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Titanium dioxide nanoparticles induce a toxic effect on rat cardiomyoblasts H9c2

Rebeca Lopez-Marure¹, Elizabeth Huerta-Garcia¹, Ivan Zepeda Quiroz¹ and Angelica Montiel-Davalos²¹Instituto Nacional de Cardiología Ignacio Chavez, Mexico²Instituto Nacional de Cancerología, Mexico

Titanium dioxide nanoparticles (TiO₂ NPs), a nanotechnology product, are used in the industry in the production of cosmetics, sunscreens, household products, surface coatings and plastics, among others. Due to their small size, they can translocate from lungs to blood and have direct contact with cardiac cells; therefore, in this work the toxic effect of TiO₂ NPs on cardiomyoblasts of rat H9c2 was evaluated. Cell proliferation and viability were determined by the MTT reduction assay and crystal violet staining, respectively; oxidative stress by DCF oxidation and changes in the mitochondrial potential with Rh123. Cell death was evaluated by annexin-V, staining with iodide propidium and formation of autophagic vacuoles was measured by flow cytometry. Phases of the cell cycle were also evaluated determining the DNA quantity. TiO₂ NPs decreased cell proliferation and metabolic activity from 20 µg/ml at 48 hours of treatment, induced oxidative stress increasing DCF oxidation and produced changes in the mitochondrial potential and disruption of the cell plasma membrane. These effects were not related with changes in cell cycle phases; however, they were associated with an increase of events in the sub-G1 region which was linked with necrotic death and autophagy. In conclusion, TiO₂ NPs induced a toxic effect on cardiomyoblasts indicating that human exposure to these nanoparticles could be dangerous to health and could be associated with the development of cardiovascular diseases, where oxidative stress and cell death are involved.

Biography

Rebeca Lopez-Marure is the Student of Biology and obtained her Doctorate in Biomedical Sciences from Autonomous National University of Mexico. Her topic of investigation is the signal transduction involved in the antiproliferative effect induced by Dehydroepiandrosterone (DHEA) in cancer and its protective effect on cardiovascular diseases. She has published 40 papers in international journals. She works as Researcher in Medical Sciences in the National Institute of Cardiology "Ignacio Chavez" in Mexico City.

rlmarure@yahoo.com.mx

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