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**Tear Film Dynamics: the roles of complex structure and rheology** MOHAR DEY, JAMES FENG, Univ of British Columbia, Canada, ATUL S. VIVEK, HARISH N. DIXIT, Indian Institute of Technology Hyderabad, India, ASHUTOSH RICHHARIYA, LV Prasad Eye Institute, Hyderabad, India. — Ocular surface infections such as microbial and fungal keratitis are among leading causes of blindness in the world. A thorough understanding of the pre-corneal tear film dynamics is essential to comprehend the role of various tear layer components in the escalation of such ocular infections. The pre-corneal tear film comprises of three layers of complex fluids, viz. the innermost mucin layer, a hydrophilic protective cover over the sensitive corneal epithelium, the intermediate aqueous layer that forms the bulk of the tear film and is often embedded with large number of bio-polymers either in the form of soluble mucins or pathogens, and finally the outermost lipid layer that stabilizes the film by decreasing the air/tear film interfacial tension. We have developed a comprehensive mathematical model to describe such a film by incorporating the effects of the non-uniform mucin distribution along with the complex rheology of the aqueous layer with/without pathogens, Marangoni effects from the lipid layer and the slip effects at the base of the tear film. A detailed linear stability analysis and a fully non-linear solution determine the break up time (BUT) of such a tear film. We also probe the role of the various components of the pre-corneal tear film in the dynamics of rupture.

Mohar Dey  
Univ of British Columbia

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