

Histological Analysis Shows That a Moisturizer Formulated for Dermatoporosis Increases Elastin Content and Improves Skin Elasticity

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ABSTRACT

Background: Dermatoporosis involves age-related alterations in dermal structure and cellular function, including changes in collagen, elastin, and markers of skin senescence. Changes in skin biomarkers (collagen I, elastin, senescence-associated beta-galactosidase, CD44, and CD47) were assessed following the use of a novel moisturizer, GC (Galderma Laboratories, L.P., Fort Worth, TX), by subjects with mature, aging skin.

Methods: This 12-week multisite study recruited female and male subjects aged 40 to 60 years of all races, ethnicities, and Fitzpatrick skin types. Subjects were required to have a history of fragile skin and dry, crepey skin on the knees. The GC cream was applied to the knee and thigh skin twice daily. A subset of 5 patients underwent 3-mm punch biopsies on the upper knee at baseline and week 12 for immunohistochemistry. Standardized photography of skin appearance and pinch-release tests were conducted at baseline and weeks 4, 8, and 12.

Results: With GC cream use, elastin expression increased from baseline to week 12 (18% to 36%; $P < .05$) and beta-galactosidase expression trended higher (18% to 24%). Expression of CD44 (91% to 92%), CD47 (81% to 82%), and collagen type I alpha 1 (94% at both timepoints) was stable. Subjects' skin firmness and appearance were visibly improved.

Conclusion: After 12 weeks of twice-daily use of the GC cream, there was a significant increase in elastin expression, which was accompanied by visual improvement in skin elasticity and texture. These data validate clinical histological findings and show how topical intervention can improve overall skin health.

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INTRODUCTION

Dermatoporosis is an age-related condition characterized by progressive loss of the skin's mechanical strength and structural integrity.¹ It first presents as fragile skin with senile purpura, stellate pseudoscars, and skin atrophy, and can progress to skin lacerations, superficial or deep dissecting hematomas, and, in severe cases, skin necrosis.^{1,2} Functionally, dermatoporosis is characterized by reductions in collagen, elastin, and glycosaminoglycans within the subdermal extracellular matrix, leading to decreased skin thickness and elasticity.^{3,4} At the cellular level, mitochondrial impairment, reduced autophagic capacity, and accumulation of senescent cells are observed.⁵

Dermatoporosis predominantly affects sun-exposed skin, and it occurs in up to 37% of individuals aged 65 and older; women are more frequently affected than men.^{2,6,7} Although prevalence is highest among older adults, skin fragility can be clinically relevant in individuals across a broad age range.² Additional risk factors include genetic susceptibility, chronic renal failure, anticoagulant use, chronic obstructive pulmonary disease, epidermal growth factor receptor inhibitor use, and physical inactivity.⁸

Despite its prevalence, the molecular mechanisms of dermatoporosis are not fully understood, and the biomarkers of dermatoporosis are poorly characterized.⁹ On this basis,

several structural and senescence-associated markers have been identified as potential biomarkers of dermatoporosis.⁹ CD44 is a cell-surface receptor that binds hyaluronic acid and contributes to epidermal homeostasis. Hyaluronate signaling through CD44 has been directly implicated in skin atrophy and dermatoporosis-related changes.^{1,2,10} CD47 is a transmembrane protein classically recognized for its inhibitory signaling against phagocytosis and is a modulator of several aging-related processes.⁵ CD47 expression is elevated in aged tissues and senescent cells, and it may be a potential novel biomarker for photoaging.^{5,11}

Senescence-associated beta-galactosidase (SA- β -gal) is a widely used biomarker of cellular senescence in vitro and in aging skin, where its age-dependent induction reflects the accumulation of senescent fibroblasts and keratinocytes, and may be relevant to dermatoporosis.^{12,13}

Together, CD47 and SA- β -gal provide complementary measures of senescence-associated cellular changes. Type I collagen is the most abundant fibrillar protein in the dermis, comprising 80% to 85% of the dermal extracellular matrix and conferring mechanical strength through its triple-helix structure.¹⁴ Expression of collagen type I alpha 1 (COL1A1) declines measurably with age.¹⁴ Finally, elastin (ELN) is responsible for the skin's elastic property. It has a very low rate of turnover, and its production ceases in adulthood, rendering it especially susceptible to cumulative damage over time.^{4,15} Together, these molecules comprise a set of measurable candidate biomarkers that capture distinct aspects of skin aging and dermatoporosis-related changes.

