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Polymeric nanoparticles for CNS targeting: It is time to think about the nanotoxicological aspects

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The employment of biodegradable polymeric nanoparticles to deliver therapeutic drugs and macromolecules to the CNS has been pioneered in 1999. Since then, various polymers have been utilized to tailor nanoparticles with desirable properties from the “efficiency” point of view. In comparison with liposomes, a platform that have been enrolled into clinical trials and proved successful, several challenges face the development of CNS-targeted polymeric nanoparticles. The formulation, stability, processability, and cost/benefit ratio are not the sole factors holding back the development of polymeric nanoparticles. The safety parameter of short and long-term administration of such nanoparticles is usually overlooked, especially that the exact *in vivo* fate of polymeric nanoparticles is not fully understood. Less than 2% of the published articles relating to CNS targeted polymeric nanoparticles between 2011 and 2015 dealt with the nanotoxicological assessment especially in the brain, liver, and kidney. In this presentation, the formulation factors that might affect the overall safety of the polymeric nanoparticulate delivery systems such as the particle size, surface properties, coatings, tendency to aggregation, and the addition of stabilizers will be discussed. In addition, the several *in vitro* and *in vivo* experimental models used to assess the toxicity of polymeric nanoparticles will be summarized. This presentation aims to redirect the current interest of pharmaceutical researchers to nanotoxicological aspects, and encourage them to comb their efforts with those of pharmacologists and toxicologists so as to push forward the development of polymeric nanoparticles for CNS drug delivery in the near future.

Biography

Amira Sayed Mahmoud Hanafy has registered for her PhD thesis on CNS delivery of neurotherapeutics in Sep 2013 in Faculty of Pharmacy, Alexandria University, Egypt. She is an Assistant Lecturer at Faculty of Pharmacy and Drug Manufacturing, Pharos University in Alexandria (PUA). She is a Referee in *AAPS PharmSciTech* journal. She had the opportunity to attend the IBRO-UNESCO Interregional School on Computational Neuroscience, 2012, India, organized by International Brain Research Organization (IBRO), and won a travel grant for this school. She was an Organizer in the “Nanoscience and Nanotechnology at Glance” International Conference, Cairo-Alexandria, Egypt, 15-16 January 2009. She has 4 publications namely, ‘Novel treatment strategies for brain tumors and metastases’, *Pharmaceutical Patent Analyst*; ‘Pulsatile core-in-cup valsartan tablet formulations: *In vitro* evaluation’, *Asian Journal of Pharmaceutical Sciences*; a poster published in the 4th International Conference and Exhibition on Pharmaceutics & Novel Drug Delivery Systems, March 24-26, 2014 at Hilton San Antonio Airport, USA, titled as ‘Valsartan time-clock pulsatile tablet formulations: Preparation and *in vitro* evaluation’; a poster published in the IBRO-UNESCO Interregional School on Computational Neuroscience, 2012, India, titled as ‘Formulation and Evaluation of Some Pulsatile Drug Delivery Systems’.

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