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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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Introduction: 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 analyzed 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 Striatum (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 B_{max} 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.

Biography

Jes Paul have done Ph.D. in Neurology & Molecular Cell Biology, stem cells with 3 years' post-doctoral training, Master's degree with 7 years' post-graduate training and Good Laboratory Practice (GLP). My publications include 15 (Research gate, Pub med) Papers in international journals (Pub Med) and Presented 16 Abstracts in various international conferences and he is also an Editorial member of IRPH Journal since four years. Currently he is working as a Research Associate (Albany medical centre cardiovascular science).

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