

TABLE 15.7
Accountability of Applied Dose^a in Protected Studies Using
Ventilated Plastic Chambers

	Absorbed	Removed from Skin (%)	Total % Accounted For
Hydrocortisone	4 ± 2	85 ± 6	89 ± 6
Estradiol	3 ± 1	96 ± 1	100 ± 1
Testosterone	18 ± 9	77 ± 8	96 ± 2
Progesterone	13 ± 6	82 ± 7	96 ± 3

Source: Data from References 11 and 24.

^a Single 4- $\mu\text{g}/\text{cm}^2$ dose with a 24-hour exposure prior to soap and water washing; penetration corrected for incomplete renal elimination.

($p < 0.01$) of the steroids. These results were in excellent agreement with the comparable nonprotected studies described earlier. As stated before, excellent dose accountability was reported (Table 15.7).

To investigate the apparent discrepancy between the effect of plastic wrap occlusion (12) and that of the plastic chamber on hydrocortisone absorption (13), we repeated the measurements of penetration using plastic wrap (Saran Wrap) with the experimental protocol of Guy et al. (13). Under these circumstances, we found no difference between plastic wrap and plastic chamber occlusion on the percutaneous absorption of hydrocortisone (Table 15.8).

15.5 PERCUTANEOUS ABSORPTION OF PHENOLS IN HUMANS

We subsequently investigated the effect of occlusion on the *in vivo* percutaneous absorption of phenols following single-dose application. The occlusive and protective chamber methodology described by Bucks et al. (24, 25) was utilized. Nine ¹⁴C-ring-labeled *para*-substituted phenols (4-aminophenol, 4-acetamidophenol, 4-propionylamidophenol, phenol, 4-cyanophenol, 4-nitrophenol, 4-iodophenol, 4-heptyloxyphenol, and 4-pentyloxyphenol) were used. As in the earlier steroid studies, the site of application was the ventral forearm of male volunteers and the area of application was 2.5 cm². Penetrants were applied in 20 μL ethanol (95%). The chemical dose was 2 to 4 $\mu\text{g}/\text{cm}^2$. After vehicle evaporation, the application site was covered with either an occlusive or protective device. After 24 hours, the patch was removed and the site washed with a standardized procedure (22). The application site was then recovered with a new chamber of the same type. Urine was collected for seven days. On the seventh day, (1) the second chamber was removed, (2) the dosing site was washed with the same procedure, and (3) the upper layers of stratum corneum from the

TABLE 15.8
Percutaneous Absorption of Hydrocortisone in Humans

	Plastic Dose Absorbed ^a
Plastic wrap occlusion	4.7 ± 2.1
Plastic chamber occlusion	4.0 ± 2.4
“Protected” condition	4.4 ± 1.7

Source: Adapted from Reference 43.

^a Single 4- $\mu\text{g}/\text{cm}^2$ dose with a 24-hour exposure prior to soap and water washing; penetration corrected for incomplete renal elimination.