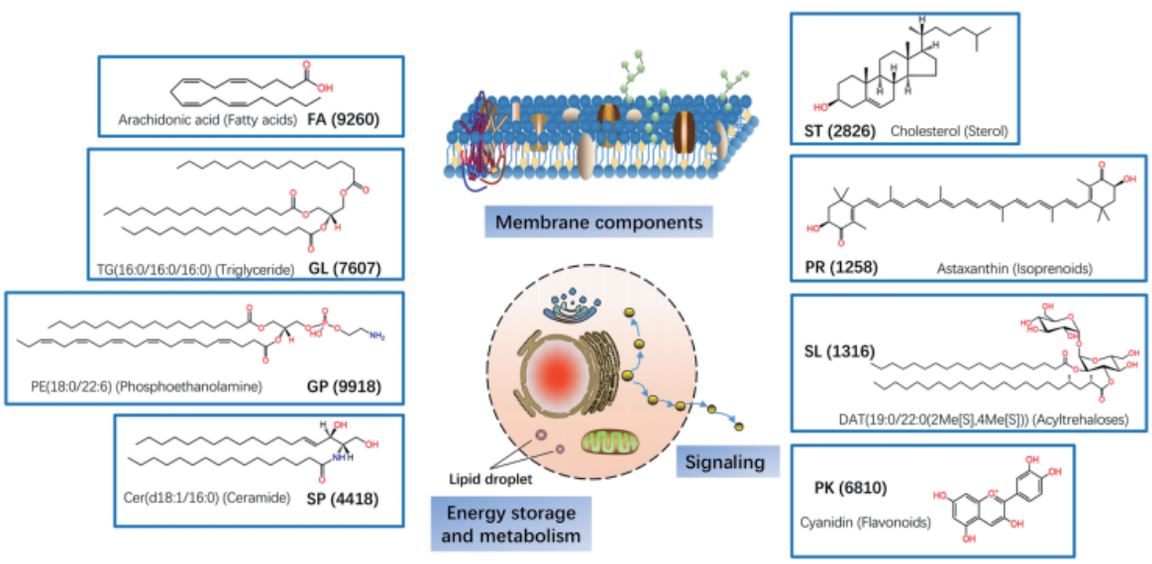
Lipidomics Service Overview

Service Description

Lipids are essential metabolites that have many key cellular functions and which can be analysed to gain insight into the metabolic state of cells. The number of lipid molecules in a cell, collectively called the lipidome, is estimated to be in the tens to hundreds of thousands.

According to the classification system proposed by the Lipid Metabolites and Pathways Strategy (LIPID MAPS) project, lipids are divided into eight classes: fatty acyls (FA), glycerolipids (GL), glycerophospholipids (GP), sphingolipids (SP), sterol lipids (ST), prenol lipids (PR), saccharolipids (SL), and polyketides (PK), covering a total of 43,413 lipid molecular species.



The common structures and main functions of eight lipid classes

Sun T, et al., Mass spectrometry-based lipidomics in food science and nutritional health: A comprehensive review, (2020)

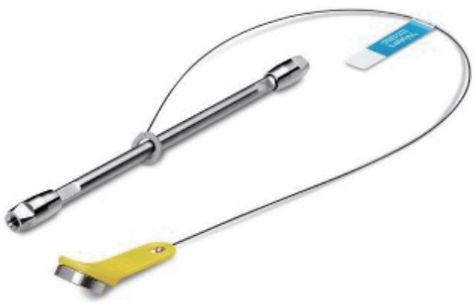
Lipidomics is a new branch of metabolomics, which analyzes the compositions and content changes of lipids (major categories, subclasses and molecular types) in biological samples such as cells, tissues, organs or body fluids. Mass spectrometry based lipidomics (LC-MS), involves the comparison of the lipidome between control and test groups in order to screen differential lipids by statistical analysis, so as to identify differences between lipid metabolism and physiological/pathological changes.

We have experience in the field of lipidomics with well-developed reliable workflows using innovative technologies and a bioinformatics infrastructure.

