CAYMAN BIOANALYSIS SERVICES

Lipidomics in Cells, Plasma, and Tissues

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 knowledge on 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 and accurate-mass Orbitrap LC-MS 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
- Glyceroesters
- Phospholipids
- Short-Chain Fatty Acids
- Sphingolipids
- Urinary Metabolites

Standard Workflow

Sample Preparation and Storage

Sample Analysis

Data Preparation and Reporting

Analytes and Internal Standards

Our analysis service can identify and quantify lipids derived from arachidonic acid (AA) through cyclooxygenase (COX), 5-lipoxygenase (5-LO) and other LOs, or cytochrome P450 (CYP450), as well as many other oxylipins derived from other fatty acids such as linoleic, eicosapentaenoic, or docosahexaenoic. This list of analytes may be modified to suit the particular needs of any researcher in any experimental model.

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 high-quality deuterium-labeled internal standards, as well as unlabeled standards, to build calibration curves used in the accurate quantitation of a wide variety of eicosanoids and other oxylipins.

Results You Can Trust

- Expert consultation on best practices for sample collection, pre-shipment processing, and storage to preserve sample integrity
- Optimized sample extraction protocols guided by accepted literature methods (liquid-liquid extraction, solid-phase extraction, targeted immunoaffinity capture)
- Semi-quantitative profile analysis, with option to follow up with absolute quantitation 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 LTB4, LTC4, LTD4, and LTE4 in vehicle control (blue row) and indomethacin-stimulated (middle and bottom rows) mouse bone marrow-derived mast cells. Red traces correspond to the deuterium-labeled internal standards, LTD4-d8 (three left column) or LTE4-d8 (right column).

Animal Models

Tissue samples from a range of animal models can be processed and analyzed. The figures below show comparative data between splines from healthy mice versus splines 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.

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

Complex Raw Data

Large sets of chromatograms are quickly reviewed for accuracy and compound identity is verified. This data may be included with confirmatory and quantitative results upon request.

Quantitative Results

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.

Data Analysis

A heat map plot or other statistical visualisation tools (bubble plots, PCA plots) can be generated to quickly cluster important changes, allowing rapid pinpointing of important trends.

Conclusions and New Hypotheses

Focused data analysis and review of trends allows for adequate interpretation of the data and generation of new hypotheses.