Previously, we found that a novel compound designed with a combination of microdosed *Centella asiatica* and mandelic acid has synergistic antisenesescence and anti-inflammatory actions.¹⁶ This study evaluated the efficacy and safety of an investigational topical cream, GC (Galderma Laboratories, L.P., Fort Worth, TX), in subjects with mature, aging skin. Specifically, we assessed changes in skin biomarkers via immunohistochemistry and conducted photographic assessments to correlate underlying tissue-level changes with clinical changes observed at the skin surface.

MATERIALS AND METHODS

Subjects

This 12-week multisite study was conducted in the United States in accordance with Good Clinical Practice guidelines. Institutional Review Board (IRB) approval was obtained on July 30, 2025 (IRB ID: 14308; ClinicalTrials.gov number: NCT07398989). All subjects provided written informed consent.

Subjects were directed to apply the GC cream twice daily for 12 weeks. A supporting SPF moisturizer was also provided, and

subjects were instructed to use it before sun exposure and to reapply as needed throughout the day. Subjects agreed to stop using current topical skincare products for the duration of the study.

The study recruited male and female subjects aged 40 to 60 years of all races, ethnicities, and Fitzpatrick skin types, with a self-reported history of fragile and easily bruised skin. Eligible subjects had mild-to-moderate skin crepiness, photodamage, and firmness on the skin of the knees and lower thighs, defined as a score of 3 to 6 on the modified Griffiths scale (0 = none; 9 = severe).¹⁷

Assessments

For assessment of biomarkers, 3-mm punch biopsies were performed on 5 subjects randomly selected from the full study population from a single clinical site at baseline and week 12. Following each biopsy, subjects returned 5 days post-procedure for wound examination and suture removal.

Tissue samples were fixed in 10% neutral buffered formalin, dehydrated, and cut into 5-micron thick sections. Two slides per biopsy were prepared, for a total of 8 sections per tissue sample for each target stain. Immunohistochemical staining for CD44, CD47, collagen I (COL1A1), SA- β -gal, and elastin (ELN) was performed using a Thermo Scientific Lab Vision Autostainer 480S. A digitally scanned image of each tissue section was captured at 40 $\times$ magnification with a Leica Aperio digital scanning system. The images were analyzed with the Positive Pixel Count v9 algorithm using ImageScope software to assess the total positivity or sum of total positive pixels. Average pixel positivity per target and per timepoint were calculated, and statistical analysis (t-tests; $P < .05$) was performed to compare the average positivity in product-treated tissues with baseline tissues for each target and for each subject. Staining with hematoxylin and eosin (H&E) was also performed to assess skin structure.

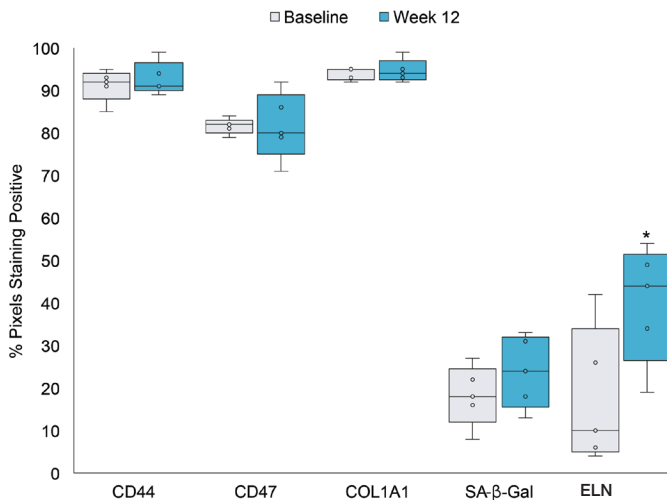
In addition to biopsy-based assessments, standardized clinical photography of the knees and lower thighs was obtained at baseline and weeks 4, 8, and 12 to document visible skin changes over time. Photography included neutral standing views and a standardized pinch-release maneuver at the upper knee to visually assess skin recoil and mechanical behavior. All images were captured under controlled positioning, lighting, and background conditions by trained study personnel.

