

Neryl acetate, the major component of Corsican *Helichrysum italicum* essential oil mediates its activity

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Introduction

Helichrysum italicum essential oil (HIEO) is obtained from the hydrodistillation of aerial parts [1] and its composition is known to depend on the geographical area of collection [2, 3]. Corsican oils are rich in neryl acetate, α -pinene and γ -curcumene.

Neryl acetate is an acetate ester resulting from the formal condensation of the hydroxy group of nerol with the carboxy group of acetic acid. This volatile metabolite of the plant participates to its fragrance, but no biological activity of neryl acetate is described.

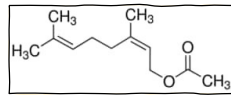
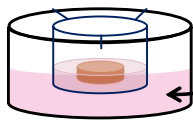
During aging, the skin barrier function is reduced and the composition of the cornified envelop changes dramatically due to altered gene coding expression patterns for their major components. There is also an overall reduction in stratum corneum lipids and a disturbance in cholesterol and fatty acid synthesis. Cer[EOS] is significantly reduced in seniors (>50 years) compared to younger individuals (20-40 years). Consequently, there is also evidence of altered permeability barrier to chemical substances and increased transepidermal water flux in aged skin [4].

We previously demonstrated that 24-hour treatment with Corsican HIEO upregulates genes involved in the epidermal differentiation complex (IVL, SPRRs, LCEs, S100-family) in skin explants [5].

Neryl acetate as a part component of HIEO was tested on skin explants for 24 hours and 5 days and its activity compared to that of the HIEO containing it.

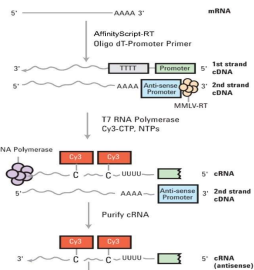
Materials & Methods :

Skin explant treatment

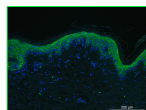


HIEO 0.1%

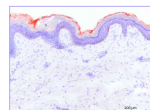
24h after treatment



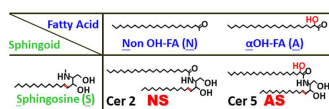
5 days after treatment



Involucrine immunofluorescence

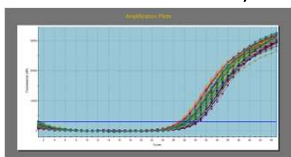


Lipid staining by Oil Red O Solution



Ceramides analysis by LC/MS

Transcriptomic analysis
SurePrint G3 Human Gene Expression
8x60K v2 Microarray



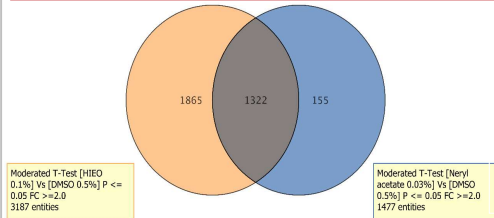
QPCR analysis

References

- [1] Antunes Viegas D et al. (2014) *Helichrysum italicum*: from traditional use to scientific data. J Ethnopharmacol 151:54-65.
- [2] Leonardi M et al. (2013) Essential-oil composition of *Helichrysum italicum* (Roth) G. Don ssp. italicum from Elba Island (Tuscany, Italy). Chem Biodivers 10:343-355.
- [3] Bianchini A et al. (2001) Composition of *Helichrysum italicum* (Roth) G. Don fil. subsp. italicum essential oils from Corsica (France). Flav Fragrance J 16:30-34.
- [4] Brown BE et al. (1995) The aged epidermal permeability barrier. Structural, functional, and lipid biochemical abnormalities in humans and a senescent murine model. J Clin Invest 95:2281-2290.
- [5] Lemaire G et al. (2016) Geographical link to efficiency of *Helichrysum italicum*. Personal Care Magazine. 2:23-25.

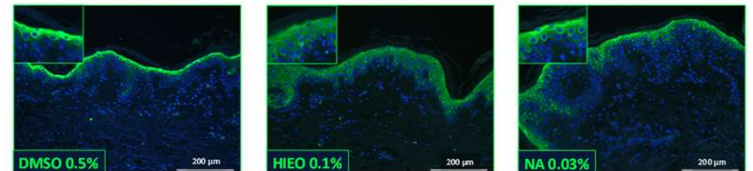
Results & Discussion

HIEO and neryl acetate share 1,322 regulated transcripts



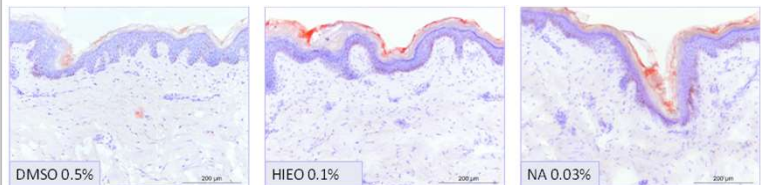
- 41.5% of HIEO-modulated genes are regulated by **neryl acetate**.
- Those genes are related to skin barrier formation and ceramide synthesis

Neryl acetate increases involucrin protein



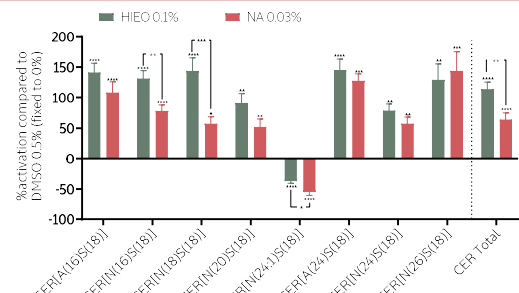
Confocal microscopy observation of involucrin immunostaining at day 5 after application of DMSO 0.5%, HIEO 0.1% or neryl acetate (NA) 0.03%. Scale bare, 200 μ m. Involucrin in green, nuclei in blue

Neryl acetate increases lipids in the epidermis



Skin sections were stained with Oil Red O to detect lipid in the epidermis at day 5 after DMSO 0.5%, neryl acetate (NA) 0.03% or HIEO 0.1% treatment. Optical representative images show the location of dye in the intercellular spaces of the epidermis. Lipids are stained in red. Scale bar, 200 μ m.

Neryl acetate increases ceramides in the epidermis



Ceramides were extracted from epidermis and subjected to LC/MS for determining the levels of each ceramide species. Data are the mean triplicate explants for each donor (n=3) related to DMSO, fixed to 0%. *p<0.05; **p<0.01; ***p<0.001; ****p<0.0001 (One-way Anova with post-hoc Tukey HSD test).

Conclusions

Our results demonstrate that **neryl acetate**, the major component of HIEO, strengthens the skin barrier function by increasing lipid and ceramide content in the stratum corneum through enhancing the expressions of ceramide synthesis-related enzymes required for the glucosylceramide pathway. Furthermore, both compounds increase the epidermal differentiation complex by stimulating the expression of involucrin (transcript and protein).

In addition, we demonstrate for the first time that HIEO-regulated effects in this study are mediated by its principal component, **neryl acetate**. Therefore, we anticipate that **neryl acetate**, the major component of Corsican HIEO, may be effective in improving skin barrier function and moisture retention in age-associated skin conditions.