Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

# Summary: Tear film report

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***Willcox M, et al. TFOS DEWS II Tear Film Report. Ocul Surf 2017;15(3): 366-403.***

Dry eye disease involves significant changes to the structure and function of the tear film. While it is widely believed and accepted that the various components in the tear film, including lipids, proteins, mucins and salts, play a critical role in preventing tear film evaporation and collapse, the report suggested that further studies are warranted to confirm or deny this concept.

Historically, the tear film has been viewed as a tri-layered structure comprising of the outermost lipid, middle aqueous and an inner mucin layer. However, over the past few years enough evidence has been generated to suggest that the tear film is a bi-phasic structure composed of an outer lipid layer overlying a muco-aqueous phase.

**The lipid layer**

The lipid layer consists of several non-polar and amphiphilic (polar) lipids. The lipid layer is important in stabilizing the whole of the tear film – this is partly through its ability to lower the surface tension of the tear film. The role of the lipid layer in preventing tear evaporation is debatable. There is evidence that removal of lipids will increase tear film evaporation, therefore, it may be that the lipid layer in combination with other components of the tear film play a role in preventing evaporation of water. The polar lipid (O-acyl)-hydroxy fatty acids appear to be important in the spreading of the whole lipid layer over the muco-aqueous layer. However the role of other polar lipids such as phospholipids is less clear. Furthermore, the report showed that tear lipid profiles are highly variable between studies and further investigation is warranted to understand the reason behind this variability.

**The muco-aqueous phase**

The muco-aqueous phase is composed of at least four major mucins and more than 1500 different proteins and peptides. Mucins are highly glycosylated proteins that help to hydrate the tears. Decreased MUC5AC expression in dry eye disease has been a consistent finding and it was suggested that the deregulation of mucin synthesis can be an important factor in ocular surface disease. Several of the proteins and peptides found in the muco-aqueous phase have been shown to change with dry eye disease. Despite the fact that the protein concentration change significantly in dry eye conditions, no definitive set of proteins or changes in protein levels have been validated to help in diagnosis.

Further work is needed to characterize the biochemistry of the tear film, which will enable us to identify novel markers that can potentially be used to diagnose, predict and treat dry eye disease. Further work is also warranted to measure tear film osmolarity in a dynamic fashion and to identify inflammatory markers over the entire ocular surface.

## REFERENCES

Willcox M, et al. TFOS DEWS II Tear Film Report. *Ocul Surf* 2017;15(3): 366-403.