Adverse events that occurred during the study period were monitored and reported.

RESULTS

A total of 31 subjects were enrolled in the study, ranging in age from 44 to 60 years. As previously described by Ablon et al, 71%

FIGURE 1. Biomarker changes from baseline across all subjects. Expression of CD44, CD47, COL1A1, SA- β -gal, and elastin was assessed by immunohistochemistry and quantified by pixel staining at baseline and week 12. Data shown are the mean, range, and interquartile range results for $n=5$ subjects. * $P<.05$ vs baseline.



COL1A1, collagen type I alpha 1; ELN, elastin; SA- β -gal, senescence-associated beta-galactosidase.

had Fitzpatrick skin types I to III and 29% had Fitzpatrick skin types IV to VI.¹⁸ Five subjects from a single site were randomly selected to undergo punch biopsies. These subjects were a mean of 57.4 years of age (range, 55-60 years), 4 were female, and 1 was male. Three identified as White/Caucasian, 1 as East Asian, and 1 as West Asian. Two subjects identified as Hispanic or Latino, and 3 were not Hispanic or Latino. Two subjects had Fitzpatrick skin types I to III, while the other 3 had Fitzpatrick skin types IV to VI.

Immunohistochemical analysis of skin biopsy samples showed a significant increase in elastin expression from baseline to week 12 (18% to 36% pixels stained; $P<.05$). SA- β -gal showed a trend toward increased expression (18% to 24%), while expression of other proteins remained stable throughout the study, including CD44 (91% to 92%), CD47 (81% to 82%), and COL1A1 (94% at both timepoints) (Figure 1).

Individual changes in elastin expression were consistent with all 5 individuals, demonstrating a significant increase in the percentage of stained proteins from baseline to week 12 (10% to 19%, 6% to 49%, 4% to 44%, 26% to 34%, and 42% to 54%, respectively; $P<.05$). Representative histologic cross-sections showed increased elastin staining intensity and broader dermal distribution at week 12 compared with baseline, consistent with the observed increases in elastin-positive pixel percentages (Figure 2). In addition, H&E staining showed consistent dermal collagenization throughout the study, with preserved dermal

FIGURE 2. Increases in elastin expression from baseline to week 12. Elastin expression was assessed in biopsy samples from 5 subjects at baseline and week 12. Representative images of elastin immunostaining are shown for Subject 101 and Subject 104 (scale bar = 200 μ m).

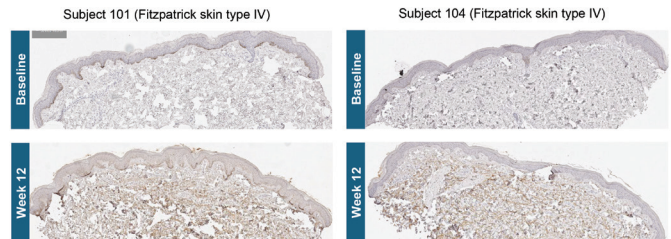
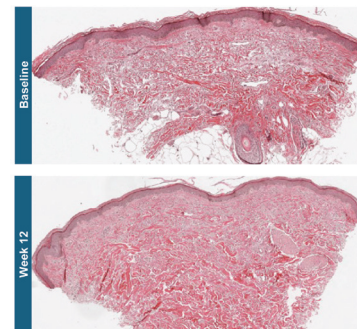


FIGURE 3. H&E staining for skin structure assessment. Skin structure was examined in H&E-stained biopsy samples from 5 patients at baseline and week 12. Representative images from Subject 103 (Fitzpatrick skin type II) are shown at baseline and week 12 (scale bar = 200 μ m).



