IN VIVO TOXICOLOGICAL EVALUATION OF BIODEGRADABLE POLYMERIC NANOCAPSULES

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Introduction: With the industrialization of nanotechnology, exposure to nanoparticles has increased significantly. However, little is known about the impact of this exposure in medium and long-term. Thus, nanotoxicology is emerging as an important specialty of nanotechnology, and refers to the study of the interactions of nanostructures with biological systems with an emphasis on elucidating the relationship between the physical and chemical properties (e.g. size, shape, surface chemistry, composition, and aggregation) of nanostructures with induction of toxic biological responses. In the past five years, a majority of nanotoxicity research has focused on cell culture systems; however, the data from these studies could be misleading and require verification from animal experiments. Studies of the toxicity of biodegradable nanoparticles are important not only for the evaluation of nanostructured materials, but to ensure the safety of high-tech formulations, made with biodegradable materials permitted by law for use in bulk form or in solution, but still must be reviewed when nanostructured, especially when the exposure is chronic and systemic. So, understanding the relationship between the physical and chemical properties of nanostructures and their behavior *in vivo* provides a basis for assessment of toxicity.
Objective: The effects of poly(ε-caprolactone) nanocapsules, a biodegradable polymer, will be evaluated through acute, subchronic and chronic toxicological tests, in which blood and urine biomarkers, also tissue samples will be evaluated in rats. Also, will be a clinical and laboratorial evaluation, including biomarkers of oxidative stress with assessment of some markers such as malondialdehyde, protein carbonyls, glutathione, endogenous antioxidant enzymes, among others. Moreover, there will be an evaluation of some markers of cardiac injury, inflammation and immunological markers, as well as the realization of the comet assay for assessment of DNA damage.
Materials and Methods: After acute (intraperitoneal), subchronic (intraperitoneal) and chronic (oral and subcutaneous) exposure to nanocapsules, blood, urine and tissues samples of rats will be collected for evaluation of toxicity in hematological, hepatic, cardiac and renal parameters, as well as its possible mechanisms through oxidative stress biomarkers evaluation. The methods for these determinations have been previously validated.

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