**Service Description**

Metabolomics is the scientific study of chemical processes involving metabolites, the small molecule substrates, intermediates and products of metabolism that occur within cells, biofluids, tissues or organisms. Collectively, these small molecules and their interactions within a biological system are known as the metabolome.

Metabolites and their concentrations directly reflect the underlying biochemical activity and state of cells and tissues. BGI’s metabolomic solutions therefore provide researchers a way to study the ‘unique chemical fingerprint that specific cellular processes leave behind’.

BGI has extensive experience in the field of metabolomics and offers a wide range of services including overall metabolite profiles as well as targeted small molecule analysis services.

By applying state-of-the-art LC-MS/MS systems and techniques, BGI offers validated metabolomics workflows including:

- Untargeted metabolomics (water/lipid-soluble)
- Targeted small molecule analysis (vitamins, amino acids, hormones and 700+ kinds of small molecules)

**Turnaround Time**

Typical 20-35 working days from sample QC acceptance to data report delivery for Metabolomics products

**Instrumentation**

**Liquid chromatography system:** Waters ACQUITY UPLC I-Class

**Liquid chromatography column:** Waters C18, HILIC

**Orbitrap:** Thermo Q Exactive HF, Q Exactive

**Triple Quad:** SCIEX QTRAP4500/5500/6500, Waters Xevo TQS, TQD

**Q-TOF:** Waters Xevo G2-XS QTOF

**GC-MS:** Agilent 7890B GC System/5977A MSD, Thermo TRACE 1300/TSQ 9000

**ICP-MS:** Agilent 7700 Series
Untargeted Metabolomics Solutions

BGI provides LC-MS/MS untargeted metabolomics services to support biomedical and biotechnology applications. Our Untargeted Metabolomics services are designed to obtain a metabolite profile and screen for differentially-expressed molecules in the sample.

Project Workflow

![Project Workflow Diagram]

We provide panels for both standard metabolome profiling (water-soluble metabolites, amino acids, organic acids, amines, etc.) and lipidome profiling (polar and non-polar lipids, lipidic metabolites, etc.)

Targeted Small Molecule Analysis Solutions

BGI’s targeted metabolomics service involves the detection and analysis for specific metabolites. By quantifying the small molecules with reference to established standards, BGI’s targeted metabolomics service can accurately monitor the dynamic metabolic process, uncover relevant metabolic mechanisms and verify potential metabolic biomarkers.

Project Workflow

![Project Workflow Diagram]
Data Analysis

After mass spectrometry data acquisition, we use the commercial software Progenesis QI (version 2.2) (Waters, UK) and the self-developed metabolomics R software package metaX™ to undertake statistical analysis of mass spectral data, wherein metabolite identification is based on the databases KEGG, HMDB and LIPID MAPS.
Metabolomic Research Applications

Human health
- Metabolome study of physiological change in healthy populations
- Disease biomarker screening and validation
- Clinical sample metabolite detection and analysis
- Drug compound identification, toxicity assessment, drug effect assessment

Plant and animal research
- Important crop traits and improvement
- Animal nutrients and breeding

Microbe research
- Microbial drug tolerance research
- Effect on microbial metabolomic pathways of growth and development by environmental stimulus
- Effect on host metabolism by microbe invasion or inhabitation

Selected Publications

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<td>Analyses of gut microbiota and plasma bile acids enable stratification of patients for antidiabetic treatment</td>
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<td>Gut microbiome and serum metabolome alterations in obesity and after weight-loss intervention</td>
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<td>2016</td>
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<td>5.6</td>
<td>Integrated metabolomics and metagenomics analysis of plasma and urine identified microbial metabolites associated with coronary heart disease</td>
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Case Study

The first diabetes-related non-targeted plasma lipidome study in Chinese population

Lipidomic profiling reveals distinct differences in plasma lipid composition in healthy, prediabetic and type 2 diabetic individuals.¹

**Background:** BGI cooperated with Suzhou CDC to study the composition and differences of plasma lipid metabolites in Chinese type 2 diabetic patients, pre-diabetes and normal glucose-tolerant people, providing references for lipid metabolism research in Asian populations.

**Samples:** 114 patients with type 2 diabetes, 81 patients with early diabetes, 98 patients with normal blood glucose (NGT)

**Data analysis:** Progenesis QI

**Study Workflow:**

[Diagram of analytical workflow of the study]

**Main findings:**

1) Random forest analysis screened out 28 disease-related metabolites and most of them strongly correlated with disease phenotypes.
2) Lysophosphatidylcholine (lysoPC) and acylcarnitine can be used as early biomarkers for the diagnosis of type 2 diabetes.

**References**

Request Information or Quotation

Contact your BGI account representative for the most affordable rates in the industry and to discuss how we can meet your specific project requirements or for expert advice on experiment design, from sample to bioinformatics.

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