Research Applications

- Disease biomarkers research
- Pathogenesis and prognosis study on diseases
- Drug target research
- Animal special behavior mechanism and food/medicinal value research
- Plant growth and development research
- Plant disease resistance and insect resistance research
- Microbial drug resistance mechanism

Technology Platforms



Waters CSH C18 column

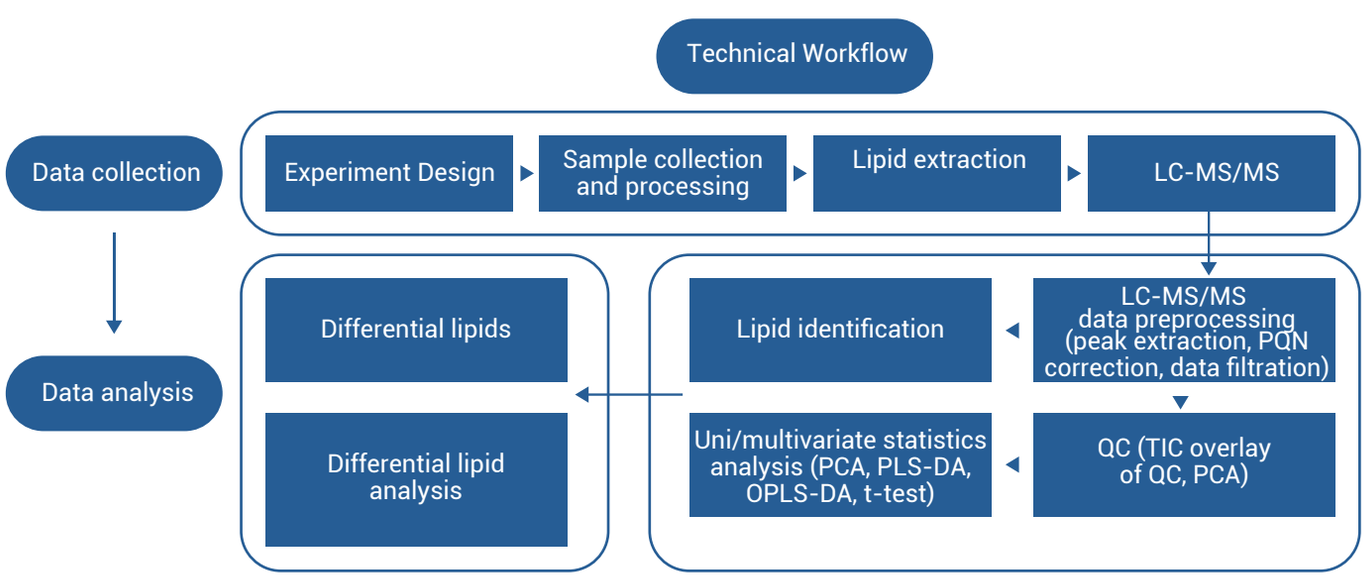
Waters ACQUITY UPLC

Thermo Q Exactive/Q Exactive HF-X

Service Advantages

State-of-the-art LC-MS/MS systems	Large scale and high volume sample experience	High-precision identification results	Strict quality control system
• Thermo Q Exactive/HF et al • Resolution up to 24,000, ensuring high spectral quality and accurate results	• Sample preparation at a capacity of up to 1000+ per day • Large scale project experience with 1,000 of samples	• Database (1.7 million lipid ions) • Manual verification increases identification accuracy	• Strict protocols governing the whole workflow • Double quality control prcoess of isotopic internal standard and QC samples

Lipidomics Workflow



Bioinformatics Analysis Workflow

Standard:

1.1 Data Processing

01	Peak extraction	02	Peak alignment	03	Lipid identification
04	Missing value filling	05	Normalization	06	Low quality data filtering

1.2 Data Quality Control

01	BPC overlapping diagram of QC samples	02	PCA analysis of QC samples and real samples	03	CV distribution of metabolites in QC samples

1.3 Statistical and Relative Quantitative Analysis of Lipid Classes

1.4 Statistical Analysis and Screening of Differential Lipids

01	Univariate analysis (fold change and T test)	02	Multivariate analysis (PCA, PLS-DA, OPLS-DA)	03	Screening of differential lipids

