pH of the Skin: Issues and Challenges

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pH of the Skin: Issues and Challenges

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Preface

In the beginning of the 20th century, Søren Peter Lauritz Sørensen defined the concept of expressing acidity as the negative logarithm of the hydrogen ion concentration, which he termed pH. The general usefulness of the pH concept for life science was recognized by Leonor Michaelis (1922). He helped to convince biochemists and later chemists and others of the critical importance of pH to analytical research. In 1928, Heinrich Schade and Alfred Marchionini reported results of their pH measurements from living skin and coined the term "acid mantle" of the skin. After this pioneering work, the number of investigations on pH and its effect on skin has steadily grown to the present day. The physiologic role of an acidic skin surface was originally thought to be a defense mechanism against invading organisms. More recently, it has been demonstrated that several key processes involved in the synthesis and maintenance of a competent skin barrier are also affected by pH and its gradient within the epidermis. And, the significance of the buffer capacity of the skin – defined as resistance to pH changes when acidic or alkaline topicals are applied to the skin – has been recognized. For a number of biochemical processes within the skin, the compartmental pH is crucial, for example, in pigmentation, ion homeostasis, epidermal (stem) cell behavior, and so on. The often existing difference between the H^+ concentration of extra- and intracellular as well as subcellular compartments establishes an ionic, electric, and/or osmotic driving force; hence, H^+ concentration per se acts as an extra-, intra-, and subcellular signaling modality affecting and controlling many cellular functions. One may even consider pH a universal signal and effector. It is therefore also no surprise that skin pH shifts have been observed in various skin pathologies. It is also obvious that the pH in topically applied preparations may play an important role. Optimal pH and buffer capacity within topical preparations may not only support the stability of active ingredients and auxiliary materials but may also increase the absorption of the non-ionized species of an acidic or a basic active ingredient or may even open opportunities to modify and "correct" skin pH and hence accelerate barrier recovery, maintain, or enhance barrier integrity. Further efforts are needed to standardize and improve pH measurements in biological media or pharmaceutical/cosmetic vehicles to increase and ensure quality, comparability, and relevance of research data.

In this volume, we present a unique collection of papers that address past, present, and future issues of the pH of healthy and diseased skin. It is hoped that this collection will foster future efforts in clinical and experimental skin research.

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