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Localizing lysozyme deposition on contact lenses using a novel in vitro eye model

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PURPOSE: To characterize the location of lysozyme on contact lens (CL) materials using a novel, in vitro eye model that simulates physiological tear volume, tear flow, air exposure and mechanical wear.

METHODS: One hydrogel (etafilcon A) and three silicone hydrogels (balafilcon A, lotrafilcon B, and senofilcon A) were tested. The CLs were mounted onto a novel eye model to simulate CL wear and were exposed to an artificial tear solution (ATS) containing fluorescently-labeled lysozyme, at a flow rate of 3mL/24hrs for two time points - 2 and 10 hours(h). After these incubation periods, lenses were imaged using confocal laser scanning microscopy to determine the distribution pattern of lysozyme throughout the lens.

RESULTS: The deposition of lysozyme increased from 2 to 10 h for all lens types, except for lotrafilcon B. Lysozyme deposited both on the surface and within the bulk of etafilcon A, with moderately higher levels on the surfaces, whereas on balafilcon A, lysozyme was uniformly distributed throughout the lens. Interestingly, lysozyme penetrated into the bulk of lotrafilcon B and senofilcon A, at higher levels than those previously seen.[1]

CONCLUSION: These results revealed a new perspective on how CLs interact with the ocular surface. The added mechanical motion and friction on the CL from the novel eye model facilitated the penetration of lysozyme beyond the lens surface and into the lens matrix. An understanding of lysozyme deposition on different CL materials could provide novel insight on CL discomfort and facilitate the design of improved lens materials.

[1]Luensmann D, Zhang F, Subbaraman L, Sheardown H, Jones L. Localization of lysozyme sorption to conventional and silicone hydrogel contact lenses using confocal microscopy. *Curr Eye Res* 2009;34: 683-97.

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