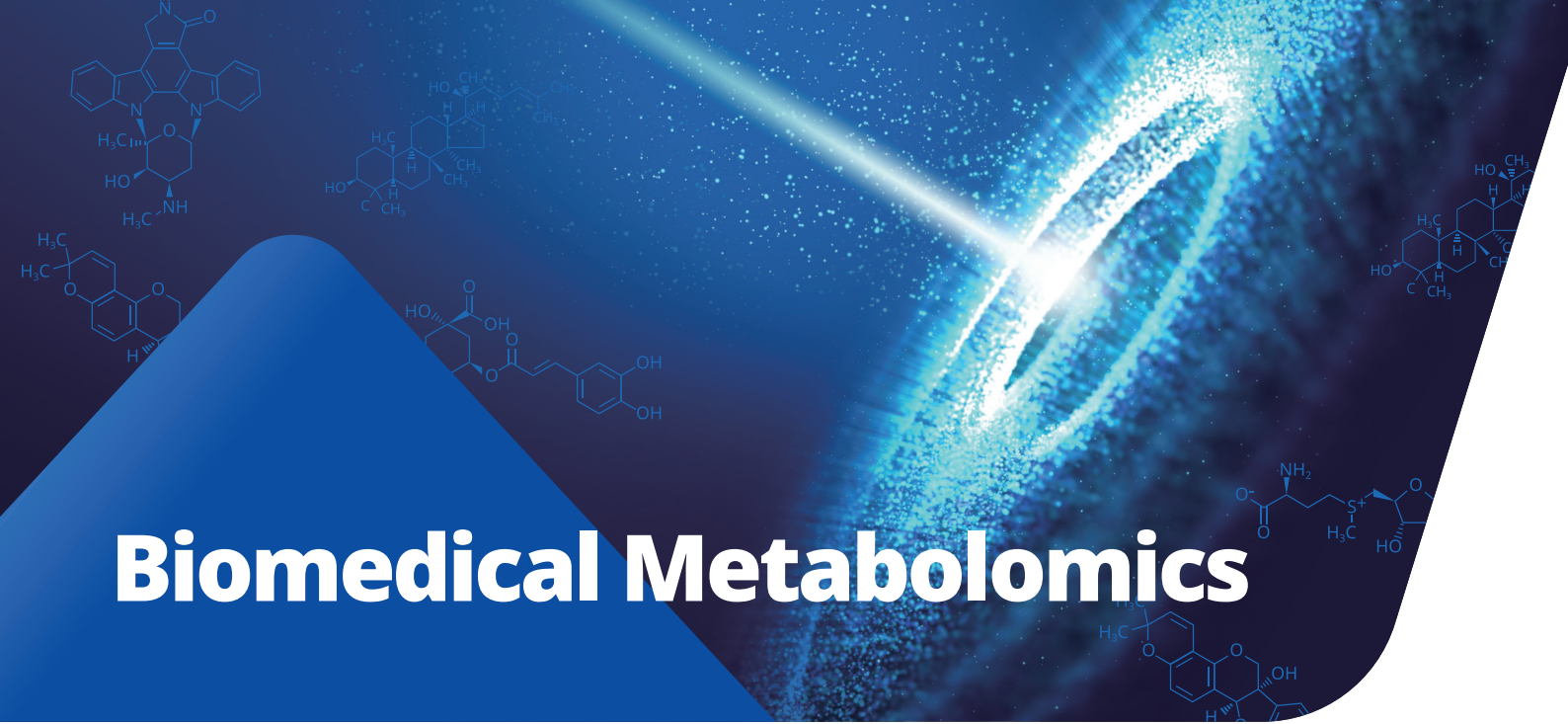


Biomedical Metabolomics

METWARE BIO

Innovative Metabolomics Insights for Better Health

Genes will tell you what may happen,
Metabolites tell you what is happening or has happened.

Artemisinin
-
Taxol
-
Ginsenoside

Dopamine
-
Serotonin
-
Neurotransmitter

Epinephrine

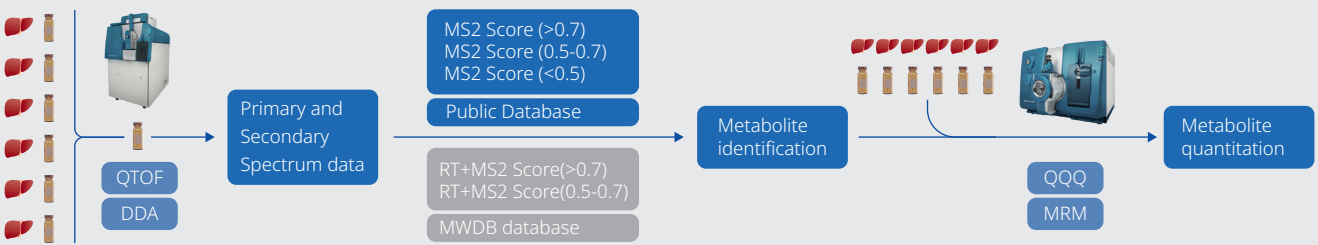
Vitamin
-
Polyphenol
-
Fatty Acid

Uric Acid
-
Blood Sugar
-
Blood Fat

The Power of Widely-Targeted Metabolomics Technology

Widely-Targeted Metabolomics

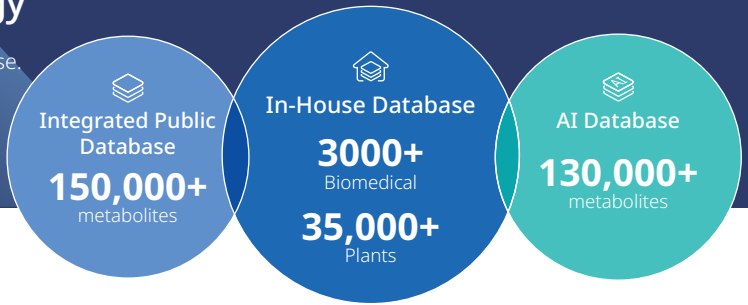
- Large-Curated Database
- Wide Coverage of Metabolites
- High-throughput
- Accurate Identification and Precise Quantitation



Global Metabolite Profiling	Targeted Metabolomics	Lipidomics	Our Expertise
35,000+ plant related metabolites	591+ metabolites	4,000+ Lipids Database	100+ patents
3,000+ mammalian metabolites			700+ publications
			20,000+ projects

Comprehensive Identification Strategy

Accurate Identification based on our large-curated in-house database.



In-house Biomedical Database

Category	Quantity	Representative substance
Amino acids and their derivatives	600+	Glycine, L-threonine, L-arginine, N-acetyl-L-alanine
Organic acids and their derivatives	400+	3-hydroxybutyric acid, adipic acid, hippuric acid, kynurenine
Nucleotides and their derivatives	200+	Adenine, 5'-Adenine Nucleotide, Guanine, 2'-Deoxycytidine
Carbohydrates and their derivatives	100+	D-glucose, glucosamine, D-fructose 6-phosphate
Lipid	500+	O-acetylcarnitine, γ-linolenic acid, lysophosphatidylcholine 22:4
Benzene and its derivatives	500+	Benzoic acid, 3,4-dimethoxyphenylacetic acid, 4-hydroxybenzoic acid
Coenzymes and vitamins	60+	Folic acid, pantothenic acid, vitamin D3
Alcohols, amines	150+	Dopamine, histamine, DL-1-amino-2-propanol
Aldehydes, ketones, esters	120+	Furfural, ethyl butyrate, α-pentyl cinnamaldehyde
Heterocyclic compound	200+	Pyridoxal, biopterin, indole-3-acetic acid
Bile acid	40+	Glycocholic acid, deoxycholic acid, taurolithocholic acid
Hormones and hormone-related substances	100+	Juvenile hormone 3, epinephrine, 3,3'-diiodo-L-thyroxine
Tryptamine, choline, pigment	15+	Serotonin, bilirubin (E-E), urobilin
Other	50+	Astaxanthin, hydroxyurea
Total		**3000+**

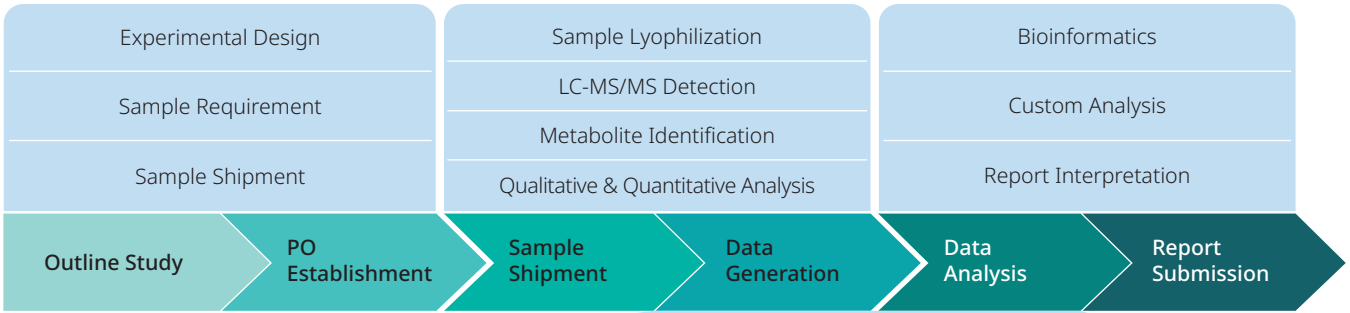
Precise Quantitation

- **Gold Standard for Quantitation**

  Using MRM mode from AB SCIEX Triple Quad 6500+

- **Rigorous Quality Control**

  Monitoring all aspects of experimentation from sample preparetion to data analysis.

