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abstract

An even complexion is key to youthful skin appearance. While the reduction of spots and unbalanced skin tone is an obvious approach to achieve an even complexion, skin texture does contribute significantly to the skin's aspect. Here we show that the use of tannic acid combined with millet seed extract providing bioavailable silicon can level out an uneven texture by strengthening the dermal collagen network with high significance *in vivo*.

Introduction

As time goes by, our skin suffers from numerous stressful conditions. Be it low or high humidity, the interchange thereof, burning sunlight, heat, cold, reactive chemicals – or simply ageing: you name it. Our skin loses its resilience and youthful complexion, even skin texture and real radiance. All signs of ageing, be it spots, uneven skin microstructure, fine lines, wrinkles or enlarged pores, interfere with the homogenous impression of young skin. As such, one of the key tar-

gets for achieving a younger looking skin is the harmonisation of all these blemishes. By improving the microstructure, fine lines, wrinkles and pores, LIFTONIN® (INCI: Water, Glycerin, Panicum Milliaceum (Millet) Seed Extract, Citric Acid, Tannic Acid, Potassium Sorbate) incorporates synergistic and potentiation effects to bring about a visible improvement in skin condition. The mixture of tannic acid and millet seed extract reduces wrinkles, provides an even complexion and creates real radiance for a fresh and youthful looking skin. (Fig. 1)

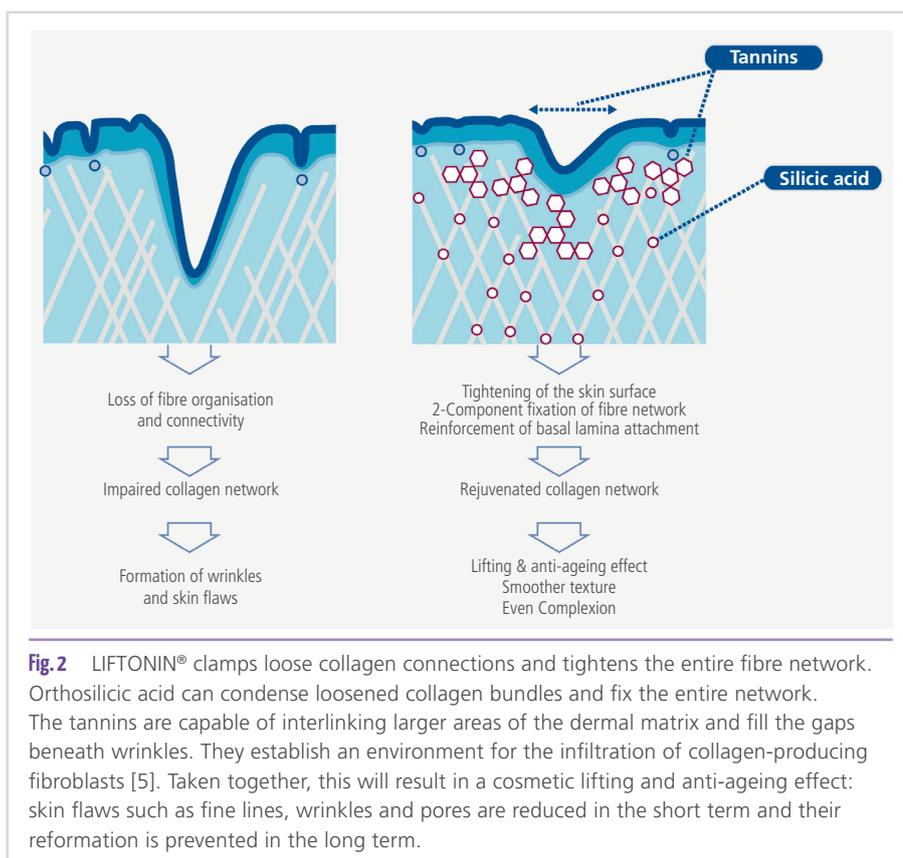
There are two main factors influencing the even look of the skin:

