

INVESTIGATION OF MICRONIZED TITANIUM DIOXIDE PENETRATION IN HUMAN SKIN XENOGRAFTS AND ITS EFFECT ON CELLULAR FUNCTIONS

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Titanium dioxide (TiO₂) nanoparticles are ubiquitously used materials in everyday life (e.g. paints, household products, plastic goods). However, despite the wide array of common applications, their pathogenetic role was also suggested under certain conditions (e.g. pulmonary neoplasias, lung fibrosis). From a dermatological point-of-view, it is also of great importance that TiO₂ also serves as a physical photoprotective agent in sunscreens and is widely used in various cosmetic products. However, the effect of TiO₂ on human cutaneous functions is still unknown. Therefore, in the current study, we investigated the *in vivo* penetration of TiO₂ via human skin transplanted to immunodeficient mice and, furthermore, we measured the *in vitro* effects of nanoparticles on various functional properties of numerous epidermal and dermal cells in culture. Hereby, using various nuclear microscopy methods, we provide the first evidence that TiO₂ nanoparticles *in vivo* do not penetrate through the intact epidermal barrier. However, we also report that TiO₂, when exposed directly to cell cultures *in vitro*, exerts significant and cell-type dependent effects on such cellular functions as viability, proliferation, apoptosis, and differentiation. Our novel findings point out, that micronized TiO₂-containing products should be used with precaution on skin with an impaired stratum corneum barrier function until the potential risk is evaluated in future, clinically-oriented trials.

Key words: titanium dioxide, epidermal barrier, skin
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