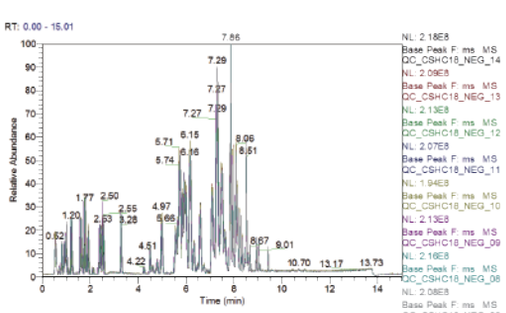
1.5 Differential Lipid Analysis

01	Volcano Plot	02	Clustering heat map	03	Lipid correlation analysis

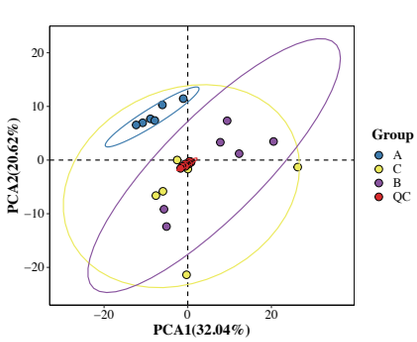
Customized Solution:

16S/Metagenome + lipidome correlation analysis
Transcriptome + lipidome correlation analysis
Proteome + lipidome correlation analysis

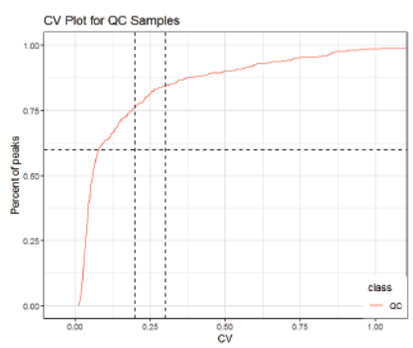
Examples of Data QC Analysis - Stability and Repeatability



