



## 2026 HIGH IMPACT GRANT

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### *Tear-Based Biomarker Discovery for Precision Diagnosis of Sjögren's Disease*

Abstract: Sjögren's Disease (SjD) is a systemic autoimmune disorder characterized by immune-mediated destruction of exocrine glands, leading to chronic ocular and oral dryness and significant impairment in quality of life. Despite its prevalence, SjD remains frequently underdiagnosed due to heterogeneous clinical presentations and the limited sensitivity and specificity of current diagnostic methods. Serologic testing and minor salivary gland biopsy often yield false-negative results, delaying diagnosis and treatment. There is therefore a critical need for objective, accurate, and repeatable diagnostic approaches. This project will apply high-dimensional 36-color spectral flow cytometry to identify tear-based immune biomarkers specific to SjD. Aim 1 will establish a standardized and clinically annotated tear biorepository from individuals with SjD, other autoimmune diseases, non-SjD dry eye, and matched healthy controls. Aim 2 will utilize spectral cytometry and computational analysis to characterize the tear immune cell composition, compare tear and serum immune profiles, and identify inflammatory signatures that distinguish SjD. Aim 3 will utilize these findings to support the development of a hand-held point-of-care diagnostic platform for rapid, non-invasive detection of SjD-associated tear biomarkers. All studies will be conducted at the Foster Ocular Immunology Center at Duke University, which provides access to well-characterized patient populations and advanced cytometry and bioinformatics resources. Led by Drs. Esen Akpek and Daniel Saban, the investigative team brings expertise in ocular immunology and translational biomarker discovery. This work aims to generate a comprehensive immune profile of tears in SjD and support the development of a novel diagnostic tool to improve early detection and clinical management.

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