Novel Approaches to Global Lipidomic Profiling: Redefining Analytical Specificity

The importance lipid mediators play in host immune inflammatory responses has translated to efforts to identify and quantify lipid molecular species as clinical biomarkers of human disease. Lipid biomarker discovery starts with global lipid profiling strategies using electrospray ionization mass spectrometry (ESI-MS/MS). The complex data arrays generated during sample analysis can then be processed by lipid identification software such as LipidView™ and principal component analysis to generate candidate lipid biomarkers, which can then be validated by targeted quantitative analysis. Despite this seemingly straight-forward means to lipid biomarker discovery, the actual process is quite challenging due to the high number of lipid isobars and isomers that interfere with qualitative and quantitative analysis. Recently, Differential Mobility Spectrometry (DMS; SelexION™ Technology) coupled to mass spectrometry has been shown to be very effective at resolving complex mixtures of lipid isomers and isobars without the need for extensive chromatography. This technology has been applied to broad-based quantitative lipidomics in the new lipidomics platform, the Lipidyzer™, which accurately detects and quantifies over 1100 lipid molecular species. In this presentation, novel lipidomic work flows that emphasize specificity, broad coverage and accurate quantitation using either infusion- or LC-based sample introduction will be presented.