Role of the protein deimination during the cornification of epidermal keratinocytes

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Peptidylarginine deiminases (PADs) are a group of enzymes which convert protein arginine residues to citrulline residues in the presence of calcium ion. Enzymatic deimination abolishes positive charges of protein molecules inevitably causing significant alteration in the structure and function of native proteins. In mammalian tissues, PADs are found as four different isoforms (type I, type II, type III and type IV), which differ in specificity for various synthetic substrates and in tissue distribution. We have previously reported that multiple deiminated proteins, composed largely of keratins and filaggrin, which is a keratinocyte terminal differentiation marker synthesize in granular cell layers, were present and localized in the granular and cornified cell layers of the epidermis. The presence of deiminated proteins in such a restricted region of the epidermis strongly suggests that PAD enzyme is involved in the cornification of epidermal keratinocytes.

In this study, we analyzed the localization of deiminated proteins in psoriatic epidermis and atopic epidermis. Immunostaining based on chemical modification of citrulline residues showed that both the psoriatic epidermis and atopic epidermis had no detectable levels of deiminated proteins. On the other hand, immunostaining with polyclonal antibody against filaggrin showed no significant change in psoriatic epidermis and atopic epidermis. These results indicated that the causes of psoriasis vulgaris and atopic dermatitis may be defective in protein deimination.