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Incorporating a traditional Chinese medicine natural preparation into cosmetic skin care products

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Background: The fruiting bodies of snow fungus, *Tremella fuciformis*, are used as a food and traditional medicine in China, reported to reduce wrinkles and increase moisture levels in the skin. The acidic heterglycans from water extracts of the fruit bodies consist of a mannan backbone with side chains containing glucose, mannose, fucose, xylose and glucuronic acid residues. A specially prepared snow fungus extract was authenticated by the Royal Botanic Gardens, Kew. In addition, in vitro skin responses to the extract were characterized by gene array analysis.

Methods: Monosaccharides released from Tremella polysaccharide by acid hydrolysis were analysed by GC-MS either as their trimethylsilyl (TMS) derivatives or as chiral derivatives obtained from the reaction with N-cysteine methyl ester. Samples were analysed using an Agilent GC-MS system (7090A GC, 5975C MSD). 1 μL of sample was injected manually using a split ratio of 10:1 and chromatography was performed on an Agilent 25 m x 0.25 mm (i.d.) x 0.25 μm DB-5MS column using a constant flow of 1 mL/min helium. For TMS derivatives the oven temperature programme was 120- 300°C rising at 6°C/min. For chiral derivatives, the oven temperature program was 180- 300°C rising at 6°C/min. The mass spectrometer scanned from m/z 38 to 650. For chiral derivatives, chromatograms were monitored at m/z 217. Gene array analysis was conducted on keratinocytes and fibroblasts to confirm in vitro biologic activity of the snow fungus extract.

Results: The phytochemical profile of the extract determined by GC/MS confirmed the authenticity of the snow fungus extract relative to authentic standards. Gene array analysis indicated significant up-regulation of hydration markers compared to vehicle control, confirming the activity of the extract in human skin cells in vitro. Conclusion: GC-MS confirmed that the specially prepared extract is authentic snow fungus Tremella fructiformis based on analysis of the monosaccharides derived from its polysaccharides. Effects of the extract on human skin cells in vitro indicated up-regulation of transcriptomics pathways related to skin hydration. These results indicate that this unique snow fungus extract is a promising candidate as a cosmetic ingredient.

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Loss of skin elasticity is more dependent on Fitzpatrick skin type than chronologic age

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The hallmark signs of skin aging include abnormal pigmentation, wrinkling, and the loss of elasticity. Previous studies have reported that the loss of skin elasticity correlates with aging on multiple sun exposed skin regions. We used a noninvasive instrument (Cutometer Courage + Khazaka Electronic GmbH, Cologne, Germany) that measures mechanical properties of the skin to determine skin elasticity in 90 volunteers with Fitzpatrick skin type I-VI from age 30-69. As predicted, we observed that the loss of skin elasticity correlated with age. This trend was also observed with Fitzpatrick skin type (lower skin elasticity in lower Fitzpatrick skin type). However, volunteers in highest age range (60-69) with Fitzpatrick skin type (V-VI) had better skin elasticity than volunteers in the mid age range (46-59) with Fitzpatrick skin type (I-II). With these findings, we conclude that the loss of skin elasticity is more dependent on Fitzpatrick skin type than chronologic age. The signs of skin aging are largely attributed to photodamage caused by UV exposure more so than chorologic aging. This finding demonstrated that the innate photoprotection associated with Fitzpatrick skin type greatly impacts biomechanical properties in skin beyond the differences measured in chronologic age. As skin mechanical properties such as elasticity are often measured in order to determine efficacy of antiaging treatments in the personal care industry, this finding could be impactful in future clinical studies.

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Matrikine-based microprotein complex technology for topical skin rejuvenation

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Background: A new class of ligand, the matrikine, has been characterized as subdomains of various extracellular matrix (ECM) proteins capable of signaling to the cell through receptors. Two classes exist: "natural" matrikines, which signal directly from the extracellular milieu and "cryptic" matrikines (matricryptins) that require proteolytic processing to reveal the ligand or to release the ligand from its ECM protein. A blend of specific matrikines has been demonstrated in vitro to stimulate the formation of all ECM components which are significantly depleted with skin aging; namely collagens I, III, and VII, elastin and hyaluronic acid. Unlike growth factors, most matrikines possess low binding affinity to their receptors, but their low molecular weight makes them valuable alternatives for topical use in skin rejuvenation.

