

Needle-free vaccination: How scientists ask skin cells for help

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Vaccination is an effective method of stimulating the human body's immune system to fight against various pathogens (e.g. bacteria, viruses). Worldwide vaccination needs safe, easy-to-use and inexpensive tools for vaccine administration. The skin immune system is a promising target as the skin lies directly in front of us. New research published in the January 2015 issue of *Experimental Dermatology* introduces a new approach to stimulate the skin immune response by applying needle-free vaccination.

"For 10 years, researchers at Charité-Berlin and UPMC-Paris have been working together on how to use the [skin](#) immune system to develop a new, non-invasive vaccination method," said Annika Vogt, a researcher involved in the work from the Department of Dermatology & Allergy (Charité-Berlin, Germany) and UPMC University Paris, Sorbonne Universités, (France). "In this study, we show how a painless method helps such vaccines cross the skin. The method 'wakes up' skin [immune cells](#) so that they are ready to catch the [vaccine](#) and generate an [immune response](#)."

To make this discovery, Vogt and colleagues treated natural skin samples with a novel method called cyanoacrylate skin surface stripping (CSSS). They then applied to the skin surface 200 nm particles which reflect the size of viruses and engineered particulate vaccines and used microscopy to compare the penetration of the particles. They found that the CSSS method enhanced the penetration of the particles to the deeper skin layers, especially to the hair follicles, and activated skin dendritic cells

which are key players in the orchestration of the skin [immune system](#).

Results of this novel approach, which should be further investigated in clinical trials, strongly suggest that the combination of an adequate skin treatment with a vaccine specifically designed to target skin immune cells could become a powerful tool for mass vaccination. It is also envisaged that, combined with conventional injections, such skin vaccination could help in generating broader, more powerful responses and could bring a big step forward in the fight against severe, chronic viral infections, e.g. HIV. "If we learn how to better reach and communicate with skin immune cells from the outside, we would be able to develop new tools for the treatment of allergies, inflammatory skin diseases or skin cancer." concluded Annika Vogt.

More information: Vogt A, Hadam S, Deckert I, Schmidt J, Stroux A, Afraz Z, Rancan F, Lademann J, Combadiere B, Blume-Peytavi U. Hair follicle targeting, penetration enhancement and Langerhans cell activation make cyanoacrylate skin surface stripping a promising delivery technique for transcutaneous immunization with large molecules and particle-based vaccines. *Exp Dermatol*. 2015 Jan;24(1):73-5. [DOI: 10.1111/exd.12589](https://doi.org/10.1111/exd.12589). Epub 2014 Dec 8.

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