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Pre-clinical and clinical studies confirm antioxidant and photoprotective effects of coffee berry extract

Jean-Philippe Therrien, PhD, Stiefel Laboratories, Inc., Palo Alto, California, United States; David H. McDaniel, MD, The Institute of Anti-Aging Research, Virginia Beach, Virginia, United States; Edward Hsia, PhD, Stiefel Laboratories, Inc., Palo Alto, California, United States; Elizabeth N. Millerman, MS, Stiefel Laboratories, Inc., Palo Alto, California, United States; Hans Hofland, PhD, Stiefel Laboratories, Inc., Palo Alto, California, United States

Coffee berry extract (CB) is derived from the fruit of the coffee plant, *Coffea arabica* and contains potent polyphenols, which scavenge reactive oxygen species (ROS) generated by endogenous oxidative stress or ultraviolet (UV) exposure. The potential photoprotective and restorative effects of CB in human skin were examined both in reconstructed human epidermis (RHE) cultures and in human subjects (n=6). CB formulation (CBF) or vehicle were applied to RHE cultures 1 hour before UV exposure. Histological analysis for skin morphology and DNA damage markers were monitored up to 24 hrs post-UV. Disruption of skin integrity was observed 2h post-UV in both CBF-treated and untreated RHE. However, 24h post-UV, complete restoration of the skin morphology was observed only in CB-treated RHE. Compared to vehicle, CB-treated RHE had 8-hydroxy-2-deoxyguanosine (8OHdG) levels decreased in both irradiated and non-irradiated RHEs. This confirms the antioxidant properties of CBF, since 8OHdG DNA damage is caused by ROS. Cyclobutane pyrimidine dimer (CPD) formation and p53 expression were observed in untreated, UVB exposed, RHE, 2h post UV, but not 24h post UV. Thus confirming that DNA repair mechanisms are functional in these RHE cultures. Unexpectedly, neither CPD nor p53 could be detected in CB treated UV exposed RHE. Since these two markers result from direct UVB exposure and are typically not prevented by antioxidants, this observation suggests a new photoprotective property of CBF. In the clinical study, CBF or vehicle were applied twice daily for 7 days. Subjects were irradiated with 1.0 MED of UV, and clinical observations were made after 24 hrs. CBF-treated areas showed a reduction of 19% in redness (measured by colorimetry) compared to vehicle-treated areas which showed an increase in redness of 9% when compared to untreated skin, suggesting an anti-inflammatory property of CBF. DNA damage markers results on skin biopsies from clinical study show similar profile to that observed in vitro, thereby supporting the use of RHE model for pre-clinical UV studies. In summary, these results suggest that regular topical use of CBF may restore epidermal integrity and repairs and/or protects against both oxidative and direct DNA damage caused by sunlight.

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