Objective: To further evaluate the safety and efficacy of a specific blend of matrikines and matrikine-like synthetic peptides for skin rejuvenation.

Methods: 120 females 38 to 65 years of age with moderate signs of facial wrinkles were enrolled into this randomized, controlled, and investigator-blinded study performed by an independent research organization. Subjects were randomized into 3 groups to receive either an oil-in-water emulsion cream with the matrikine-based complex, or either 1 of 2 growth factor products. The subjects applied the test products 2× daily to face for 6 mos.

Results: 114 subjects completed the study (39: matrikine-based complex; 75: growth factor products). The test products were well tolerated and all products significantly ($P = .05$) reduced periorbital and perioral wrinkles s after 3 and 6 mos as scored on the Rao-Goldman 5-pt Wrinkle Score. In the matrikine-based complex group, periorbital wrinkles improved (= 1 unit) in 28% of the subjects after 1 mo, 65% after 3 mos, and 81% after 6 mos. Perioral wrinkles also improved (= 1 unit) in 39% of the subjects after 1 mo, 41% after 3 mos, and 59% after 6 mos. Further, a significantly improved skin elasticity (R^2-value) was measured after 2 mos. (20% improvement; from 0.443 ± 0.095 to 0.533 ± 0.124) and lasting until 6 mos (16%; to 0.512 ± 0.117).

Conclusions: This study confirms an earlier exploratory study that a cream with a matrikine microprotein complex technology is suitable for skin rejuvenation and provides a first indication that this technology may be of comparable efficacy to some leading, growth factor technologies.

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Self-reported facial characteristics associated with aging in a diverse sample of men and women from a multinational Web-based panel survey

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Objective: This is the first study to describe facial characteristics associated with aging among men and women across a large, diverse, multinational sample.

Method: A cross-sectional, Web-based survey was administered to health panel participants in the United States, Canada, United Kingdom, and Australia in early 2014. Male and female participants 18-75 years old were recruited based on a prespecified sociodemographic sampling framework. Exclusion criteria included prior facial trauma/treatments (eg, plastic surgery, injectables, prescription retinoids). Participants compared their facial features against photonumeric scales depicting degrees of severity for 14 facial characteristics including facial lines, midface and lip volume deficiencies, and eyebrow and eyelash fullness. Linear regressions adjusted for age were fit to assess the impact of race/ethnicity (white [reference], Asian, black, Latino/Hispanic) on severity of each feature for male and female cohorts separately. Linear regressions were fit to examine the relationship between age (categorized in 10-year cohorts) and race/ethnicity on select characteristics.

Results: 4086 participants completed the survey (80% female, 41% white, 22% Asian [South and East Asian/Pacific Islander], 21% black, 16% Latino/Hispanic) (mean age = 47 ± 16). BMI, income, and smoking status distributions aligned with general population norms from each country. White women demonstrated significantly greater severity of most facial features and a higher rate of change than other groups. Among all men and women, upper facial lines developed by the fourth decade of life, and the severity increased steadily with age. Linear regressions for male and female cohorts revealed that, after controlling for age, White participants reported significantly greater severity of forehead, crow's feet, glabellar, and marionette lines; midface volume deficiency; hollows under the eyes; and lip thinning than other races/ethnicities. Black participants had significantly less midface volume deficiency and perioral lines and greater lip fullness than other races/ethnicities.

Conclusions: In this globally diverse sample, white participants reported greater severity of most facial characteristics associated with aging than Asians, blacks, and Latino/Hispanics, with some differences by gender. These results provide valuable and novel insight into the characteristics of facial aging in multiple countries and diverse populations.

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