



2025 Pilot Research Grant

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Project Title: Profiling the immune cells in the autoimmune-induced dry eye disease through spatial multi-omics

Sjögren's disease (SjD) is an autoimmune disease where the body's immune system mistakenly attacks its own tissues, including the tear-producing glands. This leads to chronic dry eye, which can cause serious damage to the cornea—the clear, outer layer of the eye. While a lack of tears was once thought to be the main cause, recent research shows that immune cells invading the cornea play a major role in worsening the disease as well. This invasion can lead to nerve damage, disorganized corneal cells, and cloudiness, all of which impair vision.

Our research uses a mouse model that mimics SjD-related dry eye. We have found that, in healthy eyes, immune cells stay in the outer edge of the cornea. However, in SjD, they move into the central cornea, where they interact with important eye cells and nerve fibers, potentially causing more corneal damage and discomfort. Despite these findings, we still don't fully understand which immune cells are involved and how they damage the cornea.

To fill this gap, we will use advanced spatial RNA and protein analysis techniques to map these immune cells and their interactions in the eye. By identifying the specific cells and signals driving corneal damage, we hope to find new treatment targets that can prevent immune cell invasion and protect the cornea. Our goal is to improve therapies for people with SjD-related dry eye and reduce long-term vision problems.