

Eczema Patients at Risk for Viral Infections

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DENVER — Eczema patients at risk for serious viral infections have more severe disease, are more likely to be allergic to food and other allergens, and have a frequent history of staph infections, according to researchers at National Jewish Health and other institutions in the NIH-funded Atopic Dermatitis Vaccinia Network. The findings, published June 22 in the online version of *The Journal of Allergy and Clinical Immunology*, could help identify people at risk for serious complications of smallpox vaccinations, and point to defects in the skin barrier and antimicrobial-protein production as possible causes for the increased susceptibility.

"Previous studies have suggested that eczema is not only becoming more prevalent, but that patients have increased susceptibility to disseminated viral infections," said senior author [Donald Leung](#), MD, PhD, Edelstein Family Chair of Pediatric Allergy and Clinical Immunology at National Jewish Health. "Our study is the largest and first in the United States to carefully characterize eczema patients who have suffered widespread herpes simplex viral infections of their skin. It is also the first to report that these patients are more susceptible to *staphylococcus* and other infections of the skin and eye."

A subset of the estimated 6 million eczema patients in the United States are susceptible to widespread infections of their skin by herpes simplex and vaccinia viruses. The herpes simplex virus is common but only rarely causes disseminated skin infections that can spread to the eye and bloodstream sometimes leading to encephalitis and meningitis. The widespread herpes simplex skin infection is known as eczema herpeticum.

Vaccinia virus, which is used in smallpox vaccinations, can also cause a serious and life-threatening skin infections in a smaller subset of patients. People who have eczema or had it in the past are susceptible to this infection when they receive a smallpox vaccination. This situation could limit the ability of those people to safely receive vaccinations in case of a smallpox bioterrorism event.

The Atopic Dermatitis Vaccinia Network (ADV N) is an NIH-funded multi-center network charged with better understanding the susceptibility of eczema patients to the vaccinia infection and to search for ways to protect against it. Atopic dermatitis is another name for eczema, an allergic skin condition that causes itchy, inflamed and cracked skin.

The ADV N researchers believed that they might be able to identify eczema patients at high risk for these infections and to obtain clues about the mechanisms of susceptibility by studying a large cohort of patients who had suffered eczema herpeticum, the herpes simplex viral skin infections. They examined a wide variety of demographic, pathologic and biologic characteristics in 901 subjects, 138 of whom had suffered eczema herpeticum.

They found that eczema patients susceptible to herpes simplex infections had more severe disease, earlier age of disease onset, more frequent history of other allergic diseases such as food allergy, asthma and hay fever, more allergic biomarkers, and more frequent skin infections with other microbes.

"These characteristics associated with eczema herpeticum should help us identify young patients at greater risk for eczema herpeticum so that we can be more vigilant with them and better equipped to prevent this serious complication of eczema," said Dr. Leung.

The greater allergic disease and sensitization, as well as infection by other microbes, point to a potential mechanism for the increased susceptibility to viral skin infections. An emerging model of eczema highlights the importance of skin-barrier defects and a lack of antimicrobial proteins among eczema patients. The skin-barrier defect is believed to result in the greater allergic sensitization among eczema patients in general. The even higher allergic sensitization among EH patients suggests the skin-barrier defect is particularly acute in those patients.

The higher levels of infections with *staphylococcus* and other microbes suggests that EH patients may be particularly lacking in antimicrobial proteins.

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