Upcycled Chios Mandarins to Combat Inflammageing

CALMandrin™ is our sustainable solution to soothe reddened skin and improve signs of skin ageing

Thanks to its anti-inflammageing effect, CALMandrin™ markedly increases the firmness and density of the skin. The upcycled elixir CALMandrin™ is based on the peel paste of organic mandarins used from the distillation process of fragrance production. The mandarins are grown exclusively in historic orchards on the Greek island of Chios.

Inflammageing in skin ageing
The term "inflammageing" is composed of the two words "inflammation" and "ageing". Chronological ageing as well as intrinsic and extrinsic stress can lead to increased levels of reactive oxygen species (ROS) in the skin, resulting in the activation of the NF-κB signalling pathway. Activated NF-κB induces the transcription of proinflammatory factors and metalloproteases. The human body's ability to fight inflammation decreases with age and inflammation can no longer be completely eliminated. Thus, low-grade chronic inflammation occurs and contributes to the development of the signs of ageing skin.

Upcycled Chios mandarins – CALMandrin™
Mandarins are particularly rich in essential oils and antioxidants. On the Greek island of Chios, mandarins grow exclusively under very mild climatic conditions in traditional organic cultivation. Chios mandarins contain many seeds, which does not correspond to today's market standards, but are nevertheless highly valued for their excellent and intense aromatic properties. In a traditional small distillery, both the juice and the peel of the Chios mandarins are used for the gentle distillation process of fragrance production. The remaining thick peel pulp is the raw material for the production of CALMandrin™. Mibelle Biochemistry's mission was to develop a skin-specific active ingredient from this special waste material through a gentle water-based upcycling process to extract the valuable antioxidants from these special mandarins for the skin.

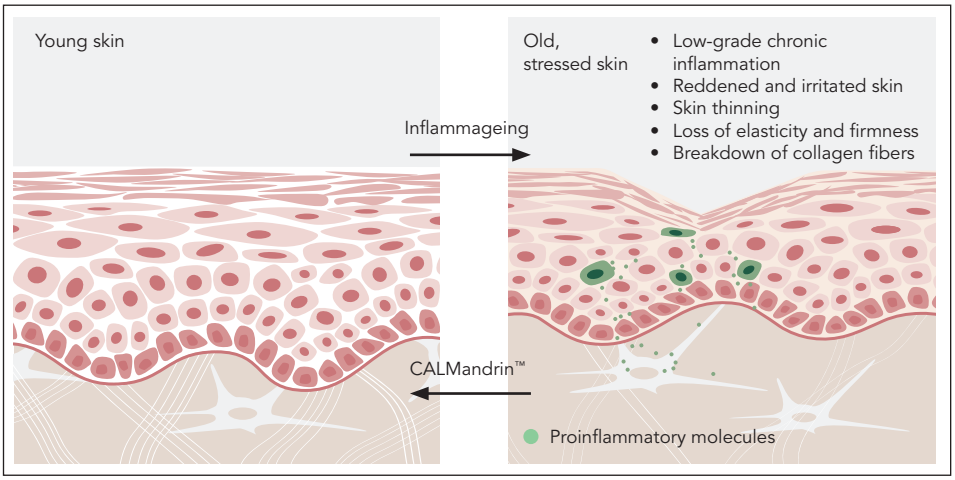
Chios mandarin extract reduces inflammation and increases collagen deposition
To investigate the effect of Chios mandarin extract on inflammation, *in-vitro* studies were performed using keratinocytes and dermal fibroblasts. For both assays, an inflammatory model was applied in the presence and the absence of Chios mandarin extract. The subsequent analysis of genes showed that the inflammatory response was reduced by Chios mandarin extract.

To find out if Chios mandarin extract has an effect on collagen deposition, dermal fibroblasts were treated with H_2O_2 in the presence or the absence of Chios mandarin extract. Oxidative stress decreased the secretion of procollagen I, whereas treatment with Chios mandarin extract counteracted this effect. In addition, an *ex-vivo* study was performed on skin explants with a cream containing CALMandrin™ or the corresponding control. The treatment with CALMandrin™ resulted in a visible increase in the ratio of young to mature collagen.

CALMandrin™ soothes reddened skin and rejuvenates the skin
To elucidate the calming and rejuvenating effect of CALMandrin™ a randomized placebo-controlled clinical study was conducted on a panel of volunteers with signs of skin redness as well as photo-ageing. Twenty women (mean age: 60.9 years) applied a cream containing CALMandrin™ or a corresponding placebo on their face and on their forearms for 28 days. CALMandrin™ led to a visible improvement in skin redness. Interestingly, facial skin redness was decreased after only 7 days of CALMandrin™-application, demonstrating a fast-acting effect on reddened skin.

The anti-ageing effect of CALMandrin™ was investigated in the same clinical study. Already 7 days of CALMandrin™-application strongly increased skin elasticity and skin firmness, highlighting a rapid improvement of the skin. Furthermore, CALMandrin™ significantly improved skin density after 28 days compared to initial conditions.

To summarize, CALMandrin™ counteracts the inflammatory immune response that results from both chronic ageing and extrinsic stress to win the race against the inflammageing-induced signs of skin ageing.



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