Summary of California Table Grape Commission Skin Health Studies

PUBLISHED RESEARCH

Oak, A.S.W., Shafi, R., Elsayed, M., Bae, S., Saag, L., Wang, C.L., & Elmets, C.A. (2021). Dietary table grape protects against UV photodamage in humans: 1. Clinical evaluation. *Journal of the American Academy of Dermatology*. doi: https://doi.org/10.1016/j.jaad.2021.01.035.

Oak, A.S.W., Shafi, R., Elsayed, M., Mishra, B., Bae, S., Barnes, S., Slominksi, A.T., Wilson, L.S., Athar, M., & Elmets, C.A. (2021). Dietary table grape protects against UV photodamage in humans: 2. molecular evaluation. *Journal of the American Academy of Dermatology*. doi: https://doi.org/10.1016/j.jaad.2021.01.036.

In a human pilot study, subjects consuming grapes (equivalent to 2.25 cups per day) showed increased resistance to sunburn and a reduction in markers of UV damage at the cellular level. Subjects' skin response to UV light was measured before and after consuming grapes by determining the Minimal Erythema Dose (MED). Grape consumption was protective; more UV exposure was required to cause sunburn following grape consumption, with MED increasing on average by 74.8%. Analysis of skin biopsies showed that the grape diet was associated with decreased DNA damage, fewer deaths of skin cells, and a reduction in inflammatory markers.

Singh.C.K., Mintie, C.A., Ndiaye, M.A., Chhabra, G., Dakup, PP., Ye, T., Yu, M., & Ahmad, N. (2018). Chemoprotective effects of dietary grape powder on UVB radiation-mediated skin carcinogenesis in SKH-1 hairless mice. *Journal of Investigative Dermatology*, 1-10.

In a study using an animal model of UVB-induced skin cancer, consuming either a 3% or 5% grape powder diet for 28 weeks significantly inhibited tumor incidence and delayed the onset of tumor growth. The grape-mediated protective response was accompanied by enhanced DNA damage repair; reduced proliferation; increased cancer cell death; and beneficial changes in several markers of oxidative stress.

Mintie, C.A., Singh, C.K., Ndiaye, M.A., Barrett-Wilt, G.A. & Ahmad, N. (2019). Identification of molecular targets of dietary grape-mediated chemoprevention of ultraviolet B skin carcinogenesis: a comparative quantitative proteomics analysis. *Journal of Proteome Research*. 3741-3751.

In evaluating the potential mechanisms for the beneficial effects observed earlier, researchers found that grapes: a) act as an anti-inflammatory agent and b) enhance the activity of a protein

complex (20S proteosome) that plays a role in cell cycle regulation including disposal of damaged proteins that contribute to the progression of cancer.

Mintie, C.A., Musarra, A.K., Singh, C.K., Ndiaye, M.A., Sullivan, R., Eickhoff, J.C. & Ahmad, N. (2020). Protective effects of dietary grape on UVB-mediated cutaneous damages and skin tumorigenesis in SKH-1 mice. *Cancers*. 12, 1751.

In a follow-up study that utilized both a short-term model of UVB-mediated skin damage and long-term model of skin carcinogenesis, researchers observed that with a grape-enriched diet there was a reduction in tumor growth and malignant conversion of cells, where cells in normal tissue or benign tumors become cancerous. These benefits are attributed to the antioxidant properties of grapes which likely inhibit early oxidative injury, leading to downstream anti-inflammatory effects and changes in other pathways.