# 14 Effects of Occlusion
## *Percutaneous Absorption*

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### 14.1 INTRODUCTION

Occlusion means the skin covered by tape, gloves, impermeable dressings, or transdermal devices. In healthy skin, the stratum corneum typically has a water content of 10% to 20% and provides a relatively efficient barrier against percutaneous absorption of exogenous substances (1). Skin occlusion can increase stratum corneum hydration, and hence influence percutaneous absorption by altering partitioning between the surface chemical and the skin due to the increasing presence of water, swelling corneocytes, and possibly altering the intercellular lipid-phase organization, also by increasing the skin surface temperature and increasing blood flow (2–4). Occlusion may enhance drug efficacy (5–10). Actually, skin occlusion is a complex event producing profound changes and influencing skin biology as well as wound healing processing (11–27). In general, occlusion can, with exceptions (2, 4, 28, 29), increase percutaneous absorption of topically applied compounds (30–42); even a short time (30 minutes) of occlusion can result in significantly increased penetration and horny layer water content (43). However, the effects of occlusion on absorption may also depend on the anatomic site as well as vehicle and penetrant (32, 37, 44, 45).

As to the nature of the vehicle, i.e., drug delivery system (DDS), the effectiveness of some DDSs, such as deformable liposomes, was attributed, besides to the physicochemical properties of vesicles, to application conditions, i.e., to their open application (nonocclusive application to the skin), as explained by the inventors of ultra-deformable vesicles named Transfersomes (46–48). Certain topical vehicles may also act as "occlusive dressings" if they contain fats or some polymer oils, reducing water loss to the atmosphere. Some nanocarriers may act as occlusive vehicles, such as lipid nanoparticles (solid lipid nanoparticles [SLNs] and nanostructured lipid carriers [NLCs]) (49, 50). These nanocarriers occlude the skin by forming a continuous thin film when the water from the formulation evaporates due to their adhesive properties (49). This occlusion reduces water evaporation