

TABLE 5.3
In Vivo Percutaneous Absorption of *p*-Nitroaniline in the Rhesus Monkey Following 30 Minutes Exposure to Surface Water: Comparisons to In Vitro Binding and Absorption

Phenomenon	Percent Dose Absorbed/Bound ^a
In vivo percutaneous absorption, rhesus monkey	4.1 ± 2.3
In vitro percutaneous absorption, human skin	5.2 ± 1.6
In vitro binding, powdered human stratum corneum	2.5 ± 1.1

^a Each number represents the mean ± SD of four samples.

and the 2.5% and 1.1% bound to PHSC. Wester et al. (10) suggest that this methodology—the systems tested, binding to PHSC, and in vitro and in vivo absorption—can be used to predict the burden on the human body imposed by bathing or swimming.

5.5 PHSC AND THE SKIN BARRIER FUNCTION

The barrier function of the SC is attributed to its multilayered wall-like structure, in which terminally differentiated keratin-rich epidermal cells (corneocytes) are embedded in an intercellular lipid-rich matrix. Any physical factor or chemical reagent that interacts with this two-compartment structure can affect the skin barrier function. Barry (6) described how certain compounds and mechanical trauma can easily dissociate callus cells and readily dissolve their membranes. Thus the amount of protein (keratin) released from the SC after chemical exposure may be a measure of the solvent potential of the chemical. To evaluate this hypothesis, a test chemical in water is mixed with PHSC and incubated. After a predetermined period, a solution is separated from the PHSC by centrifugation. The protein (keratin) content of the solution is then measured. Table 5.4 shows the amount of protein released from the PHSC after incubation with glycolic acid, sodium hydroxide, or water alone at different time points. Sodium hydroxide has a pronounced ability to release protein from PHSC. This ability increases with increasing incubation time. The results suggest that the PHSC model constitutes a vehicle to probe the barrier nature of the stratum corneum and the chemical interactions with the PHSC.

TABLE 5.4
Protein Releasing from PHSC Following Chemical/Water Exposure

Test Chemicals	Protein Content (mg/4mL) ^a		
	10 min	40 min	24 hr
Glycolic acid	0.093 (0.026)	0.175 (0.029)	0.173 (0.041)
Sodium hydroxide	0.419 (0.054)	0.739 (0.301)	5.148 (1.692)
Water	0.002 (0.014)	0.135 (0.043)	0.077 (0.021)

^a Each number represents the mean (SD) of six samples.