Immunohistochemical Evaluation of IL-31 Receptor A Localization in Neuronal and Cutaneous Tissues of Beagle Dogs

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Interleukin 31 (IL-31) is a key cytokine involved with chronic inflammatory diseases of the skin including atopic dermatitis (AD). IL-31 is a member of the IL-6 family of cytokines and signals through heterodimeric receptor consisting of the IL-31 receptor A (IL-31 RA) and the oncostatin M receptor (OSMR) subunits. Inhibition of janus kinase (JAK) signaling using Apoquel ® (oclacitinib) blocks activation of this receptor complex preventing signal transduction of IL-31 and other proinflammatory cytokines. Expression of IL-31 RA protein in keratinocytes is increased in human patients with AD when compared to normal skin. To date, limited knowledge of the IL-31 RA protein expression in canine tissues is known. Our objective was to perform immunohistochemical (IHC) staining of the IL-31 RA protein in canine peripheral and central neuronal tissue as well as skin tissue. The IL-31 RA protein was detected in the neuronal bodies and axons of dorsal root ganglion (DRG) tissue, neuronal terminals of the dorsal horn isolated from the lumbar spinal cord, and in basal keratinocytes of hair follicles from dog skin sections. To examine if the IL-31 RA was localized on sensory neurons, co-localization staining was carried out with the TRPV1 receptor which has shown involvement in pruritogenic-induced signaling. Partial co-localization was observed in DRGs and complete co-localization in the dorsal horn of the spinal cord. To determine specificity of staining, isotype controls were run in parallel and minimal staining was observed. IL-31 RA and TRPV1 staining patterns in canine DRGs and spinal cord were consistent with previous reports in human and murine tissues. Taken together, these data provide relevant localization of IL-31 RA protein in both cutaneous and neuronal tissues in dog and further support the hypothesis that IL-31 is a key cytokine coupling the immune and neuronal systems in canine atopic dermatitis.

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