H&E, hematoxylin and eosin.

FIGURE 4. Pinch-release assessment. Skin recoil was assessed by pinch-release assessment at baseline and throughout the study. Representative responses to a pinch-release test are shown at baseline and weeks 4, 8, and 12 for Subject 106 (Fitzpatrick skin type II).

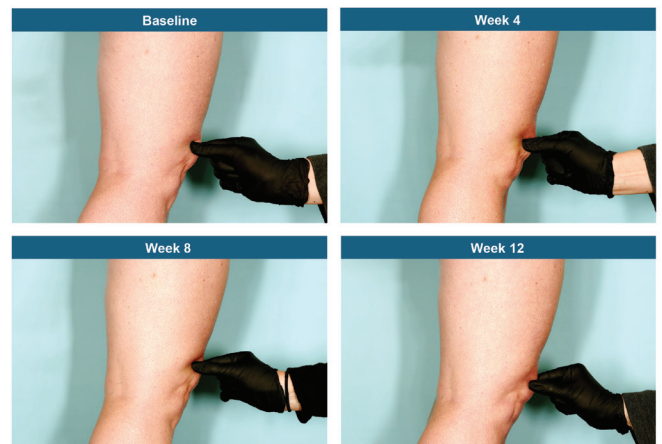
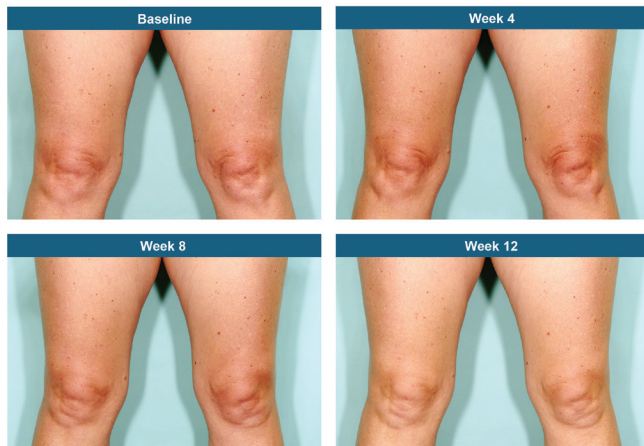


FIGURE 5. Clinical improvement in overall skin appearance and skin texture. Skin appearance was assessed using clinical photography at baseline and throughout the study. Representative results of changes in overall skin appearance and skin texture are shown at baseline and weeks 4, 8, and 12 for Subject 106 (Fitzpatrick skin type II).



architecture and no evidence of structural disruption (Figure 3).

Pinch-release assessments demonstrated improved skin recoil after 12 weeks of treatment with the GC cream, consistent with increases in subdermal elastin (Figure 4). Representative clinical photography demonstrated visible improvement in skin firmness and texture, with progressive changes observed from baseline through week 12 (Figure 5).

Thirty of 31 subjects completed the study, and there were no study product-related adverse events. The GC cream was well tolerated by all subjects, with no clinically meaningful increase in erythema, edema, or dryness at any post-baseline visit. Full safety and tolerability outcomes have been previously reported.¹⁸

