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Lipidomic analysis using high resolution time of flight mass spectrometry – look no column needed

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Abstract

High resolution mass spectrometry (HRMS) has become a preferred tool in comprehensive differential analysis for metabolomic profiling associated with disease states. In its many forms it is used in the direct analysis of samples (no chromatography) with great results for lipidomics. The successful direct analysis of complex lipid extracts requires high resolution (> 50,000) and low mass accuracy (< 1ppm). Few analytical platforms meet these criteria. Plasma samples are investigated using direct infusion analysis to differentially profile lipids from diseased and control rats in the Zucker model. As a separate challenge polar lipid extracts from mouse liver are also interrogated using high resolution MS. The ability to leverage mass spectral data having resolving power of up to 100,000 and mass accuracies below 1 ppm is discussed in the context of potential biomarker identification and selective relative quantitation. Specifically the ability to investigate the "unsaturome" (unsaturated forms of the same lipid classes)in these complex samples without chromatographic separation is demonstrated and compared to some results from LCMS using the same MS platform. The ability to characterize lipid classes and differentiate lipids of the same formula but different classes is discussed by examining the fragment ion profiles simultaneously in the same samples. Evauations and differential analysis is not limited to lipids and is extended to other classes of metabolites. The power and simplicity of direct analysis as a screening tool for metabolic analysis is demonstrated and its strengths, values and limitations discussed.

Biography

Patrick has completed his Ph.D at Purdue University under the guidance of Prof. Graham Cooks. After more than 15 years in biological mass spectrometry and biomarker research, he is currently the Director of Marketed Technology at LECO, a manufacturer of high performance time of flight mass spectrometers. He has published more than 40 papers in reputed journals and presented more than 50 orals at global conferences.