Altered Lipid Profiles of Hypertriglyceridemia

Specificity and Breadth of Lipid Quantitation using the Lipidyzer™ Platform

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A novel lipidomics platform was developed that includes simplified sample preparation, automated acquisition methods, and streamlined data processing techniques that enable facile, quantitative lipid analysis. Serum samples from individuals with known metabolic conditions were used to validate the Lipidyzer™ Platform results.

METHODS

A small plasma sample set was obtained consisting of 3 experimental groups, samples from individuals who exhibited high amounts of triglycerides in blood known as hypertriglyceridemic (n = 14), who exhibited high amount of cholesteryl esters in blood known as hypercholesterolemics (n = 14), and healthy individuals who acted as controls (n = 12). The Lipidyzer chemical standard kits were added and the lipid fraction was extracted from each sample.

The Lipidyzer™ Platform (SCIEX) was used for targeted profiling of over a thousand lipid species from 13 different lipid classes on the 40 prepared lipid samples. Using flow injection sample introduction, two MRM acquisition methods were used, one injection with SelexION® Technology ON and another with the SelexION Technology turned OFF. Positive/negative polarity switching was used in both methods.

RESULTS

The Lipidyzer Platform involves a four-step process before samples can be acquired: (1) Kit registration for automated calculation of concentrations, (2) DMS cell tuning for class-specific compensation voltages (COV) allowing for maximum specificity, (3) system suitability testing to assess performance of the platform and the assay and (4) sample submission. All of these actions can be performed from the Lipidomics Workflow Manager (LWM) Software (Figure 1).

Once a sample set has been completed on the Lipidyzer Platform, the user has the ability to explore the results from the Project Owner summary (Figure 2). A user can view the logged samples (2b) including any metadata and if they want to add extra metadata post-acquisition this is possible. The batches acquired can be explored (2c) and here a sub-section of the spectral data can be reviewed. This includes reviewing the raw data, QC data charts as well as the processed final results (calculated to the appropriate internal standards). Finally a user can view a project report (2d), conduct any statistical analyses (2e) and publish data to access Metabolon’s Surveyor Web Tools for further evaluation (2f).

Figure 3 highlights the lipid species changes which were upregulated in the hypertriglyceridemic and cholesterolobolerimc
samples. However when TAGs are measured in the clinic they are done using a colorimetric test which measures free glycerol which could be coming from anywhere in the body. What this colorimetric TAG test couldn’t highlight was the novel results found in the down regulation of the hexosylceramides (HCER) and lactosylceramides (LCER) highlighting altered glycosphingolipid metabolism.

**CONCLUSIONS**

This serum data set demonstrates that the Lipidyzer™ Platform provides similar findings to the accepted colorimetric test on samples with known metabolic. Both triglycerides and cholesteryl esters correlated with the known characterization of the samples. The specificity and breadth of the Lipidyzer Platform assay also provided novel findings which was not possible with current tests.