New study says nanoparticles don't penetrate the skin

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The study shows that even the smallest nanoparticles don't penetrate the skin

(Phys.org)—Research by scientists at the University of Bath is challenging claims that nanoparticles in medicated and cosmetic creams are able to transport and deliver active ingredients deep inside the skin.

Nanoparticles, which are tiny particles that are less than one hundredth of the thickness of a human hair, are used in sunscreens and some cosmetic and pharmaceutical creams.

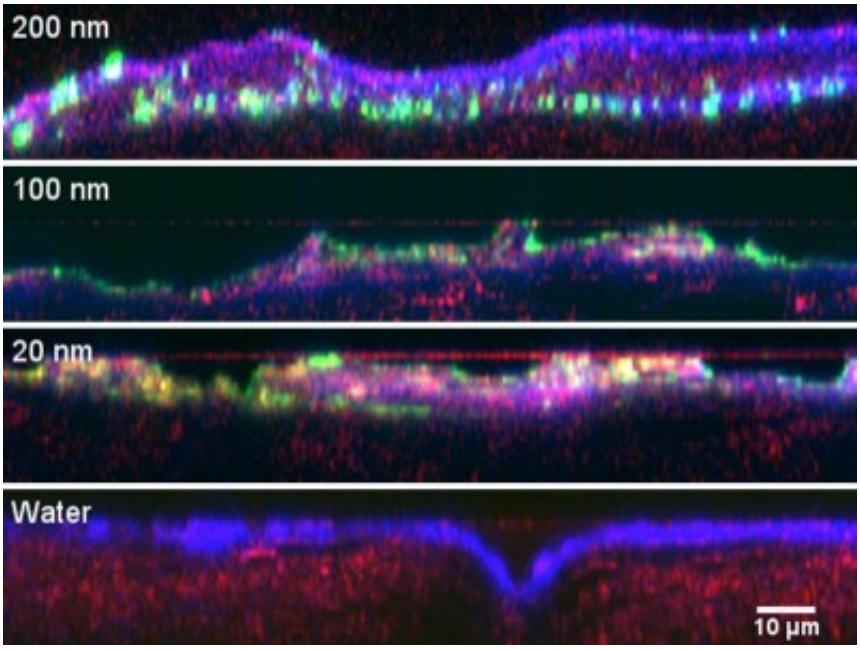
The Bath study discovered that even the tiniest of nanoparticles did not penetrate the skin's surface.

These findings have implications for pharmaceutical researchers and cosmetic companies that design skin creams with nanoparticles that are supposed to transport ingredients to the deeper layers of the skin.

However the findings will also allay safety concerns that potentially harmful nanoparticles such as those used in sunscreens can be absorbed into the body.

The scientists used a technique called laser scanning confocal microscopy to examine whether fluorescently-tagged polystyrene beads, ranging in size from 20 to 200 nanometers, were absorbed into the skin.

They found that even when the skin sample had been partially compromised by stripping the outer layers with adhesive tape, the nanoparticles did not penetrate the skin's outer layer, known as the stratum corneum.



This microscopy image shows the nanoparticles in green on the skin's surface

Professor Richard Guy from the University's Department of Pharmacy & Pharmacology, who led the study, said: "Previous studies have

reached conflicting conclusions over whether nanoparticles can penetrate the skin or not.

"Using confocal microscopy has allowed us to unambiguously visualise and objectively assess what happens to nanoparticles on an uneven skin surface. Whereas earlier work has suggested that nanoparticles appear to penetrate the skin, our results indicate that they may in fact have simply been deposited into a deep crease within the skin sample.

"The skin's role is to act as a barrier to potentially dangerous chemicals and to reduce water loss from the body. Our study shows that it is doing a good job of this.

"So, while an unsuspecting consumer may draw the conclusion that nanoparticles in their skin creams, are 'carrying' an active ingredient deep into the skin, our research shows this is patently not the case."

The results of the work, published in the *Journal of Controlled Release*, suggest that it might be possible to design a new type of nanoparticle-based drug formulation that can be applied to the skin and give controlled release of a drug over a long period of time.

This would enable sustained delivery of the active drug, potentially reducing the frequency with which the patient would have to apply the formulation to the skin.

Provided by University of Bath

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