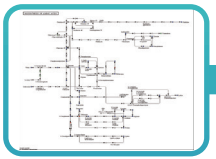


Quality Control

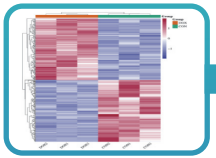
Instrument Monitoring	Data Generation	Data Analysis
Solvent QC	Internal Standards	QC-PCA
Mixed-Standards	Mixed Sample	QC-RSD
Plasma QC	Blank Sample	
Repeated Injection of QC	Random Sampling	

Comprehensive Bioinformatics Analysis

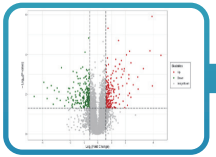
KEGG Annotation



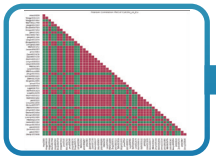
KEGG Pathway



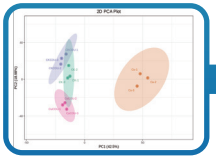
Cluster Heatmap



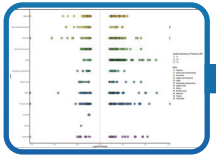
Volcano Plot



Correlation Analysis

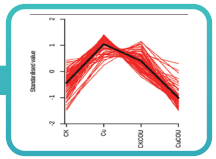


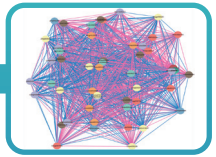
PCA Analysis



Metabolites Distribution

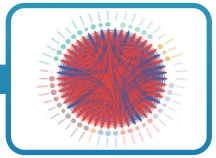
K-means Cluster





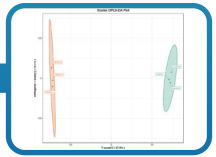
Correlational Network

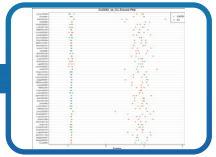
Radar Map



Chord Diagram

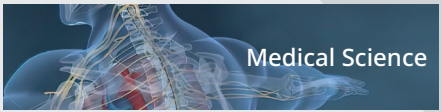
OPLS-DA Analysis





Z-score Plot

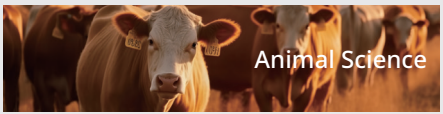
Solutions for All Industries



- Clinical Marker Discovery
- Disease Mechanisms

- Agriculture
- Nutritional Value
- Food Quality

- Mechanism of Treatment
- Toxic Side Effect Evaluation



- Genetic Breeding
- Feed Nutrition
- Animal Diseases

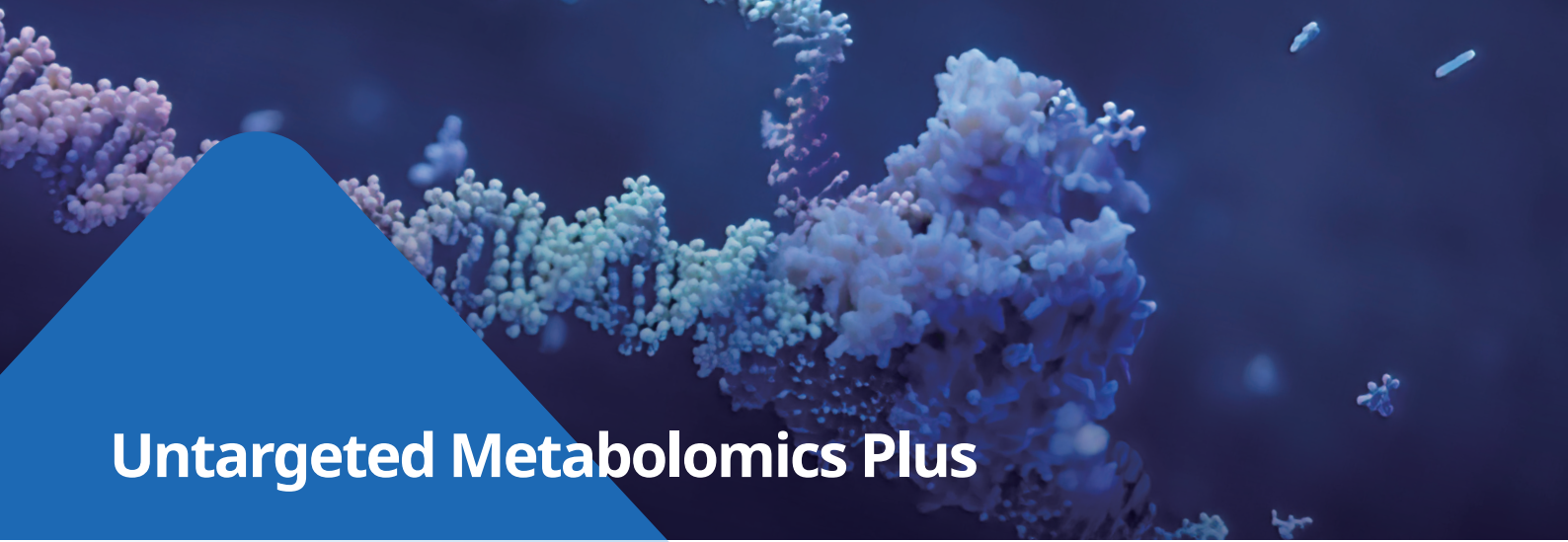
- Efficacy Evaluation
- Drug Toxicity Assessment

- Environmental Toxicology Research

Comprehensive analytical portfolio

Global Metabolite Profilling	Targeted Metabolomics	Multi-Omics
TM Widely-Targeted Metabolomics	Energy Metabolism	Transcriptome
Untargeted Metabolomics Plus	Bile Acid	Microbiome
Quantitative Lipidomics	Amino Acid	Proteomics
Widely-Targeted Metabolomics for Plants	Tryptophan	Transcriptome+Metabolomics
Quantitative Lipidomics for Plants	Short-Chain Fatty Acid	Microbiome+Metabolome
	Customized Targeted Assay	Proteomics+Metabolomics

For other metabolomics services, contact us please!



Untargeted Metabolomics Plus

The untargeted metabolomics is used for unbiased detection of metabolites in samples by LC-MS/MS and to obtain their qualitative and quantitative information. The main research idea is to compare the case group with the control group to find the differential metabolites and metabolic pathways between the groups, which can provide clues and directions for the research of disease biomarker development, pathogenesis and drug treatment mechanism. In our novel untargeted metabolomics approach, employing a HILIC column in addition to the C18 column substantially enhances the detection of highly polar metabolites, such as amino acids and their derivatives, nucleotides, and other metabolites crucial to energy metabolism.

