

Light-activated therapy may change skin at molecular level

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Photodynamic therapy—which involves a light-activated medication and exposure to a light source—appears to produce changes at the molecular level in aging skin, according to a report in the October issue of *Archives of Dermatology*, one of the *JAMA/Archives* journals. These changes are consistent with increased collagen production and improved appearance of the skin.

"The deleterious effects of exposure of the skin to UV irradiation are well established," the authors write as background information in the article. "Alternatively, several visible and infrared lasers and light sources have been reported to produce various positive changes in the clinical and histologic [microscopic] appearance of the skin. In recent years, the concept of employing a photosensitizing compound to enhance the effects of some light-based therapies has been espoused."

For aesthetic treatments, this type of photodynamic therapy typically involves application of a topical medication, such as 5-aminolevulinic acid (5-ALA), that is activated by exposure to light. Jeffrey S. Orringer, M.D., and colleagues at the University of Michigan Medical School, Ann Arbor, studied this treatment in 25 adults age 54 to 83 with sun-damaged skin on their forearms. Before treatment, the degree of skin damage was rated and a biopsy (tissue sample) was taken from the forearm. A solution containing 5-ALA was applied to the treatment site and left on for three hours; the skin was then washed with cleanser and treated with a pulsed-dye laser. Participants returned for re-examination and to provide additional biopsy samples four to five times during the six

months following treatment.

After photodynamic therapy, tissue samples demonstrated a five-fold increase in levels of Ki67, a protein thought to play a fundamental role in the growth and development of new skin cells. The epidermis (skin's outer layer) increased in thickness 1.4-fold. Levels of enzymes and other compounds associated with the production of collagen, the main structural protein in the skin, also were increased.

"Photodynamic therapy with the specific treatment regimen employed produces statistically significant quantitative cutaneous molecular changes (e.g., production of types I and III collagen) that are associated with improved appearance of the skin," the authors conclude. When compared with previous data regarding the effectiveness of pulsed-dye laser therapy alone, these results suggest that using a photosensitive compound such as 5-ALA enhances changes in the skin.

"Although our molecular measurements cannot yet precisely predict clinical outcomes for a single given patient, taken together they are very much in keeping with the bulk of the clinical literature and thus lend substantial support to the conclusions reached by other researchers who have published purely clinically oriented work in this field," the authors conclude. "We believe that the quantitative amount of dermal repair and regeneration induced by a specific therapeutic intervention very likely underlies the degree of clinical rejuvenation produced. Thus, it is our hope that, with further development, our working molecular model may one day be used to predict the clinical value of new technologies in aesthetic dermatology."

Source: JAMA and Archives Journals

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