Retinyl palmitate for high level efficacy when combined with 10-hydroxy stearic acid

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Research and Development

Meet Dr Dominik Imfeld at IFSCC

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Poster session: **Delivering on Efficacy**

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Abstract

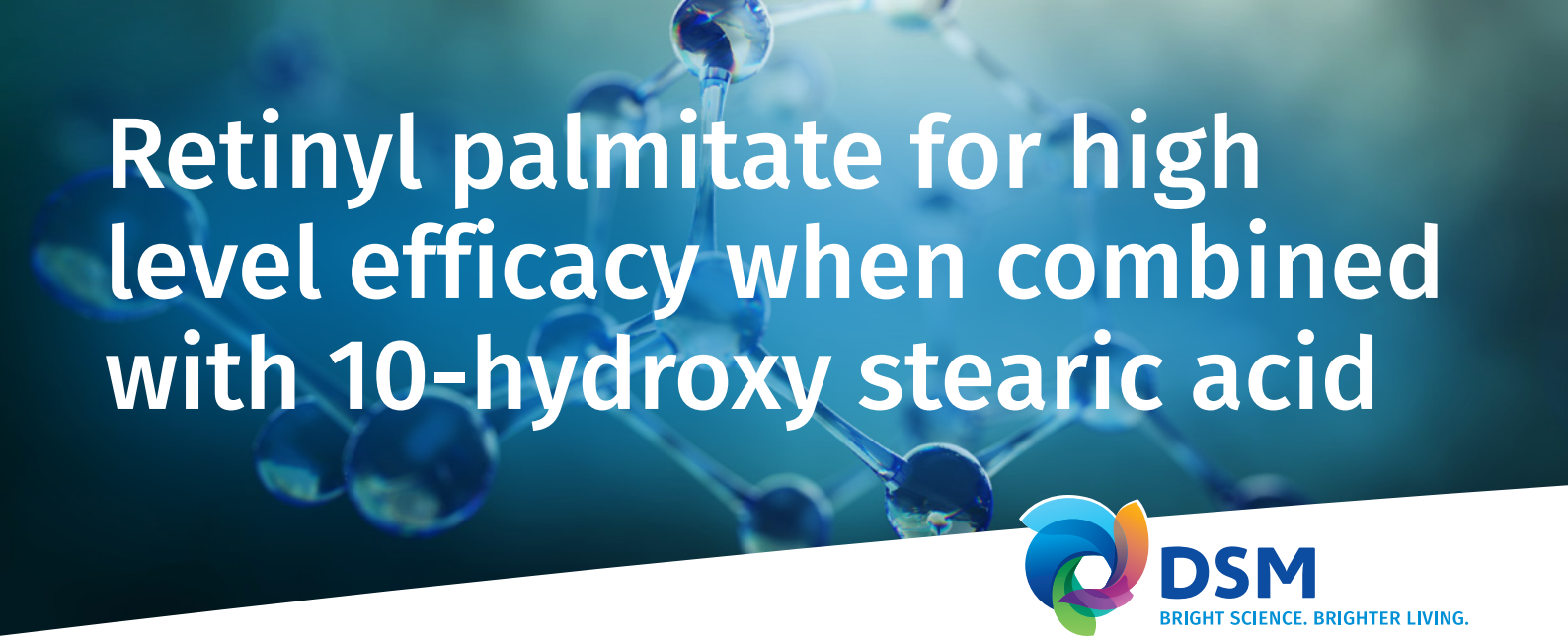
Skin aging is a global concern that is becoming even more important with a growing population living in higher prosperity. Retinol is generally recognized as a gold-standard skin care ingredient in terms of anti-aging activity, but it has its limits for the use level and stability in formulation. However, besides retinol various retinyl esters are also very popular and widely used and in certain settings retinyl esters tend to have a higher stability than retinol.

The first aim of this work was to assess several retinyl esters on their potential anti-aging efficacy and the second aim was to assess its potential synergistic effect when combined with 10-hydroxstearic acid (10-HSA).

We used a test system on *ex vivo* human skin (45- and 49-year old female donors) with application of the test compounds to the skin surface to simulate final use of active cosmetic treatment and the antiaging response was assessed by quantification of collagen I or III in the dermis after histologic immunostaining.

Immunostaining in the papillary dermis was quantified and normalized to the control (100%) after 6 days of treatment. We obtained a dose dependent increase of collagen induction and at 0.73% retinyl palmitate (RP) was at 144% and best performing candidate of the tested retinyl esters. In another study the potential stimulation of RP on collagen III production was assessed and compared to retinol. After 6 days of incubation RP at 0.5% strongly stimulated the level of collagen III to 248% compared to solvent treated control (100%) and was slightly better than retinol at 0.1% with 213% response.

RP in nature is widely present in living organisms. It is the palmitic ester form of retinol and as such an inactive precursor of retinol. It is also widely present in skin as storage form. However once RP is applied topically on skin, conversion to retinol is expected to happen, however the efficiency and the mechanisms of conversion via microbial or skin derived enzymes was not yet clearly known. Indeed, with our results we can suggest that most probably RP



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doesn't stay inactive on skin and to some extent is converted by retinyl ester hydrolase to retinol. However, we believe due to this additional metabolic step we showed the need to use RP at 3 to 5 times higher concentration than retinol to achieve similar efficacy.

Previously we discovered the PPAR agonist 10-HSA and showed on various *in vitro*, *ex vivo* and *in vivo* study also anti-aging benefits on skin for example stimulation of collagen synthesis, reducing the size of pores on facial skin and reducing the visibility of age spots.

We then published (at IFSCC 2020) that we can further boost the efficacy of retinol when combined with 10-HSA which is a peroxisomal proliferator activated receptor (PPAR)-alpha agonist. When we applied the two ingredients *ex vivo* on human skin, we obtained a synergistic response on collagen III synthesis to a level that was more than doubling the sum of the individual ingredients. On biochemical level the synergistic effect could in fact be expected since activated PPARα is partnering with RXR to amplify retinoic derived gene expression response.

In these studies, we now showed that the combination of RP (0.5%) with 10-HSA (0.1%) also worked out very well and the combination induced collagen III synthesis. The combination reached almost an additive level compared to the single ingredients (10-HSA +72%, RP +149%, combination +192%). Further studies are needed to test different concentrations and ratios to determine synergy.

In contrast to data reported by others we show RP to be a very valid candidate for anti-aging treatments and to even deliver higher level of performance when combined with 10-HSA.

Keywords: retinyl palmitate, retinol, 10-hydroxystearic acid, PPAR-alpha agonist

Brief summary

With this publication we show that retinyl palmitate is a very valid alternative to retinol.

Retinyl palmitate is an ester derivative of retinol and with this it is more stable and causes less irritation than retinol. However as a precursor it needs to be metabolized by skin to become active.

We showed that skin indeed is converting retinyl palmitate to the active form to execute the great anti aging effects known for retinol. We showed this *ex vivo* on human skin by the stimulation of collagen synthesis. As the molecule first has to be activated in just needs a bit more time and 3 to 5 times higher concentration than retinol.

In addition we also showed that the benefits of retinyl palmitate can be further boosted in combination with Beauactive, as we showed it previously on the synergy together with retinol.

For those that are shy of using retinol they can take retinyl palmitate to get similar benefits with potentially less issues of irritation and at higher stability.