Contact lens wearers note: Your eyes may get more infections because their microbiomes changed

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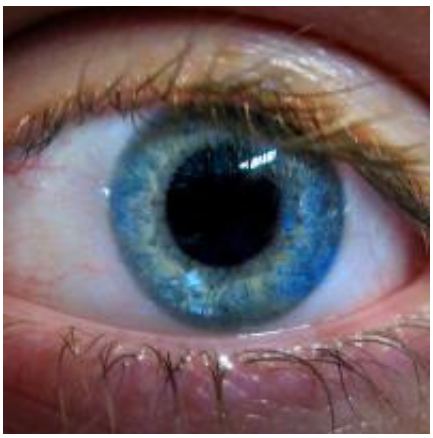

Using high-precision genetic tests to differentiate the thousands of bacteria that make up the human microbiome, researchers at NYU Langone Medical Center suggest that they have found a possible—and potentially surprising—root cause of the increased frequency of certain eye infections among contact lens wearers.

In a study report on their work to be presented at the annual meeting of the American Society for Microbiology on May 31 in New Orleans, NYU Langone researchers say they have identified a diverse set of microorganisms in the eyes of daily contact lens wearers that more

closely resembles the group of microorganisms of their eyelid skin than the bacterial grouping typically found in the eyes of non-wearers.

Specifically, the NYU Langone team found that the eye surface, or conjunctiva, has surprisingly higher bacterial diversity than the skin directly beneath the eye and three times the usual proportion of *Methylobacterium, Lactobacillus, Acinetobacter*, and *Pseudomonas* bacteria in the eyes of the study's nine contact lens wearers than is typically found on the surface of the eyeballs of 11other men and women in the study who did not wear contact lenses. When measured and plotted on a graph, statistical germ diversity scores showed that the eye microbiome of contact lens wearers had a composition more similar to that of the wearer's skin than the eye microbiome of non-lens wearers.

"Our research clearly shows that putting a foreign object, such as a contact lens, on the eye is not a neutral act," says senior study investigator and NYU Langone microbiologist Maria Gloria Dominguez-Bello, PhD.

"What we hope our future experiments will show is whether these changes in the eye microbiome of lens wearers are due to fingers touching the eye, or from the lens's direct pressure affecting and altering the immune system in the eye and what bacteria are suppressed or are allowed to thrive," says Dominguez-Bello, an associate professor at NYU Langone.

"These findings should help scientists better understand the longstanding problem of why contact-lens wearers are more prone to eye infections than non-lens wearers," says Dominguez-Bello, whose research focuses on the different microbiomes of the gut and other body parts, how they interact, and how contemporary lifestyle practices may affect the microbiome and increase disease risk. Such understanding, she says, should point to better means of preventing infections.

"There has been an increase in the prevalence of corneal ulcers following the introduction of soft contact lenses in the 1970s," says study co-investigator Jack Dodick, MD, professor and chair of ophthalmology at NYU Langone. "A common pathogen implicated has been Pseudomonas. This study suggests that because the offending organisms seem to emanate from the skin, greater attention should be directed to eyelid and hand hygiene to decrease the incidence of this serious occurrence," he says.

As part of the study, researchers took hundreds of swabs of various parts of the eye, including the eye conjunctiva, as well as along the skin directly beneath the eye. Both swabs and used contact lenses were then subjected to genetic analysis in the lab to determine which bacteria were present.

While the bacterial composition in the eye of contact lens wearers more closely resembled that of the skin, some 5,245 distinct bacterial strains and subtypes were identified in the eye conjunctiva of lens wearers, and 5,592 strains were identified in the eyes of non-lens wearers. A similar but different composition of 2,133 strains and subtypes were identified in the skin directly beneath the eye of those with contact lenses, while 3,849 distinct bacteria were identified in non-lens wearers.

Surprisingly, researchers say, more Staphylococcus bacteria, which are linked to eye infections and more prominent on the skin - were found in the eyes of non-lens wearers, and researchers do not yet have an explanation for the disparity. Estimates vary, but many cases of potentially scarring bacterial keratitis, or eye inflammation, as well as conjunctival infections occur in contact lens wearers.

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