Titanium dioxide and zinc oxide nanoparticles are not mutagenic in the mouse lymphoma assay but modulate the effect of UVC-light post-treatment

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Nanogenotoxicity is an emergent field, relevant for estimating the potential genotoxic risk of nanomaterials. Among nanomaterials, titanium dioxide nanoparticles (TiO_2 NPs) and zinc oxide nanoparticles (ZnO NPs) are widely used in industrial products including cosmetics, sunscreens, UV-light blockers, paints and medical materials. Since conflicting data exist on their possible risk for humans, we have selected two different NP sizes (between 1-50 nm and 50-100 nm) of TiO_2 (1, 10 and 100 µg/mL) and ZnO NPs (1, 10 and 100 µg/mL) and their microparticulated forms to determine their ability to induce mutagenicity in mammalian cells. There is an important lack of mutagenicity data on mammalian cells for such products, which represents an important gap for any risk-assessment estimation. We have used the mouse lymphoma assay (MLA) to determine the mutagenic potential of these NPs. The MLA assay detects a broad spectrum of mutational events, from point mutations to chromosome alterations. In addition, interactions with UVC-light (0.004 J/cm^2) have also been analysed. UVC-light exposures ranging from 0.0001 to 0.004 J/cm^2 produce a direct dose-response relationship with statistical significance after exposures equal or higher than 0.002 J/cm^2. Neither the selected NPs nor their microparticulated forms are mutagenic in the MLA assay. Nevertheless these NPs reduce the mutagenic effect of UVC-light, in a direct dose-effect relationship. These *in vitro* results, obtained with the L5178Y/Tk$^{+/-}$-3.7.2C mouse lymphoma cell line, contribute to increase the current database on the TiO_2 and ZnO NPs mutagenic effects as well as to the open the discussion about the possible risk associated with their use in photoprotection sunscreens.