1. the skin topology or evenness: Our skin contains a network of fine lines giving rise to its texture. During ageing, some of these lines become aggravated and appear as furrows and wrinkles. The main trigger is repeated mechanical stress, intrinsic and extrinsic ROS and UV exposure. All these stresses cause the skin to decrease in thickness [1]. A typical cause of wrinkles are mimic muscle movements. Laughter, anger, consternation or sadness are translated into corresponding mimic expressions. Through the countless repetitions of these movements, mechanical stress will bring about the development of permanent wrinkles. They start as fine lines that are barely visible e.g. in the area around the eyes or at the forehead and worsen with ageing.

2. the skin tone or complexion: Extrinsic factors have a great impact on the skin's even complexion: UV, ROS, changes in humidity and urban pollution induce changes in the cell-biology of the epidermis. The distribution of melanin can be disturbed as well as the thickness of the epidermal layers may change leading to an uneven skin texture and skin tone. As a response to these outside stressors, the skin reacts with inflammatory responses like vasodilatation, spots and pimples which are aggravated



Fig. 1 Like our skin, marble statues are exposed to environmental factors, which lead to erosion (left). To retain a youthful appearance the skin has to be protected. The same is true for statues made from alabaster, which is the finest and most delicate stone for creating sculptures (right). With gypsum as a basic component, it has to be protected from the outside.



by the bacteria of our skin flora [2]. Besides these extrinsic factors, the skin sensitively reacts on internal triggers like hormone status, nutrition, stress and illness. Typically, these conditions lead to a reddening of the skin due to inflammatory responses [3].

Aged skin suffers from disorganized collagen and a diminished interconnectivity of the dermis with the epidermis [4]. By providing natural clips like tannins, the network can be reordered and revitalized. Tannins are a well-known astringents which are capable of smoothing the surface of the skin. Besides this, recent research points to an additional function: due to their numerous hydrogen bond donor and acceptor residues, tannins are able to bind protein structures, especially collagens, and stabilize the dermal network. Additionally, they provide an environment for the infiltration of collagen producing fibroblasts [5]. The antimicrobial and tyrosinase inhibiting properties of tannic acid [6] adjust the skin tone and lead to an even complexion and a real radiance. The mixture of tannic acid and millet seed extract also contains valuable nutrition and vitamins for the skin from the millet (*Panicum miliaceum*) that provide the epidermis with an extra portion of energy to ensure an optimal cell growth. Amongst these, silicon – or better said orthosilicic acid – has a synergistic effect to stabilize a deranged dermal network. Due to its 4 hydroxyl groups, it is also able to clamp unordered collagen fibers and contribute to a firm dermis [7]. (**Fig. 2**)

The capability of the mixture of tannic acid and millet seed extract to strengthen dermal collagen and to reduce wrin-

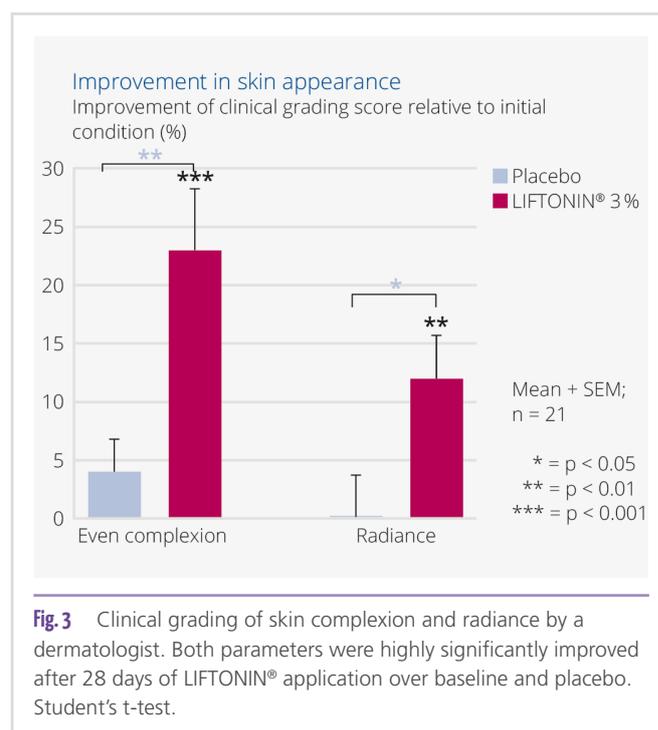
kles and fine lines was reported elsewhere [8]. Here, we like to focus on the improvement of texture, complexion and radiance, all parameters important to achieve a smooth skin appearance.

