Advancing Autoimmune Disease Treatment With AI-Assisted Gene Expression Analysis

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Over 50 million Americans have an Autoimmune Disease (AD). Diagnosis of symptoms is challenging and the available treatments are invasive and costly. As chronic diseases, ADs often significantly impact patients for the entirety of their lives, with treatments remaining costly, invasive, and frequently uncovered or underfunded by healthcare providers. In this work, the researcher will show how state-of-the-art computational biology techniques combined with modern AI can be used to diagnose systemic lupus erythematosus (SLE) with 99.1% validation accuracy using a patient's gene expression profile. The primary genes used by the model to determine a patient's diagnosis (XIST, USP18, ALMS1, and AVIL) have been associated strongly in previous studies with lupus or cytokines directly tied to lupus, suggesting that the model's findings corroborate with existing research. Existing traditional methods of detecting AD require 5 or more tests at significant cost. The advances in modern DNA gene expression panels that are used in this work reduce costs dramatically, and our proposed model is efficient enough to be run on almost any laptop. This work not only has the ability to significantly improve the affordability and availability of AD diagnosis on its own, but it also highlights a multitude of genes correlated to lupus, serving as a starting point by which to design targeted treatments.

Awards Won: