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Possible mutagenicity in *Ha-Ras* gene by TiO₂ nanoparticles in mice

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Increase using of nanoparticles in the industry ranging from health care products to cosmetics to dietary supplements let human exposure to nanoparticles is a driving concern. TiO₂ nanoparticles are used in a broad range of applications due to their high stability, corrosion resistance and photocatalytic properties. Recent evidences have shown TiO₂ nanoparticles to induce inflammatory and genotoxic response in different animal and human cell lines. However, the mechanisms involved in nano-TiO₂ induced genotoxicity and carcinogenicity have not been clearly defined and are poorly studied in vivo. Ras gene is a proto-oncogene that normally regulate the cell proliferation, the aim of the present study is to evaluate point mutation that may be induced by different treatments (acute and sub-acute) and doses of titanium dioxide nanoparticles TiO₂ (<100 nm) in testis, lung and kidney of mice in Ha-ras gene exons 2 and 3 (hot spot exons) as an example of oncogenes using PCR-Single-Strand Conformation Polymorphism (SSCP) analysis and sequencing of the mutant samples. Sequencing of mutant samples revealed substitution mutations caused amino acid substitution and insertion mutations caused frame shift and insertion mutations found outside coding sequence. In conclusion, Single Strand Conformation Polymorphism (SSCP) analysis of Ha-ras exons 2, 3 and sequencing studies showed that TiO₂ nanoparticles significantly increased the incidence of band alterations and induced different point mutations at different dose levels and treatments in lung, kidney and testis compared to control. Anyway, further investigation should be considered to figure out the possible role of long exposure of TiO₂-NPs in cancer initiation.

Biography

Haidan M Salem is an Academic Lecturer of Molecular Biology and Genetics and completed her PhD in 2014 at Cairo University, Egypt. Currently, she is supervising one PhD thesis and four MSc theses, working on two projects entitled "Investigation of the possible role of par-4 as a therapeutic pro-apoptotic protein in hepatocellular carcinoma" and "Efficiency of using Camptothecin and 7-hydroxy-6-methoxycoumarin encapsulated in chitosan nanoparticles in Hepatocellular carcinoma treatment". She has taught a number of biology courses, a number of practical molecular and cytogenetic assays and also has an extensive experience working with DNA, RNA and proteins.

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