Bioactive lipids supporting the functionality of the epidermal barrier

S-03.4-1

A. Nicolaou[I]

[I]The University of Manchester, Oxford Road, M13 9PT, Manchester, United Kingdom

The skin presents a multifaceted barrier that protects the body from external threats including exposure to ultraviolet radiation, pathogens and chemicals, regulates temperature and prevents excessive water loss. To support these diverse activities, skin relies upon a vast array of lipids that contribute to the structure and function of the permeability barrier, as well as the related chemical, microbiological and immunological barriers. The epidermal physical barrier is dependent on a specific mixture of free fatty acids, cholesterol and ceramides, which form intercellular lipid lamellae in the stratum corneum. Sebum- and keratinocyte-derived acylglycerols, fatty acids and oxylipins cover the skin's surface, contributing to the acid mantle, and supporting and regulating the skin microbiome. Fatty acid-derived lipid mediators comprising eicosanoids, octadecanoids and endocannabinoids, and various sphingolipids, drive cutaneous processes, immune reactions, skin inflammation and its resolution. These bioactive lipids are not only necessary for maintaining homeostasis in healthy skin, but are also implicated in many cutaneous diseases, systemic conditions with cutaneous involvement, and natural processes including ageing. As the long chain polyunsaturated fatty acids (PUFA) that are important for the epidermal barrier homeostasis are provided systemically, nutritional supplementation has been explored as a means of supporting the cutaneous lipid microenvironment. PUFA have also been considered as potent nutritional supplements with anti-inflammatory activities, important for reducing cutaneous inflammation and, potentially, facilitating its efficient and timely resolution.