Desquamation in the Stratum Corneum

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INTRODUCTION

The building blocks of the stratum corneum, the corneocytes, and their intercellular cohesive structures, constitute an important part of the barrier, and they form a backbone for the intercellular barrier lipids.

To maintain a constant thickness of the stratum corneum the desquamation rate and the de novo production of corneocytes is delicately balanced. Using a plantar stratum corneum model we have obtained evidence that proteolysis is a central event in the desquamation process. A number of regulatory mechanisms for desquamation have been postulated based on our findings.

REGULATION OF DESQUAMATION

In order to understand desquamation we will have to identify mechanisms of cell cohesion in the stratum corneum, the structures involved, and the changes these structures undergo as cell cohesion decreases. We must then identify the chemical reactions taking place, which would immediately give us information regarding the nature of the involved enzymes.

ENZYMES INVOLVED IN DESQUAMATION

The best characterised enzyme so far with a proposed function in desquamation is stratum corneum chymotryptic enzyme (SCCE) [6–9]. SCCE has several properties compatible with a role in desquamation in vivo, including pH profile of its catalytic activity, its inhibitor profile, and tissue location. SCCE is produced as an inactive precursor which can be converted to active enzyme by proteolytic modification by trypsin-like enzymes. The mechanisms of SCCE-activation in vivo remains to be elucidated.

The turnover time of the stratum corneum is normally two to four weeks. The mechanisms responsible for a well regulated desquamation may be assumed to be very complex. A central event in desquamation is elimination of corneocyte cohesion. If this took place in the barrier-forming parts of the stratum corneum it would be deleterious. Corneocytes are “dead” in the sense that they have no protein synthesis, which means that they have no active turnover of cell surface structures, and they can not respond to intercellular signalling. Thus, any process within the stratum corneum which leads to structural and functional changes will have to be initiated in one sense or the other by keratinocytes in the viable parts of the epidermis. At the time when the most superficial part of the the stratum granulosum is transformed to the deepest part of the stratum corneum there must be a “programming” of the tissue which allows individual cells to be strongly linked to each other for a certain period of time, after which cell cohesion should decrease to a point where cell shedding can occur.
water content [16, 17] and pH of the stratum corneum [18], and the action of modifying enzymes such as various glycosidases [19].

CONCLUSION

A well regulated desquamation is a prerequisite for the barrier function of the stratum corneum and for a normal skin appearance. In recent years we have learnt some basic facts about stratum corneum cell cohesion and the role of proteolytic enzymes in desquamation. Our knowledge in this area is, however, still very limited. In the near future we may expect to discover a number of hitherto unknown enzymes and enzyme inhibitors involved. We may also expect to learn from studies on hereditary skin diseases with disturbances in the formation and turnover of the stratum corneum. And, of course, studies on the stratum corneum carried out by biophysicists will continue to provide crucial information, not only for the understanding of the barrier properties of the stratum corneum, but also for the understanding of desquamation.

REFERENCES