

REGULATING THE EXPRESSION OF GENES ASSOCIATED WITH THE PROTECTION AND MAINTENANCE OF SKIN STRUCTURE VIA TOPICAL TREATMENT WITH NARCISSCUS TAZETTA BULB EXTRACT AND SCHIZANDRA CHINENSIS FRUIT EXTRACT—AN *IN VITRO* ANALYSIS

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BACKGROUND

One of the most noticeable signs of skin aging is the loss of skin structure resulting in a sagging, wrinkled appearance. Within the last decade, there have been hundreds of studies done on ingredients that address this attribute of skin aging. This study investigates the *in vitro* effect of a blend of Narcissus tazetta bulb extract and Schizandra chinensis fruit extract on genes related to skin structure integrity. Narcissus tazetta bulb extract and Schizandra chinensis fruit extract are well-known for their health benefits when taken orally. However, limited research has been done on the benefits of topical applications of these extracts. Recent unpublished in-house studies of a combination of these two extracts have led to the hypothesis that when combined, Narcissus tazetta bulb extract and Schizandra chinensis fruit extract may be able to protect and maintain the structure of the skin, helping to prevent the appearance of aged skin.

OBJECTIVE

To assess the skin-beneficial properties of a combination of two plant extracts, Narcissus tazetta and Schizandra chinensis.

METHODS & MATERIALS

A combination of Narcissus tazetta bulb extract and Schizandra chinensis fruit extract was applied to human equivalent skin cultures containing normal human epidermal keratinocytes and fibroblasts.

Epidermal full-thickness skin cultures were obtained from MatTek (Ashland, MA, USA). These cultures are comprised of normal human-derived epidermal keratinocytes and normal human-derived dermal fibroblasts. A combination of Narcissus tazetta bulb extract (0.02%) and Schizandra chinensis fruit extract (0.01%) was applied to the cultures for 24 hours. Cultures incubated without the extracts were used as control. RNA was extracted from the cultures and converted to cDNA using the High Capacity Transcription Kit from Life Technologies (Foster City, CA USA). Reactions were performed according to manufacturer's instructions. Custom Taqman Low Density Arrays (TLDA_s) were created using Life Technologies' validated gene expression assays. Each TLDA card contained 379 target genes and five common endogenous control genes. An Applied Biosystems 7900HT (Applied Biosystems, Foster City, CA USA) was used for amplification and fluorescence detection. Data analysis for qPCR was carried out according to the RQ analysis method using RQ Manager and STATMINER (v3.1) software programs.

RESULTS

Results showed that when combined, Narcissus tazetta bulb extract and Schizandra chinensis fruit extract induced the expression of genes associated with the protection and maintenance of skin structure while reducing the expression of genes known to degrade skin structure. The genes that were upregulated include LOX, SIRT1, SOD2, TGM1, TIMP1, and COL4A3. The genes that were downregulated were ERBB2 and HRH1.

GENE	GENE NAME	FUNCTION	REGULATION	FOLD CHANGE	REFERENCE
COL4A3	Collagen Type IV Apha 3	Strengthens ECM	UP	2.600	Clin Exp Obstet Gynecol. 2001;28(3):179-82.
LOX	Lysyl Oxidase	Increases Elastin	UP	2.126	Exp Dermatol. 2006;15(8):574-81.
TIMP1	Tissue inhibitor of matrix metalloproteinases 1	Degrades MMP1	UP	1.710	J Invest Dermatol. 2008;128:2297-2303.
SOD2	superoxide dismutase 2, mitochondrial (MnSOD)	Protects against oxidative stress	UP	2.628	J Invest Dermatol. 1999;112:13-18.
SIRT1	Sirtuin 1	Inhibits MMP9	UP	1.833	Biochem Biophys Res Commun. 2008 Nov 28;376(4):793-6.
TGM1	Transglutaminase 1	Necessary for formation of the cornified cell envelope	UP	1.638	J Invest Dermatol. 2008;12:1212-1219.
HRH1	Histamine	Induces MMP-9	DOWN	1.917	J Invest Dermatol. 2008;128(12):2783-91.
ERBB2	v-erb-b2 erythroblastic leukemia viral oncogene homolog 2	Helps in activation of NFκB via UV induction	DOWN	2.396	Am J Pathol. 2006;169:1402-1414.

TABLE 1. Selected statistically-significant skin structure-relevant gene expression data and references.

DISCUSSION

Gene expression changes accompany skin aging and contribute to the formation of noticeable signs of aging such as the formation of fine lines, wrinkles, and sagging skin. In the aging dermis, there are increases in expression of genes responsible for degrading key components of the extracellular matrix (ECM), while there are decreases in gene expression responsible for key components that build and/or contribute to ECM formation. Thus, more breakdown of ECM occurs than formation. Identifying actives with an understanding of their associated gene change will allow for efficacious combinations of ingredients that can help slow down the aging process by influencing beneficial gene expression changes.

In this study, we report the effect of a blend of two extracts was examined with respect to gene expression changes related to maintaining the structure of skin during aging. Further work is necessary to determine if these changes are translated to have a meaningful impact on protein levels. Additionally, identification of the active component of these extracts might provide for potent skin beneficial compounds.



NARCISSUS TAZETTA FLOWER, BULB



SCHIZANDRA CHINENSIS FRUIT

CONCLUSION

Our study suggests that when combined, Narcissus tazetta bulb extract and Schizandra chinensis fruit extract may contribute to protecting and maintaining the integrity and structure of skin and support a younger skin appearance.