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A reproductive toxicity study shows the properly encapsulated cadmium-based quantum dots are well-tolerated by mice

Jianwei Liu[1], Ling Ye[1], Ken-Tye Yong[2,3], Rui Hu[2], Jing Liu[1], Liwei Liu[4], Yazhuo Hu[1], Hongyan Chen[1] and Jinghui Yang[1]
[1]Chinese PLA General Hospital, China
[2]Nanyang Technological University, Singapore
[3]University at Buffalo, the State University of New York, USA
[4]Chang Chun University of Science and Technology, China

Cadmium-based nanocrystals are among the brightest, best-studied and most widely available quantum dots for bioimaging. However, concerns over the cytotoxicity of their cadmium content have limited their medical translation applications. Reproductive toxicity assessment is one of the important parts of the nanomaterials biosafety evaluation. In the present study, the reproductive toxicity of quantum dots (QDs) in Kunming mice was investigated. Female and male mice were intravenous injected with 25 mg kg-1 phospholipid micelle-encapsulated CdSe/CdS/ZnS quantum dot. Two weeks later, treated female and male mice were caged in pairs for mating. The following determination demonstrated there were no significant reproductive difference between QD treated and the control animals. The days of pregnancy were 21.4 ± 0.6 (the control group) and 20.6 ± 1.0 (QD group). The body weights of pregnancy mice before delivery were 55.3 ± 3.8g and 57.2 ± 4.9g. The offspring numbers were 13.5 ± 1.4 and 13.0 ± 1.5. The sex ratios of ♀:♂were 6.0 : 7.4 and 6.7 : 6.1, respectively. The body weight of three weeks F1 mice were 12.0g (♀), 12.7g (♂), and 12.3g (♀), 12.6g (♂) in the control and treatment groups. Hematology, blood biochemistry, organ histology and their respective fluorescent images have shown no changes. Overall, this report indicates that the formulated micelle-encapsulated QDs were not reproductive toxic to the Kunming mice and they have the potential to be utilized for specific clinical applications such as image-guided surgery, drug and gene delivery.

Biography

Jianwei Liu graduated from the Department of Clinical Medicine, Beijing Medical University in 2000. He is the chief technician of the Institute of Geriatrics, Chinese PLA General Hospital. He has published more than 50 papers in English or Chinese. Recent researches involving nanobiology of quantum dots published on ***Nature Nanotechnology*** (2012, 7(7): 453- 458), ***ACS Nano*** (2013 Jul 15. [Epub ahead of print]), ***RSC Advances*** (2013, 3:1768 - 1773), etc.

lye301@gmail.com

Neomorphic moonlighting TPPP/p25 protein in CNS diseases: Regulatory functions by day and pathological functions at night

Judit Ovadi
Hungarian Academy of Sciences, Hungary

Moonlighting proteins comprise proteins with multiple functions that do not originate at gene but protein level. In addition, there are special multifunctional proteins with neomorphic moonlighting functions displaying physiological and pathological functions due to their interactions with distinct partners; a prototype of these proteins is the brain-specific Tubulin Polymerization Promoting Protein (TPPP/p25). This disordered protein with its extended unstructured N- and C-terminals straddling a flexible region comprising binding domains involved in physiological (tubulin, GTP, zinc) or pathological (α-synuclein, β-amyloid) interactions. In normal brain TPPP/p25 is predominantly expressed in oligodendroglial cells; it is indispensable for the differentiation of the progenitor cells by its rearrangement role in the microtubular network in the course of elongation of projections necessary to the axon ensheathment. The non-physiological TPPP/p25 expression with its destructive potency can generate CNS diseases: synucleinopathies (Parkinson's disease, multiple system atrophy), glioma, or sclerosis multiplex. Very recently distinct binding motives involved in the physiological or pathological interactions have been identified that have innovative impact in the evaluation of specific peptidomimetics for drug discovery.

ovadi.judit@ttk.mta.hu