Large Curated Database
Over **280,000** metabolites

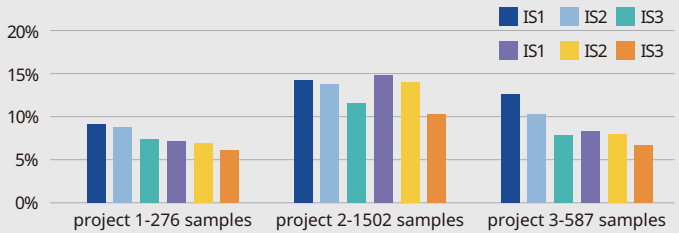
Comprehensive Identification Strategy
① In-house standard database
② Integrated public database
③ AI database
④ metDNA algorithm

Comprehensive Metabolic Detection
Covering metabolites with strong polar and non-polar compounds using C18 and HILLIC column

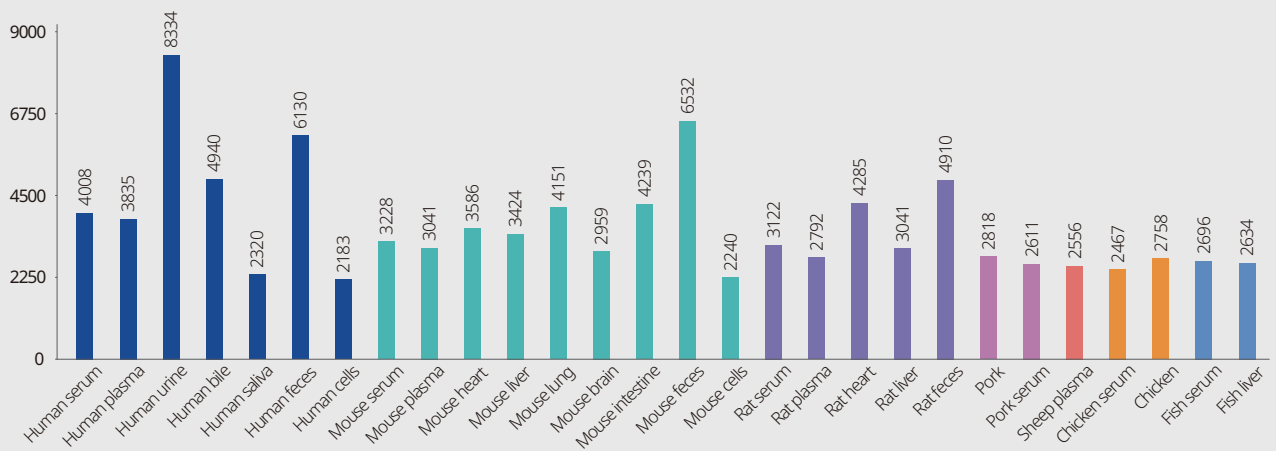
Rigorous Quality Control
Monitoring all aspects of experimentation from sample preparation to data collection.

Stability

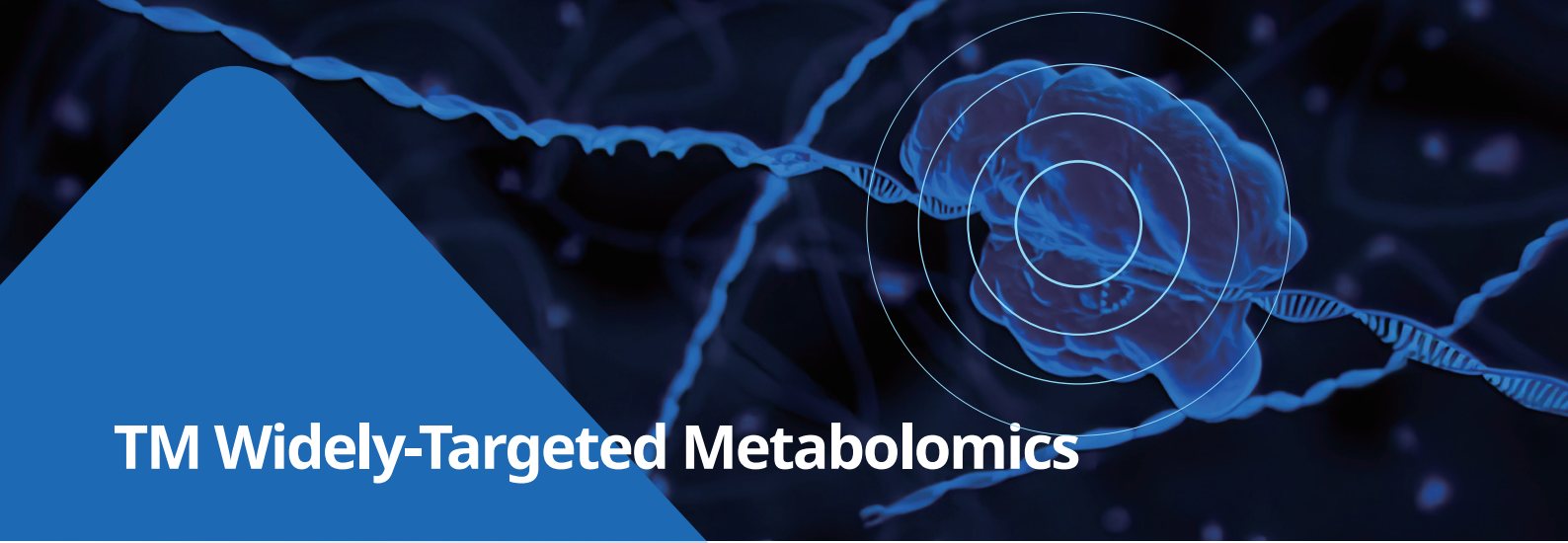
Highly stable detection for untargeted metabolomics analysis. Coefficient of variation (CV) of six internal standards are less than 15% in large cohort samples from 3 projects.



Project Experience



Number of metabolites detected from various samples, including serum and plasma and fecal samples, etc.



TM Widely-Targeted Metabolomics

A combination of an untargeted assay (with QTOF and DDA) followed by an additional run with QQQ and MRM for better annotation and accurate relative quantitation of metabolites. We typically identify/ annotate over 1,400 metabolites with an accurate relative quantitation in a variety of samples.

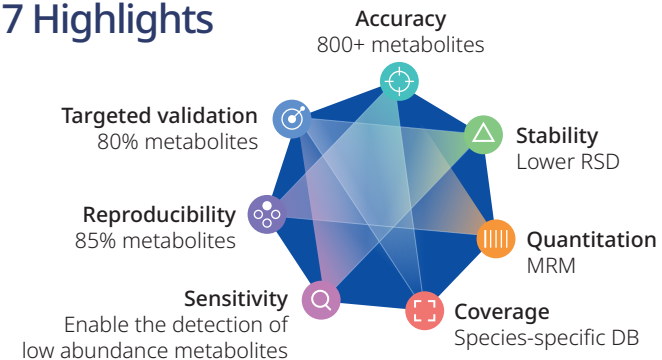
Large Curated Database
Over 3000 metabolites are from in-house purified chemical standards

Rigorous Quality Control
10 QC Indicators

Accurate Identification
AB SCIEX QTOF 6600+

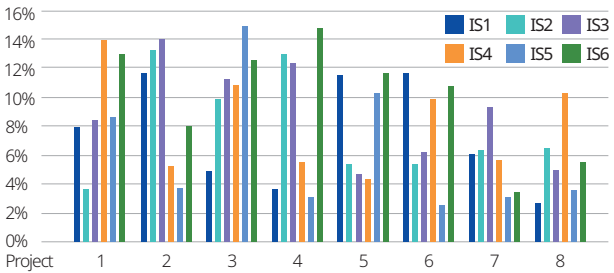
Precise Quantitation
AB SCIEX Triple Quad 6500+

