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Conformational and thermodynamic features of meibum in adolescents and adults with graft-versus-host disease

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Graft-versus-host disease (GvHD) is a common complication of allogeneic hematological stem cell transplantations that is often associated with dry eye disease (DED) with mixed Meibomian gland dysfunction and aqueous tear deficiency. The temperature-dependence of conformational changes in human meibum (hM) was measured in a comparative study to elucidate the potential impact of GvHD on hM composition, structure and function with DED. A total of 28 donors without DED and 15 donors with DED separated into adolescent and adult pools were analyzed by Fourier Transform Infrared Spectroscopy. Both age and DED lead to conformational and thermodynamic differences in hM. Increases in lipid order and transition temperatures were observed in hM with GvHD. However, these relative increases were more pronounced in hM from adolescents than

from adults. The decrease of change in enthalpy for adolescents was more pronounced compared with adults. The conformational and thermodynamic differences observed with age and, importantly, with DED/GvHD are indicative of compositional changes in hM that could impact tear film stability. We decided to test this theory. We hypothesize that the hM layer alone or hM layer interacting with phospholipids (PLs) in the aqueous portion of tears act as a barrier to tear evaporation; and that in patients with DED/GvHD, either altered composition of the hM and/or its interaction with PLs in tears, lead to a greater rate of evaporative fluid loss from tears. Our studies suggest that the hM alone does not retard the evaporation of water from a saline solution used as an aqueous phase.

Biography

Samiyyah Sledge received her master's in Physiology and Biophysics from the University of Louisville School of Medicine. Currently she is a doctoral candidate in the Department of Physiology and she researches in the Department of Ophthalmology and Visual Sciences under the guidance of Dr. Douglas Borchman. She has published five papers in several well regarded journals.

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