclude that ingestion of green tea catechins improved skin hydration, transepidermal water loss, density, and elasticity, which was probably associated with long-term consumption and not a transitory response. The improvements in skin structure may be related to increases in cutaneous blood flow. Overall, the authors conclude that regular consumption of tea flavonoids provide photoprotection against harmful UV radiation and help maintain skin structure and function.

This study demonstrates another benefit associated with green tea consumption. It is important to note that the study used an artificial sweetener system (sodium cyclamate, acesulphame-K, and aspartame) to prevent an increase in caloric intake. Also, it would
be interesting to see if this study could be replicated with a product readily accessible to the general population.

—Heather S. Oliff, PhD

The American Botanical Council has chosen not to reprint the original article.