

How does the sebum oily layer interact with epidermal lipids?

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Abstract

The skin is the largest organ of the human body and anatomically one of the most heterogeneous. Acting as the first barrier against foreign pathogen invasion and water loss, skin must have a very low permeability to foreign molecule penetration (1). The outermost layer of skin, stratum corneum (SC) has specific properties within its lipid matrix to ensure this low permeability (2).

To understand transdermal transport, atomistic molecular dynamic simulations of meaningful approximations of the biological composition and structure of the SC have been performed, giving an insight into the structural and mechanical properties of the SC bilayer. Additionally, an oily layer in contact with the bilayer has been added to replicate the natural state of skin - covered by the physiological sebum. Most of lipids presented in the total extractable epidermal surface are in fact of sebaceous origin, with an insignificant fraction represented lipids with epidermal origin (3).

This work shows how structural and mechanical properties of the SC lipid matrix are affected by the surrounding sebum oily layer to give an insight into the capacity of nano-objects, small molecules or pathogen agents to penetrate through a more realistic skin barrier, in order to design a non-invasive, patient-friendly option for drug delivery.

References

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