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Biodistribution and Toxicology of Carbon Dots Coated With Boronate in Female C57BL/6 Mice with and Without Tumor

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Extended Abstract

With advent of nanotechnology and nanoscience, carbon quantum dots (C-Dots) are current applied at various fields of biomedical sciences, physics, chemistry and others. C-Dots are carbon particles in nanometric scale that possess different proprieties from macrometric scale, like fluorescence. C-Dots do not show toxicity of quantum dots because they do not possess heavy metals in their constitution, such as cadmium. Because of their low toxicity, C-Dots are current used as chemical sensors, biosensors and to obtain bioimages (Lim et al., 2015). Depending on what tissue or what physiological response from cells are desired to obtain, different types of molecules can be attached to nanoparticles to obtain determinate response. One interesting molecule that has biological applications and can be attached to C-DotsB is boronate. Because boronate can bind to glucose molecules, it is used as sensor for blood sugar, and may detect signs of diabetes mellitus (Shen and Xia, 2014). As previously works showed (Szablewski et al, 2013), one reason for cancer cells growth is due to their capability to pick up large amount of glucose molecules. Knowing that boronate can bind to glucose, C-DotsB coated with boronate can accumulate at sites that demand a large amount of glucose, like tumor sites.

The aim of this study is to evaluate by analyses of blood and serum samples, weight of animals, intake of water and food, light microscopy, fluorescent microscopy and fluorescent images *in vivo* and *ex vivo* the distribution and toxicity of C-Dots coated with boronate (C-DotsB) in mice C57BL/6 with or without tumor. For this work female mice C57BL/6 (n=24) were used, distributed in three treatment groups (n=6) and one control group (n=6, G1). One group received C-DotsB and was monitored for two days (G2); one group received C-DotsB and was monitored for 30 days (G3); and for one group were induced tumor with B16F10 cells and after 8 days of tumor cells inoculation were applied C-DotsB and

animals were monitored for two days (G4). For each treated group it was injected 100 µL of C-DotsB in lateral tail vein. Animals from G1 and G3 had their weight, food and water intake evaluated twice per week for toxicological studies. Fluorescent images from the animals were made after 0h, 2h, 4h, 6h, 24h and 48h of their treatment. After 30 days of treatment, G1 and G3 were euthanazied, and after 48h of treatment, G2 and G4 were euthanized and it was collected their blood and the following organs: brain, lungs, liver, spleen, kidney and tumor. It was made fluorescent images of the organs collected. It will be analyzed number of erythrocytes, leukocytes and thrombocytes with the blood samples. With serum samples, will be measured the levels of glucose, AST and ALT enzymes. Collected organs were fixed in paraformaldehyde and processed for histology. The cuts (5 µm) will be stained by hematoxylin and eosin (HE). The analysis will be performed by light microscopy and fluorescent microscopy.

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