The 9th International Electronic Conference on Medicinal Chemistry (ECMC 2023)

01–30 November 2023 | Online

One the path to innovative nanotechnological formulations for skin diseases associated with barrier impairment

Chaired by **Dr. Alfredo Berzal-Herranz** and **Prof. Dr. Maria Emília Sousa**

pharmaceuticals MDPI

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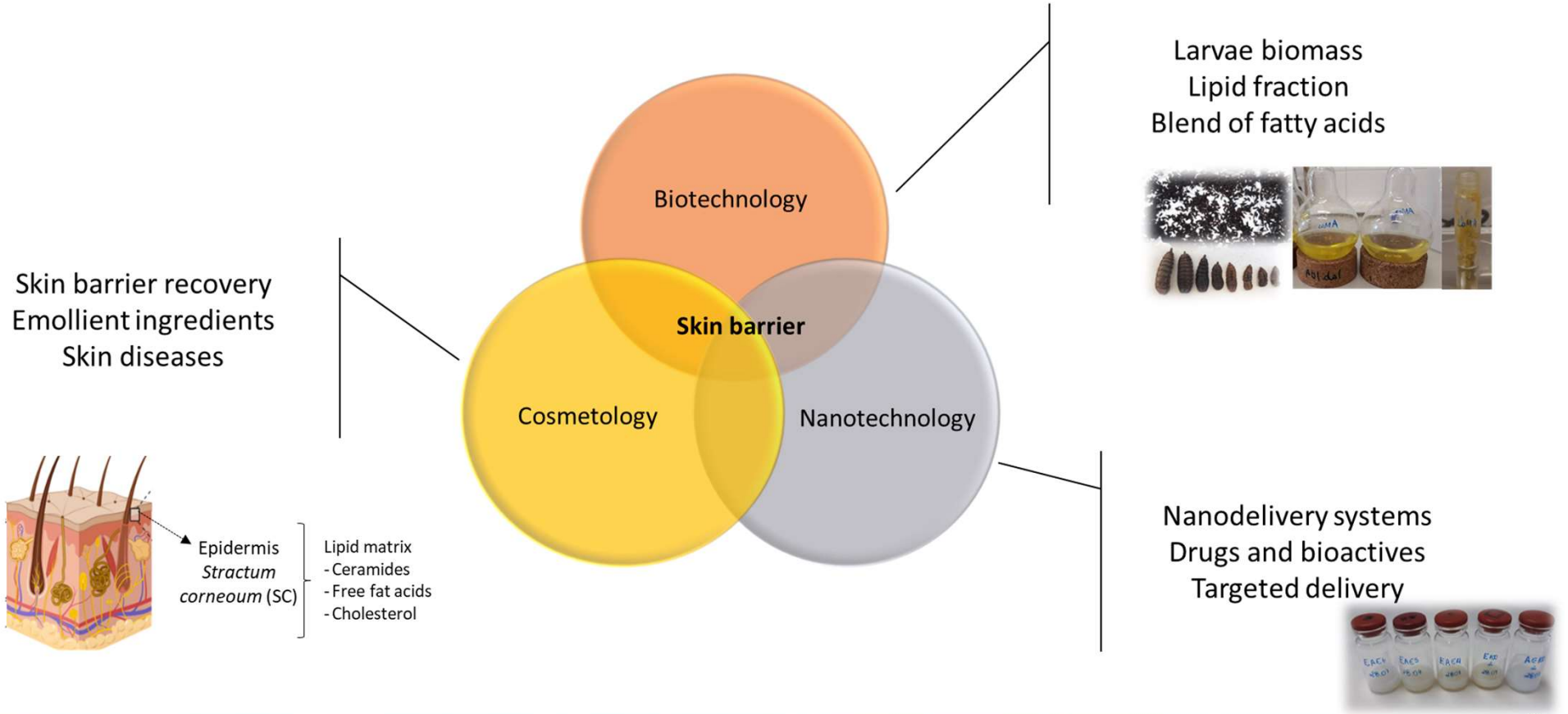
One the path to innovative nanotechnological formulations for skin diseases associated with barrier impairment