Results

In a double blind, placebo controlled study, 21 females (22–45 years ; average 34 years) with healthy Asian skin showing first signs of ageing applied an emulsion containing 3 % of the mixture of tannic acid and millet seed extract or placebo for 28 days twice daily on the face. The skin complexion and radiance was objectively evaluated by a dermatologist. We found a significant improvement of the complexion by 23 % compared to baseline and a more than 5-fold improvement compared to placebo (**Fig. 3**). The verum also improved the radiance

significantly over baseline which was not at all the case for the placebo formulation. Both parameters were significant over baseline and placebo (for statistic values see figure legends).

In a similar way, the study participants were asked to score the appearance of the skin texture, complexion and radiance at day 0 and after 28 days of application of verum in a sub-



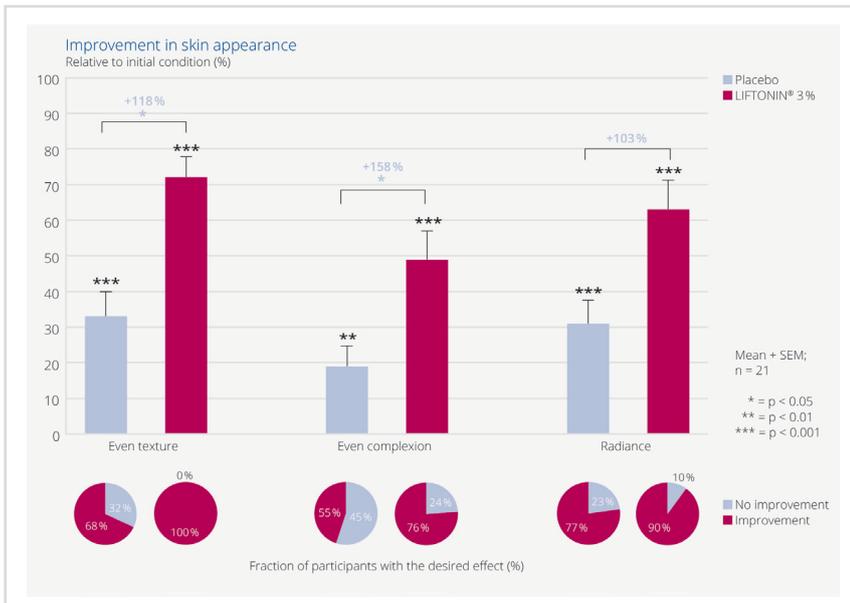


Fig. 4 LIFTONIN® visibly improves skin texture, complexion and radiance. Subjective grading by the study participants. Statistical values in black refer to the comparison to baseline condition, in blue to placebo. Student's t-test.

