EVALUATION OF THE IN VITRO AND IN VIVO TOXICITY OF GOLD NANOPARTICLES SYNTHESIZED BY GREEN NANOTECHNOLOGY

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Researchers and laboratories around the world have studied gold nanoparticles. In medicine, several studies demonstrate the applicability of gold nanoparticles (AuNPs) in the treatment and diagnosis of cancer. Green nanotechnology uses phytochemical agents to synthesize and stabilize nanoparticles. The phytochemical epigallocatechin-gallate (EGCG) reduces and stabilize gold nanoparticles by functionalizing the surface of the molecule. Such chemical groups allow binding to overexpressed receptors on some types of tumors as demonstrated in studies performed with PC3 prostate cancer cells. With the advancement of nanotechnology, a large number of nanoparticles are produced on a daily basis. However apart from their possible applications it is necessary to evaluate the environmental impact of these molecules as well as find ways for proper disposal. The embryonic zebrafish (*Danio rerio*) trial has recently emerged as an interesting method for evaluating *in vivo* nanotoxicity providing a more complex system analysis than in typical cell cultures and less expensive if compared to large-scale biocompatibility studies performed in rats and mice. The objective of this study was to evaluate the *in vitro* and *in vivo* toxicity of EGCG-AuNPs by means of the cytotoxicity by neutral red uptake methodology according to the International Standard Organization [ISO 10993-5, 2009] and *in vivo* test based on the OECD guideline on Fish Embryo Toxicity Test (FET) (OECD, 2013). The spectrophotometric band at 535 nm observed is characteristic of the formation of AuNPs. Nanoparticles synthesized with EGCG presented a size of 32 ± 4 nm as determined by transmission electron microscopy and the hydrodynamic diameter of these particles was about 60 ± 18 nm obtained by dynamic light scattering. The EGCG-AuNPs showed no cytotoxicity up to 4.2 $\mu g.L^{-1}$. In the FET test regarding the acute ecotoxicity assay the LC50/96 hours revealed no toxicity at concentrations up to 1.8 mM.

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