7 Highlights

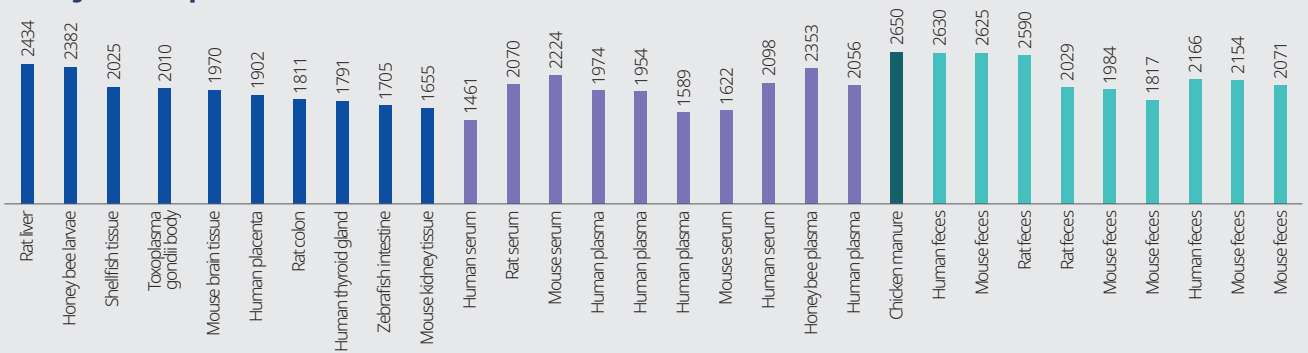


High Stability

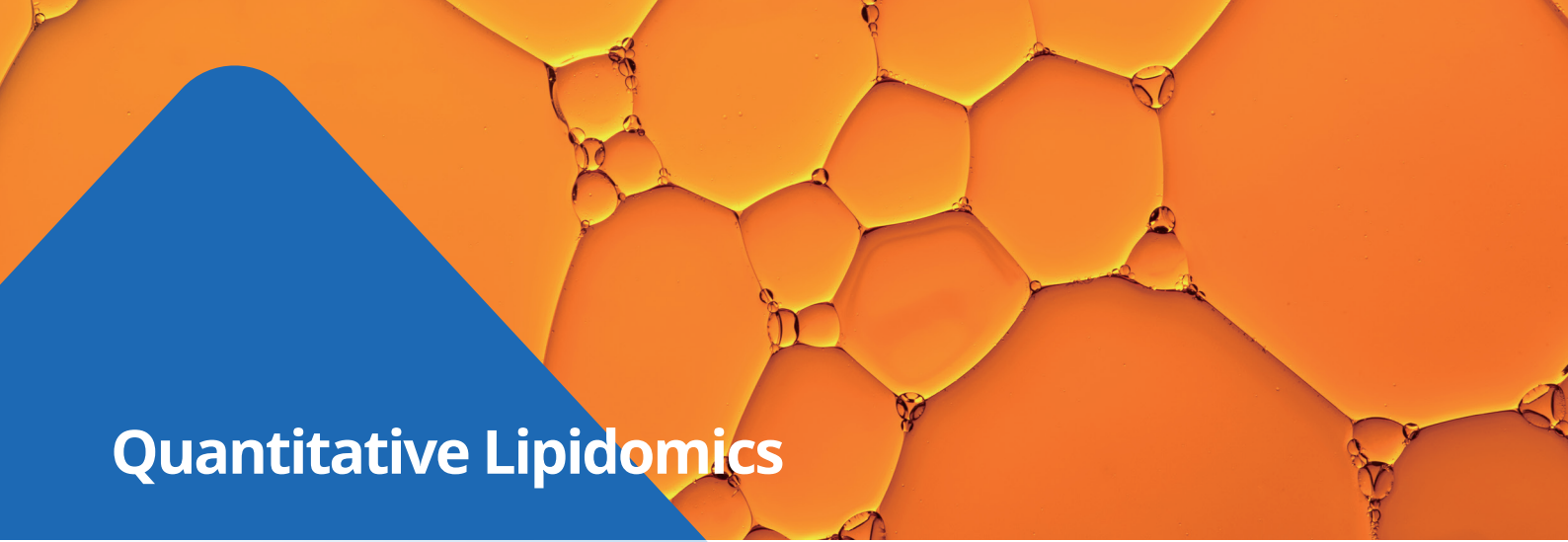
CV of six internal standards over 8 projects.



Project Experience



Number of metabolites detected from various samples, serum and plasma and fecal samples.



Quantitative Lipidomics

Quantitative Lipidomics is a high-throughput targeted approach to enable the simultaneous identification and absolute quantitation of thousands of lipids in a single experiment.

High-Throughput
4000+ lipids

High Accuracy
200+ chemical standard
54 internal standards
absolute quantitation

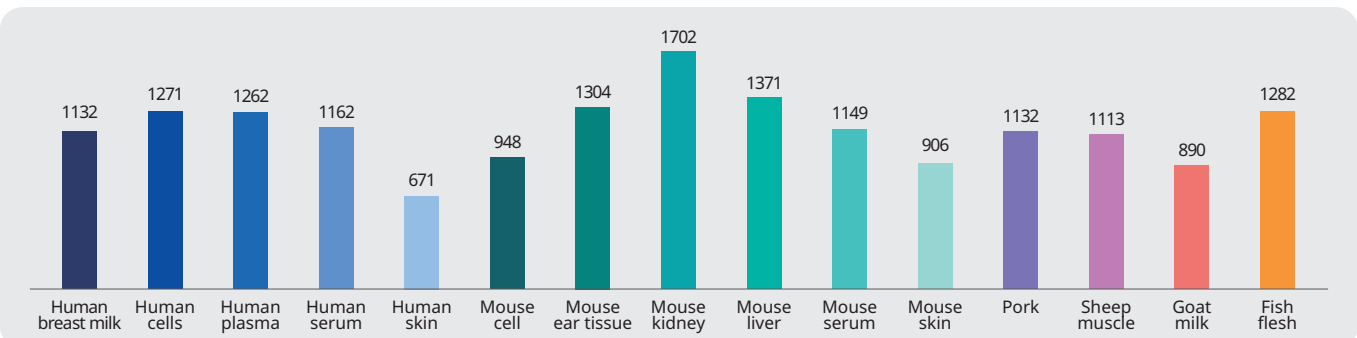
High Sensitivity
pg level

High Reproducibility
data correction

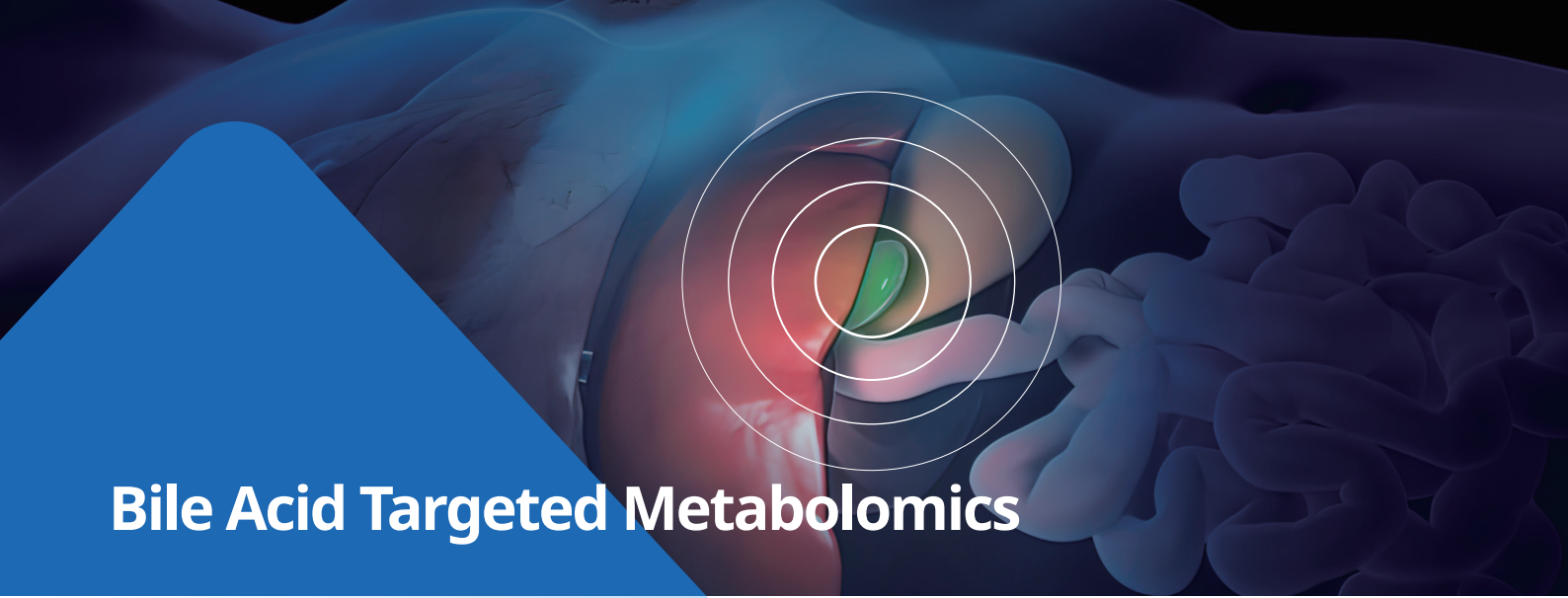
List of Lipids

Number of Lipids		
Class I	**Class II**	**Number**
Fatty Acyls (FA)	CAR, FFA, Eicosanoid, FAHFA	270
Glycerolipids (GL)	DG,DG-O,MG, TG,TG-O,MGDG,DGDG	1015
Glycerophospholipids (GP)	LPC,LPC-O,LPE,LPE-P,LPG,LPS,PC,PC-O,PE,PE-P,PE- O,PG,PS,LPI,PI,LPA,PA,PMeOH,BMP,HMBP,LNAPE	1800
Sphingolipids (SL)	SPH, CerP, HexCer, SM, Cer, Cert	828
Sterol Lipids (ST)	Cho, CE, BA, CASE	122
Prenol Lipids (PR)	CoQ	3
Total	**4000+**	

Project Experience



Number of quantitative lipids detected from various samples.



