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IN VITRO EVALUATION OF THE CYTOTOXICITY OF NANOPARTICLES CONTAINING AN INNOVATIVE ORGANOSELENIUM COMPOUND IN HEALTHY AND TUMOR CELL LINES

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INTRODUCTION: Nanotechnology has emerged as an innovative approach in various fields, especially in healthcare, being applied in the development of strategies for disease prevention, diagnosis, and treatment, such as cancer. In this sense, the use of polymeric nanoparticles (NPs) as drug carriers in the body presents significant advantages by allowing the targeted delivery of the encapsulated bioactives at the site of action, increasing drug solubility, bioavailability, and stability, as well as reducing possible adverse and non-specific toxicological effects, highlighting its potential for oncological treatment. However, biological safety tests are need to verify the biocompatibility of the formulation, considering that nanomaterials interact with cells, fluids, and tissues, and can cause cytotoxicity. Therefore, *in vitro* studies of biological safety using healthy cell lines are useful to evaluate the toxicological profile of nanoformulations. **OBJECTIVE**: Evaluate and compare the cytotoxicity of NPs containing the organoselenium compound 5′-seleno-(phenyl)-3′-(ferulic-amido)-thymidine (AFAT-Se) (NPs-AFAT-Se) in two healthy cell lines and one tumor cell line. **MATERIALS AND METHODS:** The cytotoxicity analysis of the NPs was performed using a monolayer/bilayer cell culture model (2D), with two healthy cell lines (L929, murine fibroblasts and Vero E6, monkey kidney epithelium), and a sensitive tumor cell line (HT-29, colorectal cancer). For comparative purposes, the cytotoxicity of free AFAT-Se was also verified. The MTT cell viability assay was conducted for the tumor cell line after 72h of treatment with the NPs and free AFAT-Se and, for the healthy cell lines, after 24h of treatment. **RESULTS AND CONCLUSION:** The NPs-AFAT-Se showed high viability in healthy cells at all tested concentrations (0.01 to 60 µg/mL), with viability values higher than 85%. In contrast, for HT-29, the highest concentration used in the treatment with NPs (2.5 µg/mL) revealed only 45% of cell viability, highlighting the specific cytotoxic effects of NPs on tumor cells. The non-encapsulated AFAT-Se did not significantly reduce cell viability. The low cytotoxicity on L929 and Vero E6 demonstrates the biocompatibility and safety profile of the nanoformulation, as well as the selectivity of the NPs-AFAT-Se to the tumor cells.

Keywords: Nanotoxicology; antitumor activity; safety tests; polymeric nanoparticles; *in vitro* toxicity.

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