34 Chemical Modification
An Important and Feasible Method for Improving Peptide and Protein Dermal and Transdermal Delivery

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34.1 INTRODUCTION

While peptides and proteins have attracted much attention as therapeutic agents (Bruno et al. 2013), their delivery through almost all administration routes encounters considerable challenges. Routes of administration for peptides and proteins include parenteral, oral, nasal, buccal, ocular, rectal, vaginal, pulmonary, and topical/transdermal pathways (Sanders 1990). Each administration route has advantages and limitations over other routes. Among these routes, paying attention to the skin for the delivery of peptides and proteins is remarkable for the following reasons: avoidance of gastrointestinal degradation and hepatic first-pass effect (some limitations of the oral route) (Bodde et al. 1989; Bruno et al. 2013); increasing patient compliance (Brown et al. 2006; Prausnitz & Langer 2008) (one of the most important limitations of the parenteral route and, to some extent, the rectal route); longer residence time in the case of controlled drug delivery, especially by adhesive systems compared to nasal and pulmonary routes (due to lack of mucociliary clearance) and also buccal, rectal and vaginal routes (because of lower membrane turnover and possibility of detachment); lower proteolytic activity compared to the mucosal routes (Foldvari et al. 1998); and finally the possibility of abrupt termination of drug delivery (Brown et al. 2006). However, in spite of their advantages, it has not been possible to deliver most peptides and proteins through the skin in therapeutic amounts due to the hydrophilic nature