Bile Acid Targeted Metabolomics

Bile acid products can be divided into free and conjugated bile acids, or primary and secondary bile acids. With our own bile acid database, MetwareBio offers absolute quantitation of **82** bile acids in a single run.

Absolute Quantitation

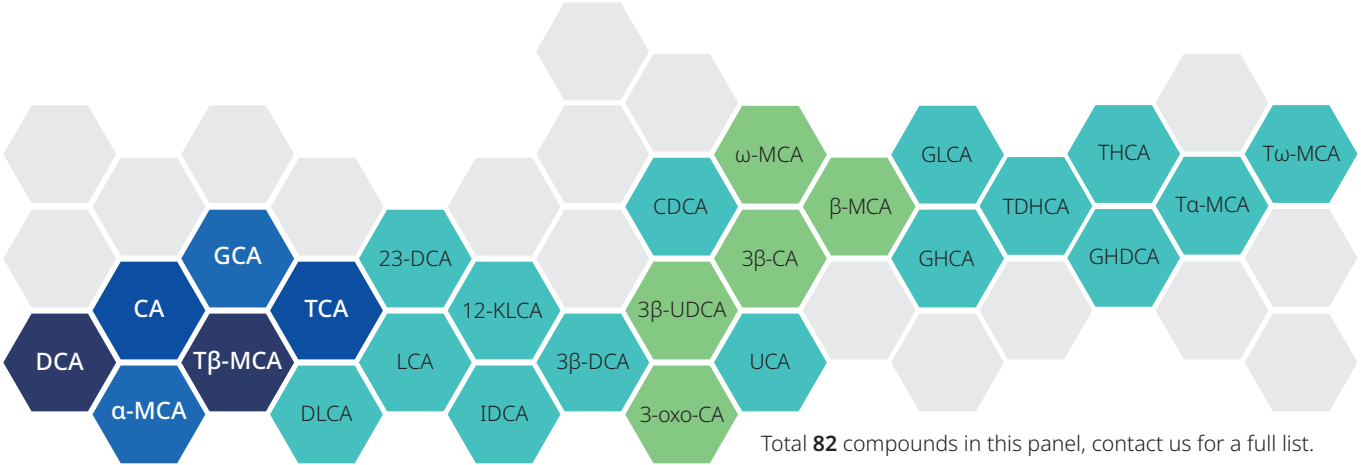
82 standard curves, r > 0.99,
15 isotope internal standards

High Sensitivity

ng/ml level

Wide Coverage

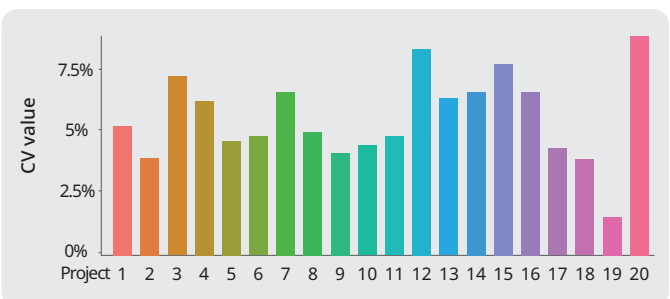
Covering large number of essential bile acids



Total **82** compounds in this panel, contact us for a full list.

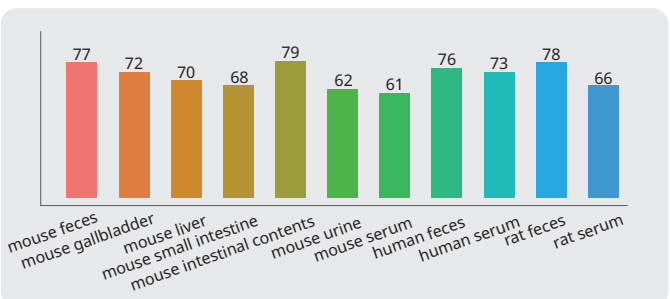
High Stability

Highly stable detection for bile acid analysis. Coefficient of variation (CV) of detected metabolites are less than 8% in mixed QC samples.



Project Experience

A total of 82 metaolites could be detacted from various tissue samples, with an average detection of 71 metabolites.



Acceptable Samples: liquid (plasma, serum, hemolymph, bile), tissue (animal tissue, placenta, thrombus), feces and intestinal contents.

Energy Metabolism

Energy metabolism is the process of generating energy (ATP) from nutrients such as glucose and fatty acids through pathways such as the amino acid pathway, glycolysis pathway, tricarboxylic acid cycle (TCA cycle), and pentose phosphate pathway (PPP). MetwareBio's Energy Metabolism Targeted Metabolomics obtains absolute quantitative results on 80 energy related metabolites from various fluid and tissue samples.

r>0.99

Absolute Quantitation

80 standard curves, r>0.99,
38 isotope internal standards

ng/ml

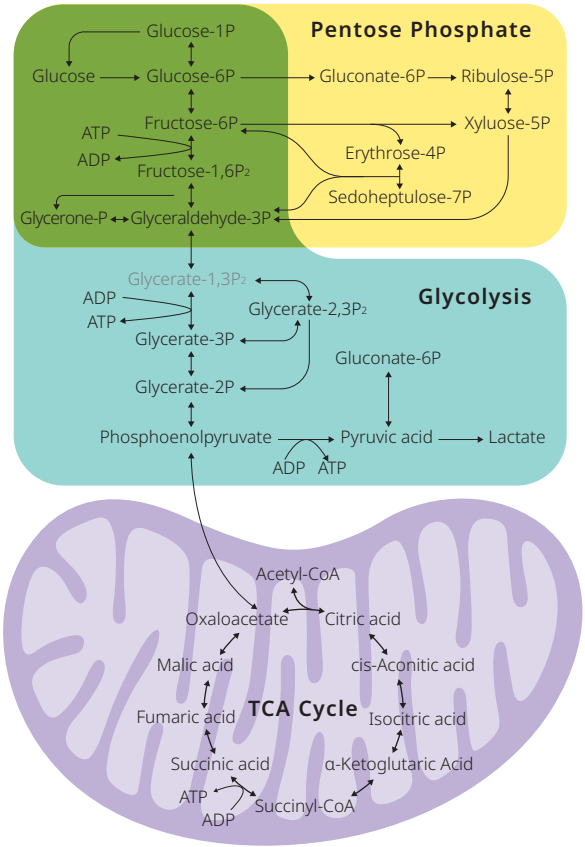
High Sensitivity

ng/ml concentration can be detected

80 compounds

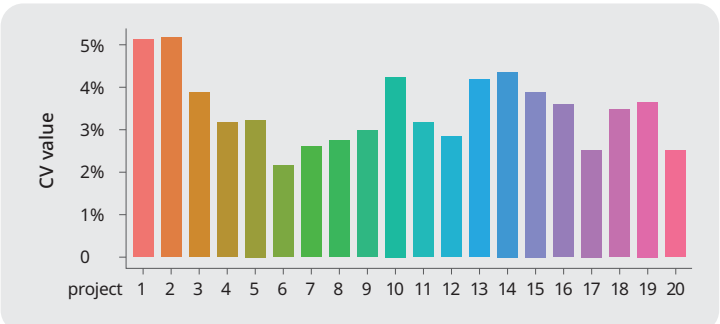
Wide Coverage

the panel covers 80 compounds in the three major pathways



High Stability

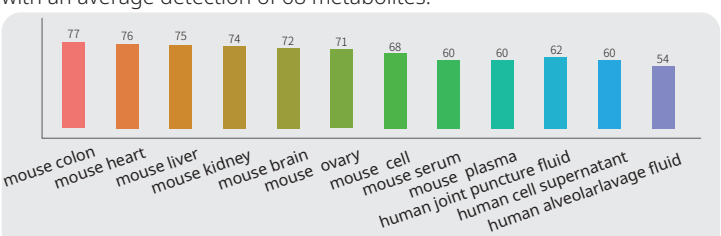
The detected metabolites showed a coefficient of variation (CV) of less than 6% in mixed QC samples.

