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Impact of oral green tea catechins on UVR-induced inflammation in humans: a randomized controlled trial

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Green tea is consumed globally and is reported to have anti-inflammatory properties, which may be mediated through impact on cyclooxygenase (COX) and lipoxygenase (LOX) pathways. Recent data suggest green tea catechins (GTC) reduce acute UVR effects, and our pilot study suggested reduced UVR inflammation. Thus our aim was to perform a double-blind randomized placebo-controlled trial to examine if GTC protects against clinical, histological and biochemical indicators of UVR-induced inflammation.

Healthy adults (18-65 years, skin phototype I/ II) were randomized to 1350 mg encapsulated green tea extract (540 mg GTC) with 50 mg vitamin C, or placebo (maltodextrin), twice daily for 3 months. Impact on skin erythema, dermal leukocytic infiltration, and levels of pro-inflammatory eicosanoids was assessed after solar-simulated UVR-challenge, and subject compliance determined through assay of the urinary GTC metabolite EGC glucuronide.

Volunteers were assigned to active (n = 25) or placebo (n = 25). Post-supplementation, median sunburn threshold (minimal erythema dose) was 28 (IQR 20-28) and 20 (20-28) mJ/cm² in the active and placebo groups respectively (non-significant), with no difference in area under the curve analysis for measured erythema index following a geometric series of 10 UVR doses. Skin immunohistochemistry showed increased neutrophil and CD3⁺ T lymphocyte numbers post-UVR in both groups (p <0.01) with no significant differences between groups post-supplementation. COX and LOX metabolites prostaglandin (PG) E₂ (vasodilator) and 12- hydroxyeicosatetraenoic acid (HETE; chemoattractant), respectively, increased post-UVR (p <0.05), with no differences between groups post-supplementation.

In a compliant mixed-sex study population, daily consumption of 1080 mg encapsulated GTC, equivalent to 5 cups of green tea, with 100 mg vitamin C, did not significantly affect the clinical or histological sunburn response, or the cutaneous production of pro-inflammatory eicosanoids. Our other work showed variable GTC and metabolite content of human skin following supplementation and impact of this awaits exploration.