

Inflammatory Mediators in Transdermal Fluid after Single and Repeated Skin Irritation Induced by Sodium Lauryl Sulfate

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Background. Immunological processes play an important role in irritant contact dermatitis. However, skin *in vivo* levels of cytokines and chemokines, which orchestrate inflammation and repair of the skin, are not well known. Our first objective was to get more insight in levels of inflammatory mediators in response to single and repeated skin irritation obtained by sampling epidermis-derived fluid. Further, we studied the presence of the granulocyte secreted proteins eosinophil cationic protein (ECP) and myeloperoxidase (MPO) as markers of eosinophils and neutrophils, respectively.

Methods. We sampled epidermis-derived fluid using a novel technology (obtained from SpectRx Inc, Norcross, GA, USA) that includes application of a continuous negative pressure on the skin after creation of four micropores in the stratum corneum by a laser beam [1]. In nine healthy volunteers, transdermal fluid was sampled after a single 4-hr 10% sodium lauryl sulfate (SLS) irritation test and after a repeated 3-week irritation test (0.1% SLS). We used a novel multiplex cytokine assay to assess 27 cytokines simultaneously in each sample. We also determined IL-1 α and the granulocyte markers eosinophil cationic protein (ECP) and myeloperoxidase (MPO) by ELISA.

Results. Levels of ECP were increased after both single and repeated SLS exposure and were highly correlated with levels of MPO. We were able to detect 13 out of 28 analysed cytokines. The levels of inflammatory mediators showed large interindividual differences, not only in exposed but also in non-exposed skin. Despite this variation, several mediators showed increased levels: CCL11, CXCL10 and VEGF after both single and repeated exposure, IL-1 α and b-FGF after single exposure and IL-1RA after repeated exposure. A differential response between single and repeated exposed skin was found for CCL5 and the ratio IL-1RA/IL-1 α , both showing a considerable increase after repeated exposure.

Conclusions. We have shown here for the first time the involvement of a wide panel of inflammatory mediators in single and repeated skin irritation *in vivo* by using a novel transdermal fluid sampling technique. The results showed clear differences in cytokine expression between single and repeated skin irritation and revealed high interindividual differences. Transdermal fluid sampling will likely give more insight in the mechanism of skin irritation and may also be useful in studying individual susceptibility to develop chronic irritant contact dermatitis.

Reference

- [1] Gebhart S, Faupel M, Fowler R, Kapsner C, Lincoln D, McGee V, Pasqua J, Steed L, Wangsness M, Xu F, Vanstoy M, Glucose sensing in transdermal body fluid collected under continuous vacuum pressure via micropores in the stratum corneum, *Diabetes Technol Ther*, 5, 159-66 (2003).