Ying Peng et al., J Clin Toxicol 2014, 4:4
http://dx.doi.org/10.4172/2161-0495.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Summit on
Toxicology & Applied Pharmacology
October 20-22, 2014 DoubleTree by Hilton Hotel Chicago-North Shore, USA

The protective effect of astaxanthin on fetal alcohol spectrum disorder in mice

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Background: Astaxanthin (AST), known as a carotenoid pigment, is a strong antioxidant which protects membranous phospholipids and other lipids against peroxidation. Evidences showed that astaxanthin had up to several-fold stronger free radical antioxidant activity than vitamin E and carotene. In double-blind, randomized controlled trials, astaxanthin was found to lower oxidative stress in several human health conditions. Moreover, it is known that ROS up-regulate proinfalmmatory cytokines such as tumor necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), and IL-6. High levels of these cytokines are associated with neurotoxicity. Whereas, astaxanthin was found to reduce makers of inflammation e.g., TNF-α. Thus, astaxanthin has been deemed to be safe and has potential as a therapeutic antioxidant and anti-inflammation agent for further testing in human diseases.

Objective: To explore the protective effect of astaxanthin on fetal alcohol spectrum disorder in mice, and to investigate the underlying mechanisms.

Methods: The morphology, expression of neural marker genes, oxidative stress indexes, and inflammatory factors in mice model of fetal alcohol spectrum disorder with or without astaxanthin pretreatment were detected.

Results: Results showed that astaxanthin blocked maternal ethanol induced retardation of embryonic growth, and the down-regulation of neural marker genes, Otx1 and Sox2. Moreover, astaxanthin also reversed the increase of MDA, H2O2, and the decrease of GPx in fetal alcohol spectrum disorder. In addiction, maternal ethanol induced up-regulation of TLR4, and the down-streaming MyD88, MyD88, NF-κB, TNF-α, and IL-1β in embryos, and this was inhibited by astaxanthin pretreatment.

Conclusions: Results demonstrated a protective effect of astaxanthin on fetal alcohol spectrum disorder, and suggested that oxidative stress and toll-like receptor signaling associated inflammatory reaction were involved in this process.

Biography

Ying Peng has completed his PhD at the age of 31 years from SunYat-Sen University School of Medicine, Guangzhou, China and Postdoctoral studies from National Cancer Institute-at Frederick, NIH, MD, USA. He is the Director and Professor of Department of Neurology, Sun Yat-Sen Memorial Hospital, SunYat-Sen University. As a clinical neurologist, he has published more than 75 papers in reputed journals and is serving as an Associate- Editor-in-Chief of "Chinese Journal of Nervous and Mental Disease" and Deputy- Chief of Neuro-pharmacological Association of Guangdong province, China.

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