Delivery of contact sensitizers and neurokinin 1 receptor antagonists by microneedle arrays targets different skin cells to abrogate contact dermatitis
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Development of contact dermatitis (CD) relays on innate and adaptive immunity that promote the activation of CD4 T helper 1 (Th1) and CD8 T cytotoxic 1 (Tc1) biased cells. Signaling via the neurokinin 1 receptor (NK1R) by the proinflammatory peptides substance P and hemokinin 1, triggers skin neuroinflammation and supports Th1 and Tc1 immunity. Thus, we hypothesized that limiting neuroinflammation during skin Ag entry induces an immune suppressive environment that limits the function of activated T cells that cause CD. Using self-disolving microneedles to deliver Substance P (SP), and NK1R antagonists to the skin of C57/BL6 mice during suppression environment that limits the function of activated T cells that cause CD. Using self-disolving microneedles to deliver Substance P (SP), and NK1R antagonists to the skin of C57/BL6 mice during the development of CD through this developmental trajectory. Using 11-color multi-parametric flow cytometry to distinguish DC progenitors and subsets, we found that IFNγ expression varies during the course of differentiation with IFNγ levels largely dictated by both location and DC maturation status in most sites. Because transcriptome analysis of IFNγ−/− vs WT might revealed differences in molecules associated with antigen processing and presentation, we tested antigen uptake ability in vivo by testing anti-DEC205 antigen capture. Fluorescent anti-DEC205 antibody capture in WT, IFNγ−/−, IFNγ−/−IFNAR−/− and IFNAR−/− mice was compared. We did not see significant differences in the in vivo antigen capture by mDCs derived from WT and IFNAR−/− mice. However, we identified enhanced early capture of anti-DEC205 in IFNγ−/− and IFNAR−/− mice, suggesting the specific regulation of TNFα- and IFNγ-dependent mDC antigen capture by type II IFN (IFNγ) signaling. Future studies in our lab will further interrogate the molecular mechanisms involved in how IFNγ/IFNγR1 signaling conditions DC development and function in tissues.

Therapeutic effects of Smad3-based protein on imiquimod-induced psoriatic lesions
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Smad3 structurally consists of N- and C-terminal domains linked with a Protruding loop. It shuttles between the nucleus and cytoplasm, and cytoplasmic Smad3 is phosphorylated, translocated out from the nucleus, and interacts with different bi-functional Smad proteins to exert various cell functions. Aberrant expression of Smad3 is often uncovered in epidermis of clinical psoriatic lesions, which was thought to contribute to epidermal hyperplasia in psoriasis. To address if this is the case, we assessed the role of Smad3 splice variants and its functional domains in IMQ-induced psoriatic pathogenesis using genetic and pharmacological approaches. K5.Smad3 mice, which express Smad3 transgene(Tg) by a keratin-5 promoter, were resistant to IMQ-induced psoriatic lesions. To investigate the broader repertoire of B-cell Smad3-based protein on imiquimod-induced psoriatic lesions