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Serum-Based Lipid Panels for Diagnosis of Idiopathic Parkinson?s Disease

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Abstract: Parkinson?s disease (PD) is a highly prevalent neurodegenerative movement disorder with an unclear etiology and a lack of definite diagnostic tests and effective treatments. About 95% of PD cases are idiopathic, in which none of the well-known genes underlying familial parkinsonism are mutated. We used untargeted liquid chromatography?mass spectrometry (LC-MS/MS) to profile the serum lipidome of 50 patients with different stages of idiopathic PD (early, mid, or advanced) and 45 age-matched controls. When comparing the PD patients to the control subjects, 169 lipids were significantly altered in both a univariate analysis and a multivariate partial least-squares discriminant analysis (PLS-DA). Compared to the controls, the patients with PD had higher levels of unsaturated triacylglycerides (e.g., TG O-56:9 and TG 52:3), saturated lysophosphatidylcholines (LPC 17:0, 16:0, and 15:0), and hydroxyeicosatetraenoic acid (12-HETE), while lower levels of phosphatidylserines (e.g., PS 40:4 and PS 16:0_22:4), sphingomyelins (SM 42:1), and ceramides (e.g., Cer 40:0 and 42:0) were found between the PD patients and the controls. A panel of 10 significantly altered lipids (PS 40:0, Cer 40:0, Cer 42:0, LPC 17:0, LPC 15:0, PC 37:7, PE O-40:8, PC O-42:4, FA 23:0, and SM 42:1) resulted in a strong receiver operating characteristic curve with an AUC = 0.974. This panel may, therefore, be useful for diagnosing PD. In addition, lipid panels may prove useful for distinguishing among the progression stages of PD. Using one-way ANOVA, 155 lipid species were significantly altered among the PD stages. Parkinson?s disease progressed from the early to advanced stages with decreasing levels of PC 31:1, PC 38:4, and LPE 22:5. Conversely, LPC-O 20:0, PC O-42:3, FA 19:0, and FA 22:2 showed an increase in their levels with disease progression. Overall, this study shows an intriguing number of robust changes in specific serum lipids that may become useful for diagnosing PD and its progression, once p