AESTHETIC AND COSMETIC DERMATOLOGY (LASERS SEPARATE CATEGORY)

EXPLORATORY STUDY TO EXAMINE THE GENE EXPRESSION EFFECTS OF RETINOL ON AGING-RELATED MOLECULAR PATHWAYS IN INDIVIDUALS OF EAST ASIAN DESCENT

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Introduction: Retinol improves the appearance of photo-aged skin and decreases the appearance of fine wrinkling in older individuals. However, it is unclear whether retinol merely reduces the appearance of skin aging features through structural changes or whether classic aging-related molecular pathways are affected.

Objective: To conduct unbiased whole transcriptomic analysis of photo-protected skin to identify molecular pathways that are altered by topical retinol.

Materials & Methods: After IRB approval and written consent, 100 women of East Asian descent between 55-75 years of age were enrolled. Participants with the top 10% highest (n=11) and lowest (n=10) fine wrinkling scores were randomly assigned to apply 0.4% retinol lotion to one sun-protected inner upper arm and vehicle lotion to the contralateral arm, daily for 12 weeks. Demographic and biometric data were collected. RNA-seq of sun-protected arm skin biopsies was performed (Illumina HiSeq 4000). To resolve inter-individual genetic variation, pairwise comparisons were made between retinol and vehicle treated skin of each patient and differentially expressed genes (DEG) were identified. Gene-ontology (GO) terms were applied to examine biologic themes.

Results: RNA-seq analysis showed 23 genes were significantly upregulated ($p<0.001$) and 21 genes were significantly downregulated ($p<0.001$) in retinol versus placebo treated skin. Of these differentially expressed genes, more were related to aging than keratinocyte differentiation. 27% of DEGs are reported to be associated with aging (e.g. EEF1E1, IVL, FILIP1L, and ITGA8); 22% of upregulated DEGs are involved in keratinocyte differentiation. GO term analysis also showed that many DEGs are involved in regulation of gene transcription.

Conclusions: Topical retinol activates transcriptional changes in aging skin, notably inducing differential expression of genes involved in aging, suggesting that retinol may exert functional anti-aging effects beyond reducing the appearance of fine wrinkling.