57 Dermal Sampling Techniques with a Focus on Dermal Open Flow Microperfusion

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57.1 INTRODUCTION

Assessment of percutaneous drug penetration is highly relevant for the development of dermal topical drug products, as these drug products aim to penetrate the skin, deliver a therapeutically effective drug concentration, and exert a local effect [1]. However, there is a complex relationship between the applied drug dose and the therapeutically effective drug concentration at the site of action. Dose–response assessment, which requires the availability of pharmacokinetics (PK) profiles, is therefore a key step in drug development. Drug development of topical drugs is particularly fraught with risk, because PK data from the site of topical drug action are difficult to access, and systemic PK data derived from blood samples may not be predictive for topical drugs that exert their therapeutic effect in the skin. To establish relevant PK profiles, knowledge of the effective drug concentrations at the site of action is required, which includes consideration of the amount of effective unbound drug in the target tissue.

Dermal PK can be mapped by sampling and analyzing dermal interstitial fluid (ISF). ISF represents the immediate environment of cells and serves as a transport medium for nutrients, signaling molecules, and for waste products among cells, as well as blood and cells [2–4]. ISF defines the physical and biochemical microenvironment of the cells in several tissues, and its relevance has recently been reassessed [5]. The interstitial space is the largest fluidic compartment of the body [6]