Bioactive Lipid Profiling

Lipids are involved in an astonishing variety of physiological and pathological processes and are the object of intense research efforts from scientists around the world. However, the analytical tools and know-how to perform lipidomics analyses are not readily available to many researchers.

With Cayman Contract Services, your lipidomics study is in the hands of experts who have many decades of collective experience in lipid synthesis, purification, and characterization.

Cayman's state-of-the-art mass spectrometry laboratories are equipped with triple quadrupole, high resolution accurate mass Orbitrap, and gas chromatography-coupled mass spectrometer systems, enabling us to offer bioanalysis services customized for your specific needs.

Our analysis service offers the sensitivity, efficiency, and specificity needed to identify and quantify these biologically relevant lipids:

- Ceramides
- Cholesterol Esters
- Eicosanoids
- Glycolipids
- Short-Chain Fatty Acids
- Sphingolipids
- Phospholipids
- Urinary Prostaglandins

Standard Workflow

Sample Receipt

Sample Preparation

LC-MS/MS Analysis

Data Collection and Reporting

LC-MS/MS as a Reliable Analytical Tool

Typical LC-MS/MS chromatogram showing the elution profile of oxylipin standards (10 pg) and, where used, deuterated internal standards (100 pg) on a reversed-phase HPLC column. Specific mass-to-charge (m/z) transitions are used in the multiple reaction monitoring (MRM) mode to simultaneously detect all analytes.

Quantitative Results

Absolute quantitation can be performed using normalized response ratios. Cayman uses a surrogate internal standard panel that includes deuterium-labeled lipids covering a wide variety of eicosanoids and oxylipins, as well as unlabeled calibration standards, to build the corresponding curves and ensure accurate quantitation.

Analytical Accuracy and Reproducibility

Cayman is committed to the use of high quality analytical standards and confidently presents time-tested methodology to ensure quantitative accuracy. Interlaboratory evaluation of quantitative results for serum LTD4 between Cayman and a collaborating lipidomics laboratory performing a similar LC-MS/MS method on duplicate serum samples demonstrates excellent correlation.

Results You Can Trust

- Expert consultation on best practices for sample collection, pre-shipping processing, and storage to preserve sample integrity
- Optimized sample extraction protocols guided by accepted literature methods (Bligh-Dyer liquid-liquid extraction, solid-phase extraction, targeted immunooaffinity capture)
- Semi-quantitative profile analysis, with option to follow up with absolute quantification of customizable analyte sets
- Timely updates, interactive real-time data review, and comprehensive reporting with strict confidentiality

Cell Culture and Biological Fluids

Cayman’s scientists can support your cell culture studies from assay design and development to analysis, and have the experience to measure lipids in common and more complex matrices. The below example shows MRM chromatograms (blue traces) of LTD4, LTE4, LTD4, and LTE4 in vehicle control (top row) and cyclic-AMP-stimulated (middle and bottom rows) mouse bone marrow-derived mast cells. Red traces correspond to the deuterium-labeled internal standards, LTD4-d4 (three left columns) or LTE4-d4 (right column).

Biological fluids such as plasma, serum, or urine are among the most accessible samples available for human and animal research. This table shows MRM m/z transitions, chromatographic and integration information, and calculated concentrations of selected lipids from an extract of 20 µl of commercial mouse plasma. It demonstrates the ability to quantify a variety of bioactive lipids over a wide dynamic range (five orders of magnitude in this case) in the same sample.

Conclusions and New Hypotheses

Learn more about our service capabilities at www.caymanchem.com/services

Animal Models

Tissue samples from a range of animal models can be processed and analyzed. The figures below show comparative data between spleens from healthy mice vs. spleens from mice with experimental autoimmune encephalitis (EAE). Using standard statistical analysis tools, complex mass spectrometry data for dozens of bioactive lipids could be analyzed to identify a changing trend in the 5-lipoxygenase pathway products.