

never exceeded 150 mg/(cm²/hr). Whereas petroleum ether removed large quantities of nonpolar lipids, it left the polar species in place. In contrast, acetone treatment caused profound barrier defects, as more and more lipid was removed. Moreover, whereas petroleum ether removed only nonpolar lipids, acetone removed a much larger proportion of polar species. These experiments show (1) a linear relationship between lipid content and barrier function; (2) that nonpolar lipids, in the absence of sphingolipids, provide a "first-line" of barrier function; and (3) that relatively polar lipids appear to provide a more profound level of barrier integrity and cohesion.

V. CLINICAL AND PATHOPHYSIOLOGIC IMPLICATIONS OF THE TWO-COMPARTMENT MODEL

The two-compartment model of the stratum corneum has stood the test of several predictions. First, in situations for which barrier function is defective, such as in essential fatty acid deficiency, there is a demonstrable abnormality in the lamellar body secretory system that leads to inadequate intercellular lipid deposition in the stratum corneum (46; Table 7). Moreover, lipophilic substances appear to traverse intercellular, rather than transcellular, routes in passing across the stratum corneum (47), consistent with sequestration of lipids to intercellular domains. There is also evidence that quantitative differences in lipid content are more accurate predictors of regional variations in skin permeability than either stratum corneum thickness or cell number (Table 8), that is, neither the thickness nor the number of cell layers in the stratum corneum correlate with permeability (48). These findings explain both the observation that lipophilic agents, such as topical steroids, readily traverse facial stratum corneum (10%–20% lipid by weight) and the poor barrier properties of the palm and sole stratum corneum, (1%–2% lipid by weight). This model also may explain why *eczema* occurs most read-

Table 2.7 Importance of Stratum Corneum Lipids for Barrier

Solvents and detergents destroy barrier while extracting lipids.

Barrier properties of different skin sites (face, leg, abdomen, palms) is related directly to lipid content.

In pathological conditions in which the barrier is defective, there is a decrease in lipid content (e.g., essential fatty acid deficiency).
