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DECIPHERING THE GENETIC LINKS BETWEEN PSYCHOLOGICAL STRESS, AUTOPHAGY, AND DERMATOLOGICAL HEALTH: INSIGHTS FROM BIOINFORMATICS, SINGLE-CELL ANALYSIS, AND MACHINE LEARNING IN PSORIASIS AND ANXIETY DISORDERS

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Abstract

The relationship between psychological stress, altered skin immunity, and autophagy-related genes (ATGs) is currently unclear. Psoriasis is a chronic skin inflammation of unclear etiology that is characterized by persistence and recurrence. Immune dysregulation and emotional disturbances are recognized as significant risk factors. Emerging clinical evidence suggests a possible connection between anxiety disorders, heightened immune system activation, and altered skin immunity, offering a fresh perspective on the initiation of psoriasis. The aim of this study was to explore the potential shared biological mechanisms underlying the

comorbidity of psoriasis and anxiety disorders. Psoriasis and anxiety disorders data were obtained from the GEO database. A list of 3254 ATGs was obtained from the public database. Differentially expressed genes (DEGs) were obtained by taking the intersection of DEGs between psoriasis and anxiety disorder samples and the list of ATGs. Five machine learning algorithms used screening hub genes. The ROC curve was performed to evaluate diagnostic performance. Then, GSEA, immune infiltration analysis, and network analysis were carried out. The Seurat and Monocle algorithms were used to depict T-cell evolution. Cellchat was used to infer the signaling pathway between keratinocytes and immune cells. Four key hub genes were identified as diagnostic genes related to psoriasis autophagy. Enrichment analysis showed that these genes are indeed related to T cells, autophagy, and immune regulation, and have good diagnostic efficacy validated. Using single-cell RNA sequencing analysis, we expanded our understanding of key cellular participants, including inflammatory keratinocytes and their interactions with immune cells. We found that the CASP7 gene is involved in the T-cell development process, and correlated with γδ T cells, warranting further investigation. We found that anxiety disorders are related to increased autophagy regulation, immune dysregulation, and inflammatory response, and are reflected in the onset and exacerbation of skin inflammation. The hub gene is involved in the process of immune signaling and immune regulation. The CASP7 gene, which is related with the development and differentiation of T cells, deserves further study. Potential biomarkers between psoriasis and anxiety disorders were identified, which are expected to aid in the prediction of disease diagnosis and the development of personalized treatments.

Keywords

Psoriasis, Psychological Stress, Anxiety Disorders, Autophagy, Machine Learning, Single-Cell RNA Sequencing