CYTOTOXIC EVALUATION OF TITANIUM OXIDE NANOTUBES IN V79 CELLS AND IN PRIMARY FISH HEPATOCYTES

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Single- or multi- walled nanotubes are becoming increasingly studied, not only for their possible applications in the eletronics, optics, and mechanical materials, but also in biological applications, such as heterogeneous catalysis, imaging and drug delivery. Because of this, it is imperative to examine the toxicity of these titanate-based nanostructures. The objective of this study was to examine the cytotoxicity of water-dispersible titanium oxide nanotube and its precursors (sodium titanate and anatase titanium oxide) in a Hamster fibroblast cell culture (V79 cells) and in fish primary hepatocytes. We have determined the biological response of the cells in culture dosed with varying concentrations of nanotubes. The titanium nanotubes were synthesized by hydrothermal treatment of TiO_2 in NaOH. The nanoparticles were characterized by scanning electronic microscopy (SEM), transmission electronic microscopy (TEM) and Fourier transform infrared (FTIR). They showed external diameter of 10 nm and length superior to 100 nm. The nanotubes did not show cytotoxic effects in fish hepatocytes using phosphatase activity and MTT reduction assays (the major concentration used was 1 mg/mL). In V79 cells the major cytotoxic compounds was the precursor anatase titanium oxide (IC40 of 1mg/mL) determined using different cell viability assays (MTT reduction, neutral red uptake and nucleic acid content). The other precursor (sodium titanate) and the titanium oxide nanotube did not show significant cytototoxic effects on V79 cells and fish hepatocytes until the maximum concentration used (1 mg/mL). According to our data, the cytotoxicity results showed only very limited impact of cell viability, therefore the nanotubes could be used in ambient detoxification processes since they not showed cytotoxic effects on V79 cells and fish hepatocytes at the studied conditions.

Supported by: Capes, CNPq and FAPESP.

Keywords: V79 cells, fish hepatocytes and nanotubes.