Examining the Role of IL-2 Receptor Mediated Signaling in Alopecia areata

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Alopecia areata (AA) is one the most common autoimmune diseases resulting from T cell mediated destruction of hair follicles. Lack of understanding of immune pathways in AA has restricted AA treatment development. In this study, the role of the Interleukin 2 (IL-2) pathway, a cytokine signaling pathway responsible for T cell regulation that functions through the Janus kinase (JAK) - signal transducer and activator of signaling (STAT) pathway, was examined. An assay was developed to measure levels of phosphorylated STAT5, a downstream molecule of IL-2 pathway that transcribes genes crucial to T cell survival, activation, and homeostasis. Significant increase in STAT5 phosphorylation upon IL-2 stimulation was observed in CD4 and CD8 T cells from AA patients compared to healthy controls. These findings concur with other findings from our lab demonstrating the efficacy of JAK inhibition with FDA approved drug Ruxolitinib in reversing AA. Decreased STAT5 phosphorylation was also observed after IL-2 stimulation in T cells of AA patients treated with Ruxolitinib, which provides a possible rationale behind the effectiveness of JAK inhibition therapy in AA treatment. Based on these findings, it is proposed that JAK inhibition therapy reverses AA by resolving abnormal hyper-responsiveness of alopecic T cells to IL-2. Although, the precise molecular mechanisms in AA development and treatment remain unclear, this study provides insight into the pathogenesis and development of targeted drug therapies in AA and possibly other autoimmune diseases.

Awards Won:
Second Award of $2,000