MMWR
Morbidity and Mortality Weekly Report

MMWR Dispatch
Vol. 55 / May 19, 2006

Update: *Fusarium* Keratitis — United States, 2005–2006

In April 2006, CDC reported on an ongoing multistate investigation of *Fusarium* keratitis occurring predominantly among contact lens wearers (*1*). This update summarizes epidemiologic developments in this investigation, which indicate an association with Bausch & Lomb's ReNu with MoistureLoc® contact lens solution.

Fusarium keratitis is a fungal infection of the cornea, preceded usually by trauma to the eye. Although not a notifiable disease, the infection is thought to be rare among contact lens wearers in temperate climates (*2*). *Fusarium* keratitis is treated with antifungal medication but can be severe and sometimes result in vision loss and the need for corneal transplantation (*3*).

As of May 18, 2006, CDC had received reports of 130 confirmed cases of *Fusarium* keratitis infection, defined as clinically consistent fungal keratitis with symptom onset after June 1, 2005, no history of recent ocular trauma, and a corneal culture yielding a *Fusarium* species. Cases have been reported from 26 states and one territory.* Patients had a median age of 41 years (range: 12–83 years), and 85 of 127 (67%) were female. As a result of this infection, corneal transplantation was required in 37 of 120 (31%) cases.

Among the 130 patients with confirmed cases, 125 reported wearing contact lenses, and 118 were able to identify which contact lens solution(s) they had used during the month before onset of infection. Seventy-five (64%) reported using Bausch & Lomb's ReNu with MoistureLoc alone, 14 (12%) reported using MoistureLoc in combination with another product, eight (7%) reported using an unspecified Bausch & Lomb solution, and 21 (18%) reported using only products other than MoistureLoc, from various manufacturers. Ongoing surveillance continues to identify persons who used MoistureLoc and had disease onset after April 13, when Bausch & Lomb withdrew this product from the market in the United States.

In April, a subset of confirmed case-patients who were soft contact lens wearers and aged ≥18 years was enrolled in a matched case-control investigation to evaluate risk factors for infection. To avoid potential bias from media coverage on case-patient responses, this subset was limited to those patients reported to CDC before online publication of the initial *MMWR Dispatch* on April 10. Neighborhood-matched controls were adults reporting soft contact lens use during March 2006 with no history of fungal keratitis. Information regarding contact lens types, solutions used, and contact lens hygiene practices was obtained via telephone interviews conducted by trained personnel who used standardized questionnaires. Exact conditional logistic regression was used to estimate odds ratios.

A total of 50 case-patients and 79 controls were enrolled in the matched case-control investigation. For the most stringent test of product association, analysis was limited to the matched sets of 25 case-patients and 37 controls who were soft contact lens wearers, reported using only a single solution type, and provided all the information requested. In a multivariable model, use of Bausch & Lomb's ReNu with MoistureLoc during the month before symptom onset was independently associated with being a case-patient (adjusted odds ratio: 19.0, 95% confidence interval = 2.4–944.9, $p<0.001$), when compared with contact lens solutions other than ReNu with MoistureLoc or ReNu Multiplus®; 19 case-patients and seven controls reported this exposure. This association was statistically significant even after controlling for poor contact lens care (i.e., reported reuse or topping off of contact lens solution). Use of ReNu Multiplus solution was not significantly associated with infection (adjusted odds ratio: 3.6, 95% confidence interval = 0.3–189.0, $p = 0.5$); five case-patients and 10 controls reported this exposure.

