Development of repair therapy for skin barrier function by product lipids of novel lipase

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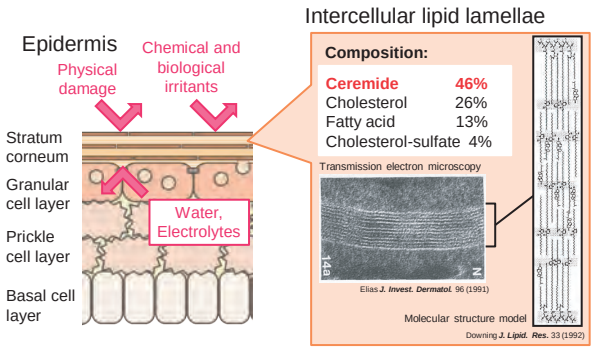
Project Outline

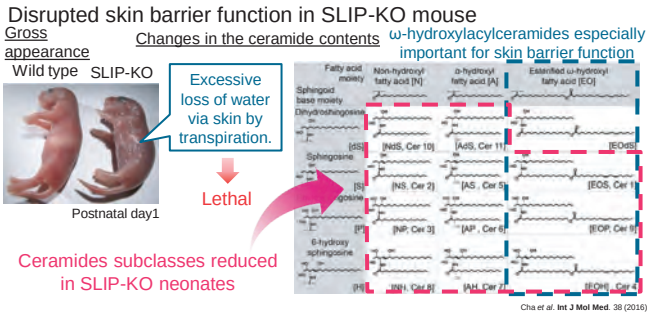
Skin barrier function and ceramides

Intercellular space of stratum corneum, which locates at the outermost layer of the epidermis in skin, is filled with lamellar structures of lipids mainly composed of ceramides. This intercellular lipid lamellae is essential for the "Skin barrier function" to protect our body from physical damage, chemical and biological irritation, and dissipation of water and electrolytes.



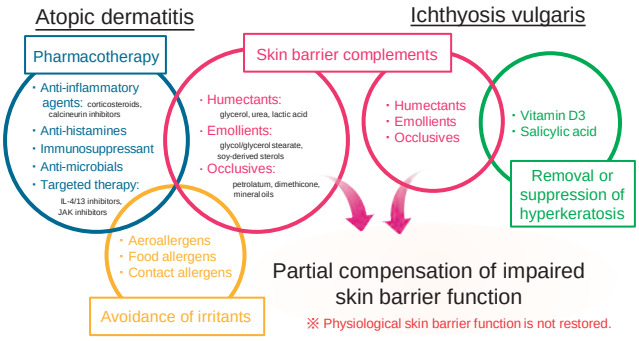
Novel lipase-like protein SLIP, an essential factor for skin barrier function

Gene knockout of SLIP (Skin-specific lipase-like protein), a novel lipase specifically expressed in epidermis, causes disruption of the skin barrier function and death shortly after birth due to excessive water evaporation in mouse. In the stratum corneum of SLIP-KO mice, the lipid lamellar structure becomes unclear, and the permeability of water and macromolecules is enhanced. Ceramides in a wide range of subclasses are reduced considerably.



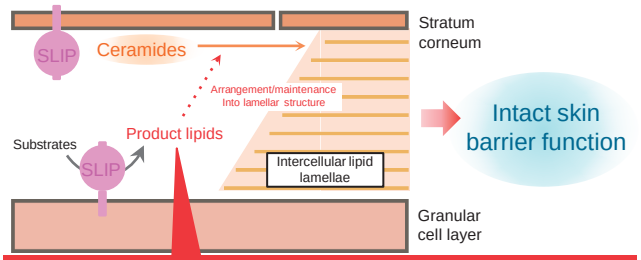
Current therapeutic approaches to pathologically impaired skin barrier function

In diseases such as atopic dermatitis and ichthyosis, the skin barrier function is disrupted due to abnormalities in the homeostasis of ceramides in epidermis. Topical agents containing humectants, emollients, and occlusives are widely used to compensate for the impaired skin barrier function. However, these treatments do not restore the physiological skin barrier function.



Drug discovery for novel skin barrier repair therapy

SLIP is a putative transmembrane protein presenting its lipase domain extracellularly in cell layers including stratum corneum. We are aiming to identify product lipid molecules of SLIP, which are expected to have a function of arranging or maintaining ceramides in the lamellar structure, and to develop a novel repair therapy for skin barrier function.



Product lipids of SLIP are expected to restore the pathologically disrupted skin barrier function in atopic dermatitis and ichthyosis by recovery of the ceramide homeostasis in intercellular lipid lamellae.

Target diseases: Impaired skin barrier function (Atopic dermatitis, ichthyosis vulgaris, etc.)
Patent information: Not applied
Technical features: Unique treatment that restores the physiological skin barrier function
Marketability: Atopic dermatitis – prevalence rate is up to a few percent of the population in worldwide
Ichthyosis vulgaris – prevalence rate is 1 patient in 250 to 300 person.
Challenges in development: Cost for identification of product lipids, Acquisition of non-clinical POC in disease models
Proposal for collaboration: Joint research and development-lipidomics analysis, disease models