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The Role of Gut Microbiota in the Pathogenesis of Uveitis: Emerging Insights

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Uveitis is an inflammatory disorder of the uveal tract with diverse etiologies, including autoimmune, infectious, and idiopathic causes. Despite advances in understanding immune mechanisms, the triggers of aberrant ocular inflammation remain incompletely defined. Emerging evidence suggests that gut microbiota, the complex community of microorganisms in the gastrointestinal tract, plays a critical role in modulating systemic immunity and may influence the pathogenesis of autoimmune uveitis. This review synthesizes current findings from preclinical models and human studies investigating gut microbiota composition and function in uveitis. Altered microbial diversity and dysbiosis have been documented in uveitis patients, with decreases in beneficial commensal bacteria such as *Lactobacillus* and increases in pro-inflammatory taxa. These

changes correlate with disease activity and severity.

Mechanistically, gut microbiota may influence ocular immune responses via molecular mimicry, modulation of regulatory T cells, and alteration of systemic cytokine profiles. Animal studies demonstrate that modifying gut flora through antibiotics, probiotics, or fecal microbiota transplantation can alter uveitis susceptibility and progression. Therapeutic implications include potential use of microbiota-targeted interventions as adjunct treatments. However, translating these findings to clinical practice requires further research to clarify causality, identify specific microbial signatures, and develop standardized protocols. Understanding gut-eye immune crosstalk may pave the way for novel diagnostic biomarkers and personalized treatment strategies in uveitis.

Biography

Dr. James Miller is a Professor of Immunology and Ophthalmology at the University of Sydney. His interdisciplinary research bridges the fields of immunology and ophthalmology, with a focus on autoimmune eye diseases and the role of microbiome-immune system interactions. Dr. Miller's work aims to uncover novel therapeutic targets to improve management of inflammatory ocular conditions.