

ENDOCRINE COMORBIDITIES AND CELLULAR IMMUNE ALTERATIONS IN GRANULOMA
ANNULARE: AN INTEGRATED APPROACH TO PATIENT ASSESSMENT

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Background. Granuloma annulare is a chronic granulomatous inflammatory skin disorder characterized by annular papules and plaques with variable clinical manifestations. Although the disease has been recognized for more than a century, its exact pathogenesis remains incompletely understood. Increasing attention has recently been focused on the interaction between cellular immune responses and metabolic or endocrine abnormalities in the development and progression of granuloma annulare.

Activation of T lymphocytes, macrophages and dendritic cells is considered an important component of granulomatous inflammation. At the same time, granuloma annulare has been reported in association with diabetes mellitus, thyroid disorders, obesity, dyslipidemia, insulin resistance and metabolic syndrome. These observations suggest that endocrine and metabolic disturbances may modify the local inflammatory response and potentially influence the clinical phenotype of the disease. However, the relationship between endocrine comorbidities, cellular immune alterations and different clinical forms of granuloma annulare remains insufficiently characterized.

Objective. To investigate the relationship between endocrine abnormalities, clinical and morphological manifestations, and cellular immune markers in patients with different forms of granuloma annulare.

Materials and Methods. The planned study will include 100 patients presenting to dermatology and/or endocrinology services with clinical manifestations suggestive of

granuloma annulare. A comprehensive assessment will include clinical examination, histological evaluation of skin biopsy specimens, biochemical and hormonal investigations, and immunohistochemical analysis.

The immunohistochemical component will focus on T-lymphocyte markers CD3+ and CD8+ and dendritic-cell markers CD1a+, CD207 (Langerin) and CD209/DC-SIGN. Clinical and immunohistochemical parameters will be analyzed in relation to the presence of concomitant endocrine disorders and the clinical form of granuloma annulare. Statistical methods will be used to determine potential associations between immune, endocrine and morphological variables.

Expected Scientific Significance. The integrated assessment of cellular immunity and endocrine status is expected to improve understanding of the pathogenetic heterogeneity of granuloma annulare. Identification of characteristic immunohistochemical patterns associated with endocrine comorbidities may help distinguish patient subgroups with different clinical manifestations and potentially different disease courses.

Particular attention to the expression of T-cell and dendritic-cell markers may provide additional insight into the mechanisms responsible for the persistence of granulomatous inflammation. Simultaneous assessment of biochemical, hormonal, morphological and immune parameters may also contribute to the development of a more comprehensive diagnostic strategy.

Conclusion. A combined evaluation of cellular immune markers and endocrine abnormalities represents a promising approach to studying granuloma annulare. Integrating dermatological, histological, immunohistochemical and endocrinological findings may improve disease characterization and provide a scientific basis for individualized diagnostic and management algorithms.

Keywords: granuloma annulare, cellular immunity, endocrine disorders, diabetes mellitus, T lymphocytes, dendritic cells, CD3, CD8, CD207, CD209.