

Abstract

Atopic dermatitis (AD) and psoriasis (PS) are two of the most prevalent chronic inflammatory skin diseases. Currently, diagnosis of AD and PS is based on the combination of physical exam findings and review of medical history. In some instances, the overlapping clinical characteristics and disease manifestations make it difficult to distinguish these two diseases, sometimes prompting a skin biopsy to look for the characteristic psoriatic histopathologic features. While sometimes helpful, skin biopsies are invasive and have the potential for complications, especially in diseases characterized by abnormalities in the skin barrier and chronic *S. aureus* colonization. Here, we describe a non-invasive method to differentiate AD and PS by comparing the expression of key genes involved in disease pathogenesis in AD and PS. Epidermal skin samples were non-invasively collected from lesional or nonlesional skin of patients with moderate to severe AD (n=20) or moderate to severe PS (n=20) using the DermTech Smart Sticker™. RNA was isolated and analyzed by quantitative real-time PCR for the expression of IL-13, IL-23, IL-17A, S100A8, S100A9, CXCL9, CXCL10, CCL17 (TARC), CCL18 (PARC), CCL27 (Eotaxin-3), TLSP, and NOS2. Dysregulation of IL-13, CCL17, IL-17A, and NOS2 exhibited the greatest differences between AD and PS. When combined, Receiver Operating Characteristic (ROC) Curve analysis of the data set generated an AUC of 0.95 that can be used to differentiate the two disease conditions. Overall, this study demonstrates the potential utility of non-invasive skin sampling to differentiate AD and PS based on a molecular signature from only four biomarkers. The ability to distinguish these two disease conditions is a valuable asset in the hands of physicians, providing additional information that may lead to personalized approaches to the treatment of AD and PS.

Non-Invasive Method

- Skin sampling using the Smart Sticker™ non-invasively samples the lesion surface, capturing genomic and proteomic material in the epidermis
- 20 samples from patients with moderate to severe AD, and 20 samples from patients with moderate to severe PS

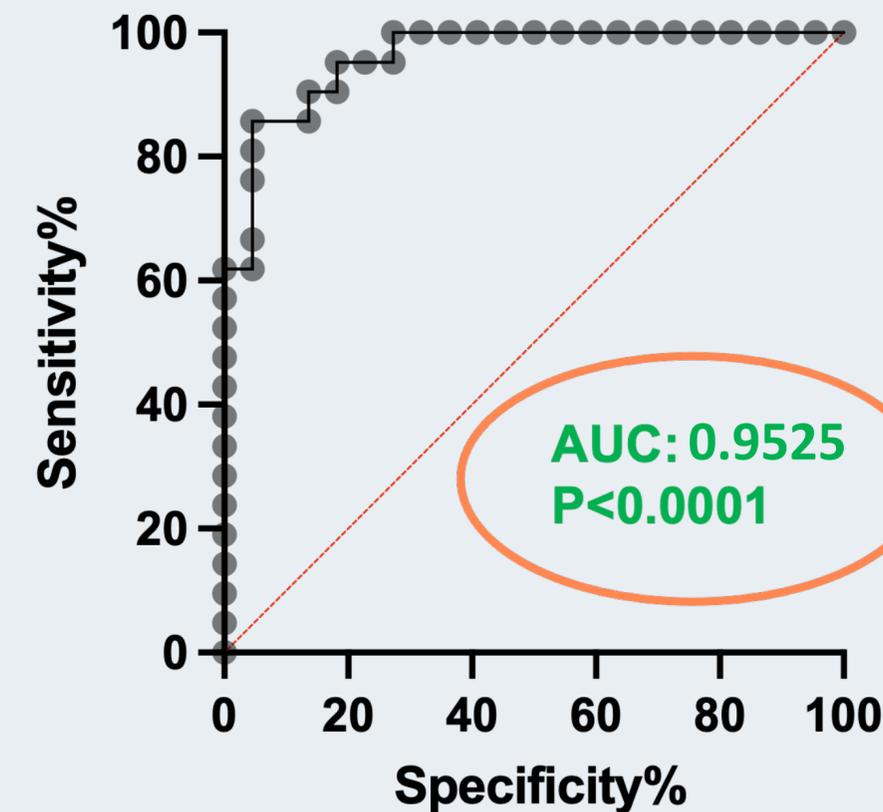
Gene Expression Analysis

- Using the Smart Sticker™ RNA was isolated and analyzed by quantitative real-time PCR for the expression of 12 different biomarkers
- Four of the biomarkers exhibited the greatest differences between AD and psoriasis
 - IL13, CCL17, IL-17A, and NOS2
- When combined, Receiver Operating Characteristic (ROC) Curve analysis of the data set generated an AUC of 0.95 that can be used to differentiate the two disease conditions

Results

Differentiating Atopic Dermatitis (Th2) and Psoriasis (Th1/Th17)

Ratio: (CCL17 + IL-13) / (NOS2 + IL-17A)



Conclusions

- **Non-invasive skin sampling with the Smart Sticker™ is a viable method to differentiate AD from PS**
- **Non-invasively assessed inflammatory gene expression also has the potential to stratify AD and PS subjects into different subtypes or endotypes**
- **The ability to distinguish between AD and PS based on a molecular signature from four genes provides a valuable asset for clinical decision-making and may ultimately be utilized for the personalized treatment of AD and PS patients**