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Viability assay and DNA double strand break induction in nervous system cells exposed to cerium dioxide nanoparticles

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Cerium dioxide nanoparticles (CeO₂ NP) show antioxidant enzyme mimetic properties and free radical scavenging activity. These properties make them a promising material for biomedical applications, but their potential adverse effects are not totally understood yet. Our objective was to assess the biological behaviour of CeO₂ NP in human neuronal and glial cells. After carrying out the physical-chemical characterization of the CeO₂ NP and analysing their ability to be taken up by neuronal and glial cells, the possible alterations in cell viability and induction of DNA double strand breaks were determined by means of MTT assay and γ H2AX assay, respectively. The possible existence of interference of the NP with the assay methodologies was previously addressed and corrected when necessary. The results obtained showed that, even though there was a significant dose- and time-dependent internalization of the NP by both cell lines, the CeO₂ NP generally presented scarce cyto- or genotoxicity, essentially depending on the NP exposure time and being restricted to higher doses. These results provide a better understanding of the interaction of CeO₂ NP with cellular systems and their possible adverse effects, specifically at nervous system level.

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