The results of this case-control investigation indicate an increased risk for *Fusarium* keratitis associated with use of Bausch & Lomb's ReNu with MoistureLoc. The cause of this association is not clear; however, further studies, including environmental and molecular testing, are ongoing. Although certain patients have reported use of other contact lens solu-

*Arizona (one case), Arkansas (one), California (seven), Connecticut (three), Florida (26), Georgia (two), Illinois (eight), Iowa (one), Kansas (one), Kentucky (five), Louisiana (one), Maryland (one), Massachusetts (one), Michigan (three), Missouri (three), Nevada (one), New Jersey (four), New York (six), North Carolina (two), Ohio (seven), Oklahoma (one), Oregon (one), Pennsylvania (12), Tennessee (eight), Texas (seven), Vermont (two), and Puerto Rico (15).

tions, the analysis does not indicate that these products are associated with significantly increased risk for disease. Patients who reported using only products other than MoistureLoc might not have recalled all the contact lens solutions they had used, especially if the period between exposure and interview was lengthy. In addition, extensive surveillance for this infection might have identified patients whose disease was unrelated to the outbreak.

Given the association between *Fusarium* keratitis and MoistureLoc, Bausch & Lomb (Rochester, New York) announced its decision to voluntarily recall and permanently remove this contact lens solution from the worldwide market on May 15, 2006. Contact lens wearers should immediately discontinue use of this solution and consult an eye-care professional regarding use of an appropriate alternative product for cleaning or disinfecting lenses. Contact lens wearers also should practice good hygiene, including hand washing and drying before handling lenses, avoiding reuse of contact lens solutions, and following the specific instructions of manufacturers of contact lenses and contact lens solutions. Clinicians evaluating contact lens wearers with signs or symptoms of keratitis (e.g., unusual redness of the eyes, eye pain, tearing, discharge, or light sensitivity) should consider fungal keratitis and refer the patient to an ophthalmologist if appropriate. Eye-care professionals should continue to be vigilant in the diagnosis and treatment of *Fusarium* keratitis, and should report possible cases to state health departments or to CDC at telephone, 800-893-0485. Reports should also be submitted to the FDA via MedWatch at telephone, 800-FDA-1088; fax, 800-FDA-0178; or mail, MedWatch, Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20857-9787; or online at http://www.fda.gov/medwatch/report.htm.

Reported by: *MA Barry, MD, J Pendarvis, MPH, Boston Public Health Commission, Massachusetts. P Mshar, MPH, Connecticut Dept of Public Health. K Ritger, MD, Illinois Dept of Public Health. P Dixon, Kentucky State Dept for Public Health. E Alfonso, MD, Bascom-Palmer Eye Institute, Miami; F Leguen, MD, Miami-Dade County Health Dept, Florida. K Signs, DVM, Michigan Dept of Community Health. A Fine, MD, B Nivin, MPH, New York City Dept of Health and Mental Hygiene; M Anand, MPH, P Smith, MD, New York State Dept of Health. E Salehi, MPH, Ohio Dept of Health. K DeMarco, MPH, Monmouth County Health Dept; E Sison, MPH, Newark Dept of Health and Human Svcs; C Genese, MBA, C Robertson, MD, C Tan, MD, E Bresnitz, MD, New Jersey Dept of Health and Senior Svcs. MA Kainer, MBBS, MPH, Tennessee Dept of Health. NL Thayer, Vermont Dept of Health. DB Jones, MD, Cullen Eye Institute, Baylor College of Medicine, Texas. K O'Donnell, PhD, US Dept of Agriculture. BJ Park, MD, K Wannemuehler, MS, L Jacobson, C Crowell, M Gerhart, M Brandt, PhD, S Fridkin, MD, National Center for Zoonotic, Vector-Borne and Enteric Diseases (proposed); A Srinivasan, MD, M Arduino, PhD, J Noble-Wang, PhD, National Center for Preparedness, Detection, and Control of Infectious Diseases (proposed); D Chang, MD, G Grant, MD, L Burwell, MD, C Rao, PhD, LR Carpenter, DVM, M Gershman, MD, A Huang, MD, FM Lewis, MD, G Mirchandani, PhD, L Sosa, MD, EIS officers, CDC.*

References

1. CDC. *Fusarium* keratitis—multiple states, 2006. MMWR 2006;55:400–1.
2. Thomas PA. Fungal infections of the cornea. Eye 2003;17:852–62.
3. Dursun D, Fernandez V, Miller D, Alfonso EC. Advanced *Fusarium* keratitis progressing to endophthalmitis. Cornea 2003;22:300–3.