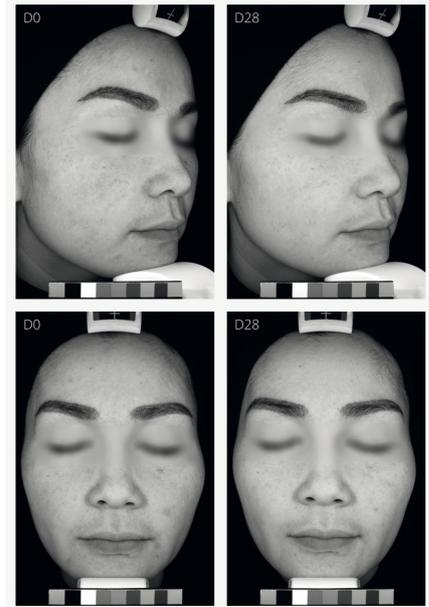


Fig. 5 The verum improved overall skin complexion. After 28 days of treatment (right panels), spots are reduced and the skin appearance is more homogenous. Study participant #20; cross polarised light; black and white conversion to emphasize freckles and spots.

jective grading (**Fig. 4**). 100 % of the study participants experienced an improvement of their skin texture which was significantly improved more than twofold over placebo. An even higher effect was visible for the complexion. Also, the radiance was judged double as good as placebo, where 90 % of the study participants experienced an improvement. Thus, the objectively evaluated skin condition correlated nicely with the subjective rating and was visible by the naked eye (**Fig. 5**). Application of verum lead to a high degree of satisfaction with the own appearance as reflected by a subjective survey (**Fig. 6**): There was a high level of consistency with the measured parameters: the overall satisfaction with texture, complexion and radiance was highly significantly improved. The number of study participants who were satisfied or only slightly unsatisfied about their skin texture and complexion improved by 8 times. Almost 50 % were completely satisfied with their skin texture whereas at the beginning of the study none of them was. After 28 days of treatment with verum, 43 % were completely satisfied with the radiance, while at the beginning, none of them was satisfied. Only 19 % were still moderately unsatisfied but none of the study participants was left highly unsatisfied. 100 % of the subjects agreed that there was an improvement in wrinkle appearance (not shown).

Conclusion

The mixture of tannic acid and millet seed extract takes care for a skin with even texture and complexion. It supports the dermal network by providing molecular clamps organizing and fixing rearranged collagen fibers and providing a fibroblast friendly environment. By firming the dermal network and adjusting the skin's texture and complexion a youthful appearance and a fine radiance is achieved.

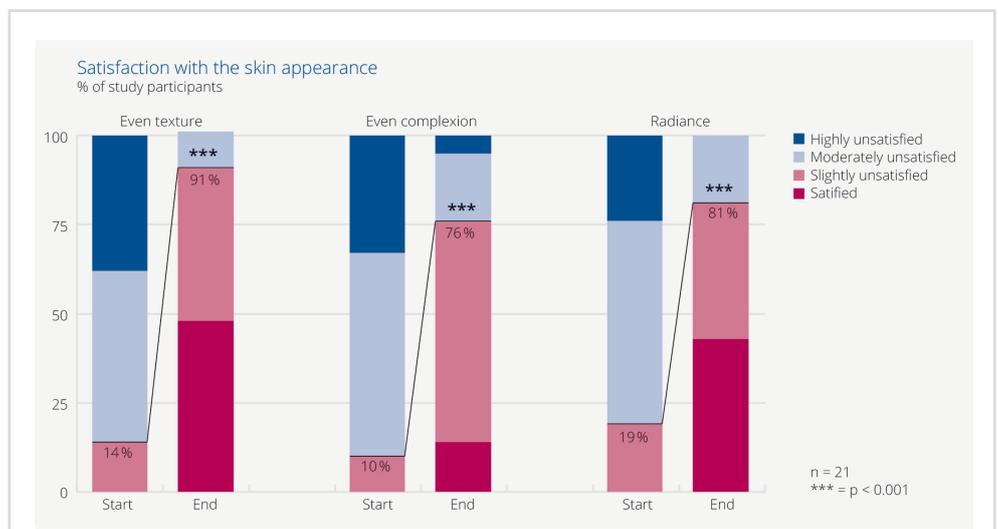


Fig. 6 LIFTONIN® subjectively improves texture, complexion and radiance on almost all study participants. Statistical values refer to the comparison to baseline condition. Wilcoxon-signed rank test.

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