Phytosterol-Rich Soy Germ and Guggul Extracts Provide Anti-Ageing Benefits

Author: Dr. K.-W. Quirin, Flavex Naturextrakte GmbH, Rehlingen, Germany

Abstract

Phytosterols are well known as minor components in non-refined vegetable oils. Their content of clearly less than 1 % is however insufficient in order to display real efficacy, since they are further diluted in cosmetic preparation.

Even if there are phytosterol enriched fractions available from industrial scale downstream processing of vegetable oils especially for detergents, lubricants and oleo-chemicals or from tall oil, a by-product of wood processing in the paper industry, such fractions are not always welcome for cosmetic use, due to chemical manipulation in the background and the trend towards natural and organic cosmetic ingredients.

This article describes two extracts obtained by supercritical CO_2-extraction of organic certified soy germs and of guggul gum resin, which have natural high phytosterol content, and explains their anti-ageing benefits in dermatological application.

Importance of Sterols

Cholesterol is a vital component of human epidermal keratinocyte membranes and lipid micro-environments on the cell surface known as lipid rafts. It was demonstrated that UVA radiation (320-400 nm) reduces the content of cholesterol in plasma membranes and lipid rafts as a consequence of sphingomyelin hydrolysis and conversion to ceramide. This process means impaired signal transduction and initiation of gene expression responsible for photo-ageing, carcinogenesis and pathological conditions. Cholesterol plays a crucial role for stabilisation of rafts which ideally need a cholesterol to ceramide ratio of > 1. Cholesterol depletion increased the susceptibility of keratinocytes for UVA-induced gene expression, whereas pre-treatment with cholesterol completely abrogated the UVA stress response. Interestingly the cholesterol molecule could be mimicked by plant sterols like campesterol, β-sitosterol and stigmasterol. These major plant sterols can therefore reduce photosensitivity and protect from photo-ageing when applied topically to the human skin[1].

Another symptom for skin ageing is the loss of dermal collagen fibres linked to wrinkle formation. The mechanism behind this is widely elucidated and explained by proteolytic collagen degradation due to matrix metalloproteinases MMPs and by reduced de-novo collagen synthesis based on down regulation of the genes COL1A1 and COL1A2. These events are initiated by UVA and UVB radiation and other environmental stimuli. Cell based in-vitro assays proved that treatment of human keratinocytes with phytosterols was able to inhibit MMP expression.

A recent study with 10 volunteers could now demonstrate the in-vivo relevance of these findings. The skin of the people tested was treated once daily with base cream, base cream plus vitamins, base cream plus phytosterols and ceramides and base cream plus vitamins, phytosterols and ceramides. After 10 days the corresponding skin areas were irradiated with 100 J/cm2 UVA. Subsequent evaluation showed that all four preparations were able to inhibit UV induced up-regulation of MMP-1 but only the phytosterol containing products were able to act against UV induced down regulation of COL1A1 and COL1A2 genes. Topical application of phytosterols can therefore delay the decline of collagen fibres and prevent skin ageing[2].

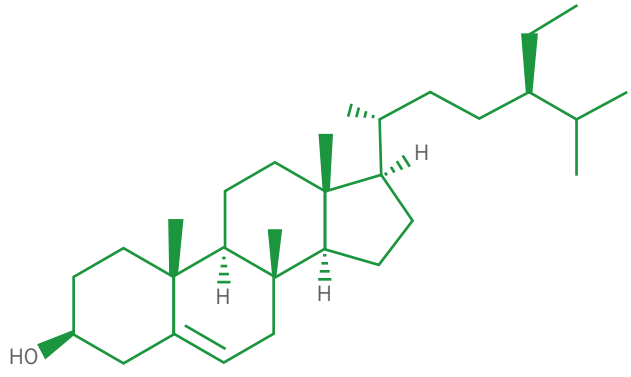

Figure 1 β-sitosterol, the main phytosterol component

Another study investigated the effect of apple seed phytosterols on age-related structural and functional skin parameters by different techniques. Again positive findings were noted on