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## Role of Chitosan-Coated Silver Nanoparticles on the Liver and Spleen Tissues of Mice: Histological and Ultrastructural Studies

Azza A. Attia<sup>1\*</sup> and Hend A. Noor<sup>2</sup>

<sup>1</sup>Zoology Department, Faculty of Science, Alexandria University, Egypt

<sup>2</sup>Biophysics Department, Medical Research Institute, Alexandria University, Egypt

The female population is particularly deserves special attention because toxicity may affect fetal development. In the present work, chitosan is used as a coating and stabilizing agent in synthesizing chitosan-coated silver nanoparticles. Two groups of pregnant mice were injected intraperitoneally with 100 mg/kg of the prepared citrate and/or chitosan-coated AgNPs, every other day after mating until the 19<sup>th</sup> day of pregnancy. Control pregnant mice received the vehicle (0.5 ml of 0.9% saline solution, and treated by the same manner). Characterization of the citrate-coated and chitosan-coated AgNPs by transmission electron microscope (TEM) and particle size analysis showed that the granules are spherical in shape and of 26.2 and 36.7 nm in size, while the UV-visible (UV-Vis) absorption spectrum showed a strong, single and narrow band peak at 422 and 437 nm respectively. In citrate-coated AgNPs, the histopathological examination revealed hydropic degenerative changes, cytoplasmic vacuolization, and inflammatory cells infiltration in the hepatic tissue. Ultrastructural results revealed the appearance of abnormal accumulation of glycogen, and presence of the nanogranules inside the mitochondria and nucleus of hepatocytes, implicating their direct involvement in the mitochondrial toxicity and DNA damage. Examination of spleen sections revealed marked loss in lymphocyte population and the observable decrease in the reticular cells and macrophages. These histopathological changes were not evident after treatment by chitosan-coated AgNPs. In conclusion, chitosan as biopolymer loaded on AgNPs, could provide a good example in lowering cytotoxicity in the liver and spleen as compared to citrate-coated AgNPs, probably due to the chemical reduction method used during preparation of AgNPs.

**Keywords:** Chitosan, silver nanoparticles, characterization, hepatocytes, spleen.