

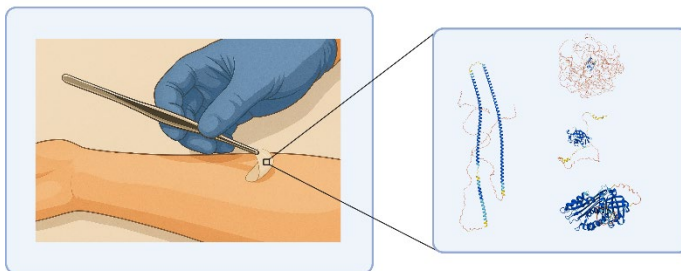
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## Research in Graubünden

### **Adhesive skin strips provide deep insights**

A new method for atopic dermatitis research

At the Center for Precision Proteomics at the Swiss Institute of Allergy and Asthma Research (SIAF) in Davos, researchers have developed a new method to gently, quickly, and efficiently study the so-called skin proteome – the entirety of all proteins in the skin – in large numbers of patients. This is a major advance for research into atopic dermatitis (neurodermatitis). In this chronic inflammatory skin disease, the natural skin barrier is weakened. Allergens, microbes, and irritants can penetrate more easily, triggering inflammation and itching.



Until now, the skin proteome was usually studied by taking skin biopsies under local anesthesia. This procedure is unpleasant and unsuitable for broad application. “Who would want to have pieces of skin cut out every few months just to document disease progression?” says Philipp Gessner, the PhD student who co-developed the new method. Instead, he uses tape strips: adhesive strips that are painlessly pressed onto the skin and then removed. This collects cells from the outermost skin layer, which are subsequently analyzed in the lab.

A single adhesive strip on the skin is enough to provide insights into its molecular processes. Image: SIAF

The idea of using tape strips is not new, but the researchers at the Center for Precision Proteomics succeeded in significantly improving protein isolation from them. They searched for a solvent capable of extracting as many proteins as possible from the skin cells without contamination from the adhesive. After testing more than fifty different variants, they found the optimal combination of chemicals, temperature, and solvent exposure time. The great advantage of this method lies in its painlessness and efficiency. Christoph Messner, head of the Center for Precision Proteomics, is visibly enthusiastic: “We are the first to measure the skin proteome of so many healthy and diseased individuals, gaining deep insights into the molecular processes of the skin and its diseases.”

The result: with just a single adhesive strip, they can now detect and analyze up to 3,000 different proteins simultaneously using modern mass spectrometry, something unimaginable only a few years ago. Analyzing the skin proteome reveals which proteins are present in altered amounts in patients. This allows researchers to better understand the disease mechanisms of atopic dermatitis. Using the new method, they have already analyzed hundreds of samples from children and adults in collaboration with clinics and biobanks. They even discovered surprising correlations, for example, that children attending kindergarten show clearly altered skin

profiles, most likely due to differences in their microbiome. The researchers now want to investigate this more closely.

That this research is possible in Davos is thanks in no small part, Philipp and Christoph stress, to the excellent facilities at SIAF. In addition to the high-tech mass spectrometer, a robot – nicknamed “Donkey” – now assists in the lab. “It takes care of routine tasks, while we have more time for other work or even a coffee,” Philipp says with a smile.

Philipp Gessner and Daniela Heinen

### **The Center for Precision Proteomics**

The Center for Precision Proteomics at SIAF Davos (affiliated with the University of Zurich) analyzes proteomes in clinical samples using state-of-the-art mass spectrometry. The goal is to identify new biomarkers and disease mechanisms in order to develop personalized therapies.

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Christoph Messner, Head  
of the Center for Precision  
Proteomics

Photo credit: Francis Crick  
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