DISCUSSION

This study shows that consistent twice-daily use of the GC cream for 12 weeks increased expression of proteins whose loss are associated with fragile, aging skin. The increase in elastin expression is of particular interest because of its contributions to skin elasticity, resilience, and structural integrity, all of which are at risk of decline in mature, fragile skin.^{4,15} Subdermal elastin expression was accompanied by improvements in skin firmness and appearance, suggesting concordance between histologic changes and visible clinical outcomes. Qualitative improvements observed in standardized clinical photography, including visible reductions in skin crepiness and enhanced surface smoothness, were consistent with the biomarker-based evidence of improved dermal structural integrity.^{1,2,4,7-9} In addition, the pinch test visually suggested progressive improvement in skin recoil over time, reflecting favorable changes in the skin's mechanical behavior that align with increased elastin expression.^{1,2,8,15}

Limitations of this study include the small number of subjects who underwent biopsies and the relatively short study duration. Although the overall study enrolled 31 subjects, the biopsy analysis was limited to a subset of 5. While other exploratory biomarkers were generally stable over the 12-week study period, a larger sample size may identify additional, clinically relevant changes. Larger and longer studies are needed to further evaluate the effects of the GC cream on mature, fragile skin.

Notably, all 5 subjects who underwent biopsies demonstrated increased elastin staining from baseline to week 12. This subdermal tissue-level finding is directionally consistent with improvements in visible skin firmness on pinch-release assessment and overall skin appearance, supporting a cohesive interpretation in which external clinical improvements were accompanied by an underlying structural biomarker signal. Because elastin contributes to skin resilience and elasticity, the observed increase in elastin staining is biologically plausible and represents the clearest biomarker finding from this exploratory biopsy analysis.

CONCLUSION

These findings demonstrate that 12 weeks of twice-daily use of the GC cream increased dermal elastin expression beneath the skin surface and resulted in visible improvements in skin firmness, texture, and post-pinch appearance at the skin surface. Together with previously reported improvements in skin texture and hydration,¹⁸ these findings support the GC cream as a moisturizer that may help improve skin health both below and at the skin surface in individuals with dermatoporosis-related changes to the skin.

DISCLOSURES

Glynis Ablon MD is an investigator and/or consultant for AbbVie, Almirall, Bausch, Benev, Beiersdorf, Church & Dwight, Eli Lilly, Estee Lauder, Everwell, Galderma, La Roche-Posay, L'Oreal, Nutrafol, Omnilux, Revision, and Valensa. Todd Schlesinger MD has been an investigator and/or consultant for: AbbVie, Almirall, Apogee, Arcutis Biotherapeutics, Beiersdorf, Benev, Biofrontera, Bristol Myers Squibb, Crown Aesthetics, Dermsquared, Eli Lilly, Estee Lauder, Flint Clinical, Galderma, Genentech, HTL Biotechnology, Janssen, LaRoche Posay, LEO Pharma, L'Oreal, MJH Life Sciences, Oruka, Pfizer, RBC Consultants, Regeneron Pharmaceuticals, Sun Pharma, Verrica, and UCB; has served as an investigator for AbbVie, Allergan, Almirall, Arcutis Biotherapeutics, Aslan Pharmaceuticals, Biofrontera, Bristol Myers Squibb, Boehringer Ingelheim, Cara Therapeutics, Castle Biosciences, Concert Pharmaceuticals (acquired by Sun Pharma), Cutanea Life Sciences, Dermavant Sciences, Eli Lilly, Galderma, HighlightII, Incyte, Janssen, Nimbus Therapeutics, Medicus, Novartis, Processa, Prolacta, Regeneron Pharmaceuticals, Sanofi, SkinCure Oncology, Takeda, Trevi Pharmaceuticals, and

