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**A comparative study of the effects of retinol and retinoic acid on histological, molecular, and clinical properties of human skin.**

*Kong R, Cui Y, Fisher GJ, Wang X, Chen Y, Schneider LM, Majmudar G, J Cosmet Dermatol. 2016 Mar;15(1):49-57. doi: 10.1111/jocd.12193.*

### **ABSTRACT**

**BACKGROUND:** All-trans retinol, a precursor of retinoic acid, is an effective anti-aging treatment widely used in skin care products. In comparison, topical retinoic acid is believed to provide even greater anti-aging effects; however, there is limited research directly comparing the effects of retinol and retinoic acid on skin. **OBJECTIVES:** In this study, we compare the effects of retinol and retinoic acid on skin structure and expression of skin function-related genes and proteins. We also examine the effect of retinol treatment on skin appearance. **METHODS:** Skin histology was examined by H&E staining and in vivo confocal microscopy. Expression levels of skin genes and proteins were analyzed using RT-PCR and immunohistochemistry. The efficacy of a retinol formulation in improving skin appearance was assessed using digital image-based wrinkle analysis. **RESULTS:** Four weeks of retinoic acid and retinol treatments both increased epidermal thickness, and upregulated genes for collagen type 1 (COL1A1), and collagen type 3 (COL3A1) with corresponding increases in procollagen I and procollagen III protein expression. Facial image analysis showed a significant reduction in facial wrinkles following 12 weeks of retinol application. **CONCLUSIONS:** The results of this study demonstrate that topical application of retinol significantly affects both cellular and molecular properties of the epidermis and dermis, as shown by skin biopsy and noninvasive imaging analyses. Although the magnitude tends to be smaller, retinol induces similar changes in skin histology, and gene and protein expression as compared to retinoic acid application. These results were confirmed by the significant facial anti-aging effect observed in the retinol efficacy clinical study. © 2015 Wiley Periodicals, Inc. **Keywords:** collagen; epidermal thickness; in vivo confocal microscopy; retinoic acid; retinol; wrinkle reduction PMID: 26578346