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Press Release

Some Large Molecules sneak across skin on their own

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Certain naturally occurring large molecules are able to sneak through the skin at a rate higher than that expected based on their size, according to a study published in the American scientific journal Proceedings of The National Academy of Sciences (PNAS). The study, authored by Prof. Dr. **Prasad Shastri** from the Institute for Macromolecular Chemistry and the cluster of excellence BIOSS Centre for Biological Signalling Studies of the University of Freiburg / Germany and his post-doctoral fellows Dr. **Chris Pino** and Dr. **Daniel Vonwil** in collaboration with Prof. Dr. **Samir Mitragotri** of the University of California, Santa Barbara / USA and Prof. Dr. **Jordan Gutterman** of the MD Anderson Cancer Center, University of Texas Houston / USA, reports a surprising finding that Avicins, plant-derived natural products with molecular weights greater than 2000, penetrate across the human skin on their own.

The researchers report that the unique structure of Avicins, which is comprised of sugar residues linked to a fat-soluble core allows the molecules to gain access to the fatty component of the stratum corneum, the outermost layer of skin, which serves as a barrier for molecules to penetrate. The researchers studied penetration of various fragments of Avicins and discovered that the sugar residues of Avicins play a key role in allowing the molecules to move into and across the stratum corneum.

The findings of the study may open new opportunities in the delivery of therapeutic drugs via skin patches. Delivery of therapeutics across the skin offers many advantages, including ease of administration compared to pills

and lack of pain in contrast to needle injections. However, transdermal delivery of drugs has proved challenging as the stratum corneum allows the passage of only small, oil-soluble molecules such as nicotine and estrogen. The insights gained from penetration of Avicins across the skin might provide design strategies for novel approaches to transport large molecules across the skin. Shastri and his collaborators hope to use the insights gained from this study to design drugs and proteins that can be delivered through the skin.

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