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Dopamine D1 and D2 receptor subtypes functional regulation in unilateral rotenone lesioned parkinson's rat model: effect of serotonin, dopamine and norepinephrine

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Parkinson's disease (PD) is due to widespread degeneration in the central and peripheral nervous systems. The hallmark pathology remains in the dopaminergic striatal insufficiency and degeneration of dopaminergic neurons in the substantia nigra (SN).

Objectives: - The present study analysed the effect of serotonin (5-HT), dopamine and norepinephrine (NE) as treatment on rotenone induced hemi-Parkinson's disease in rats and its role in the regulation of Dopamine receptor subtypes in the Corpus Straiatum (CS) of the experimental rats.

Methods: - Unilateral stereotaxic single dose infusions of rotenone were administered to the substantia nigra of adult male Wistar rats. Neurotransmitters –serotonin (5-HT), dopamine and norepinephrine (NE) treatments were given to rotenone induced hemi-Parkinson's rats. Dopamine receptor and its subtypes (D1 and D2) binding assay were done. Gene expression studies of Dopamine D1 and D2 were done using real-time PCR.

Results: - Scatchard analysis of Dopamine and Dopamine D2 receptor showed a significant increase ($p<0.001$) and Dopamine D1 receptor showed a significant decrease ($p<0.001$) in the Bmax in Corpus Striatum of the PD rats compared to control. These altered parameters were reversed to near control in the serotonin and norepinephrine treated Parkinson's disease rats and no change was observed in Dopamine treated Parkinson's disease rats. Real-time PCR results confirmed the receptor data.

Conclusion: - Our results showed serotonin and norepinephrine functionally reversed in Dopamine receptors in rotenone induced hemi-Parkinson's rat. This has clinical significance in the therapeutic management of Parkinson's disease.

Key words: Corpus Striatum; Dopamine D1 and D2 receptor subtypes; Parkinson's disease; Rotenone; Substantia nigra pars compacta.

Biography

Jes Paul is doing research on Stem Cell, Genetics, Medical Biochemistry, pathophysiology, Molecular and Cellular neurobiology. He worked as an Associate Research Scientist Texas Tech University Health Sciences Center. He did Post-doctoral researcher from Ohio State University Medical Center.

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