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The cytotoxic effects of titanium oxide and zinc oxide nanoparticles oh Human Cervical Adenocarcinoma cell membranes TATSIANA MIRONAVA, Stony Brook University, ARIELLA APPLEBAUM, ELIANA APPLEBAUM, Ma'ayanot Yeshiva High School, SHOSHANA GUTERMAN, Yeshiva University High School for Girls, KAYLA APPLEBAUM, Yeshiva University, NY, DANIEL GROSSMAN, Queens College CUNY, CHRIS GORDON, PETER BRINK, H.Z. WANG, MIRIAM RAFAILOVICH, Stony Brook University — The importance of titanium dioxide (TiO_2) and zinc oxide (ZnO), inorganic metal oxides nanoparticles (NPs) stems from their ubiquitous applications in personal care products, solar cells and food whitening agents. Hence, these NPs come in direct contact with the skin, digestive tracts and are absorbed into human tissues. Currently, TiO_2 and ZnO are considered safe commercial ingredients by the material safety data sheets with no reported evidence of carcinogenicity or ecotoxicity, and do not classify either NP as a toxic substance. This study examined the direct effects of TiO_2 and ZnO on HeLa cells, a human cervical adenocarcinonma cell line, and their membrane mechanics. The whole cell patch-clamp technique was used in addition to immunohistochemistry staining, TEM and atomic force microscopy (AFM). Additionally, we examined the effects of dexamethasone (DXM), a glucocorticoid steroid known to have an effect on cell membrane mechanics. Overall, TiO_2 and ZnO seemed to have an adverse effect on cell membrane mechanics by effecting cell proliferation, altering cellular structure, decreasing cell-cell adhesion, activating existing ion channels, increasing membrane permeability, and possibly disrupting cell signaling.

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