Evaluation of Different Instrument Platforms for Shotgun Lipidomics of Plasma Samples

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Abstract

Here we describe two different strategies used for profiling of lipid metabolites in shotgun Lipidomics sample. Both methods were applied in a combination to enable targeted and non-targeted approaches can be obtained using a combination kit, which enables lipid profile analyses from in a single-stage assay.

Introduction

Researches are increasingly mapping the range of functional that lipids have within the body, including energy storage, cell membrane structure and hormone signaling. Recently, a powerful technique for direct analysis of global cellular lipids (in shotgun fashion using ionization or mass spectrometry (MS)) has emerged [see review 1]. The idea of shotgun lipidomics is to generate high throughput data in conjunction with global analysis of cellular lipids directly from biological samples. Methods combining liquid chromatography (LC) and mass spectrometry (MS) generate high throughput data in conjunction with global analysis of cellular lipids directly from biological samples. Methods combining liquid chromatography (LC) and mass spectrometry (MS) (LC/MS) allow for the comprehensive characterization of lipid metabolism. The interpretation of MS data can be complicated as there are many classes of lipids.

Methods and Materials

For lipid quantification, we used the AbsoluteIDQ™ p150 Kit (BIOCRATES Life Sciences AG, Innsbruck, Austria). The kit is a commercially available product for targeted metabolomics and enables the simultaneous identification and quantification of 161 endogenous metabolites from 4 different compound classes (acidic, basic, neutral, and glycerolipid/glycosphingolipid) and resolved in single-scan. The kit is performed by automated plate preparation and metabolite extraction, the samples were filtered by centrifugation. The obtained filtered samples were then analyzed using an AB SCIEX TripleTOF™ 5600 mass spectrometer (quadrupole linear TOF) in the Multi Tandem (MSMSall) mode.

Results

Lipid extracts from human plasma were directly infused into the mass spectrometer using the TriVersa NanoMate autosampler. An infusion rate of 1 µL/5 min was used. The samples were run on the AB SCIEX TripleTOF™ 5600 in combination with AB SCIEX instrumentation delivers quickly a broad overview over the lipidome. Within samples from human and rat plasma distinct differences in the lipid classes and lipid species were observed.

Conclusions

The AbsoluteIDQ™ Kit, combined with AB SCIEX instrumentation delivers quickly a broad overview over the lipid profile available from a single targeted assay enabling you to accelerate your research while maintaining a high level of specificity. Within samples from human and rat plasma distinct differences in the lipid classes and lipid species were observed. The accurate mass high resolution quadrupole TOF instrument is beneficial to distinguish lipids from background interferences. The high resolution and accurate mass of the AB SCIEX TripleTOF™ systems can be used to empirically calculate the formula of molecular ions and MSMS fragment ions using Formula Finder of PeakView™ software.

References


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