Black soldier fly (BSF) larvae biomass can be viewed as an innovative source of compounds with high aggregate value and marketing potential due to the sustainable organic matter bioconversion process used as a substrate for its development. The larvae lipid fraction seems particularly promising as a source of added-value lipids for the pharmaceutical and cosmetic industries, mainly due to its blend of mono and polyunsaturated fatty acids (FA). Dysfunctions in the cutaneous barrier are behind many pathologies, resulting in clinical manifestations such as inflammatory processes. Some of these disorders are related to alterations or depletion of the SC lipidic matrix. The lipid fraction of BSF larvae biomass can be foreseen to provide barrier recovery and emollient ingredients for topical formulations due to good biocompatibility that is expected for this raw material, since FA are critical in skin barrier function. Different methods of extraction were then tested and, in general, the lauric acid was prevalent in all extractions, followed by the palmitic, linoleic, and oleic acids. Nanotechnology has provided promising and advanced tools for the delivery of drugs and actives for topical application in the context of skin diseases with barrier impairment. Lipid-based, polymeric and hybrid nanoparticles have been explored to load glucocorticoids for topical application in the management of these skin conditions. Moreover, lipid-based and polymeric nanosystems have been explored to provide ceramides by topical application, reinforcing the skin barrier. In this context, multifunctional nano-based formulations joining FA, ceramides and glucocorticoids may bode well for the future of managing skin diseases with barrier impairment.

Keywords: Lipid extract; Nanotechnology; Skin barrier impairment.

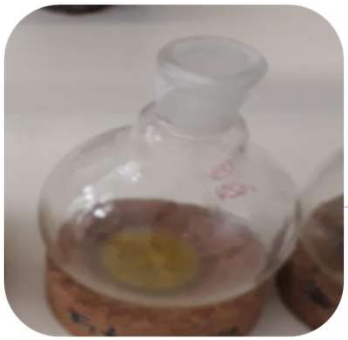
Introduction

nanomaterials
MDPI

Review

Nanodelivery Strategies for Skin Diseases with Barrier Impairment: Focusing on Ceramides and Glucocorticoids

Cíntia Almeida [1], Patrícia Filipe [1], Catarina Rosado [1,*,†] and Catarina Pereira-Leite [1,2,*,†]



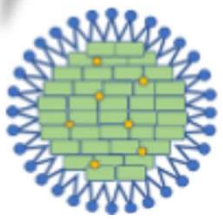
Larvae biomass → Extractions → Lipid Fraction

Main fatty acids
- Lauric acid (C12:0)
- Palmitic acid (C16:0)
- Linoleic acid (C18:2)
- Oleic acid (C18:1n-9)

This blend of fatty acids can be further explored for its potential applicability as a cosmetic ingredient, since a good skin biocompatibility is foreseen and several FA are already known for their positive effects in the skin