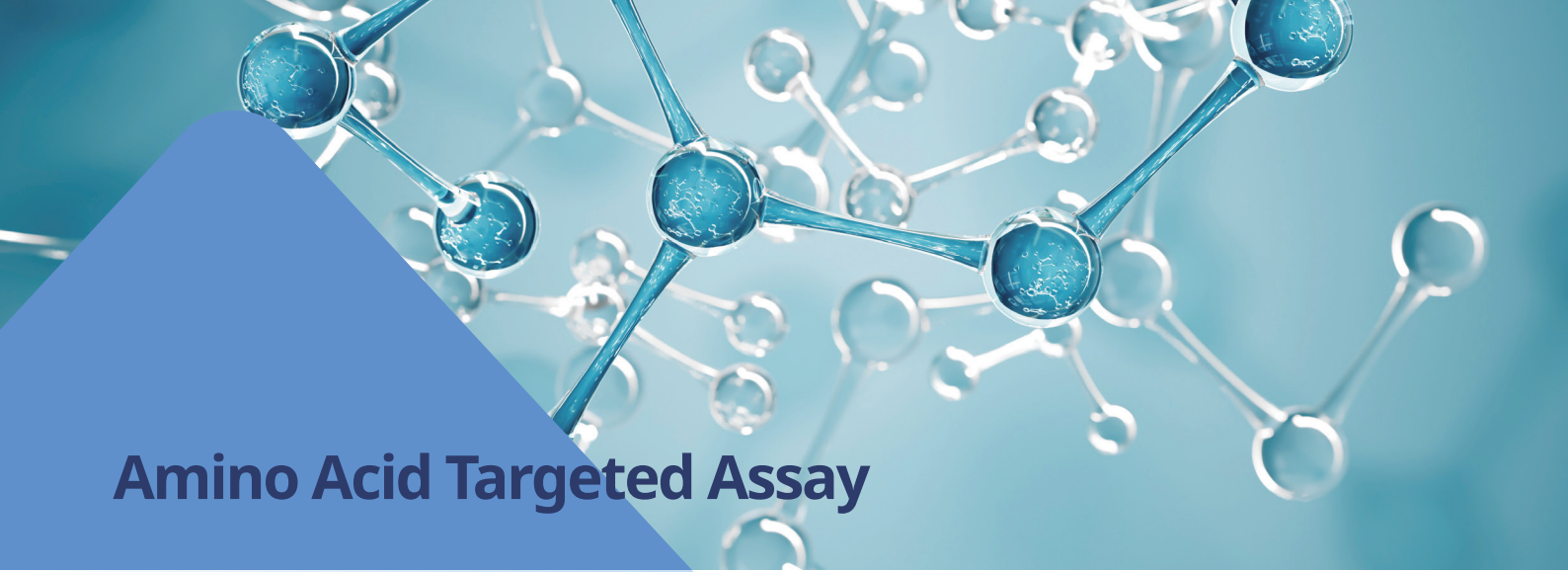


Coefficient of Variation of energy metabolites detected over 20 projects

Project Experience

A total of 80 metabolites could be detected from various tissue samples, with an average detection of 68 metabolites.





Amino Acid Targeted Assay

Delivering absolute quantitation of a wide-coverage of **94 amino acid compounds** (inculding 8 essential amino-acid) from wide varieties of species and tissue types.

r>0.99

Absolute Quantitation

94 standard curves,**r>0.99**, isotope internal standards

ng/ml

High Sensitivity

Detection at **ng/mL** level

94 compounds

Broad Coverage

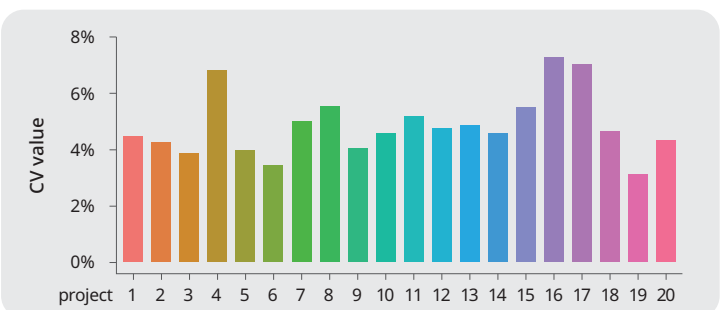
Up to **94** amino acid compounds

94 Amino Acid Compounds

2-Aminoethanesulfonic Acid	L-Proline	N6-Acetyl-L-Lysine	Homo-L-arginine
L-Cystine	L-Serine	Phosphorylethanolamine	L-Tryptophyl-L-glutamic acid
1,3-Dimethyluric Acid	L-Tryptophan	Anserine	Nicotinuric Acid
N-Propionylglycine	L-Phenylalanine	Trans-4-Hydroxy-L-Proline	N-Acetylneuraminic Acid
N-Isovaleroylglycine	Sarcosine	D-Homocysteine	N,N-Dimethylglycine
Succinic Acid	L-Pipecolic Acid	α-Aminoadipic acid	4-Acetamidobutyric Acid
5-Hydroxy-tryptophan	L-Theanine	L-Ornithine	L-Carnosine
3,7-Dimethyluric Acid	Ethanolamine	L-tyrosine methyl ester	3-Chloro-L-Tyrosine
Glycine	3-N-Methyl-L-Histidine	γ-Glutamate-Cysteine	S-(5-Adenosy)-L-Homocysteine
L-Alanine	Homoserine	Nα-Acetyl-L-glutamine	N'-Formylkynurenine
L-Valine	Creatine	N-Acetyl-L-Tyrosine	···
L-Leucine	Kinurenine	γ-Aminobutyric Acid	
L-Methionine	L-Cystathionine	D-Alanyl-D-Alanine	**Contact for a full list.**

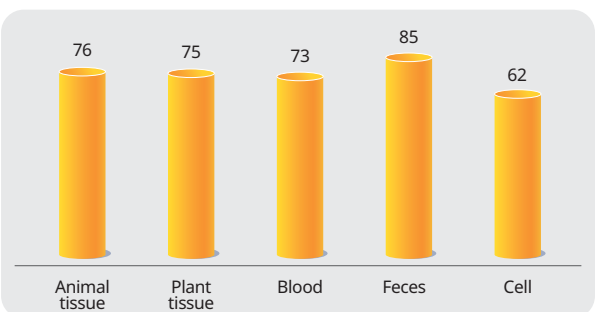
High Stability

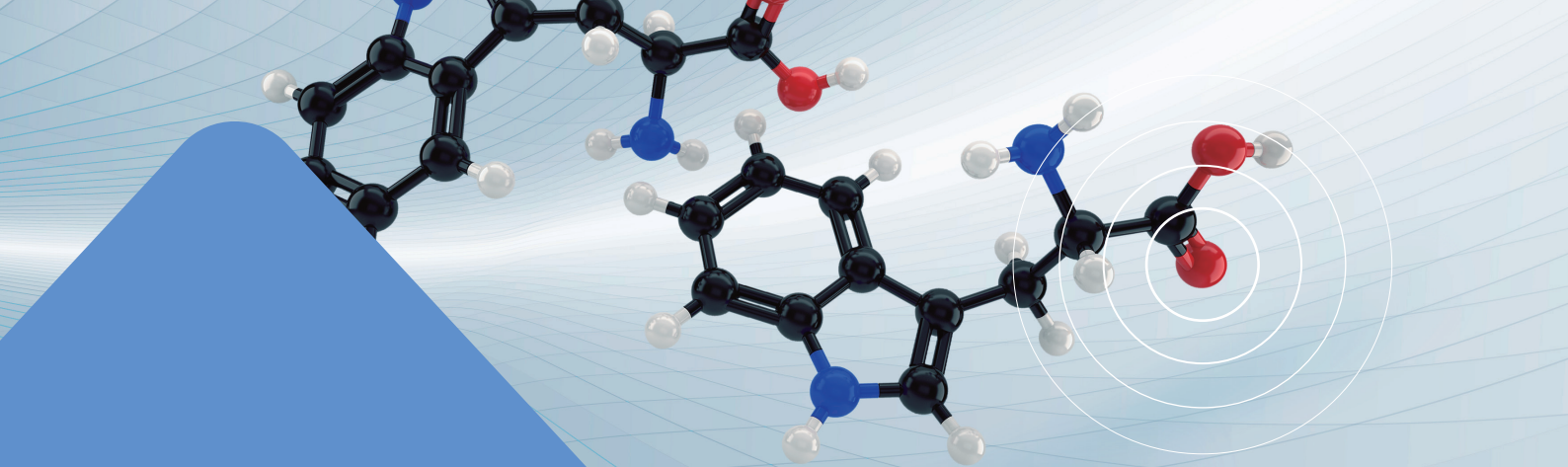
Highly stable detection for amino acid analysis. Coefficient of variation (CV) of detected metabolites are less than 8% in mixed QC samples.



