The time of the follow-up application and the extent of the enhancement will govern the presence of a reservoir effect. Desquamation will only affect the reservoir effect when the penetration rate of the solute is very slow. The reservoir effect is also important in dermal exposure risk assessments.

ACKNOWLEDGMENT

This work was supported by the Australian National Health and Medical Research Council and the Lions Medical Research Foundation. We are grateful to Professor Annette Bunge and Dr. Micaela Reddy for providing us with the material for Figure 4.10. This chapter is an update of our recently published review (54).

REFERENCES

1. Vickers CF. Stratum corneum reservoir for drugs. Adv Biol Skin 1972; 12:177–189.
2. Guillot M. Physiochemical conditions of cutaneous absorption. J Physiol 1954; 46:31–49.
3. Schaefer H, Stuttgen G, Zesch A, Schalla W, Gazith J. Quantitative determination of percutaneous absorption of radiolabeled drugs in vitro and in vivo by human skin. Curr Probl Dermatol 1978; 7:80–94.
4. Malkinson FD, Ferguson EH. Percutaneous absorption of hydrocortisone-4-C14 in two human subjects. J Invest Dermatol 1955; 25:281–283.
5. Sulzberger MB, Hermann F. On some characteristics and biological functions of the skin surface. Dermatologica (Basel) 1961; 123:1–23.
6. Vickers CFH. Existence of reservoir in the stratum corneum—experimental proof. Arch Dermatol 1963; 88:20–33.
7. Roberts MS, Anissimov Y, Gonsalvez R. Mathematical models in percutaneous absorption. In: Bronaugh RL, Maibach HI, eds. Percutaneous Absorption: Drugs Cosmetics Mechanisms Methodology. 3rd ed. New York: Marcel Dekker, 1999:3–55.
8. Carr RD, Wieland RG. Corticosteroid reservoir in the stratum corneum. Arch Dermatol 1966; 94:81–84.
9. Zesch A, Schaefer H, Hoffmann W. Barrier and reservoir function of individual areas of the horny layers of human skin for locally administered drugs. Arch Derm Forsch 1973; 246:103–107.
10. Roberts MS, Walker M. Water—the most natural penetration enhancer. In: Walters KA, Hadgraft J, eds. Skin Penetration Enhancement. New York: Marcel Dekker, 1993: 1–30.
11. Barry BW, Woodford R. Comparative bio-availability and activity of proprietary topical corticosteroid preparations: vasoconstrictor assays on thirty-one ointments. Br J Dermatol 1975; 93:563–571.
12. Anderson BD, Higuchi WI, Raykar PV. Heterogeneity effects on permeability—partition coefficients in human stratum corneum. Pharm Res 1988; 5:566–573.
13. Neelissen JA, Arth C, Wolff M, Schrijvers AH, Junginger HE, Bodde HE. Visualization of percutaneous 3H-estradiol and 3H-norethindrone acetate transport across human epidermis as a function of time. Acta Derm Venereol Suppl (Stockh) 2000; 208:36–43.
14. Siddiqui O, Roberts MS, Polack AE. Percutaneous absorption of steroids: relative contributions of epidermal penetration and dermal clearance. J Pharmacokin Biopharm 1989; 17:405–424.
15. Anissimov Y, Roberts MS. Diffusion modeling of percutaneous absorption kinetics. 1. Effects of flow rate, receptor sampling rate, and viable epidermal resistance for a constant donor concentration. J Pharm Sci 1999; 88:1201–1209.
16. Rougier A, Dupuis D, Lotte C, Roguet R, Schaefer H. In vivo correlation between stratum corneum reservoir function and percutaneous absorption. J Invest Dermatol 1983; 81:275–278.
17. Dupuis D, Rougier A, Roguet R, Lotte C, Kalopissis G. In vivo relationship between horny layer reservoir effect and percutaneous absorption in human and rat. J Invest Dermatol 1984; 82:353–356.
18. Rougier A, Dupuis D, Lotte C, Roguet R, Wester RC, Maibach HI. Regional variation in percutaneous absorption in man: measurement by the stripping method. Arch Dermatol Res 1986; 278:465–469.
19. Dupuis D, Rougier A, Roguet R, Lotte C. The measurement of the stratum corneum reservoir: a simple method to predict the influence of vehicles on in vivo percutaneous absorption. Br J Dermatol 1986; 115:233–238.
20. Stokes RP, Diffey BL. The water resistance of sunscreen and day-care products. Br J Dermatol 1999; 140:259–263.
21. Wester RC, Maibach HI, Bucks DA, Sedik L, Melendres J, Liao C, DiZio S. Percutaneous absorption of [14C]DDT and [14C]benzo[a]pyrene from soil. Fundam Appl Toxicol 1990; 15:510–516.