Nanodelivery Systems

Biovectorization
Bioavailability
Biodegradability



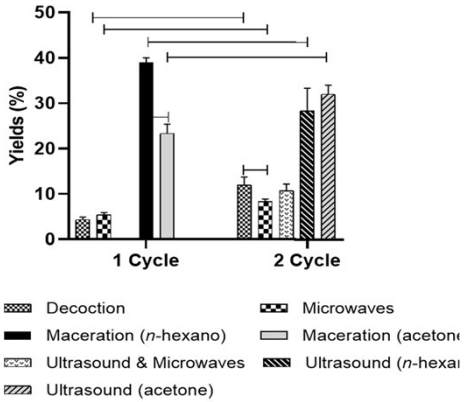
Solid lipid nanoparticles development

Nanoformulations

Results and discussion

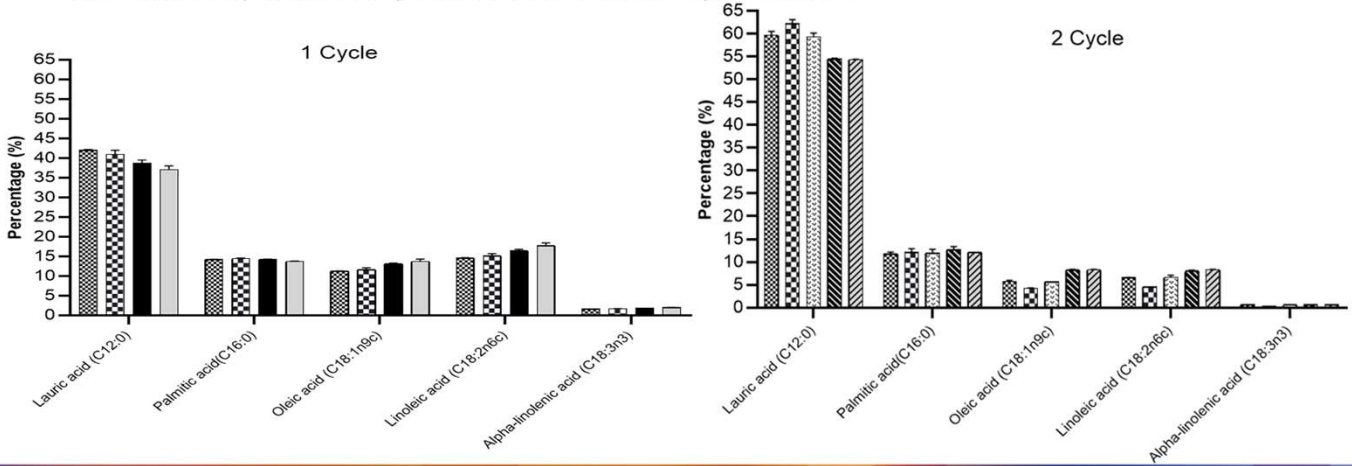

Contents lists available at ScienceDirect
Heliyon
journal homepage: www.cell.com/heliyon
Research article
Characterization of lipid extracts from the *Hermetia illucens* larvae and their bioactivities for potential use as pharmaceutical and cosmetic ingredients
Cíntia Almeida [a,b], Daniel Murta [c,d,e], Rui Nunes [c], André Rolim Baby [f], Ângela Fernandes [g], Lillian Barros [g], Patrícia Rijo [a,*,1], Catarina Rosado [a,1]

➢ Yields of extraction methods



The aqueous extraction provided slightly higher concentrations of lauric acid and PUFA, which have a great potential in skincare cosmetics, despite having low yields when compared to those obtained using organic solvents (4% from decoction against 39% using hexane).

➢ The main fatty acids composition in BSF larvae lipid extracts

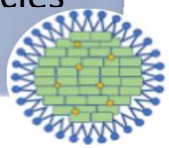


Higher concentrations of lauric acid were achieved and this fatty acid amounted to 41% to 62% of the extract.

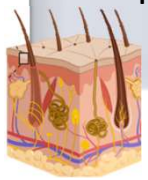
Conclusions

Promising and innovative biomaterial. Sustainable, natural and versatile raw material.

The SLN made of crude lipid extract from BSFL can be a promising strategy for nanoparticles development for drug encapsulation.



Its lipid content can have an emollient effect promoting skin barrier recovery.



The development of lipid nanoparticles made up of BSFL extract may be a good strategy for the treatment of diseases related to the impairment skin barrier, such as Atopic Dermatitis.

Acknowledgments

Thank You!

This research was funded by FCT - Foundation for Science and Technology, I.P. under the UIDB/04567/2020, UIDP/04567/2020 and EXPL/BTM-MAT/0112/2021 projects attributed to CBIOS, and UIDB/00690/2020 to CIMO as well as for the research grant attributed to C.A. (UI/BD/151423/2021). National funding by FCT, P.I., through the institutional scientific employment program-contract for the contracts of A. Fernandes and L. Barros. Additionally, the authors would like to acknowledge funding of the projects ENTOVALOR (POCI-01-0247-FEDER294 017675/ 2016–2019) and NETA (POCI-01-0247-046959).