Altered lipids, skin infections may point to new personalized therapy for atopic dermatitis

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Credit: Oregon State University

Researchers have discovered a new way to identify the lipids, or fats found in the skin of people who have atopic dermatitis, and compare them to people with healthy skin.

This is a fundamental advance in dermatology that could lead to new therapies for millions of people with this debilitating skin problem - atopic dermatitis is one of the most common forms of eczema.

The findings were just announced in the *British Journal of Dermatology*.

The new technology should open the door to the formulation of personalized treatments, scientists say. Patents have been applied for, and researchers are working with university officials to begin the process of licensing and commercialization.

As another part of this advance, the scientists also discovered a clear link between atopic dermatitis, altered lipid profiles and some types of bacterial infections such as staphylococcus aureus, or a staph infection. This had never before been reported.

They believe these staph infections may both lead to atopic dermatitis problems and make people more prone to further infections – a cycle of skin inflammation that can disrupt the skin microbiome and be one component of this disease that has been so resistant to long-term treatment.

"These findings about altered lipid profiles and the link to bacterial infections could be a breakthrough to ultimately help many people who struggle with atopic dermatitis and related skin problems," said Arup Indra, an associate professor in the College of Pharmacy at Oregon State University, an expert on inflammatory skin disease and lead author of the study.

"For the first time we will be able to identify the individual lipids that may be needed to help someone's skin return to health," Indra said. "This may be of value not only to patients with atopic dermatitis or other skin diseases, but even for normal individuals who simply want their skin to be more healthy, well hydrated and resistant to aging."

Lipids, or fats, are a vital part of healthy skin, serving almost as a "blanket" to help protect its integrity. They can also act as a natural

barrier to infection; are part of the innate immune system; and when properly balanced and healthy can help prevent skin cancer. Skin lipids include ceramides, free fatty acids, cholesterol and triglycerides.

When these lipids are not available in the right type or amount, skin inflammation can occur. In atopic dermatitis patients this can range from mild, intermittent rashes to severe, almost continual skin problems over significant portions of a person's body. Some amount of atopic dermatitis is common in infants, but in some people it's a lifelong issue.

Steroid drugs, either topical or systemic, have been one of the few ways to treat atopic dermatitis, but they have a wide range of side effects that make long-term treatment a concern. Moisturizing creams, lotions, special diets and other approaches have shown limited success.

With the new technology, however, researchers can identify a person's individual skin lipid profile with some simple tests. A type of tape has been developed that can pull some lipids off a person's skin; allow testing of them with the use of a mass spectrometer; and have the results compared to the skin lipid profiles of generally healthy patients.

With this information, researchers in the future should be able to determine quite specifically what lipids are deficient, and develop topical compounds to replace them – either individually, or with compounds that could aid groups of people who share similar lipid profiles.

Researchers say they hope to interrupt the cycle of skin inflammation and staph infections through the use of personalized lipid-replacing compounds, and create a new, promising approach to therapy.

"This has the potential to remove any guess work that might have existed in the past regarding the correct combination of lipids required to

improve skin health,' Indra said, "and will help restore to people's skin the right quantity and type of lipids they need."

More information: S. Li et al. Altered composition of epidermal lipids correlates withcolonization status in Atopic Dermatitis, *British Journal of Dermatology* (2017). DOI: 10.1111/bjd.15409

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