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Association of plasma and mid-brain metabolites with 6-OHDA induced in vivo Parkinsonism

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Parkinson's Disease (PD) is a debilitating neurodegenerative disorder, with no cure at present. An in-depth understanding of the pathology of PD will pave ways for effective treatment options. In recent years metabolomics has emerged as a powerful tool to identify biomarkers and mechanisms for a range of diseases. The aim of this study was to use systems metabolomics to identify changes in an in vivo model of PD. Male Sprague-Dawley rats were injected with the toxin 6-hydroxydopamine (6-OHDA) into the mid-brain, to induce Parkinsonism. Animals injected with saline were used as the control group. Two weeks after the injection, behavior tests were carried out to assess motor dysfunction, followed by plasma and brain collection for untargeted metabolic profiling. Palmitic acid (p=1.76x10-2, q=3.72x10-2, FC=1.81) and stearic acid (p=2.56x10-2, q=3.84x10-2, FC=2.15) were significantly up-regulated in the plasma of the PD group, while mono-palmitin (p=2.4x10-2, q=4.8x10-2, FC=-11.7), mono-stearin (p=3.1x10-2, q=3.72x10-2, FC=-15.1) and myoinositol (p=3.81x10-2, q=3.81x10-2, FC=-3.32) showed a significant imbalance in their mid-brains. Receiver operating characteristic (ROC) curves showed that all these metabolites had an area under the curve (AUC) of >0.8, which indicates good prediction ability. Furthermore, the plasma metabolites were significantly correlated with the behavior test scores. These results show that plasma saturated free fatty acids and their mono-glycerides in the brain were associated with 6-OHDA induced toxicity. All these metabolites showed good prediction ability. The plasma fatty acids also had a strong correlation with motor dysfunction, an integral symptoms of PD, suggestive of their potential as biomarkers.

Biography

Anuri Shah is currently pursuing PhD between The University of Hong Kong and King's College London. Her doctoral thesis is aimed at understanding pathways involved in Parkinson's disease and subsequently studying the protective effects of herbal medicine. Her expertise lies in cellular and animal models, coupled with molecular biology and metabolomics. She has received a Master Degree in Pharmacology from the University of Southern California, where she also studied protein chemistry in the context of Parkinson's disease.

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