Advances in lipidomics and metabolomics for insight into disease mechanisms

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Abstract

Metabolomics refers to the comprehensive measurement of small molecules in biofluids by either mass spectrometry (MS) or nuclear magnetic resonance (NMR) with the aim of covering multiple KEGG pathways, exposome products, and chemical reactions to provide new insights into disease etiologies. Lipidomics is a subset of metabolomics focused specifically on the analysis of lipid species. MS based metabolomics and lipidomics generally require the use of liquid chromatography to separate metabolites based on polarity and high-resolution MS to accurately measure the mass-to-charge (m/z). The combination of retention time and m/z accuracy provides a reliable method to identify metabolites, which is critical for making disease marker discoveries. These 'Omics also represent the merging of many disciplines. It covers knowledge of metabolism, analytical measurement, and statistical analysis as well as integrated pathway mapping in order to unravel cellular complexities. Our work in disease diagnostics centers on the merging of analytical capabilities with informatics to improve our ability to identify illness either earlier or with better precision. This talk will discuss analytical advances such as IE-Omics in the context of several disorders including urinary cancers (prostate, kidney, bladder), meningioma as well as rare disease diagnostics.