ASSESSMENT OF ACCUMULATION AND TOXICITY OF CADMIUM SELENIDE NANOPARTICLES (CdSe NPs) ON MICE *IN VIVO*

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Abstract: Quantum dots (QDs) such as cadmium selenide (CdSe), are the new fluorophores for use in bio-imaging. However, toxicological aspects still remain unclear and thus there are serious health concerns associated with use of these materials in medical application and diagnostics. A critical but still an unknown point is the pharmacokinetics of the CdSe NPs in the body since, these nanometer size particles are readily transported through blood and enter the cells. In this study, we have investigated the accumulation, excretion and toxicity of CdSe QDs of 3.0 nm in diameter. Aqueous solutions of CdSe were exposed to UV light (365 nm) for 2 h. Mice were exposed to two different doses (3.6 mg and 0.36 mg) of thiol-stabilized CdSe NPs *in vivo*. A total of 45 CD-1 mice were grouped as nine mice per group (one control and four treatments). Treatments received either UV-exposed or –unexposed NPs. Single injection of 0.3 mL of NPs (12 mg/L) was made through tail vein. Animals were sacrificed periodically at 1st, 7th and 14th day of injection to collect samples, including the intestine, kidney, liver, lung, heart, brain and spleen. Urine and feces were collected at 12 h, 24 h, 48 h, 7th and 14th day of injection. The organs were digested in acid and then analyzed for Cd and Se content by ICP-MS. Malondialdehyde (MDA) assay was conducted on liver samples to determine oxidative stress levels. The results showed that CdSe NPs accumulate over time. Highest accumulation was found in the spleen followed by the liver, kidney and intestine. No significant accumulation occurred in the brain, heart, and lungs. Data from urine and fecal samples indicated that NPs were excreted through feces. No significant Cd detected in the urine. MDA levels increased significantly in the treatments indicating that exposure to CdSe NPs induced oxidative stress.

Key words: CdSe nanoparticle, toxicity, accumulation, oxidative stress, CD-1 mice, in vivo exposure

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