Project Experience

Average detected metabolites in different tissue and sample types.





Tryptophan Targeted Metabolomics

Tryptophan acts as a precursor to serotonin, melatonin, and vitamin B3, and a crucial member of in the kynurenine pathway and AhR Pathway. Metwarebio's tryptophan-targeted metabolomics assay enables simultaneous absolute quantification of 38 metabolites associated with tryptophan.

r>0.99

Absolute Quantitation

38 standard curves, r>0.99, 24 isotope internal standards

ng/ml

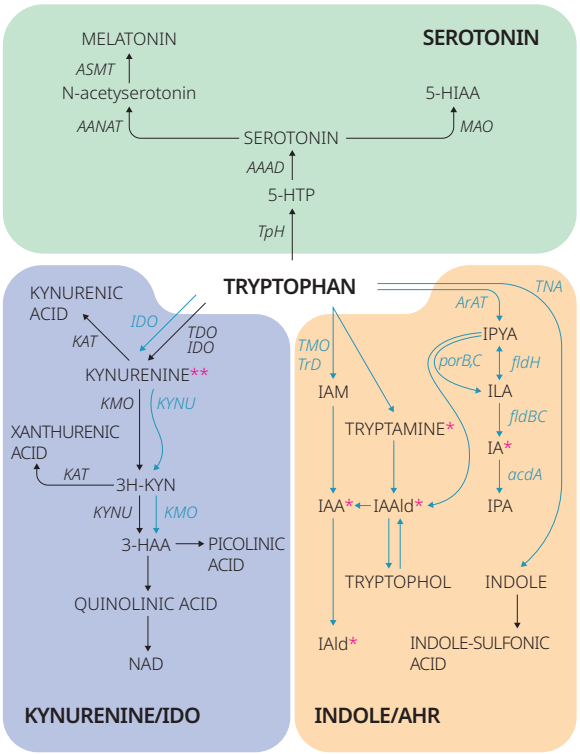
High Sensitivity

ng/ml concentration can be detected

38

Wide Coverage

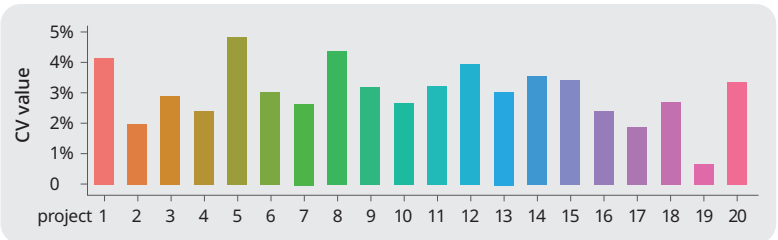
Covering 38 compounds in three pathways



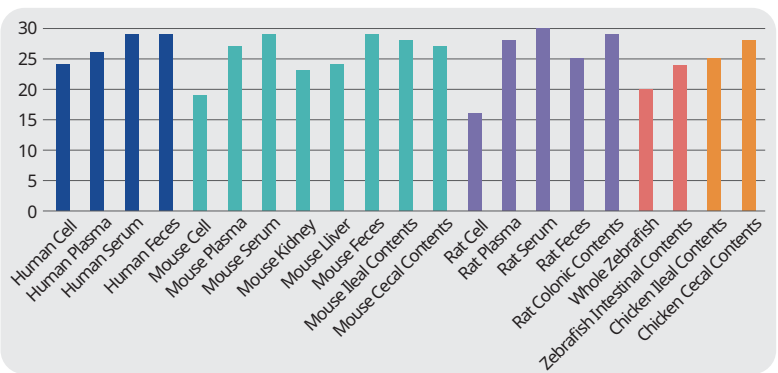
* AhR ligands
** Potential AhR ligand but in supraphysiological concentrations
→ Host pathway
→ Microbial pathway

High Stability

The detected metabolites showed a coefficient of variation (CV) of less than 6% in mixed QC samples.



Project Experience



A total of 31 metabolites could be detected from various samples, with an average detection of 26 metabolites (This data is based on the previous version of the database)

Short-chain Fatty Acids

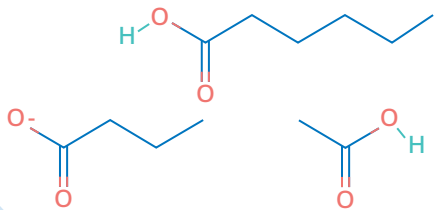
Short-chain fatty acids (SCFAs), also referred to as volatile fatty acids, are organic fatty acids characterized by carbon chains that vary in length from 1 to 6 carbon atoms. They primarily encompass acetic acid, propionic acid, isobutyric acid, butyric acid, isovaleric acid, valeric acid, and hexanoic acid, among others. MetwareBio offers absolute quantitation of **11 molecules** in a single run.

Absolute Quantitation

11 Short-chain Fatty Acids

High Sensitivity

Detection at **ng/mL** level



List of SCFAs

- 2-methylbutyrate
- Acetate
- Butyrate
- Crotonate
- Hexanoate
- Isobutyrate
- Isohexanoate
- Isovalerate
- Octanoate
- Propionate
- Valerate

Functions

- Providing energy
- Protecting the intestinal mucosal barrier
- Regulating the immune system
- Inhibiting tumor growth

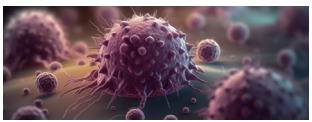
Applications

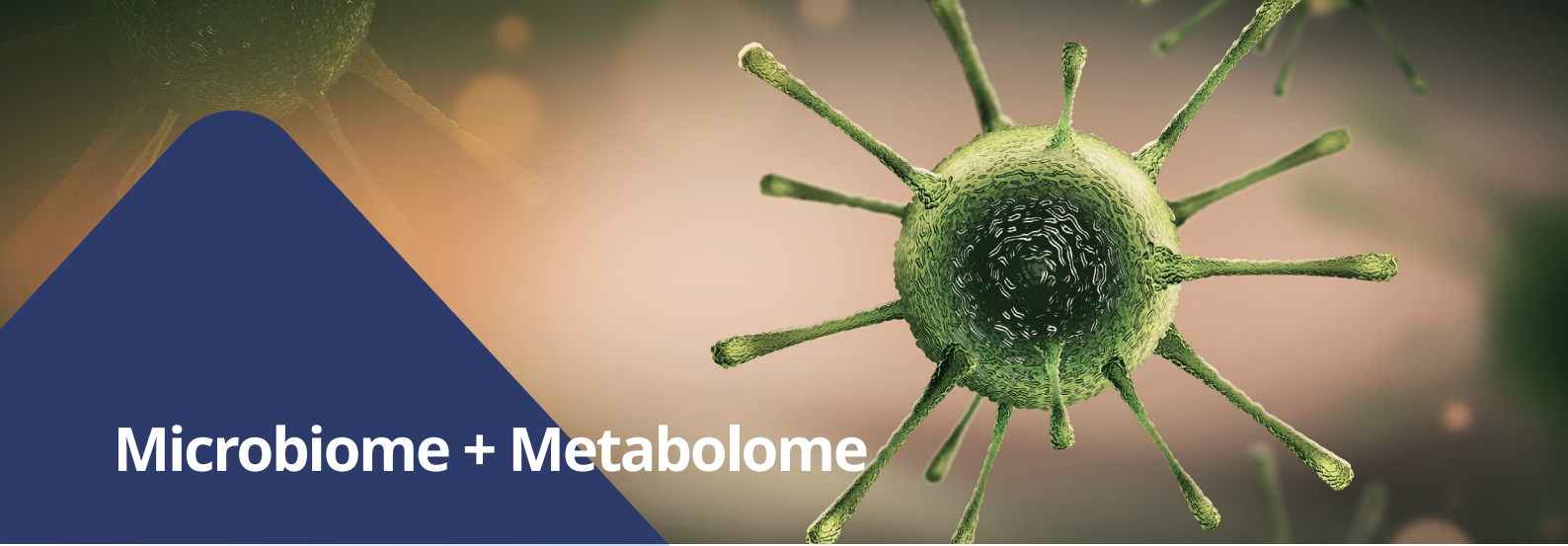
Research on diseases
Inflammatory diseases of the gastrointestinal tract, colon cancer, cardiovascular and kidney diseases, etc.

Mechanisms to the gut microbiota
Mechanisms of SCFAs in metabolic regulation and the brain-gut axis.

Food and nutrition
Research on poultry feed breeding and the development of nutritional products.