BPC Overlay of QC Samples

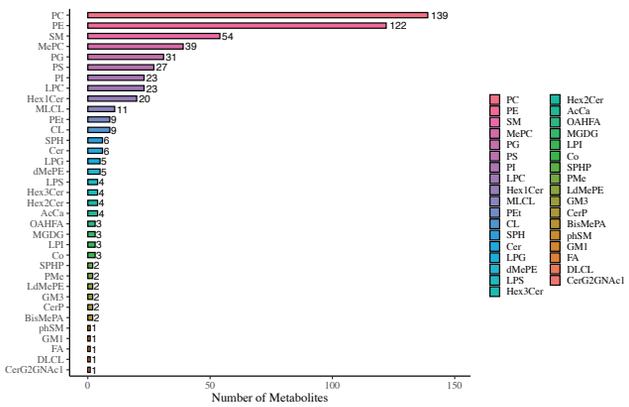


PCA Analysis

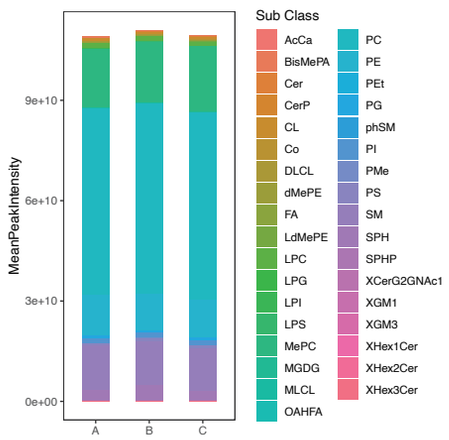


CV Distribution

Examples of Statistical and Relative Quantitative Analysis of Lipid Classes

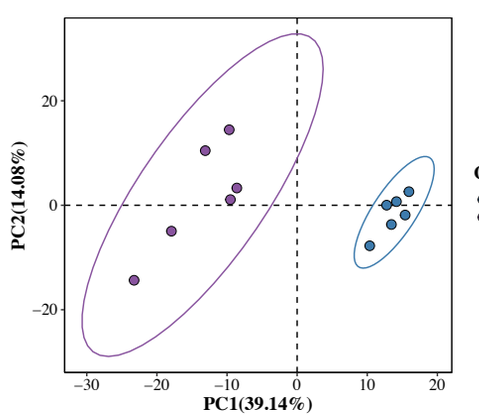


Statistical Chart of Lipid Sub Classes

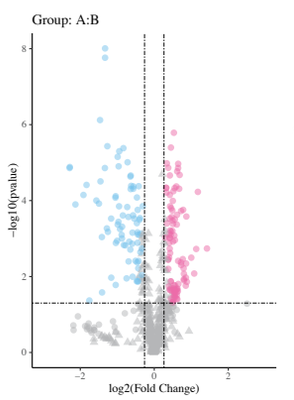


Total Lipid Molecule Content Change by Category Level

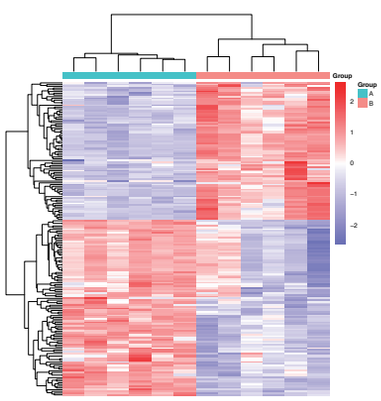
Examples of Statistical Analysis of Differential Lipids



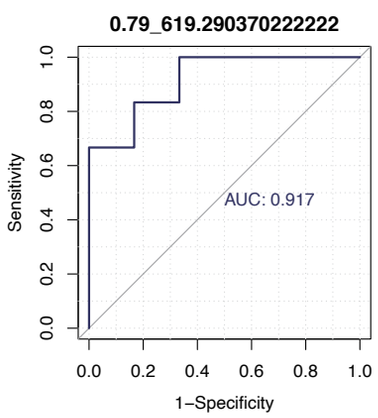
Score Graph of PLS-DA



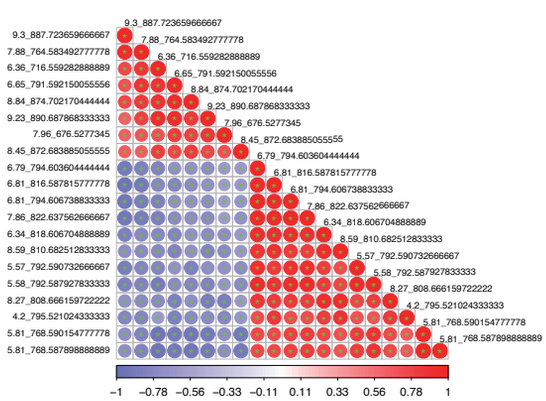
Volcano Plot



Cluster Analysis



ROC Curve



Lipid Correlation Analysis

General Sample Requirements

SAMPLE TYPE	RECOMMENDED SAMPLE AMOUNT	MINIMUM SAMPLE AMOUNT
Serum, plasma,urine	≥ 300 μL	≥ 100 μL
Animal and clinical tissues	≥ 200 mg	≥ 25 mg
Feces and intestinal contents	≥ 200 mg	≥ 25 mg
Cell	≥ 1×10^7	≥ 5×10^6
Microorganism	≥ 1×10^7 or ≥ 200 mg	≥ 5×10^6 or ≥ 25 mg
Culture medium, fermentation medium	≥ 1 mL	≥ 100 μL
Plant tissue	≥ 1 g	≥ 100 mg
Milk	≥ 1 mL	≥ 100 μL
Other body fluids (amniotic fluid, saliva, hemolymph, cerebrospinal fluid, etc.)	≥ 300 μL	≥ 100 μL

Turn Around Time

Sample size: 1-50, 3-5 weeks

Request for Information or Quotation

Contact a BGI Genomics representative to discuss how we can meet your specific needs or for expert advice on experiment design, from sample to bioinformatics.

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