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P-42: Comet assay assessment of oleic acid-coated magnetite nanoparticles on human SHSY5Y neuronal cells

Joao P. Teixeira¹, Blanca Laffon², Gözde Kiliç², Natalia Fernández-Bertólez², Carla Costa¹, Solange Costa¹, Eduardo Passaro² and Vanessa Valdiglesias²

¹Environmental Health Department, National Institute of Health, Portugal

²Universidade da Coruña, Spain

Superparamagnetic iron oxide nanoparticles (ION) have a wide range of potential applications. Among them, the most important uses in biology and medicine are as contrast agents in magnetic resonance imaging, as carriers for drug delivery or transfection and as therapeutic agents in cancer therapy by magnetic field-mediated hyperthermia. For all these applications, ION must be introduced in the human body and come into contact with cells and tissues, so it is imperative to know the potential risks associated to this exposure. Nevertheless, although ION biocompatibility has been reported to be high, there is a lack of information regarding their genotoxic potential, especially on the nervous system. Thus, the main objective of this work was to examine possible genotoxic effects of ION (crystalline phase magnetite, covered by oleic acid) on human SHSY5Y neuronal cells by the standard alkaline comet assay, along with its OGG1 enzyme modified version to analyse oxidative DNA damage. Previously we evaluated the possible interference of the ION with the comet assay methodology and with OGG1 enzyme activity. ION were dispersed both in complete and serum-free cell culture media, and cells were exposed to four concentrations in the range 10-200 µg/ml for 3 and 24 h. Results obtained showed increases in DNA damage, both primary and oxidative, after treatment with oleic acid-coated ION, even though the highest concentrations were found to interfere with OGG1 enzyme activity in incomplete cell culture medium. The results of this study encourage the need for checking the suitability of comet assay when used for testing genotoxicity of nanomaterials. Further investigations are required to assess the ability of ION to induce oxidative stress, and to elucidate the specific mechanism involved in primary DNA damage induced by these ION.

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