Medicines and supplements
Targeting drugs related to gastrointestinal inflammation and the development of dietary supplements.





Microbiome + Metabolome

Microbial metabolomics focuses on the study of all small-molecule metabolites produced by a microbial community, uncovering key metabolites associated with microbial changes during host pathology. The correlation analysis between the microbiome and metabolome provides clues for understanding the mechanisms of microbial-host interactions.

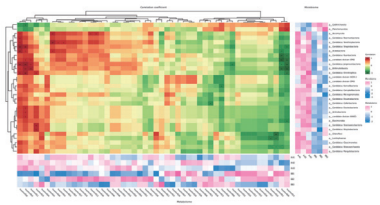
Holistic View of Biological Systems

Comprehensive Reports

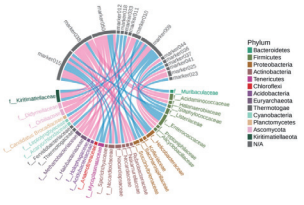
Personalized Analysis

SCFA: propionic acid, butyric acid, caproic acid, etc.	Firmicutes Clostridium	Pathogens inhibition; Cholesterol synthesis; Insulin resistance.
Bile acid: cholate, deoxycholate, ursodeoxycholate, etc.	Lactobacillus, Bifidobacterium, Enterobacter, Bacteroidetes.	Dietary absorption; Triglycerides, cholesterol, glucose, and energy homeostasis.
Cholines: methylamine, trimethylamine oxide, betaine, etc.	Prevotella, Bifidobacterium.	Lipid metabolism and glucose homeostasis. NAFLD, diet-induced obesity, and cardiovascular disease.
Indole derivatives: N-acetyl tryptophan, indole acetyl glycine (IAG), melatonin, etc.	Clostridium sporogenes, Escherichia coli.	Gastrointestinal tract protection; Gastrointestinal pathology and neurological disorders.
Vitamins: vitamin K, vitamin B12, thiamine, etc.	Bifidobacteria.	Supplementary source of endogenous vitamins; Immune function; Cell proliferation regulation.
Polyamines: putrescine, spermidine, spermine, etc.	Campylobacter jejuni, Clostridium glycolytica.	Produce genotoxic effects, anti-inflammatory and anti -tumor effects on the host.
Lipids: fatty acids, GP, sphingomyelin, etc.	Bifidobacterium, Roseburia, Lactobacillus, Klebsiella.	Gut-brain-liver axis to regulate glucose homeostasis; Chronic systemic inflammation.

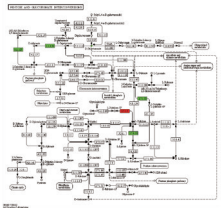
Joint Analysis



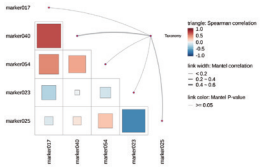
Correlation Clustering Heatmap



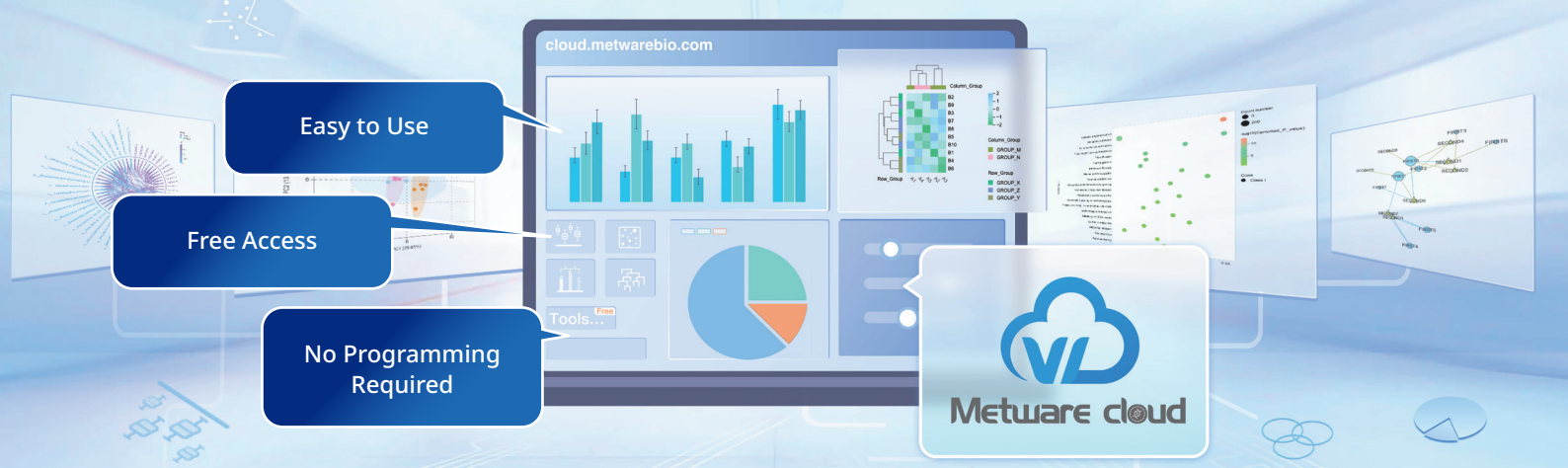
Correlation Chord Diagram



KEGG Map



Mantel Test Analysis



Analyze Metabolomics Data With Ease

Cloud Tools

- Data Processing
- Difference Analysis
- Functional Enrichment Analysis

50+
Cloud tools

- Multi-omics Association Analysis
- Gene Sequence Analysis
- File Format Conversion

Cloud Process

Customize analysis parameters.

Get started for FREE!

https://cloud.metwarebio.com/

Sample Requirements

Sample Type	Sample	Recommended Sample	Minimum Sample size
Liquid	Plasma, Serum, Hemolymph, Whole Blood, Milk, Cerebrospinal Fluid (CSF), Interstitial Fluid (TIF), Pancreatic Juice, Bile, Pleural Effusion, Follicular Fluid, Culture Medium (liquid), Culture Supernatant, Tears, Bone Marrow (liquid)	100μL	20 μl (Steroid Hormones, SCFAs 50 μl)
	Seminal Plasma, Amniotic Fluid, Respiratory Condensate, Gastric Lavage Fluid, Bronchoalveolar Lavage Fluid (BALF), Urine, Sweat, Saliva, Sputum	500 μl	100 μl
Tissue	Small Animal Tissues, Placenta, Blood Clot, Mycelium, Nematode, Zebrafish (whole fish), Bone Marrow (solid), Nail	100 mg	20 mg
	Large Animal Tissues, Whole Insect Body, Wings (of insects), Pupa, Eggs, Large Fungi (mushroom types), Large Algae (red algae), Cartilage, Bone (solid)	500 mg	20 mg (SCFAs 50 mg)
	Zebrafish Organs, Insect Organs, Whole Microinsect Body (e.g., Drosophila)	20 units	10 units
Solid	Feces, Intestinal Contents, Microbial Fermentation Product (solid), Culture Medium (solid), Earwax, Lyophilized Tissue Powder, Lyophilized Plant Powder	200 mg	20 mg
Cell	Adherent Cells, Animal Cell Lines	1*10^7	1*10^6
	E. Coli, Yeast Cells	1*10^10	5*10^8
	Unicellular Algae (Cyanobacteria), Large Quantities of Bacterial Hyphae (sediment), Mucilaginous Protoplasmic Clusters (hyphae)	100 mg	20 mg
Organelle	Lysosomes, Mitochondria, Endoplasmic Reticulum	4×10^7 cells	1×10^7 cells
	Exosomes, Extracellular Vesicles	2×10^9 particles	1×10^9 particles

Biological duplicates: A minimum of 3 replicates is required; 3-6 replicates for animal samples; 6-10 for clinical samples.

Innovative Multi-Omics Insights for Better Health

Metware Biotechnology Inc. (MetwareBio) is focused on developing and applying innovative multi-omics technologies to life science and health research. By leveraging state-of-the-art mass spectrometry technologies, unique detection workflow, and large curated in-house database, MetwareBio offers one-stop multi-omics solutions to academic research, clinical studies, and biotech/pharmaceutical developments.

MetwareBio's technical achievements have been presented and published in over 700 publications, including Cell, Nature Genetics, PNAS, Nature Communications, National Science Review, and many other international peer-reviewed journals. Working with MetwareBio means you have all the metabolomics expertise supporting your research and development.

10
Data QC Indicators

3000+
Verified Biomedical Metabolites Database

35,000+
Purified Plant Metabolites Database

METWARE BIO

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