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REFERENCES

1. Kaya G, Saurat JH. Dermatoporosis: a chronic cutaneous insufficiency/fragility syndrome. Clinopathological features, mechanisms, prevention and potential treatments. *Dermatology*. 2007;215(4):284-294. doi:10.1159/000107621
2. Kaya G, Kaya A, Sorg O, Saurat JH. Dermatoporosis: a further step to recognition. *J Eur Acad Dermatol Venereol*. 2018;32(2):189-191. doi:10.1111/jdv.14777
3. Konstantinou E, Longange E, Kaya G. Mechanisms of senescence and anti-senescence strategies in the skin. *Biology (Basel)*. 2024;13(9):647. doi:10.3390/biology13090647
4. Liang Y, Su W, Wang F. Skin ageing: a progressive, multi-factorial condition demanding an integrated, multilayer-targeted remedy. *Clin Cosmet Investig Dermatol*. 2023;16:1215-1229. doi:10.2147/CCID.S408765
5. Mutombo Menga A, Hong X, Zhu L. CD47 signaling in aging and age-related diseases: mechanisms, challenges, and therapeutic opportunities. *Biogerontology*. 2025;27(1):27. doi:10.1007/s10522-025-10370-4
6. Guadanhim LRS, Miot HA, Soares JLM, et al. Efficacy and safety of topical or oral hydrolyzed collagen in women with dermatoporosis: a randomized, double-blind, factorial design study. *Dermatol Ther (Heidelb)*. 2023;13(2):523-534. doi:10.1007/s13555-022-00859-y
7. Kaya G, Kaya A, Sorg O, Saurat JH. Dermatoporosis, a prevalent skin condition affecting the elderly: current situation and potential treatments. *Clin Dermatol*. 2019;37(4):346-350. doi:10.1016/j.clindermatol.2019.04.006
8. Dyer JM, Miller RA. Chronic skin fragility of aging: current concepts in the pathogenesis, recognition, and management of dermatoporosis. *J Clin Aesthet Dermatol*. 2018;11(1):13-18.
9. Menzinger S, Saurat JH, Kaya G. Morphological analysis of dermatoporosis by in vivo reflectance confocal microscopy and ultrasonography. *Dermatopathology (Basel)*. 2020;6(4):279-287. doi:10.1159/000505990
10. Kaya G, Tran C, Sorg O, et al. Hyaluronate fragments reverse skin atrophy by a CD44-dependent mechanism. *PLoS Med*. 2006;3(12):e493. doi:10.1371/journal.pmed.0030493
11. Xu X, Lu X, Chen X, et al. Elevated CD47 expression impairs elimination of photoaged fibroblasts by macrophages and serves as a potential biomarker for photoaging. *J Cosmet Dermatol*. 2025;24(4):e70098. doi:10.1111/jocd.70098
12. Dimri GP, Lee X, Basile G, et al. A biomarker that identifies senescent human cells in culture and in aging skin in vivo. *Proc Natl Acad Sci U S A*. 1995;92(20):9363-9367. doi:10.1073/pnas.92.20.9363
13. Dorf N, Maciejczyk M. Skin senescence—from basic research to clinical practice. *Front Med (Lausanne)*. 2024;11:1484345. doi:10.3389/fmed.2024.1484345
14. Bar O, Valiukevičienė S. Skin aging and type I collagen: a systematic review of interventions with potential collagen-related effects. *Cosmetics*. 2025;12(4):129. doi:10.3390/cosmetics12040129
15. Baumann L, Bernstein EF, Weiss AS, et al. Clinical relevance of elastin in the structure and function of skin. *Aesthet Surg J Open Forum*. 2021;3(3):ojab019. doi:10.1093/asjof/ojab019
16. Widgerow AD, Ziegler M, Garruto JA, et al. Novel strategy for strengthening dermatoporotic skin by managing cellular senescence. *J Drugs Dermatol*. 2024;23(9):748-756. doi:10.36849/JDD.8388
17. Griffiths CE, Wang TS, Hamilton TA, et al. A photometric scale for the assessment of cutaneous photodamage. *Arch Dermatol*. 1992;128(3):347-351. doi:10.1001/archderm.1992.01680130061006
18. Ablon G, Emesiani C, Garimella S, et al. A novel moisturizer formulated with micronized *Centella asiatica* and mandelic acid improves mature, crepey skin. *J Drugs Dermatol*. 2026;25(9):833.

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