

PRURITUS

## **PATHOPHYSIOLOGY OF ITCH IN ATOPIC DERMATITIS: A 3-DIMENSIONAL STUDY OF IL-31 AND ITS RECEPTORS AND CUTANEOUS INNERVATION**

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**Background:** The nervous and immune systems work in concert to mediate itch in atopic dermatitis and emerging evidence has demonstrated extensive cross-talk between these systems. Interleukin-31 is one of the itch mediator that is also a Th2 cell cytokine. There is no published study on the 3-dimensional (3D) features of the nervous system and itch mediators in the skin even though both are known to be implicated.

**Objective:** Our aim is to identify itch mediator and its receptors known to be increased in lesional skin compared to non-lesional skin of patients with AD, and to determine if they co-localise with the cutaneous nerves 3-dimensionally.

**Materials and Methods:** Itch and AD severity has been clinically assessed and recorded for 10 patients. A 4mm punch biopsy has been performed on an AD lesion and another from the adjacent normal skin. The tissues are sectioned into 3 pieces of 300um in thickness. Samples are incubated with mouse anti-IL-31, rat anti-IL-31RA and rabbit anti-PGP9.5. Then samples are immersed in RapidClear 1.52 overnight before imaging on the confocal microscopy. Three-dimensional images obtained are analysed using Imaris.

**Results:** We have consistently demonstrated IL-31+ cells near the dermal-epidermal junction and dermis in non-lesional skin of AD patients. Interestingly, fewer IL-31+ cells are demonstrated in the lesional skin than non-lesional skin. We hypothesise that IL-31+ Th2 cells congregate near the dermal-epidermal junction and secrete IL-31 into the interstitium of AD lesional skin. However, IL-31 and IL-31R fail to co-localise to the nerve fibres.

**Conclusions:** This study provides information regarding 3D spatial proximity of itch mediators to nerve fibres. By virtue that majority of the IL-31RA does not co-localise with the nerves and is scattered evenly throughout the dermis and dermoepidermal junction, an intermediary mediator may exist in the itch signal transmission.