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Identification of microRNAs in Early and Late Onset of Parkinson's Disease Patient

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Abstract : Introduction: Parkinson's disease (PD) is a complex and asymptomatic disease where patients are usually diagnosed at late stage where about 70% of the dopaminergic neurons are lost. Therefore, identification of molecular biomarkers is crucial for early diagnosis of PD. MicroRNA (miRNA) is a short nucleotide non-coding small RNA which regulates the gene expression in post-translational process. The involvement of these miRNAs in neurodegenerative diseases includes maintenance of neuronal development, necrosis, mitochondrial dysfunction and oxidative stress. Thus, miRNA could be a potential biomarkers for diagnosis of PD. Objective: This study aim to identify the miRNA involved in Late Onset PD (LOPD) and Early Onset PD (EOPD) compared to the controls. Methods: This is a case-control study involved PD patients in the Chancellor Tunku Muhriz Hospital at the UKM Medical Centre. miRNA samples were extracted using miRNeasy serum/plasma kit from Qiagen. The quality of miRNA extracted was determined using Agilent RNA 6000 Nano kit in the Bioanalyzer. miRNA expression was performed using GeneChip miRNA 4.0 chip from Affymetrix. Microarray was performed in EOPD (n= 7), LOPD (n=9) and healthy control (n=11). Expression Console and Transcriptomic Analyses Console were used to analyze the microarray data. Result: miR-129-5p was significantly downregulated in EOPD compared to LOPD with -4.2 fold change (p = <0.050. miR-301a-3p was upregulated in EOPD compared to healthy control (fold = 10.3, p = <0.05). In LOPD versus healthy control, miR-486-3p (fold = 15.28, p = <0.05), miR-29c-3p (fold = 12.21, p = <0.05) and miR-301a-3p (fold = 10.01, p =< 0.05) were upregulated. Conclusion: Several miRNA have been identified to be differentially expressed in EOPD compared to LOPD and PD versus control. These miRNAs could serve as the potential biomarkers for early diagnosis of PD. However, these miRNAs need to be validated in a larger sample size.

Keywords : early onset PD, late onset PD, microRNA (miRNA), microarray
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