Abstract
Towards Skin Longevity: The Development of a Novel Plant-Based Combination with a Potent Stimulation of Collagen I Synthesis In Vitro †

Viktor Filatov * and Elizaveta Patronova

Science Center, SkyLab AG, 1066 Lausanne, Switzerland
* Correspondence: rnd.innovation@skylaboratory.ch
† Presented at the 3rd International Electronic Conference on Biomolecules, 23–25 April 2024; Available online: https://sciforum.net/event/IECBM2024.

Abstract: Human skin is constantly exposed to various endogenous and exogenous factors, including UV radiation and vitamin deficiency, which can influence the earlier appearance of visible wrinkles and decrease skin firmness and elasticity. This process is related to decreased collagen I synthesis in the dermis. However, the use of retinol derivatives, synthetic molecules, and growth factors is associated with significant adverse effects, low bioavailability, and instability in dermatological products. Thus, our research was focused on the investigation of a novel plant-based combination for the stimulation of collagen I synthesis in deep skin layers and the prevention of accelerated skin ageing. Aloe barbadensis leaf extract, trimethylglycine, and panthenol were chosen as potential candidates using in silico modelling. A Way2Drug tool predicted anti-inflammatory, anti-psoriatic, and antioxidant activities beneficial for the prophylaxis of skin ageing. An in vitro study was conducted to determine collagen I synthesis in skin fibroblasts in the presence of single substances and their composition using a colorimetric analysis. It was revealed that the combination of Aloe barbadensis leaf extract, trimethylglycine, and panthenol in a specific mass ratio of 2:4:1 and at a concentration of 0.5% significantly increased the amount of collagen I in the skin fibroblasts by up to +18% within 24 h (p < 0.001). This effect was comparable to that of TGF-β1 (10 ng/mL), with a 37% collagen I increase (p < 0.001). The single compounds and the combination of Aloe barbadensis leaf extract and trimethylglycine showed a negative effect on collagen I synthesis, with an unpredictable decrease in this protein in fibroblasts. The combination of the compounds made it possible to achieve a synergistic effect, boosting the natural rejuvenation process in fibroblasts. Overall, the results indicate that the developed plant-based composition in the specific mass ratio and concentration given above could increase collagen I synthesis and can be considered a promising substance for dermatological products with reverse anti-ageing effects.

Keywords: Aloe vera extract; trimethylglycine; panthenol; synergy; anti-aging; collagen I

Author Contributions: Conceptualization, V.F.; methodology, V.F.; software, V.F. and E.P.; validation, V.F.; formal analysis, V.F.; investigation, V.F., resources, V.F.; data curation, V.F.; writing—original draft preparation, V.F. and E.P.; writing—review and editing, V.F.; visualization, V.F. and E.P.; supervision, V.F.; project administration, V.F. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this research are available on request from the corresponding author.
Conflicts of Interest: The authors declare no conflicts of interest. V.F., and E.P. are employees of SkyLab AG.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.