Theme 4: OMICS

AB013. Tear lipidome and its implications

Sin Man Lam[1], Louis Tong[2], Markus R. Wenk[3], Guanghou Shui[1]

[1]State Key Laboratory of Molecular Developmental Biology, Institute of Genetics and Developmental Biology, Chinese Academy of Sciences, Beijing, China; [2]Singapore Eye Research Institute, Singapore National Eye Centre, Singapore; [3]Department of Biological Sciences, National University of Singapore, Singapore

Abstract: The tear film covers the anterior eye and the precise balance of its various constituting components is critical for maintaining ocular health. The composition of the tear film amphiphilic lipid sublayer, in particular, has largely remained a matter of contention. The limiting concentrations of lipid amphiphiles in tears have also posed considerable challenges to their detection and accurate quantitation. Using systematic and sensitive lipidomic approaches, we reported the most comprehensive human tear lipidome to date; and conferred novel insights to the compositional details of the existent tear film model, in particular the disputable amphiphilic lipid sublayer constituents, by demonstrating the presence of cholesteryl sulfate, O-acyl-ω-hydroxy fatty acids, and various sphingolipids and phospholipids in tears. Lipidomic analysis of human tear fluid from patients with various subtypes of dry eye syndrome (DES) revealed structure-specific lipid alterations in DES, which could potentially serve as unifying indicators of disease symptoms and signs.

The meibomian glands constitute the predominant source of lipid supply to the human tear fluid. Meibomian gland dysfunction (MGD) is a leading cause of evaporative dry eye and ocular discomfort, characterized by an unstable tear film principally attributed to afflicted delivery of lipids to the ocular surface. We investigated the longitudinal tear lipid alterations associated with disease alleviation and symptom improvement in a cohort of MGD patients undergoing eyelid-warming treatment for 12 weeks. Our preliminary data indicated that excess ocular surface phospholipase activity detrimental to tear film stability could be alleviated by eyelid warming alone without application of steroids and identify tear OAHFAs as suitable markers to monitor treatment response in MGD.

Keywords: Tear; lipidomics; dye eye syndrome; meibomian gland dysfunction (MGD)

Cite this abstract as: Lam SM, Tong L, Wenk MR, Shui G. Tear lipidome and its implications. Ann Eye Sci 2017;2:AB013. doi: 10.21037/aes.2017.AB013