It would seem that information derived from ultrastructural studies on skin barrier has reached a plateau, and that no more useful insights can be gathered from this line of investigation.

This is because the Ruthenium tetroxide technique has been used extensively, and nearly all the alterations in barrier lipid structures in skin diseases have already been characterized. However, I would argue that this is not the case, and that examining some of exotic / rare models, as well as employing more recent developments in ultrastructural research could be very fruitful in advancing our understanding of the skin barrier. Presently I would discuss two rare models that I studied, a bird that creates a “toxic mantle” in its skin, and Refsum Disease; a rare inherited human disease, both of which provide clues to a hitherto under-appreciated functions of the epidermal lamellar bodies. Another aspect of the skin barrier relates to morphological basis of the polar route of permeation through the stratum corneum- termed the “pore pathway” based on static two dimensional TEM images. Our (Menon & Elias) proposed model has been criticized as lacking in scientific rigor (Guy). This limitation was overcome by using the Focussed Ion Beam SEM technique, so that a virtual 3 D ultrastructural image of the pore-pathway was obtained, using skin samples permeated with an aqueous dispersion of Quantum dots as tracer, and aided by low frequency sonophoresis. These virtual 3D images show the continuity in tracer distribution between the lacunar domains. Additionally, images of hydrated SC also show the highly expanded “lacunae” that appear to be contiguous.

These results would be shared and discussed, with the aim of dispelling the notion that ultrastructural investigations have reached its limits of usefulness in skin barrier research.
Profile

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