Beverly A Rzigalinski, J Nanomed Nanotechnol 2018, Volulme: 9
DOI: 10.4172/2157-7439-C3-072

Nano World Summit: Current and Future Perspectives

June 06-07, 2018 | Philadelphia, USA

Beverly A Rzigalinski

Edward Via College of Osteopathic Medicine, USA

Redox-active nanoparticles in treatment of human neurodegenerative disease

To quote the physicist Richard Feynman, "At the atomic level, we have new kinds of forces and new kinds of possibilities, new kinds of effects" which are evolving as the frontier of nanotechnology. Although the principles of nanoscience apply to the biological realm, application of nanotechnology to medicine is just beginning. Nanoparticles represent catalytic entities that differ substantially from what we traditionally think of as drugs. Their catalytic activities result from actions at the quantum level – providing novel strategies for treatment and prevention of disease. Of particular interest are redox active nanoparticles such as cerium oxide nanoparticles (CeONPs), which are regenerative free radical scavengers under biological conditions, where elevated oxidative stress is a key component of disease. Increased oxidative stress and free radical production are associated with many neurodegenerative conditions, including aging, trauma, Alzheimer's and Parkinson's diseases, and numerous others. Our work demonstrates that CeONPs are potent free radical scavengers in tissue culture and *Drosophila* models. Nanoparticles increased the lifespan of mixed brain cells and neurons in culture and protected cells from free radical-mediated injury. At the organism level, CeONOs increased mean and maximum life span in *Drosophila* and improved motor function during aging. CeONPs enhanced survival of *Drosophila* after exposure to paraquat (which induces death via free radical production) and enhanced functional recovery. CeONPs were also neuroprotective in pre-clinical mammalian models for traumatic brain injury and Parkinson's disease, and improved functional outcome. This work suggests that CeONPs are a potent disease-modifying nanopharmaceutical for future treatment of neurodegenerative disease.

Biography

Beverly A Rzigalinski is a Professor of Pharmacology at the Edward Via College of Osteopathic Medicine in Blacksburg, VA. She holds joint appointments in the Virginia Tech/Wake Forest School of Biomedical Engineering, and the Virginia-Maryland Coll. of Veterinary Medicine. She has received her BS in Biology from Rutgers University, an MS in Biochemistry and Toxicology New York University, and a PhD in Biochemistry and Pharmacology from Eastern Virginia Medical School and Old Dominion University. She is recognized internationally for her work in nanomedicine and her seminars in the field have been translated into over 10 languages.

brzigali@vcom.vt.edu

Notes: