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The Penetration of Titanium Dioxide Nanoparticles: From Dermal Fibroblasts to Skin Tissue LAUREN SIPZNER, JAIMIE STETTIN, Yeshivah University High School, ZHI PAN, XIAOHUA FANG, WILSON LEE, Materials Sci. & Engr. Dept, SUNY at Stony Brook, NADINE PERNODET, MIRIAM RAFAILOVICH, Program in Chemical and Molecular Engineering, SUNY at Stony Brook — TiO2 particles are widely used in industry; however concerns are arising about their penetration into cells and tissue. In this study, we cultured dermal fibroblasts together with different commercial formulations of TiO2 nanoparticles and observed the morphology,traction forces, proliferation, and migration of the cells as a function of nanoparticles dispersion and concentration. The location of the particles within the cell was studied with TEM. We found significant penetration after 30 minutes. In all cases damage to cell structure and function was observed. Actin fibril formation was disturbed, proliferation was severely hindered, and cell motility was impaired. The effects were more pronounced in fibroblasts from older subjects. These effects were attributed to both dimensionality, as well as UV photocatalysis of the particles. The implications for tissues will be discussed. This work is supported by NSF-MRSEC program.

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