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Molecular Ophthalmology Research

Our research focuses on understanding the pathological effects of damaging extrinsic stimuli on mucosal epithelia. The mucosal epithelium interfaces with the environment at all body surfaces, including the eye, and represents the first line of host defense. As gatekeepers of the ocular surface, epithelial cells use a general defense strategy that is believed to play a critical role in regulating protection provided by the immune system. Sometimes, however, this defensive strategy can overreact to an external threat or aberrantly react to a harmless stimulus that it doesn't recognize. In either case, the resulting immune response can cause a disease state. This is particularly problematic in the immune privilege cornea, where an aberrant immune response disrupts corneal clarity and can threaten vision. Examples include, microbial infection, ocular allergy or autoimmune-mediated ocular surface disease. In each of these disease entities there is an immunological component that either initiates or enhances the disease state. We are trying to dissect the molecular events that underlie these early immune responses. Our research program involves both clinically-based, human studies to characterize key components of ocular defense, as well as both *in vivo* and *in vitro* studies to decipher the mechanism whereby they modulate disease. This work will lead to a better understanding of the molecular patterns that contribute to pathological alteration of mucosal epithelia and suggest new strategies for modulating their response in favor of the host.
