

International Conference on Central Nervous System - Drug Effects & Novel Drug Development

September 5-7, 2012 DoubleTree by Hilton Philadelphia Center City, USA

Evaluation of oxidative / nitrosative stress markers in non-SN regions of post-mortem Parkinson's Disease Brain: Neuroprotection by natural antioxidant

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Parkinson's Disease (PD) is an age associated neurodegenerative disease characterized as a movement disorder. Oxidative and nitrosative stress are important molecular determinants of PD pathogenesis. Glutathione (GSH) depletion and mitochondrial dysfunction are evident during PD. Oxidative stress and mitochondrial dysfunction, in the substantia nigra (SN) of the PD brain, have been well documented. However the status of such markers in the non-SN regions of the PD brain has not been studied extensively. The present study therefore aimed to evaluate oxidative stress markers such as GSH levels and astrocytic proliferation in the non-SN regions of PD brain.

Results indicated that in contrast to the SN, these anatomical regions exhibited a 3-5 fold increase in GSH levels, suggesting a probable compensatory mechanism for neuroprotection in these regions. Further, to confirm the neuroprotective ability of antioxidants, we evaluated the efficacy of the natural polyphenolic compound, curcumin, in cell and animal models of PD. Chronic dietary supplementation with turmeric protected SN neurons against 1-methyl 4-phenyl 1,2,3,6-tetrahydropyridine (MPTP) mediated cell loss *in vivo*. However, the therapeutic application of curcumin/turmeric *in vivo* is limited by its poor bioavailability. We, therefore used bioconjugates (diesters at the phenoxy groups) of curcumin with enhanced bioavailability, and observed improved neuroprotective efficacy *in vitro* and in dopaminergic neuronal cells. Our findings suggests that the non-SN regions of the PD brain are protected from oxidative stress, probably by increased antioxidant load. Natural antioxidants such as curcumin and its synthetic bioconjugates can serve as efficient therapeutic candidates in neurodegenerative disorders such as PD.

Biography

Dr. Rajeswara B. Mythri completed PhD from National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India and is currently pursuing post doctoral research in the Department of Neurochemistry, NIMHANS, Bangalore, India. She has published 15 papers including 1 book chapter and 2 reviews in reputed, peer reviewed National and International Journals. She has presented papers in various National and International conferences and has been awarded twice for the "Best Oral presentation".

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